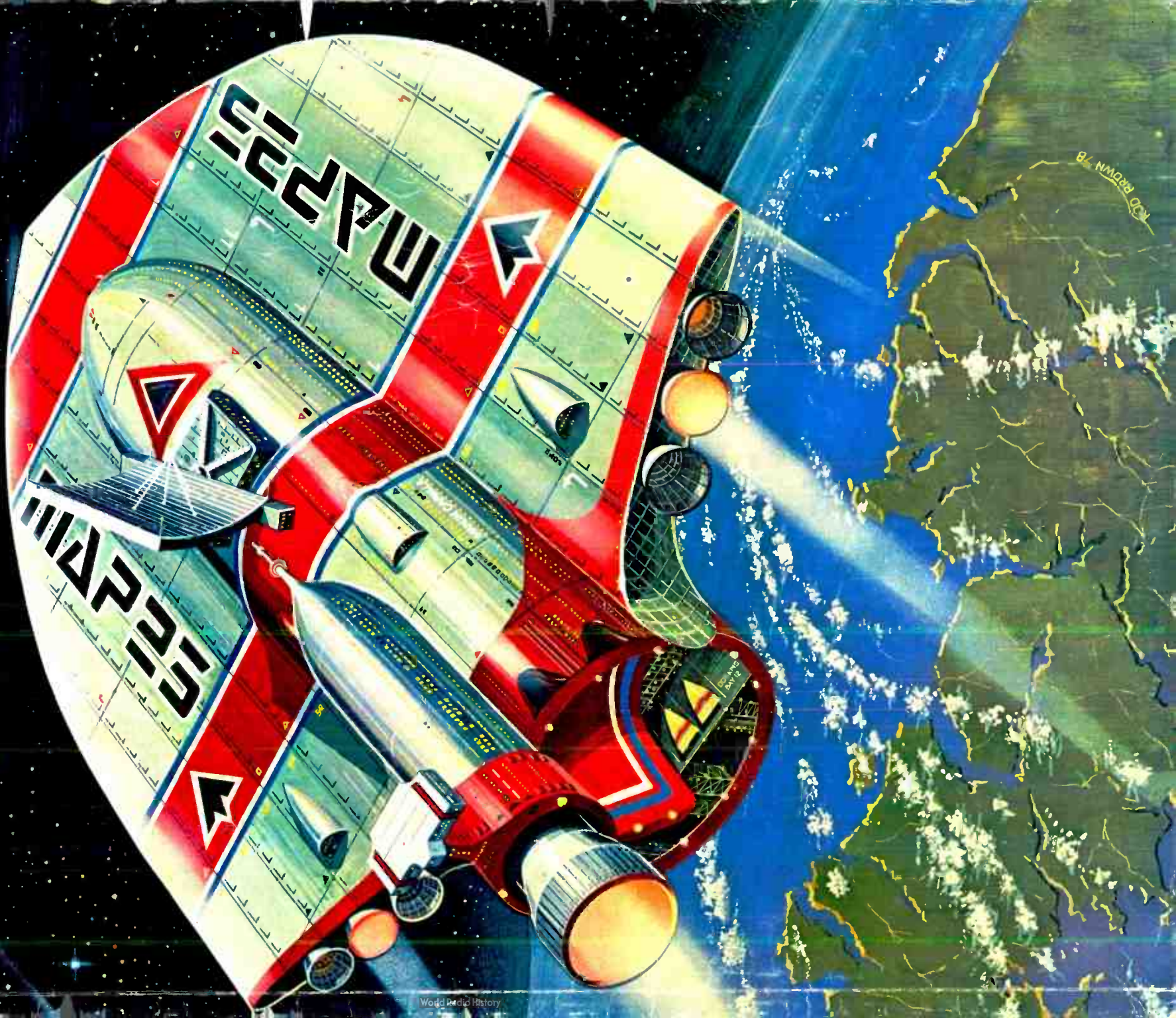
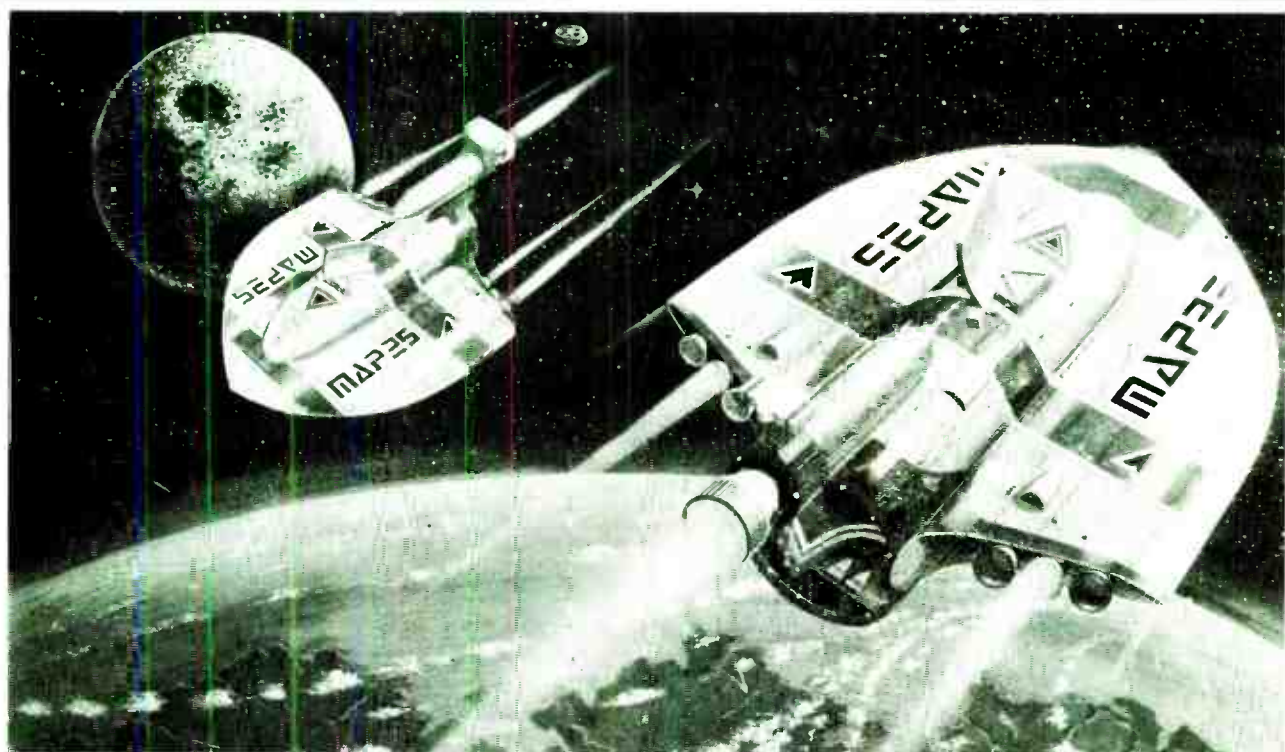


# UTRPLIN









The picture on the front cover was captured by famous artist Rod Brown as the Maplin Capella on her way to the deep space colonies when she was passed by the Maplin Sirius seconds after she dropped out of hyper-space. The Sirius is about to dock at Space Station North 1, after a journey of several hundred light years touring the colonies in our local arm of the galaxy. She was last in Earth orbit over two years ago.

These giant Star Class freighters are nearly half a mile long (750 metres), about 600 metres wide and 300 metres high at the highest point. They can carry over 1½ million tons yet need a crew of only 20. The Capella will be away for nearly four years visiting some of the newest and remotest human colonies in the galaxy. The Capella is packed with the electronic components that are the lifeblood of existence on inhospitable planets scattered through the galaxy. She will return, packed as the Sirius is now, with the exports of these planets — metals and oil.

The Maplin freighter fleet is just one of the many fleets of trade ships that hold the outposts of mankind together, bringing free trade across the vast empty reaches of space in the great tradition that goes back to the dawn of history.

**Maplin: the way to the future.**

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MAPLIN ELECTRONIC SUPPLIES LTD.  
P.O. Box 3, Rayleigh, Essex, SS6 8LR.  
Telephone: Southend-on-Sea (0702) 554155 Telex: 995695

Office hours: 9 a.m. to 12.30 p.m. and 1 p.m. to 4.30 p.m. Monday to Friday.  
Sales desk open 9 a.m. to 5.30 p.m. Monday to Friday

For personal service visit our shop at  
284 London Road, Westcliff-on-Sea, Essex.  
Telephone: Southend-on-Sea (0702) 554000  
Opening hours: 9 a.m. to 5.30 p.m. Tuesday to Saturday

Shop closed all day Monday

All mail to P.O. Box 3, Rayleigh, Essex.

# THE MAPLIN TEAM



Working together to bring you the finest service ever.



**Telephone Sales**  
Sandra, Kathy, Peggy, June

**Technical Dept.**  
Peter, John, David, Bob, Laurie, Roy

**Clerical**  
Frances, Patricia, Maureen, Philippa, Lyn,  
Hazel, Monica, Linda M. S.

**Purchasing and Stores**  
Lewis, Patrick, Joyce, Don, Howard, Valerie, Jack

**Invoicing**  
Morag, Jean, Heather, Jo, Linda S.

**Packing**  
Eileen H., Janet, Steve, Eileen S., Christine, Rose, June

**Canteen**  
Ivy

**Shop**  
Dave, Nigel, Graham, Bernie

**Order Processing**  
Joan, Linda W., Mary, Janice, Vivien, Margaret, Brenda, Ian





## MAPLIN PROMISE

Top quality components.

Same day service (on all in-stock items).

Every item in this catalogue always either in stock or already on order from our supplier. (Price list gives details of any items discontinued by manufacturers).

A reply paid envelope so that ordering costs you nothing if orders are valued over £2\* each.

If we should make an error we *will* correct it immediately.

All goods sent by first class post (if total weight of package less than 750 grammes).

All quoted prices include VAT and postage and packing (if order under £2\*, there is a 20p\* handling charge.)

Money-saving vouchers with every order over £2\* (except where stated on price list).

Prices guaranteed correct (errors excepted) for period stated on our price lists.

\*Correct at time of writing, price list gives latest details.

Our trained staff are waiting to receive your order. We all promise you that we will give your order the utmost care and attention to ensure your absolute satisfaction.

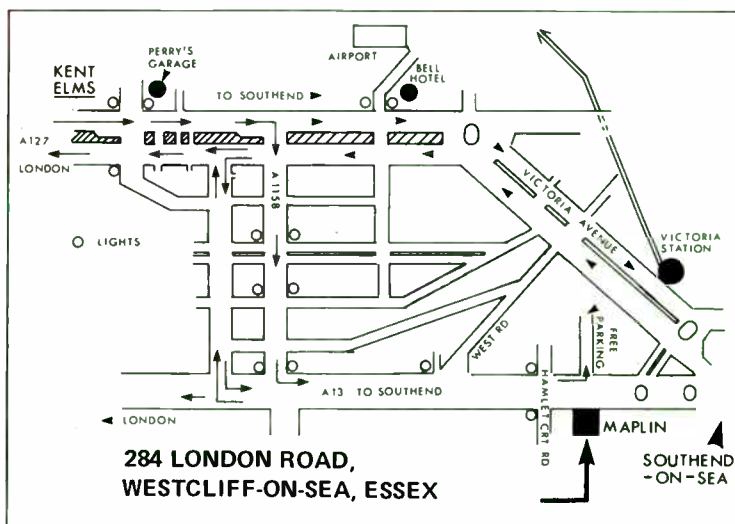
The post arrives in our office at 9 a.m. Here the letters are sorted for the different departments, all orders are recorded and allocated an order number in sequence. This is the number that will appear on your packing slip (and credit note where applicable.) From then on we are able at any time to locate the whereabouts of the order by reference to this number.

The day's orders then start to come through to the warehouse. In one year each person working in this department will collect over 3 million individual items and in doing so will walk over 2000 miles.

Your order is collected from small bins which are constantly replenished from the main stock.

When the order is collected it is passed to the invoicing clerks who price the order and check that the money you have sent in is correct.

Finally the order passes to the packing department where it is made up into a postal packet or parcel. By 9.30 a.m. the first orders will be in the outgoing mail-sacks.



Catalogue design: Peter Blackmore  
 Colour photography: Ian James Photography  
 Typesetting: Royston Repro Ltd.  
 Processing: Planagraphic Studios Ltd.  
 Modern Text Typesetting

Produced by Ken Pharaoh Ltd.  
 Printed in U.K.

Published by Maplin Electronic Supplies Ltd. © 1979

## HOW TO ORDER

USE OUR ORDER FORM whenever possible. If you use additional sheets write your name and address on every sheet. Keep an accurate copy of your order so that you can check that we have sent you exactly what you ordered.

## PLEASE USE THE ORDER CODE

Using our order codes helps us to deal with your order quickly and efficiently. Each item has its own code number which (except for resistors) is a five character code in the format: two letters, two numbers then one letter. This code is always shown after the words: "Order As". No further description is necessary, but if you wish, to assist you identify the codes, you can also write a brief description of the item, and to help you we have put this description in brackets after the five character code. When ordering resistors please turn to page 70 for details.

## PAYMENT

Payment may be made by cheque or Postal Order. These should be made payable to "Maplin Electronic Supplies Ltd." In your own interest cross all cheques or Postal Orders sent in the post with two straight lines across the centre. Do not send cash unless the envelope is registered at the Post Office. If you send cash in an ordinary envelope the Post Office may compulsorily register it and we regret that we cannot accept such letters. **REMEMBER TO ENCLOSE WITH YOUR ORDER THE NUMBERED CREDIT NOTE IF YOU ARE CLAIMING CREDIT AND THE BUNDLES OF DISCOUNT VOUCHERS IF YOU ARE CLAIMING YOUR £1 FREE.**

## POSTAGE AND PACKING

Our prices are inclusive of postage and packing charges except where the total value of the order is less than £2\*, when we require an additional 20p\* to cover our handling costs.

\*Rates applicable at time of writing. See current price list for latest rate.

## BUSINESS REPLY ENVELOPES

Our prepaid envelopes are provided for your convenience when ordering.

## VAT

All our prices include VAT (the amount of VAT actually included is shown to the nearest penny within the heavy rules on our price list for the benefit of overseas customers).

## DISCOUNTS

### Collect our Discount Vouchers and Save Money

Every time you spend over £2\* you will receive some Maplin Discount Vouchers with your order. We will give you one voucher for each full pound spent if you spend between £2 and £5.99½ in one order. If you spend £6 or more in one order, we will give you two vouchers for each full pound spent.

When you have collected 25 voucher units send them to us with an order and we will give you £1 of goods FREE.

Vouchers are not allowed against credit notes, only against the cash (P.O. or cheque) sent with the order.

The orange voucher is worth 1 unit.  
The green voucher is worth 5 units.  
The blue voucher is worth 25 units.

You may use any combination of vouchers to make up groups of 25 units. The vouchers do not have a pro rata exchange rate, they are only redeemable in groups of 25. The vouchers are for exchange for goods only. They do not have a cash value.

## CREDIT

When we are out of stock of an item that you have ordered, we will issue a numbered credit note. If you do not want to buy anything further from us, simply put the credit note with your name and address and your request for a refund in the reply paid envelope and we will send you a cheque refund by return of post. We regret that we cannot refund by Postal Order and we can only refund cash if you provide a Post Office registered envelope prepaid with the correct stamp. If you do not have a bank account, you can pay cheques made out to you into P.O. savings accounts or anyone who has a bank account will be able to cash the cheque for you.

## DESPATCH

We despatch all orders having a total weight of less than 750 grammes by first class letter post (except leaflets and catalogues which are despatched second class). Orders having a total weight over 750 grammes are despatched by parcel post, except as follows. Calscopes are despatched by Securicor. Items marked "Delivery by Carrier" are despatched by Roadline and the following items are also despatched by Roadline: XB77J (Disco Cabinet); XB79L (4600 Cabinet); XQ02C (5600S Cabinet); XQ04E (3800 Cabinet); XQ06G (Piano Cabinet Black); XY11M (Piano Cabinet Teak). If your order includes an item which we despatch by Roadline, we may include all or part of the rest of the order in that shipment. However, you may mark your order in large writing "Despatch all items other than carrier items by post", and we will follow your instructions.

## CREDIT CARDS



We are pleased to accept order with payment by any of the following credit cards: Access, Barclaycard, Eurocard, Mastercharge and Visa. NEVER send your credit card to us. Simply write your full credit card number on your order and send no money. Please note that we have to check every order with the credit card company and we regret that Barclaycard and Visa have advised us that they may not be able to give clearance on your order until the day after we give them the details. However, on most occasions and almost always on Access, Eurocard and Mastercharge we shall be able to give our usual same day service. The address for goods to be despatched to, must be the same as the address known to the credit card company.

## TELEPHONING MAPLIN

Our switchboard is open from 9 a.m. to 5.30 p.m. Mondays to Fridays. During those periods dial (0702) 554155 and when you get through ask for the department you require as follows:

Sales	For credit card sales, prices, and stock levels, mail order only.
Back-orders	For enquiries about orders held on back-order; mail order only.
Enquiries	For enquiries about orders not received or incorrectly received or any other enquiry not covered by the other categories, mail order only.
Technical sales	For enquiries about the suitability of our components or additional data on our components
Shop	For any enquiry if you have dealt with or intend to deal with our shop. You may also dial the shop direct (you will have to between 4.30 pm and 5.30 pm) and the number is (0702) 554000.

Please do not explain your problem to the switchboard operator, but ask at once for the department you require.



**TELEPHONE ORDERS**

If you intend to pay for your order by credit card, you may telephone your order to us. We shall require your credit card number, the cardholders address (and goods will only be sent to this address) and full name. Subject to the delays which may be created by Barclaycard and Visa indicated above, we shall normally be able to despatch on the same day all orders received by telephone before 2 pm.

When you telephone please be as brief as possible. When the switchboard operator answers please ask for sales and you will be connected to our sales desk. Please give your order in the following manner: state the quantity you require and the five digit code only.

**TERMS OF BUSINESS**

Every order placed is subject to the following terms and conditions.

**Method of payment**

Payment is by cash with order only. Cheques, Post Office Giro Cheques, Postal Orders and Money Orders should be crossed and made payable to "Maplin Electronic Supplies Ltd." Do not send bank-notes in the reply paid envelope.

**Carriage and Packing**

FREE in U.K., except for very small orders where a handling charge is made.

**Guarantee**

Maplin Electronic Supplies Ltd. guarantees that all goods described in this catalogue are brand new and meet the manufacturer's published specifications. Goods returned to us as faulty will normally be replaced at the discretion of Maplin Electronic Supplies Ltd. provided that the goods have not been misused or damaged in any way. Maplin Electronic Supplies Ltd. shall not be liable in respect of defects in goods supplied for any injury, loss or damage resulting from such defects. At our discretion goods returned to us as faulty (especially integrated circuits) may be referred to the manufacturer for their decision. Integrated circuits are not guaranteed if they have been soldered (excluding quad-in-line types and types where we recommend direct soldering). If you wish to take advantage of the guarantee you must use sockets.

**Returns**

Except for faulty goods or goods sent in error, no goods may be returned without our prior consent in writing.

**Despatch**

Orders will normally be dealt with on the day of receipt. Any item out of stock will be considered cancelled and a credit note issued to the full value. Credit notes are redeemable on demand and repayments will be by cheque.

**Specifications and Illustrations**

Specifications and illustrations in this catalogue are given in good faith, but they should be regarded as for guidance only as goods are subject to alteration without notice in order to maintain delivery or price levels.

**Prices**

The price charged will be that ruling on the day of despatch.

**VISIT US AT OUR SHOP**

We would be very pleased to see you at our shop in Westcliff. Bring the whole family — we are less than half a mile from Southend where there are beaches, amusements and an excellent shopping centre. If you come by car we are on the A13 and if you come by train we are in walking distance of Westcliff or Southend Victoria stations. Most of our projects are on continuous demonstration in our shop. If there is something you particularly want to see please telephone first to ensure that it will be there.

If you bring lists of components you require into our shop, it will help us to serve you more quickly if you group similar components together and put them in value order. We look forward to seeing you.

**OVER A THOUSAND NEW ITEMS**

This catalogue which will be current until November 1980 contains well over a thousand new lines, not shown in our 1977/78 (Concorde cover) catalogue. As a guide wherever possible we have indicated new items, but it has not been possible to mark every new item, particularly additions to ranges and new semiconductors.

**TECHNICAL ENQUIRIES AND FAULT FINDING**

We very much regret that we cannot answer technical enquiries by telephone, so please write to us if you have any problems with our projects or components. Address your letter Technical Dept., Maplin Electronic Supplies Ltd., P.O. Box 3, Rayleigh, Essex. We will do our utmost to answer your enquiry within 3 working days of our receiving it. We cannot answer queries which do not relate to items in our catalogue or projects which are specifically mentioned in our catalogue or newsletters. Priority will be given to those enquiries accompanied by an s.a.e.

Before you write try to narrow down the fault; it is difficult to help you if you just say it doesn't work, since in most cases the fault could be almost anything. Most designs follow a logical sequence, so if possible check to see if any parts of the circuit are operating correctly, and make a note of every test you make. You will undoubtedly require a multimeter and in audio circuits a crystal earpiece can be useful as the tip only need be connected to enable you to hear what is happening throughout the circuit and the extremely high impedance of this monitor will not cause the existing conditions to change. Always check the power supply voltages and voltage rails in the circuit, and check that all points that should be at earth potential are correct, especially when you have several seemingly unconnected faults. Hums and buzzes are almost always caused by incorrect earthing, poor layout or interconnecting wires that are too long.

Poor soldering is one of the most common causes of faults. Keep the soldering-iron tip clean and free from build-ups of flux by wiping it on a damp rag or sponge, but ensure that it is always tinned (covered with a layer of molten solder — with a new iron tin the bit by wiping the molten solder over it with a piece of card or rag). It is most important that both sides of a joint are heated together by the iron. If one side is cold the flux from the solder will flow round it and insulate it from the other side; exactly the opposite to what is wanted.

**REPAIRS AND GET-YOU-WORKING SERVICE**

We will undertake to repair or get working any of our projects providing that they are built on our ready-etched printed circuit boards, and use a majority of components that we have supplied. Return the faulty board or boards carriage paid and packed extremely carefully. Please do not return the whole project, just the faulty board or boards. Enclose a cheque or P.O. for approx. 10% (minimum £6) of the cost of the components being returned. If the boards arrive damaged by the Post Office, they will be returned to you with your money after deducting the return postage. Under no circumstances will we be liable for damage to goods sent to us. In addition we will not attempt a repair if the quality of construction is so poor that the only answer is a complete re-build. Again the package will be returned to you with your money after deducting the return postage.

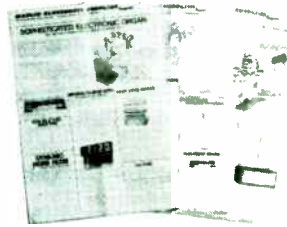
If the fault is due to faulty components, or incorrect instructions or any error on our part which could have led to the fault, we will repair the board and return it to you carriage paid with a refund of your fee and your postage to us.

If the fault is due to an error or errors you have made we will charge you for our time at a reasonable rate (approx. £6 per hour or part of an hour) and for the cost of any parts replaced. If this is less than the amount you sent, we will refund the difference after deducting the cost of postage to you. If the cost including return postage is more than the amount you sent, we will ask you to pay the difference before the goods are returned.

We will make the repair as fast as we possibly can, but please allow three weeks. We will acknowledge receipt of your parcel by return of post (second-class).

Ready-made goods which are faulty should be returned to us immediately and providing we have stocks we will either repair or replace it as quickly as possible (usually same day). This does not apply to oscilloscopes where we will arrange for collection from your door.

## NEWSLETTER/PRICE LIST



Approximately every two months we issue a newsletter which contains our price list.

The price list shows our guaranteed (maximum) price (errors excluded) for each item in our catalogue for the period shown on the price list. Even when the price to us is increased we guarantee to hold our price for the duration of that price list. The newsletter contains details of new projects, new lines, and keeps you up to date with everything that's happening at Maplin.

If you would like to receive our newsletter as soon as each issue is published, just send 30p and we will send you the next six issues. As a subscriber you will be entitled to use the special voucher you will receive with each issue to buy any of our special offers that appear in the newsletter. These offers really can save you pounds over our normal list price and you can only take advantage of them if you are a subscriber. With each issue you will receive a 5p voucher which you can use towards the cost of an order to repay your 30p subscription fee. In most cases subscribers (in the U.K.) will receive their copy of the newsletter/price list before the new prices are implemented, so if you order quickly you can take advantage of the old price, providing we have stocks available.

For overseas customers the mailing list subscription fees are as follow:

Europe:	60p for six issues
Anywhere else by surface mail:	60p for six issues
by airmail:	£1.20 for six issues.

## HOW TO ORDER IF YOU LIVE OUTSIDE THE U.K.

Always use our Order Form whenever possible. To specify any item simply write the five character code shown in this catalogue and on the price list. If you wish you may also write a description of the item to help you identify the items on the order form, and a brief description is given in brackets close to the five character code. For resistors the codes are slightly different as shown on page 70. The code always follows the words Order As.

Orders will be despatched by the cheapest method, but we will despatch by airmail if you write 'AIRMAIL' across your order in large letters and only if you send sufficient money to cover the cost.

The most convenient method of payment is for you to calculate the total cost including an allowance for postage in pounds (usually 10% to 20% of the cost of the order), then go to a local bank and buy a bank draft written in pounds sterling and drawn on a British bank. You pay in your currency and we receive the money in pounds. All other methods are subject to delays, but with this system we can usually despatch your order the day we receive it.

If your bank cannot arrange a bank draft for you, please write to us for details of other methods of payment. We prefer the internationally recognised system known as the "irrevocable letter of credit" which can be arranged through a local bank. The letter of credit must be open for 6 months, or we cannot accept it. Using this system, we do not receive payment until the goods are delivered, but because of the documentation costs we cannot accept this system on orders worth less than £100.

If you get a chance to visit England this year we would be very pleased to see you at our shop in Westcliff. If you land at Dover, take the train to London Victoria, then go by Underground to Tower Hill. Walk round to Fenchurch Street station and take a Southend or Shoebury (not Tilbury) train alighting at Westcliff. Ask at the station for directions to London Road and when you reach the traffic lights in Hamlet Court Road, turn right and our shop is about 200 metres along on the right (284).

If your order is to be sent to an address in the Channel Islands, Isle of Man or Irish Republic, you do not have to pay British VAT and there are no additional postage charges. Goods sent to addresses elsewhere outside the UK are not subject to British VAT, but postage will be charged extra at cost.

## HOW TO ORDER FROM BFPO ADDRESSES

If your BFPO address is in Northern Ireland you must use the ordinary inland prices, but if your BFPO address is elsewhere in the world, you do not have to pay VAT and there are no additional postage charges. However if any item is too large or heavy for despatch by BFPO you must supply a civilian address and pay extra for carriage at cost.

## COMMENT PASSER VOTRE COMMANDE SI VOUS RESEDEZ HORS DU ROYAUME-UNI

Si vous ne résidez pas au Royaume-Uni, vous n'êtes pas passible de la TVA mais le port vous est imputé en supplément au prix coûtant. Le prix d'une rubrique est obtenu en déduisant du prix total le montant indiqué sur notre tarif entre les lignes grasses noires. Veuillez prévoir un supplément suffisant pour l'affranchissement. Si ce montant est excessif, nous vous créditerons la différence. S'il est insuffisant, nous vous écrirons pour vous faire part du port à payer et de la surtaxe que vous devez nous envoyer. Veuillez, dans la mesure du possible, toujours utiliser notre bon de commande. Pour spécifier une rubrique, il vous suffit d'inscrire le code de cinq lettres précisé dans ce catalogue et sur le tarif. Vous pouvez également si vous le désirez décrire la rubrique afin que l'identification vous soit plus aisée sur le bon de commande; une brève description est rédigée entre parenthèses à côté du code de cinq lettres. Ces codes varient légèrement dans le cas de résistances comme indiqué page 70. Le code suit toujours les mots "Order As". Les commandes sont expédiées par le moyen le moins cher mais peuvent être envoyées par service postal aérien si vous écrivez 'AIRMAIL' en grandes lettres sur votre commande et ce uniquement si vous nous envoyez suffisamment d'argent pour couvrir les frais.

Le mode de paiement le plus pratique est la procédure suivante: vous calculez le coût total en prévoyant les frais de port en livres (soit généralement 10 à 20% du montant de la commande) et vous achetez dans la banque la plus proche une traite bancaire rédigée en livres sterling et prélevée sur une banque britannique. Vous payez dans votre devise et nous recevons l'argent en livres. Toute autre méthode donne lieu à des retards et, grâce à cette méthode, nous sommes généralement en mesure d'expédier votre commande le jour où nous la recevons. Si votre banque ne peut pas vous faire cette traite bancaire, écrivez nous et nous vous fournirons des renseignements complémentaires sur les autres modes de paiement. Nous préférons le système de la "lettre irrévocable de crédit" qui est accepté au niveau international et qui peut être effectué par une banque ordinaire. La lettre de crédit doit être à terme de six mois pour que nous puissions l'accepter, confirmée par une banque londonienne, le transbordement doit être prévu et vous devez vous acquitter de tous les frais bancaires. Selon ce système, nous ne sommes payés que quand les articles vous sont livrés mais, en raison des frais de documentation, nous ne l'acceptons que pour des commandes de plus de 100 £. Si vous avez la possibilité de vous rendre en Angleterre cette année, nous serions très heureux de vous voir à notre boutique de Westcliff. De Douvres, prenez le train jusqu'à la gare de Victoria de Londres et rendez vous ensuite à Tower Hill par le métro. Rendez vous à pied à la gare de Fenchurch Street d'où vous pourrez prendre un train en direction de Southend ou Shoebury (et non Tilbury) qui fait halte à Westcliff. Arrivé à cette gare, demandez le chemin de London Road; aux feux de signalisation de Hamlet Court Road, tournez à droite et notre boutique est à quelques 200 mètres sur la droite au No. 284.

## BESTELLUNGEN AUS DEM AUSLAND

Wenn Sie nicht in Großbritannien wohnen, brauchen Sie keine britische Mehrwertsteuer (VAT) zu zahlen; Porto wird jedoch zum Selbstkostenpreis berechnet. Um den Preis eines Artikels auszurechnen, ziehen Sie von dem in der Preisliste erscheinenden Gesamtpreis jeweils den in fetten schwarzen Linien angegebenen Betrag ab. Bitte fügen Sie einen ausreichenden Betrag für Porto hinzu. Falls Sie zuviel Geld schicken, schreiben wir Ihnen den Überschuss gut. Falls Sie nicht genug schicken, werden wir Ihnen schreiben, das genaue Porto nennen und angeben, wieviel Geld Sie zur Deckung des Portos noch schicken müssen.

Bitte benutzen Sie möglichst immer unsere Bestellformulare. Zur Bezeichnung eines Artikels schreiben Sie einfach den aus fünf Schriftzeichen bestehenden Code nieder, wie er im Katalog und in der Preisliste erscheint. Sie können den Artikel außerdem kurz beschreiben, damit Sie ihn auf dem Bestellformular identifizieren können; eine Kurzbeschreibung erscheint in Klammern in der Nähe des Fünfzeichencodes. Für Widerstände sind die Codes etwas anders (siehe Seite 70). Der Code erscheint jeweils nach den Worten



## TILAAMINEN (jatkoa sivulta 7)

telyä käytettäessä me pystymme tavallisesti saattamaan tilauksen matkaan jo samana päivänä kuin tilaus tulee perille. Jos pankkisi ei pysty järjestämään tällaista asetetta, kirjoita meille ja me kerromme mita muita maksutapoja on mahdollista käyttää. Me suositamme kansainvälisen käytännön mukaista maksutapaa, joka tunnetaan nimellä "peruuttamaton luottokirje"; ja tämä on mahdollista järjestää minkä tahansa pankin kautta. Luottokirjeen tulee olla voimassa kuusi kuukautta, muussa tapauksessa me emme voi sitä hyväksyä, ja sen täytyy olla jonkin lontoolaisen pankin vahvistama, siirtämisen täytyy olla luvallista ja Sinun täytyy suorittaa kaikki pankkikulut. Tätä menetelmää käytettäessä me saamme maksun vasta tavarain tultua perille, ja kaiken tähän liittyvän paperisodan vuoksi me hyväksymme tämän maksutavan vain mikäli tilauksen arvo on yli sata puntaa (£100). Jos Sinulla on tilaisuus käydä Englannissa tänä vuonna, meistä olisi kovin mieluisaa jos pistäytisit myymälässämme Westcliffissä. Jos saavut meritse Doveriin, tule ensin junalla Lontoon Victoria-asemalle ja sieltä maanalaissella Tower Hill – asemalle. Kävele Fenchurch Street -asemalle ja nouse junaan, joka menee Southendiin tai Shoeburyyn (ei Tilburyyn), ja jää pois Westcliffin asemalle. Kysy asemalla tietä London Roadiin ja kun tulet Hamlet Court Roadin liikenneväylään, käänny kulmasta oikealle. Meidän myymälämme on tästä noin 200 metrin päässä kadun oikealla puolella numeroosa 284.

## VID BESTÄLLNING FRÅN ANDRA LÄNDER AN STORBIRTTANNIEN

Kunder från andra länder än Storbritannien är inte underkastade brittisk mervärdeskatt, men portokostnaden debiteras extra. Priset på en artikel erhålls genom att man drar av det belopp som upptas inom de kraftiga svarta linjerna på prislistan från det totala priset. Var vänlig skicka alltid ett tillräckligt belopp för att täcka portokostnaden. Om beloppet är för stort, krediteras överskottet till kunden. Om beloppet är för litet, skriver vi till kunden med uppgift om hur stor portokostnaden är och hur stort extrabelopp som måste erläggas. Använd alltid vår orderblankett, när så är möjligt. Vid specifikation av en artikel är det bara att ange den beteckning i fem bokstäver/siffror som upptas i denna katalog och i prislistan. Den som så önskar kan också beskriva artikeln på orderblanketten för att bidra till dess identifiering. (En kortfattad beskrivning återfinns också inom parentes intill beteckningen.) I fråga om resistorer är beteckningarna något annorlunda, vilket framgår på sid. 70. Beteckningen följer alltid orden "Order As::: Beställningarna avsänds på billigaste sätt, men avsändning sker med flygpost, om kunden skriver "AIR-MAIL" med stora bokstäver tvärs över beställningen och endast om tillräckligt betalning erlagts för att täcka kostnaden. Den bekvämaste betalningsmetoden för kunden är att räkna ut totalkostnaden inklusive portokostnaden i engelska pund (vanligtvis 10-20 % av kostnaden för hela beställningen) och att sedan gå till närmaste bank och där köpa en bankcheck utskrivnen i pund Sterling och dragen på en brittisk bank. Kunden köper alltså checken i sin egen valuta, och vi erhåller betalningen i pund. Alla andra metoder innebär förseningar, men med detta system kan vi vanligtvis expediera Er beställning samma dag vi erhåller den. Om kundens bank inte kan utfärda en bankcheck, ombuds kunden att skriva till oss med begäran om upplysningar om andra betalningsmetoder. Vi föredrar då det internationella erkända systemet bekant som "oåterkallligt kreditiv", som kan arrangeras genom en lokal bank. Kreditivet måste stå öppet i sex månader för att vi skall kunna acceptera det, det måste bekräftas av en London-bank, omlastning måste medges och kunden måste betala alla bankavgifter. Med detta system erhåller vi inte betalning, förrän varorna har levererats, och på grund av dokumentkostnaderna kan vi inte godta detta system för beställningar understigande 100 engelska pund. Om Ni skulle få en chans att besöka England i år, är Ni hjärtligt välkommen att besöka vår försäljningsanläggning i Westcliff. Om Ni landstiger i Dover, är det bäst att ta tåget till Victoria Station i London och därifrån resa med tunnelbana till Tower Hill. Promenera sedan ett kort avstånd till Fenchurch Street station samt tag ett tåg till Southend eller Shoebury (inte Tilbury) och stig av i Westcliff. Fråga stationspersonalen om vägen till London Road, och när Ni nått trafikljusen på Hamlet Court Road, viker Ni av åt höger: våra lokaler ligger ca. 200 m längre fram på höger sida i nr 284.

## SLIK BESTILLER DE OM DE BOR UTENFOR STORBIRTTANNIA

Hvis De bor utenfor Storbritannia behøver De ikke å betale VAT (britisk m.v.a.), men porto kommer i tillegg til prisen. For å finne det en artikkel vil koste trekker De beløpet som står angitt innenfor De kraftige, sorte strekene i vår prisliste fra totalprisen. Vennligst send nok penger til dekning av portoen. Hvis De sender for meget skal vi kreditere Deres konto, om De ikke sender nok kommer vi

til å skrive til Dem og opplyse hva portoen kommer på, og hvor meget mer De må sende til dekning av dene. Bruk alltid vår bestillingseddelen om mulig. For å spesifisere en artikkel skriver De ganske enkelt fem-tegns koden som står i denne katalogen og på vår prisliste. Om De ønsker det kan De naturligvis også sende med en beskrivelse av artikkelen, slik at denne blir lettere å finne igjen på bestillingsseddelen. De vil se at en kort beskrivelse står oppgitt i parentes ved siden av fem-tegns koden. For motstander er koden litt forskjellig, og som vist på side 70. Koden følger alltid etter ordene "Order As::: Ordrene sendes på billigste måte, men vi skal sende varene med luftpost ("AIRMAIL") om De skriver "AIRMAIL": tvärs over ordren, med store, tydelige bokstaver, men bare om De sender nok penger til å dekke denne utgiften.

Den beste måte å betale på er at De regner ut totalprisen, inkludert porto, i pund sterling (portoen er normalt 10 til 20% av det ordren koster), gå deretter til banken og kjøp en bankanvisning utstedt i pund sterling, trukket på en britisk bank. De betaler i norske kroner, og vi får oppgjør i pund. Alle andre betalingsmåter medfører forsinkelsete, men om De går frem slik som vi har beskrevet kan vi normalt sende varene samme dag vi får ordren. Hvis Deres bankforbindelse ikke kan ordne med en bankanvisning for Dem, bes De skrive til oss og forhøre Dem om andre betalingsmåter. Vi foretrekker det internasjonale, anerkjente system som kalles "ugjenkallelig rembours": — dette kan ordnes av Deres bankforbindelse. Rembursen må åpnes for et tidsrom av 6 måneder da vi ellers ikke kan akseptere den, og den må bekreftes av en bank i London. De må også regne med omskipning, og alle bankomkostninger må betales av Dem. Ved bruk av denne metoden får ikke vi betaling for varene er levert, men på grunn av alt papirarbeid dette systemet fører med seg, beklager vi at vi ikke kan akseptere ordrer til under £100 om De velger denne fremgangsmåten.

Hvis De kommer til å besøke England i år skal det vær oss en glede å vise Dem rundt i vår forretning i Westcliff. Hvis De ankommer til Dover tar De toget til Victoria stasjon i London og undergrunnen til Tower Hill derfra. Gå deretter til Fenchurch Street jernbanestasjon like ved og ta et tog til Southend eller Shoebury (ikke Tilbury) og gå av toget i Westcliff. Spør på stasjonen etter veien til London Road — når De kommer frem til trafikkllysene i Hamlet Court Road dreier De til høyre, og vår forretning ligger ca. 200 m på høyre side (nr. 284).

## كيف تطلب شراء بضائع إذا كنت تعيش خارج المملكة المتحدة ؟

إذا كنت تعيش خارج المملكة المتحدة فإنك لا تخضع للضريبة البريطانية المضافة إلى القيمة . ولكن سوف تضاف أجرة البريد إلى التكلفة . ولحساب سعر أي بند أخصم من السعر الكلي المبلغ المبين بداخل الخطوط السوداء الثقبية بقائمة الأسعار الخاصة بنا . الرجاء إرسال مبلغ إضافي كافي لتغطية أجرة البريد . وإذا كنت قد أرسلت مبلغ أزيد من اللازم فسوف نرد لك أي فائض . وإذا لم ترسل مبلغا كافيا فسوف نكتب إليك لنبلغك عن أجرة البريد ومقدار المبلغ الذي سوف تحتاج إلى إرساله لتغطية النفقات .

ويجب دائما إستعمال إستارة الشراء الخاصة بنا طالما أمكن ذلك . ولتحديد أي بند اكتب ببساطة رقم الإشارة المكون من خمسة حروف والمبين في هذا الكتالوج وبقائمة الأسعار . وإذا كنت ترغب يمكنك أيضا أن تكتب وصف للبند ليساعدك على تمييز البند باستارة الطلب ويعطى وصف موجز بين قوسين بجوار رقم الإشارة . أما بالنسبة للمقاومات فنجد أن أرقام الإشارة مختلفة قليلا كما هو مبين في صفحة ٧٠ ويتبع رقم الإشارة دائما الكلمات « Order AS » وترسل إستارات الشراء بأرخص الطرق ولكننا سوف نقوم بإرسال البضائع بالبريد الجوي إذا كتبت Air mail في طلبك بأحرف كبيرة وإذا أرسلت مبلغ يكفي لتغطية التكلفة .

وأفضل طريقة ملائمة للتسديد هو أن تحسب التكلفة الكلية شاملة مبلغ نظير أجرة البريد بالجنيهات ( عادة ١٠٪ إلى ٢٠٪ من تكلفة الطلب ) ثم توجه إلى بنك محلي واشترى حوالة مصرفية مكتوب عليها بالجنيهات الأسترلينية ومسحوبة من بنك بريطاني . أما كل الطرق الأخرى فهي عرضة للتأخير ولكن بهذه الطريقة يمكننا عادة أن نرسل البضائع التي تطلبها في نفس اليوم الذي تتسلم فيه الطلب . وإذا لم يتمكن البنك الخاص بك من ترتيب حوالة مصرفية لك نرجوا الكتابة إلينا بالتفصيل عن الطرق الأخرى للدفع وإننا نفضل الطريقة المعترف بها دوليا والمعروفة باسم « خطاب اعتماد غير قابل للنقض » حيث يمكن ترتيبه من بنك محلي . ويجب أن يكون خطاب الاعتماد مفتوحا لمدة ستة شهور وإلا فإننا لا نستطيع أن نقلبه كما يجب إعادته من بنك في لندن كما يجب أن يسمح بأجر الشحن كما يجب أن تدفع كافة المصاريف المصرفية . وباستعمال هذه الطريقة فإننا لا نتسلم المبالغ حتى يتم تسليم البضائع ولكن بسبب تكاليف إعداد المستندات فإننا لا نقبل هذه الطريقة لطلبات شراء تقل قيمتها عن ١٠٠ جنيه إسترليني .

وإذا حانت لك فرصة لزيارة إنجلترا هذا العام فسوف يسعدنا وسرنا أن نراكم في محلاتنا في ويستكليف . وإذا نزلت في دوفر يمكنك أن تأخذ القطار إلى محطة فيكتوريا ثم أركب مترو الأنفاق «الاندراجاوند» إلى محطة تاور هيل ثم سيرا على الأقدام إلى محطة فينشيرش ستريت ثم خذ قطار ساوث اند أو شوبري ( ليس تيلبري ) المتجه إلى ويستكليف . ثم أسأل في المحطة عن كيفية الوصول إلى لندن رود وعندما تصل إلى اشارات المرور في طريق هامليت كورت رود إنعطف إلى اليمين حيث توجد محلاتنا على بعد ٢٠٠ متر جهة اليمين رقم ٢٨٤ .

"Order as". Bestellungen werden auf die billigste Weise versandt, aber wir versenden sie gern per Luftpost, falls Sie "Airmail" in großen Buchstaben über Ihre Bestellung schreiben und genügend Geld für das Luftpostporto einschicken.

Es ist am einfachsten für Sie, wenn Sie den Gesamtpreis einschließlich der Portokosten in Pfund ausrechnen (Portoaufschlag im allgemeinen 10 bis 20% des Bestellpreises) und dann von einer dortigen Bank einen auf eine englische Bank gezogenen Bankwechsel in Pfund Sterling kaufen. Sie zahlen in Ihrer eigenen Währung, und wir erhalten das Geld in Pfund. Alle anderen Überweisungsarten sind mit Verzögerungen verbunden, aber auf die oben beschriebene Art und Weise können wir Ihre Bestellung im allgemeinen noch am Tage des Auftrags eingangs abschicken. Sollte Ihre Bank Ihnen keinen Bankwechsel ausstellen können, schreiben Sie uns bitte, damit wir Ihnen andere Zahlungsmöglichkeiten nennen können. Wir bevorzugen das international anerkannte "unwiderrufliche Akkreditiv", das durch eine dortige Bank eröffnet werden kann. Das Akkreditiv muß sechs Monate lang Gültigkeit besitzen, da wir es sonst nicht akzeptieren, es muß durch eine Londoner Bank bestätigt werden, Umladung muß erlaubt sein, und Sie müssen für alle Bankspesen aufkommen. Hierbei erhalten wir das Geld erst nach Lieferung der Ware. Im Hinblick auf die mit den Dokumenten verbundenen Kosten können wir diese Zahlungsart allerdings nur für Bestellungen im Werte von über £100 annehmen.

Wenn Sie dieses Jahr nach England kommen, würden wir uns sehr freuen, Sie in unserem Geschäft in Westcliff begrüßen zu können. Wenn Sie in Dover landen, fahren Sie mit der Bahn nach London (Victoria) und von dort mit der U-Bahn nach Tower Hill. Vom Bahnhof Fenchurch Street ganz in der Nähe fahren Züge über Westcliff nach Southend oder Shoebury (nicht Tilbury). Fragen Sie am Bahnhof, wie man zur London Road kommt, und biegen Sie an der Verkehrssampel in der Hamlet Court Road rechts ab. Unser Geschäft liegt etwa 200 m entfernt auf der rechten Seite (Nr. 284).

## COME ORDINARE SE NON RISIETEDE NEL REGNO UNITO

Se non abitate nel Regno Unito, non siete soggetti all'IVA britannica, ma le spese postali vi saranno fatturate a parte. Per sapere il prezzo di un articolo, dovrete dedurre dal prezzo totale l'ammontare indicato all'interno delle grosse linee nere del nostro listino. Siete pregati di aggiungere un supplemento sufficiente a coprire le spese postali per la spedizione a voi. Se mandate troppo, vi accrediteremo la differenza. Se non ne mandate abbastanza, vi scriveremo per informarvi del costo, e dell'ammontare che dovrete spedire in più per coprirlo.

Qualora possibile, usate sempre il nostro Modulo di Ordine. Per specificare un articolo particolare, basta scrivere il codice a cinque caratteri di questo catalogo e del listino; se volete, potete aggiungere una descrizione dell'articolo e questo vi aiuterà ad individuare i vari articoli sul modulo di ordinazione; una breve descrizione appare fra parentesi vicino al codice a cinque caratteri. Per i resistori i codici sono un po' diversi, come si vede a pagina 70. Il codice segue sempre le parole "Order As". La spedizione degli articoli ordinati verrà effettuata con il mezzo più economico, ma spediremo per via aerea se scriverete "AIRMAIL" a grossi caratteri attraverso l'ordine e solo se invierete denaro sufficiente a coprire il costo.

Il metodo di pagamento più conveniente consiste nel calcolo da parte vostra del costo totale comprendente una certa cifra in sterline per le spese postali (generalmente dal 10 al 20% del costo della merce ordinata), e poi acquistare un vaglia bancario in sterline su una banca britannica. Voi pagate nella vostra valuta e noi riceviamo il pagamento in sterline. Con tutti gli altri metodi ci sono ritardi, mentre con questo sistema siamo generalmente in grado di spedire la merce non appena riceviamo il pagamento. Se la vostra banca non può provvedervi il vaglia bancario, vi preghiamo di scriverci per chiederci dettagli su altri metodi di pagamento. Noi preferiamo il sistema riconosciuto internazionalmente della "lettera di credito irrevocabile", che può venire mandata attraverso una banca locale. La lettera di credito deve essere valida per 6 mesi, altrimenti non possiamo accettarla, deve essere confermata da una banca di Londra, deve consentire il trasbordo, e voi dovrete pagare tutte le spese bancarie. Con questo sistema, noi non riceviamo il pagamento fino a dopo la consegna della merce, ma dati i costi di preparazione dei documenti, possiamo accettare questo metodo solo per ordini di valore superiore a 100 sterline. Se avrete l'occasione di venire in Inghilterra quest'anno, saremo ben lieti di vedervi nel nostro negozio di Westcliff. Se sbarcate a Dover, prendete il treno per la stazione di Victoria a Londra, e poi procedete con la metropolitana per Tower Hill. A piedi recatevi alla stazione di Fenchurch Street dietro l'angolo, e prendete un treno per Southend o Shoebury (non Tilbury), e scendete a Westcliff. Alla stazione chiedete la strada per London Road, e quando raggiungete il semaforo in Hamlet Court Road, voltate a destra, ed il nostro negozio è a circa 200 metri sulla destra (No 284).

## HOE TE BESTELLEN WANNEER MEN BUITEN GROOT-BRITANNIE WOONT

Wanneer u buiten Groot-Brittannië hoeft u geen Engelse B.T.W. te betalen, maar het porto wordt u tegen kostprijs berekend. Om de prijs van een artikel vast te stellen trekt u het bedrag dat binnen de zware zwarte omranding op onze prijslijst staat, van de totale prijs af. S.v.p. niet vergeten genoeg extra geld te zenden om de portokosten te dekken. Wanneer u teveel zendt, crediteren wij u voor het teveel.

Altijd, indien mogelijk, ons orderformulier gebruiken. Om een artikel te specificeren gelieve u de 5-teken code uit deze catalogus en onze prijslijst aan te geven. Indien u wilt kunt u ook een beschrijving van het artikel toevoegen, waardoor u de artikelen op het orderformulier gemakkelijker kunt identificeren, en u vindt een korte beschrijving tussen haakjes achter de 5-teken code. Voor weerstanden is de code enigszins anders, zoals u op pag. 70 kunt zien. De code volgt altijd op de woorden "Order As". Orders worden op de goedkoopste manier verzonden, maar als u in grote letters dwars over uw order "AIRMAIL" schrijft, verzenden wij hem per luchtpost als u voldoende geld inzendt om de kosten te dekken.

De handigste betaalmethode is, dat u de totale kosten uitrekent inclusief een toeslag voor porto in ponden (meestal 10 tot 20% van het bedrag van de order), dan naar een plaatselijke bank gaat en een postwissel koopt die in pond Sterling uitgeschreven is en getrokken op een Britse bank. U betaalt in uw valuta en wij ontvangen het geld in ponden. Alle andere methodes zijn aan vertragingen onderhevig, maar met dit systeem kunnen we gewoonlijk uw order op de dag dat we hem ontvangen, verzenden. Wanneer uw bank geen wissel voor u kan afgeven, gelieve u ons te schrijven, zodat we u details over andere betaalmethodes kunnen zenden. Wij gebruiken bij voorkeur het internationaal geaccepteerde systeem van "onherroepelijke accreditieven", die door een plaatselijke bank gearrangeerd kunnen worden. Het accreditief moet voor een periode van 6 maanden geopend worden, anders kunnen we het niet accepteren, en moet bevestigd worden door een Londense bank, overlading moet geoorloofd zijn en u moet alle bankkosten betalen. Wanneer u dit systeem gebruikt, ontvangen wij pas betaling nadat de goederen geleverd zijn maar vanwege de documentatiekosten kunnen we dit systeem voor orders beneden de £100 niet accepteren.

Wanneer u dit jaar gelegenheid hebt Engeland te bezoeken, heten we u graag welkom in onze winkel in Westcliff. Wanneer u in Dover aan land gaat, neemt u de trein naar London (Victoria Station), en gaat dan met de ondergrondse naar Tower Hill. U loopt naar Fenchurch Street Station en neemt een Southend of Shoebury (geen Tilbury) trein en stapt in Westcliff uit. Bij het station de weg naar London Road vragen en tot de stoplichten in Hamlet Court Road gaan, rechtsaf slaan en onze winkel is ongeveer 200 m verder aan de rechterkant (nummer 284).

## TILAAMINEN ENGLANNIN ULKOPUOLELTA

Jos asut Englannin ulkopuolella, et ole velvollinen maksamaan Englannin arvonlisäveroä, mutta hintaan lisätään postituskulut tosiasiallisen postimaksun mukaan. Lopullinen ostohinta saadaan vähentämällä kokonaishinnasta summa, joka meidän hinnastossamme on paksumien mustien viivojen sisällä. Lähetä rahaa riittävästi yli ostohinnan, niin että se kattaa postituskulut. Jos olet lähettänyt liian paljon, me palautamme ylimääräisen rahan. Jos taas et lähetä riittävästi, me kirjoitamme Sinulle mainiten paljonko postituskulut ovat ja kuinka paljon lisää Sinun tulee toimittaa niiden kattamiseksi.

Käytä meidän omaa tilauskaavakettamme aina kun se suinkin on mahdollista. Haluamasi tavarain määrät yksinkertaisesti kirjoittamalla kaavakkeeseen luettelossa ja hinnastossa annetun viisinumeroisen koodin. Jos haluat, voit myös kirjoittaa tavarain nimikkeen, niin että voit helpommin tunnistaa tilauskaavakkeeseen merkitsemäsi tavarat. Viisinumeroisen koodin viereen on tätä tarkoitusta varten merkitty sulkeisiin lyhyt tavarainimike. Vastusten osalta koodit ovat jonkin verran erilaiset, kuten käy ilmi sivulta 70. Koodi on aina annettu sanojen "Order As" jälkeen. Tilaukset toimitetaan yleensä halvimmalla mahdollisella tavalla, mutta me voimme toimittaa ne myös lentopostissa jos kirjoitat tilauksesi poikki isoin kirjaimin sanat "AIR MAIL" edellyttäen että lähetät tätä varten riittävästi rahaa.

Maksu on helpoin suorittaa laskemalla ensin tavarain kokonaishinta postituskulut mukaan luettuina (nämä ovat yleensä 10 - 20% tilauksen arvosta) Englannin punnissa ja menemällä sitten lähimpään pankkiin ja ostamalla Englannin punnissa ilmaistun ja jonkin englantilaisen pankin maksettavaksi merkityn asetteen ko. summalle. Maksat itse Suomen markoissa ja me saamme maksun punnissa. Kaikki muut maksutavat aiheuttavat viivytyksiä, mutta tätä menet-

Jatkuu sivulla 8





**ELECTRONIC ORGAN**

A series of constructional leaflets each of which builds a complete organ which can then be expanded using all or part of the next leaflet with very little wastage. At every stage we use the very latest technology available to give you a really high quality instrument that is not only on a par with, but probably in advance of most commercially available organs.

Eventually you could be the owner of a highly sophisticated instrument and parts of it will still be using the original components you bought for the basic organ. Of course this means greatly reduced costs and wherever you stop, the organ you finish up with will have cost you only a fraction of the cost of a ready-built one – and this organ will be to your own specification!

**Model 51 Basic Organ**

In this leaflet MES 51 the first in the MES 50 series, we deal with the basic theory of electronic organs and go on to describe the construction of a simple polyphonic (i.e. all notes may be played simultaneously) 49-note instrument, having a single keyboard and a limited number of stops.

**Specification.**

- Single keyboard: 49-note C to C.
- Frequency range: C<sub>3</sub> to C<sub>7</sub>.
- Stops: Flute and String
- Output: 1V rms (max)

When you have built this simple organ you will own the ideal instrument on which to learn to play or teach your family to play, and as your skill increases and you want more out of the organ, it can be expanded to meet your requirements as far as you want to go with hardly any wastage.

**Model 52 2-Keyboard Organ**

In this leaflet (MES 52) is described the extension of the organ to two keyboards each having five voices. The voicing section is considerably improved and the range of the organ is extended by a further octave.

**Specification:**

- Two keyboard both 49-note C to C.
- Frequency range. Solo C<sub>3</sub> to C<sub>7</sub>.
- Accompaniment C<sub>2</sub> to C<sub>8</sub>.
- Stops: Solo manual – Flute, String, Horn, Diapason, Vox Angelica.
- Accompaniment manual – Flute, String, Clarinet, Diapason, Vox Humana.

**Balance control**

Provision for 61-note keyboard (frequency range of both – C<sub>2</sub> to C<sub>7</sub>).

Output: 1V rms (max).

**Model 53 Stage One Full Scale Organ**

This leaflet MES 53 marks a major step forward in the development of the organ since it introduces solid state switching which facilitates the extension of the number of footages to seven on both keyboards with up to 38 preset stops. A novel solid state switching system is introduced which allows the organist to accurately control the attack and decay rates for any stop. A stub pedalboard is incorporated and this includes a sustain facility. In addition to the wide range of preset stops, a drawbar controlling each footage linked to the flute stops may be fitted.

**Specification:**

- Two keyboards 49 or 61-note C to C
- Pedalboard 13-note C to C.

*Continued on page 10*

## Electronic Organ (continued from page 9)

Frequency compass of organ C<sub>1</sub> to C<sub>9</sub>.

Solo manual – Stops: Flute 16', Cello 16', Tuba 16',  
Saxophone 16', Flute 8', French  
Horn 8', Oboe 8', Trumpet 8',  
String 8', Clarinet 8', Diapason 8',  
Vox Humana 8', Flute 5 1/3', Flute  
4', Octave 4', String 4', Clarion 4', Flute  
2 2/3', Flute 2', Flute 1'.

7 drawbars on flutes, variable attack control, variable decay control, delayed tremulant.

Accompaniment manual –

Stops: Flute 16', Flute 8', String 8', Horn 8', Diapason 8',  
Vox Angelica 8', Dulciana 8', Salicional 8', Flute 5 1/3',  
Flute 4', String 4', Octave 4', Salicet 4', Flute 2 2/3',  
Flute 2', Flute 1'.

7 drawbars on flutes, variable attack control, variable decay control, delayed tremulant,

Pedal Manual – Stops: Sub Bass 16', Gedeckt 8'.  
Sustain.

Other facilities: Tremulant with variable rate and depth, reverboration with variable balance, solo to accompaniment variable balance, variable pedal level, foot swell pedal, variable maximum volume control.

Output: 1V rms (max).

### Model 54 32-Note Pedalboard

This leaflet (MES 54) describes the construction of a full range 32-note polyphonic pedalboard that can be added to MES53 or any organ, since it is a complete unit with its own tone generation system etc. This is essential since the keyboard tones would at some times have tremulant in operation and this could not be tolerated on the pedalboard. The electronic parts of this design could be added to an existing pedalboard by the addition of one extra contact under each key to give free phase bass – the "church" sound.

Specification:

Pedalboard: 32-note C to G

Frequency range: C<sub>1</sub> to G<sub>5</sub>

Stops: Sub-Bass 16', Diapason 16', Gedeckt 16',  
Mixture 16', Flute 8', Gedeckt 8', Flute 4',  
Reed 4'.

Output: 1V rms (max).

### Model 55 Auto-Organ Rhythm Generator

This leaflet, MES 55, describes a complete rhythm generator and auto-organ which can play the whole accompaniment section providing you tell it, by depressing the appropriate key on the keyboard, which key you are playing in. Thus with one finger of the left hand and one finger of the right hand playing the tune, you can sound like a real professional. The auto-organ will add the trills to the right hand and chord and vamp the left hand in time with the rhythm generator.

The unit has eight rhythms, Waltz, Tango, Swing, Beat, Bossa Nova, Samba, Rumba and Slow Rock and drives five instruments. The rhythms can be mixed to achieve further variations and tempo control is included. There is a rhythm start/stop switch and the rhythm always starts on the downbeat. The instruments sound extremely realistic and considerable care has been taken to make them sound natural.

The chording section is turned on separately by its own on/off switch and has a standard or percussive sound which can be switched on by pressing the "harmonic attack" button. The auto-organ has its own tone generator and divider network, so that fitting the unit to any organ is very simple. The chording section has three different modes of operation: automatic, semi-automatic and manual.

#### Automatic

This mode is suitable for the beginner as the auto-organ plays the entire accompaniment controlled by one finger of the left hand. Simply play the tune with one or more fingers of your right hand and it sounds as though you've been playing for years. Play one note from the bottom two octaves on the keyboard and the major chord relating to that note will be generated (i.e. play 'C' and chord of 'C' will sound). Switches are fitted to change from major to minor or 6th, 7th, 5th and dim. 5th. These switches can be the black notes on the bottom octave, some of the notes on the pedalboard or front panel switches – the choice is yours when you build the unit. (The leaflet explains in more detail.)

When the note is released, chord or rhythm continue until a new note is pressed and then the chord changes. An auto-reset button is provided if you want to stop the chord sounding. The rhythm will

continue and to restart the chord after the rest simply press a new note.

#### Semi-automatic

This mode can be used if you want to make your own chord shapes on the keyboard and this can be done on any notes in the lowest two octaves. As in the automatic mode the chord will be vamped by the rhythm unit, but in this case it will play the notes you have selected. If chord is released, the notes you had selected are memorised and carry on playing until a new chord is played or until the auto-reset button is pressed and this works in the same way as it did in the automatic mode.

#### Manual

This mode is the same as the semi-automatic mode except that when the chord is released, it stops playing. The rhythm however will continue as before (see auto-stop timer below).

#### All Modes

The following additional features are available in all modes:

#### Walking/Alternating Bass

This feature may be switched on at any time and generates a walking or alternating bass depending on position of switch, on its own or in addition to the chord section.

#### Arpeggio

This feature may be switched on at any time and will generate arpeggio runs in time with the selected rhythm and in tune with the chord being played. Three different runs are available and these are selected by a switch.

#### Auto-stop Delay Timer

This feature enables rhythm or chord and rhythm to be stopped after a preset time. The period is set by a variable control on the front panel and will be found very useful in all modes.

#### Other Features

In addition there is an overall volume control and a rhythm volume control. The auto-organ is very simple to add to any organ. It need not be electrically connected to the organ at all. All that is required is one single-pole make contact under each of the 24 lowest keys on the lowest keyboard wired to the auto-organ. These must be additional or spare contacts of course, not ones already in use. Alternatively a separate keyboard or pedalboard could be wired up. A guitarist for instance could supply himself with a complete accompaniment section with one foot on a 13-note pedalboard. The possibilities with this fascinating design are endless.

**The following is a list of parts used in this project, the details of which are not shown elsewhere in this catalogue.**

#### AS314s

This device is a C-MOS analogue switch. It uses the basic CD4007BE graded to ensure that all types have matched turn-on and turn-off characteristics. They are colour coded violet. They have to be used in conjunction with the Mark/Space Adaptor Kit described below. Leaflet MES53 describes how to use AS314a and AS314d, but these are no longer available and each position must now be filled with an AS314s.

#### Order As BR45Y (AS 314s)

#### Mark/Space Adaptor Kit

This kit of parts must be used in conjunction with the AS314s and now forms an integral part of MES53. It is very easy to install and only four wires additional to MES53 are required per keyboard. Full instructions are supplied with the kit.

#### Order As BR88V (Mark/Space Adaptor Kit)

#### Printed Circuit Boards

	Order As	
BB00A (Divider Board 'A')		BB11M (Gate Board)
BB01B (Divider Board 'B')		BB04E (Tone Board 'C')
BB02C (Tone Board 'A')		BB05F (Tone Board 'D')
BB03D (Tone Board 'B')		BB06G (Tone Board 'E')
BB07H (Control Board 'A')		BB12N (Pedal PCB 'A')
BB08J (Control Board 'B')		BB15R (Mother Board 'A')
BB09K (Sawtooth Board 'A')		BB13P (A/B Switch Board)
BB10L (Sawtooth Board 'B')		BB14Q (MES Amp Bd 'A')
BB77J (Divider MO & Freq Gen)		
BB78K (Pedal PCB 'B')		
BB79L (32-Note Pedal Voice)		
BB80B (Pedal Diode PCB)		
HQ72P (Auto-Organ Gen/Clock PCB)		
HQ73Q (Auto-Organ Chord Coder PCB)		
HQ74R (Auto-Organ Auto Stop PCB)		
HQ75S (Auto-Organ Pre-Amp PSU PCB)		

#### Construction Details

Full construction details are given in our leaflets:

MES51	Order As XH00A
MES52	Order As XH02C
MES53	Order As XH04E
MES54	Order As XH31J
MES55	Order As XH33L





**THE INTERNATIONAL MUSIC SYNTHESISERS**

A range of synthesisers based around the circuitry of the 4600 synthesiser originally designed by "Electronics Today International" and now extensively redesigned and re-named the 5600S synthesiser. The 4600 synthesiser parts and its book of construction details are still available and will continue to be so for some time. The 3600 synthesiser originally designed by "Electronics Today International" has also been extensively redesigned and re-named the 3800 synthesiser. The 3600 Front Panel and 3600 Aux Board are discontinued.

**INTERNATIONAL 5600S STEREO SYNTHESISER**

A superb stereophonic music synthesiser with more features than virtually any other ready-made synthesiser costing up to, at the very least, more than four times the cost of the parts for this synthesiser. Its excellent styling and finished appearance make it look as good as any ready-made synthesiser. Equally at home in the studio or on the stage it is available with a teak-veneered cabinet or in a hard wearing plasticised-cloth covered cabinet with lid and carrying handle.

Just some of its outstanding features are listed below:

- \* Fully digital keyboard which may be directly controlled by a microprocessor
- \* Last note played always sounds regardless of number of other keys held.
- \* Four oscillators each with five different shape outputs and one low oscillator with sine and square wave output.
- \* Fully stereophonic output with voltage controlled panning.
- \* 900 socket patchboard, making the output sound possibilities virtually limitless.
- \* Voltage controlled solid state phase and reverb (not simultaneously).

**Specification:**

**Keyboard**

48-note F to E monophonic (could use a keyboard of up to 63 notes, but not in our cabinets.) Each note generates its own specific 6-bit digital code which is decoded in the keyboard controller. Thus notes may be generated directly by a microprocessor or other digital input. The code being used is displayed by six LED's.

**Outputs to patchboard**

Trigger: -7V to +7V transition at each new key press.  
A new trigger pulse is initiated every time a new key is pressed and that key will sound whether or not any other keys are pressed.

- Analogue (direct): 0 to +5V
- Analogue (modulated): 0 to +12V
- Output to microprocessor: 6 data lines plus strobe
- Inputs: Low oscillator, Patchboard, Computer
- Controls: Adjustable rate 0 to 10 seconds. With on/off switch.
- Modulation selection: Selects direct modulation on keyboard by low oscillator or from patchboard.
- Modulation: Allows input to modulate keyboard to a maximum of  $\pm 1$  octave.
- Tune: Tunes keyboard  $\pm 2$  semitones.
- Pitch bend: See Joystick.
- Computer: Switches data socket from input to output. Keyboard is operative in both positions. A microprocessor could be used directly as a sequencer giving up to 62 notes or rests of any length up to  $8\frac{1}{2}$  seconds based on approx.  $\frac{1}{60}$ th second intervals, for each kilobit of random access memory or other digital memory. (Notes or rests use 16 bits of memory per  $8\frac{1}{2}$  seconds and notes or rests of any length in  $\frac{1}{60}$ th second multiples can be generated). The sequence recorded in the RAM can be edited from the keyboard. A complete design for this sequencer will be available during the life of this catalogue.

**Oscillators**

Four voltage controlled oscillators plus one low oscillator (described separately). Overall range: 0.1Hz to >20k Hz, per oscillator.  
Output to mixers 1, 2 and 3.  
Controls  
Range: Switchable in seven ranges from  $\frac{1}{2}$ ' to 32' plus low frequency (0.1Hz) special effects source.  
Tune: Tuning range of  $\pm \frac{1}{2}$  octave.  
Free run: Internal voltage source manually adjusts oscillator over full range. Oscillators 2, 3 and 4 can be synchronised with oscillator 1 i.e. every time

*Continued on page 12*

## 5600S Synthesiser (continued from page 11)

oscillator 1 starts a new cycle so does any other oscillator with free run operative. A'sync off' position is provided on oscillators 2, 3 and 4.

**Shape:** Varies mark/space ratio of square wave output, plus switch to enable shape to be voltage controlled from either of two control lines on patchboard or off.

**Waveform:** Selects sine, triangular, sawtooth, inverted sawtooth or square wave as output.

**Stability:** Frequency change with change in temperature: <0.015%/°C typical.  
Frequency change with constant temperature over one week: <±0.05% typical.

### Low Oscillator

**Range:** 0.2Hz to 20Hz  
**Outputs:** Sine wave to patchboard via level control, and square wave at fixed 5V to patchboard simultaneously.

### Noise

A pseudo random noise generator with colour control to allow noise spectrum to be continuously variable between white and pink. Output to patchboard via level control.

### Sample And Hold

Samples incoming waveforms and stores the voltage.  
**Controls:**  
**Sample rate input:** Switchable between low oscillator and external input module.  
**Level:** Sets the range of output voltage.  
**Input:** From patchboard  
**Output:** To patchboard.

### Mixers 1, 2 and 3

**Inputs:** Four (one from each oscillator) each with independent level controls.  
**Level:** Adjusts level of output from each mixer.  
**Overload:** LED lights to indicate overload.  
**Output:** To patchboard.

### Mixers 4 and 5

**Inputs:** Two each, from patchboard with level individually adjustable.  
**Level:** Adjusts level of output from each mixer.  
**Overload:** LED lights to indicate overload.  
**Output:** To patchboard.

### Filters 1 and 2

Two active voltage controlled filters (VCF).  
**Inputs:** From patchboard  
**Cut-off rate:** 24dB per octave  
**Control range:** >2 decades  
**Controls**  
**Tune:** Tunes filter to control source  
**High/Low:** Selects tuning range  
**Resonance:** Adjusts Q of filter  
**Level:** Adjusts level of output to patchboard.

### Amplifiers 1 and 2

Two voltage controlled amplifiers (VCA) which may be AC or DC coupled.  
**Input signal:** Via patchboard      **Input control:** Via patchboard  
**Mode switch**  
**Amp:** In this position VCA is DC coupled and functions as a voltage controlled amplifier  
**RM:** In this position VCA is AC coupled and functions as a ring modulator.  
**Output:** To patchboard via level control.

### Envelope

**Input trigger:** From keyboard or external input  
**Attack, Decay 1 and Decay 2:** All adjustable from 5msec to 5sec  
**Hold level:** Adjustable 0 to 5 volts.  
**Delay:** Adjustable 5msec to 5sec or duration of key contact closure as selected by switch.  
**Control Mode:** Linear or exponential voltage controlled amplifier with a range of 60dB  
**Signal input:** From patchboard  
**Signal output:** To patchboard  
**Control output:** Trapezoid output to patchboard

### Transient 'A'

**Trigger input:** From keyboard or external input  
**Levels:** Start, hold and final adjustable from 0 to 5V.  
**Delay 1, Slopes 1 and 2:** Adjustable 5msec to 5sec.  
**Hold delay:** Adjustable 5msec to 5sec or for duration of key contact closure.  
**Re-trigger:** Allows transient to re-trigger itself at the end of each sequence, but this can be interrupted from the keyboard,

then restarted again by a momentary tap on any key.  
**LED indicators:** LED 1 lights when trigger pulse occurs and extinguishes at the end of Delay 1; LED 2 then lights and extinguishes at the end of Hold delay; then LED 3 lights and extinguishes at the end of Slope 2.  
**Output:** To patchboard.

### Transient 'B'

Identical to Transient 'A' except it has no internal re-trigger facility. However, it can be independently triggered from a push switch on the front panel.

### Exponential Converter

Converts a linear input to an exponential output.  
**Input:** From patchboard      **Output:** To patchboard

### Joystick

Gives 2 axis control of any two functions.  
**Range:** Variable range on horizontal axis.  
Switch to select patchboard or pitch bend.

### External Signals

**Inputs:** Two inputs having a sensitivity of 50mV to 2V at 10kΩ.  
**Sensitivity:** Input level control with high/low switch making it suitable for most signal sources.  
External input 1 only, also has a trigger level control. This trigger pulse may be switched to patchboard or (in external input position) to any module switched to external.

### Foot Pedal

A control voltage to patchboard may be generated by an external swell pedal. Range is controlled from front panel.

### Foot Switch

Glide may be switched on and off or a trigger pulse may be generated from an external foot switch. Switched on front panel.

### Echo

An external echo chamber may be connected and control on front panel adjusts balance between straight through and returned signal. Output to output channel 1.

### External Control Voltage Inputs 1 and 2

Up to two control voltages from external sources (e.g. another synthesiser) may be connected and the voltages will appear separately on two patchboard lines. The inputs are protected against overload and should the voltage go more negative than 0V the voltage at the patchboard will remain at 0V. Similarly, if the voltage exceeds 5V the patchboard voltage will remain at 5V.

### Inverter

When input is at 5V, output will be at 0V and vice versa. Intermediate voltages are similarly reversed.  
**Input:** From patchboard      **Output:** To patchboard

### Reverberation

Not available when switched to Phase  
Multistage reverberation using a 3060 bit CCD solid state reverb. Level control adjusts between no reverb and full reverb, or when switched to patch, may be voltage controlled from patchboard.  
**Input:** From patchboard      **Output:** To patchboard

### Phase

Not available when switched to Reverb.  
The control angle is fully variable through 360°, and more to give a delay to the signal, the length of which depends on the frequency. This control may be used in conjunction with the voltage controlled input from the patchboard.  
**Input:** From patchboard  
**Output:** To patchboard

### Output Stages

There are two separate output channels: 1 and 2 and two separate outputs: left and right. Both channels are fed from the patchboard (or echo chamber: channel 1 only). Both left and right output can be fed from either or both output channel, or any mixture of the two. This panning facility may be controlled manually or by voltage control from Transient 'A' for right output and patchboard for left output. Note that it is the outputs that are panned between the two channels and not vice versa.  
**Output level:** 0 to 1V rms approx.  
**Load impedance:** 2kΩ  
On/off switch provided

### Phones Output

A stereo output for stereo headphones. This output is linked to the main output and therefore pans with it.  
**Power output:** >2W rms  
**Load impedance:** 8Ω  
Output level control provided

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**INTERNATIONAL 3800 SYNTHESISER**

A low-cost version of our superb 5600S synthesiser. The 3800 is a truly remarkable small synthesiser. No ready-built synthesiser at even double the cost of the parts for the 3800 even begins to compare with this unit for versatility and excellence of specification. It is equally at home on the stage or in the studio and when mounted in its cabinet looks as good as any ready-made synthesiser.

Just some of its outstanding features are listed below:

- \* Fully digital keyboard which may be directly controlled by a microprocessor.
- \* Last note played always sounds regardless of number of other keys held.
- \* Two oscillators each with five different shape outputs and one low oscillator with sine and square wave outputs.
- \* Switchable interconnections allowing fast set-up times, making it ideal for live performance work.

**Specification**  
**Keyboard**

48-note F to E monophonic. (Could use a keyboard of up to 63 notes, but not in our cabinets). Each note generates its own specific 6-bit digital code which is decoded in the keyboard controller. Thus notes may be generated directly by a microprocessor or other digital input. The code being used is displayed on the front panel.

**Controls:**

- Tune: Tunes keyboard  $\pm 2$  semitones
- Glide: Adjustable rate 0 to 10 secs with on/off switch
- Computer Switches: Data socket from input to output (see 5600S for details)

**Modulation**

Provides a source of modulation for oscillators other than from the keyboard

**Controls**

- Low oscillator: Selects low oscillator as source
- Transient: Selects transient as source
- Sample and Hold: Selects held voltage

**Oscillators**

Two voltage controlled oscillators plus one low oscillator (described separately). Overall range: 0.1Hz to  $>20$ kHz per oscillator.

**Controls**

- Input: Selects keyboard or modulation unit as source of control. Off position provided.
- Range: Switchable in seven ranges from  $\frac{1}{2}$ ' to 32' plus low frequency (0.1 Hz) special effects source.
- Tune: Tuning range of  $\pm \frac{1}{2}$  octave.

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**"ELECTRONICS TODAY INTERNATIONAL" 4600 SYNTHESISER**

All the parts for this synthesiser and the construction book are still available, but for new constructors it has been largely superseded by the 5600S Stereo Synthesiser. Full specification and construction details are given in the 4600 Synthesiser book.

Order As XF00A (4600 Synthesiser Book)

The following is a list of parts used in this project which are not shown elsewhere in this catalogue.

**Printed Circuit Boards**

- Order As BB39N (Synth Keyboard Controller PCB)
- BB42V (Synth Noise Controller PCB)
- BB46A (Synth VCF PCB)

**Mounting Brackets**

Aluminium mounting brackets punched and angled for fixing the pcb's to the front panel.

- Order As BB57M (Synth Noise Controller Bkt)
- BB61R (Synth VCF Mtg Bkt)
- BB62S (Synth Output Stage Bkt)

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## 'PRACTICAL ELECTRONICS' STRING ENSEMBLE

A string ensemble with brass and woodwind voices in addition. The construction details were published in "Practical Electronics" March to July 1978.

Brief Specification

49-note C to C keyboard split into 16-note lower and 33-note upper section.

Range: 60Hz-2k Hz (fundamental) up to 8.2k Hz harmonic generation.

Transposable pitches: C, B, Bb, Eb.  
Upper voices: String 16', String 8', Woodwind 16', Brass 16'.

Lower voices: String 16', String 8', String 4', Couple strings.

Envelope controls: Attack rate; Sustain length.

Fine tune.

Upper level balance

Output: 100mV and IV.

The following parts used in this project are not shown elsewhere in this catalogue.

### Printed Circuit Boards

PSU/Tone Gen	Order As	HY14Q	(String Ensemble 1 PCB)
Diode Gates	Order As	HY15R	(String Ensemble 2 PCB)
Chorus	Order As	HY22Y	(String Ensemble 3 PCB)
Voicing	Order As	HY23A	(String Ensemble 4 PCB)

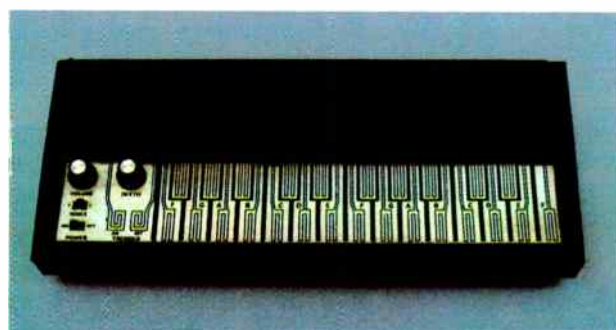
### Cabinet

Please note that the cabinet shown in the picture above is not available.

### Component Schedule

A component schedule is available free of charge to assist in ordering. The schedule converts the parts lists in the articles into our order codes and describes the slight modifications we have made to the pcb's to make construction easier.

Order As XH17T (Leaflet MES 14)



## 'ELECTRONICS TODAY INTERNATIONAL' TOUCH ORGAN

A really novel project that is very easily made on one pcb, and will give endless enjoyment. No fiddly stylus to mess about with, you simply play it with your fingers, as you would an ordinary organ – but you haven't the expense of a full keyboard. Instead the 'keyboard' is printed on the printed circuit board.

The instrument has two voices and covers a full two octave range from F<sub>3</sub> to F<sub>5</sub>. A variable tremolo with on/off touch pads is provided as well as a battery on/off switch and volume to miniature speaker which can be glued to the pcb.

### Construction Details

Full construction details are to be found in the "Electronics Today International" publication "Top Projects No. 5".

Order As XF10L (ETI Top Project No. 5)

### Printed Circuit Board

Order As BB76H (Touch Organ PCB)

### Other Parts

All the other parts required for this project are listed in this catalogue except the battery holder of the type shown in the article and the case.

## 4600 Synthesiser (continued from page 13)

### Front Panel

A semi-gloss black finish panel, punched and printed in white.

Order As XB78K (4600 Front Panel)

### Rear Panel

A semi-gloss black finish panel, punched and printed in white, which provides a mounting for the mains and input and output sockets of the synthesiser.

Order As XB08J (Synth Rear Panel)

### Wooden Cabinet

A professionally made teak finish wooden cabinet supplied in flat pack form with all fixing screws etc. and full instructions. The 4600 synthesiser will also fit in the 5600S cabinet, if a portable cabinet is required.

Order As XB79L (4600 Cabinet)





**TOUCH-SENSITIVE ELECTRONIC PIANO**

A very high quality electronic piano with highly realistic voicing and touch-sensitive keys that automatically make the notes louder, the harder you hit them. Considerable care was taken in the design to ensure that the tone of the piano was a very close approximation to the sound of an acoustic piano. In addition, there are two extra voices.

**Specification**

- 61 note C to C keyboard
- Voices: Piano, Clavichord, Honky tonk
- Dynamic Range: >30dB
- Volume Control
- Loud and Soft Pedals

This superb design costs far less to build than almost any ready-built electronic piano let alone one with such a quality performance as this one.

**Construction Details**

All the construction details are given in our leaflet MES22.

**Order As XH18U (Leaflet MES 22)**

**Printed Circuit Boards**

- Order As** BY78K (Piano PSU/Voice PCB)
- BY79L (Piano Top Octave PCB)
- BY80B (Piano Two-Octave PCB)

**Wooden Cabinet**

A choice of cabinets for the electronic piano depending on whether it is to be used primarily in the home or on the stage. One is finished in teak and one in a hard-wearing black plasticised cloth. Both are professionally made and make your home-made piano look as good as any ready-built unit.

- Order As** XQ06G (Piano Cabinet Black)
- XY11M (Piano Cabinet Teak)

**'PRACTICAL ELECTRONICS'  
RADIO CONTROL SYSTEM**

A really comprehensive model control system, featuring up to nine independent fully proportional channels achieved by a design using incredibly few components, thus keeping the cost to a minimum. The system operates at 27MHz and has the option of either proportional control or on/off type switched control on any channel. Full construction details are given in our booklet.

**Order As XF03D ('PE' Radio Control Book)**

**Printed Circuit Boards**

- Order As** BB28F (RC Codar PCB)
- BB29G (RC Transmitter PCB)
- BB30H (RC Receiver PCB)
- BB31J (RC Interface PCB)
- BB32K (RC Decoder PCB)
- BB33L (RC Relay Drive PCB)
- BB34M (RC Servo Drive PCB)
- BB35Q (RC Servo Amp PCB)
- BB36P (RC Tone Generator PCB)
- BB37S (RC Tone Decoder PCB)





## RHYTHM GENERATOR, THE "DRUMSETTE"

The Drumsette is a very high quality rhythm generator which has been designed with the musician in mind. There are no fiddly switches to complicate the instrument, the organist has only to lightly brush the sensitive touch pads to select a rhythm. He may stop and start the rhythm during a piece simply by touching one of the large stop/start touch-pads and the rhythm will automatically re-start on the down-beat. The controls are also designed to help the musician set-up quickly for the piece he proposes to play. The balance control adjusts the volume of the brush sounds compared to the drum sounds and the tempo control is scaled so that the sheet-music may be notated with the speed you prefer to play at. It is therefore unnecessary to run the rhythm before playing a piece in order to set the speed every time you play.

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## ORGAN AND BASS GUITAR PEDAL UNIT

A very high quality add-on pedal unit for organs. A special feature is the bass guitar stop whose high realism is achieved by no less than four individual envelope controls which makes this pedal unit into an ideal accompaniment instrument for the solo guitarist.

### Specification:

Four organ stops: Sub-Bass 16'  
Diapason 16'  
Gedeckt 8'  
Bourdon 8'

Sustain (having an accurate exponential characteristic)  
Sustain cancel (automatic)  
Bass guitar stop (pitched at 8')  
Mains powered (240V AC)

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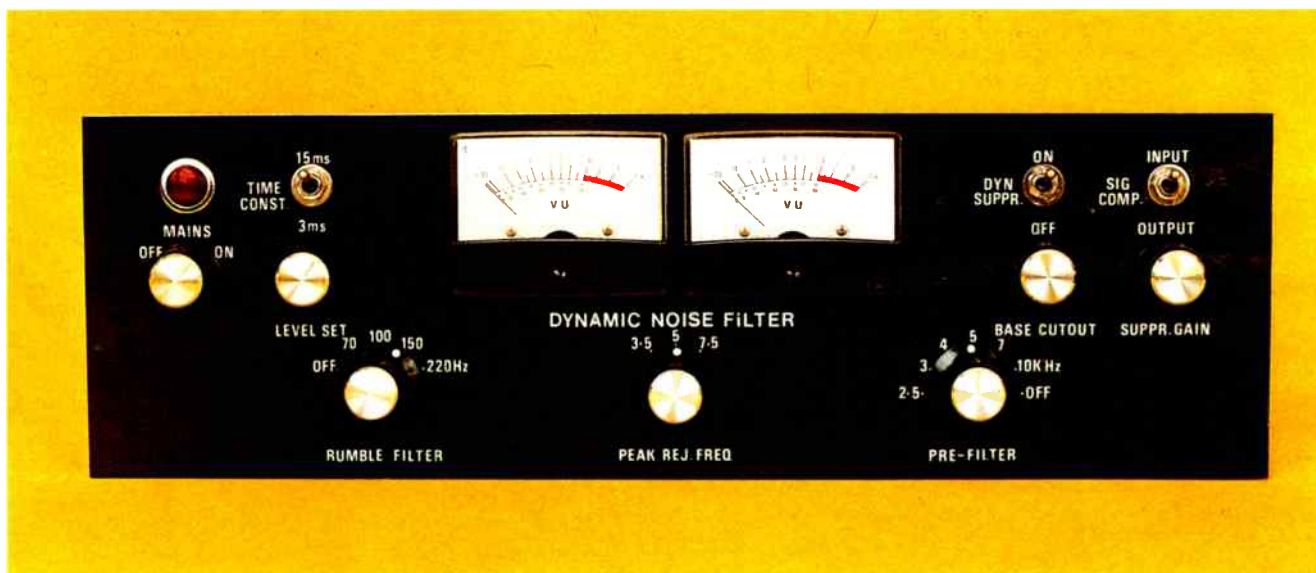
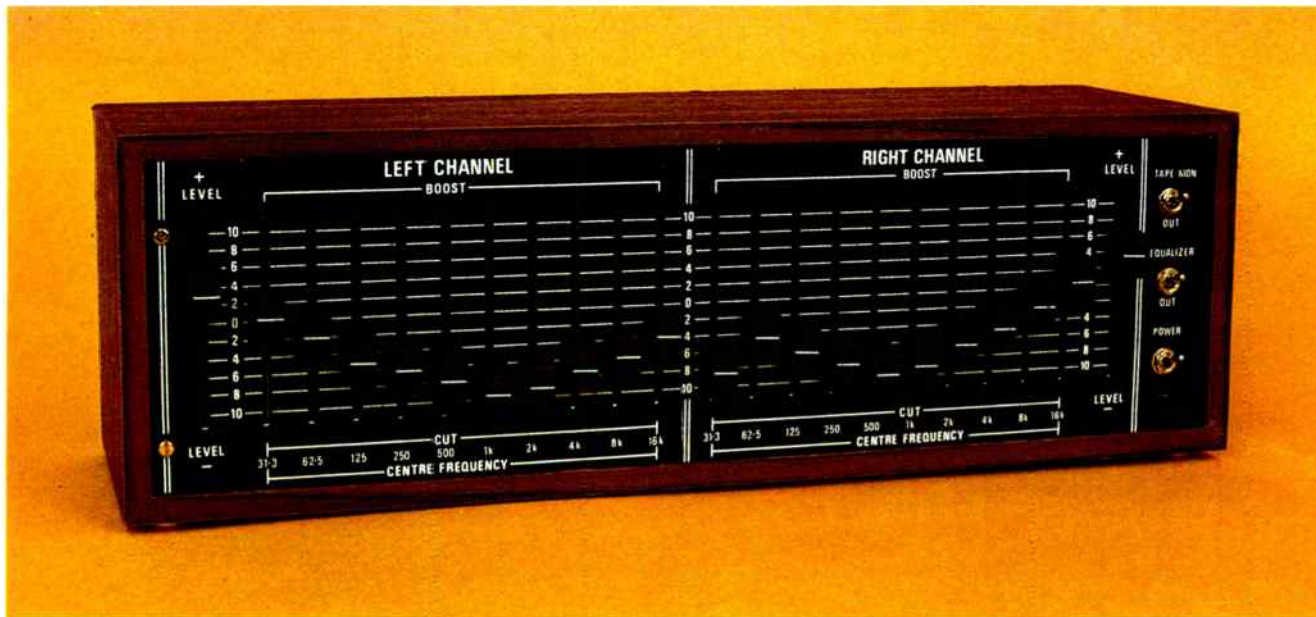


**HIGH FIDELITY STEREO AMPLIFIER**

A superb 40W rms per channel high fidelity stereo amplifier with a very high quality double anodised front panel to make it look as good as it sounds. There are dozens of features including two tape inputs and outputs plus tape monitoring facilities designed so that you can tape record from any source including another tape recorder and monitor the recorded signal without interfering with the recording. There is a three position high cut filter with variable slope, and bass and treble controls with a choice of operating range; a two-position rumble filter, and lots more. For full specification and construction details turn to the project section at the back of this catalogue.

**HIGH FIDELITY STEREO TUNER**

A superb high fidelity stereo tuner with a very high quality double anodised front panel designed to match the 40W hi fi amplifier to which it makes an ideal partner. The tuner covers four wavebands: long wave, medium wave, VHF and the UHF TV band. The VHF band gives you excellent stereophonic reproduction of all BBC and local radio transmissions in your area, whilst a unique feature is the ability to receive the high quality sound, broadcast by the TV stations and usually considerably degraded by the poor quality sound reproduction systems in most TV sets. It will also give stereo sound if the TV stations ever start to broadcast in stereo. For full specification and construction details turn to the project section at the back of this catalogue.



## TEN CHANNEL STEREO GRAPHIC EQUALISER

A really superior quality Graphic Equaliser with ten controls per channel making a total of twenty plus two overall volume controls. The design avoids the need for complicated coils and also makes use of a special op amp designed for use in audio circuits and featuring a very low noise input specification that puts this unit solidly into the top flight hi-fi class.

### Specification

Control centre frequencies: 31.3Hz, 62.5Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz, 4kHz, 8kHz, 16kHz  
 Frequency response: (Controls flat): 10Hz to 20kHz  $\pm 1$ dB  
 Range of filter controls:  $\pm 13$ dB  
 Distortion (2V out controls flat): 0.02% typical  
 Signal to noise ratio: (2V out controls flat): 82dB

### Construction Details

Full construction details are given in our leaflet MES 37 complete with component schedule.

Order As XH21X (Leaflet MES37)

### Printed Circuit Board

Order As XX03D (10-Channel G.E. PCB)

### Cabinet and Woodwork

A ready printed and punched chassis with front and rear panel finished in semi-gloss black and printed in white, and a teak effect finish wooden cabinet available separately.

Order As XB74R (10-Channel Equaliser Metalwork)  
 XB75S (10-Channel Equaliser Woodwork)

## DYNAMIC NOISE FILTER

A dynamic noise filter which does not need specially encoded material to function correctly, (as does the "Dolby" noise reduction system) but will reduce the noise present in any signal.

Our six page leaflet MES 32 describes the noise limiter and how it works and shows you the full construction details, component list etc.

### Construction Details

Order As XH07H (Leaflet MES 32)

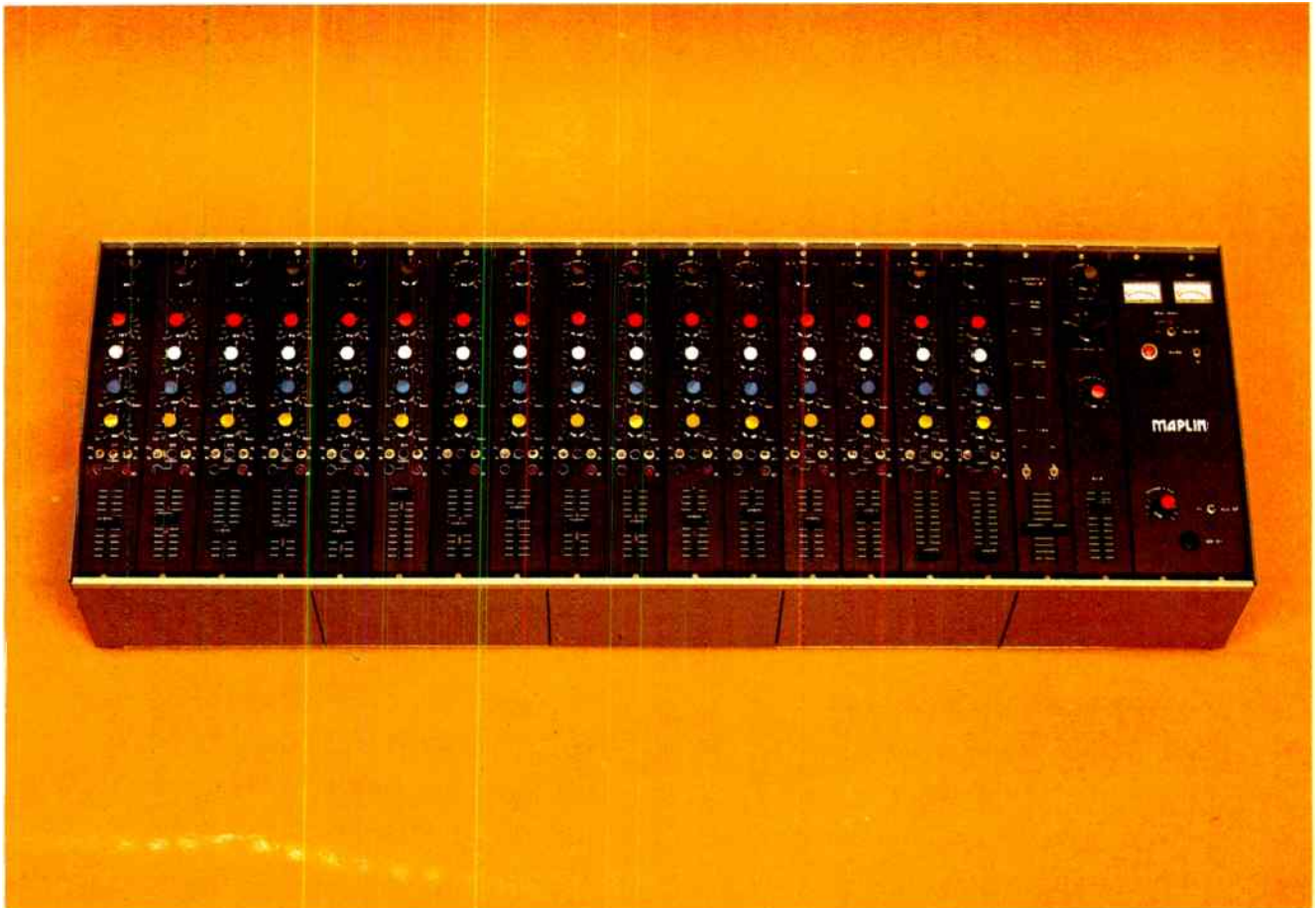
### Printed Circuit Board

Order As BB55K (Dyn Noise Fitr PCB)

### Metalwork

Order As XB05F (Dyn Noise Fitr Metalwork)





**PROFESSIONAL EXTRA HIGH FIDELITY STEREO MIXER**

Designed by Peter Cole

- Fully modular for flexibility.
- Two separate group mixing sections both fully stereophonic and switchable to any input module.
- Pre-fade listen (PFL) on inputs and group mix modules.
- PPM or peak VU metering.
- Foldback (FB).
- Talkback.
- Any number up to 16 input modules (mono or stereo).
- Selection of input modules to cater for all types of input equipment, including professional microphones.
- Tone control on all channels.

**Specification of Prototype**

Main Frame (fully assembled with PFL and FB)

Frequency response	Better than -3dB (20Hz to 20kHz) with 16 input modules. The fall-off in the frequency response is mainly a function of the numbers and lengths of interconnecting cables and buses. The individual mixing amplifier boards have a virtually flat response over the audio spectrum.
Signal to noise ratio	Better than 90dB
Distortion	<0.01%
Output level	0V to 4V (adjustable)

**Input Amplifier**

Mic. Amp	
Balanced input	20 to 50Ω or 200 to 600Ω
Sensitivity	12 to 20μV, 25 to 30μV, 80 to 100μV
Signal to noise ratio	Better than 100dB
Other parameters	Better than Main Frame
Cartridge Amp	
Switchable inputs	Magnetic Cartridge, Ceramic Cartridge, High Impedance Microphone
Sensitivities	Magnetic Cartridge 4mV at 50k Ceramic Cartridge 80mV at 100k Hi-Z Mic 10mV at 50k
Other parameters	Better than Main Frame.

**General Purpose Pre-Amp**

Sensitivity, variable	from 30mV at 33k
Other parameters	Better than Main Frame

**Tone Control**

Band response	-18dB
Treble response	+16dB

**Filter Unit**

Switch in "DU" position	Flat
With roll-off control at minimum	the response will fall-off at 6dB/octave from the selected frequency (5, 7, 10 or 15kHz)
Roll-off control	may be adjusted to give any roll-off between 6dB/octave and 18dB/octave.

**General**

The mixer, as described, has been designed to meet the requirements of professional recording studios, FM radio stations, concert halls and theatres, yet is equally suited for home use. It offers a performance which matches that of the very best tape-recorders and high fidelity equipment. Considerable design and re-design work has been undertaken to achieve this remarkable performance at a fraction of the cost of comparable mixers. With the exception of the basic parts (P.S.U. main mix module, group mix module) other parts may be included or left-out as desired.

The input modules should be selected to suit the equipment that will be used with the mixer. Tone controls may be fitted to each input module as required. The block diagram Fig. 1, shows the interconnections between the boards in a module and between the modules. Each input module has a peak over-load detection circuit so that immediate visual indication is given if an input signal becomes too loud. Pan pots are provided on main channels which enable the monophonic source to be positioned on the overall stereophonic sound stage. Pre-fade listen (PFL) is provided. The operator can listen to an input which at that time is not included in the main output mix, and adjust the preset level control by switching PFL to the meters. When that input is required in the main mix the operator can simply push the channel faders fully open and that channel will enter the main mix at the preset level. The tone controls and on stereo channels the balance control may also be set in advance. The output of each input module may be switched to either group mix module as required, so that a selection of inputs e.g. all instruments may be mixed in one group, whilst another selection e.g. all vocalists may be mixed in the other group. Group mix modules may also be fitted with PFL. The outputs of the group mix modules are further mixed in the main mix module to give an overall stereo output.

Foldback is provided to allow mixed groups of signals to be fed back into an input module so that it may be re-mixed with other signal, and be further processed as a block of signals. It may be desirable to insert an echo effect at this point and the Echo Chamber shown on page 152 is ideal for this purpose.

Any input module, except General Purpose types can also be wired with talkback facilities. This allows an input module to feed signals to the PFL line and thence to the monitor amps which may be temporarily connected to the performers' headphones. When this facility is switched on, the input module is automatically isolated so that it cannot accidentally be connected into the mix. A front panel lamp lights to give a visual indication that that module cannot be used for mixing.

**Construction Details**

Full construction details are given in our leaflet MES 38 (a component schedule is also available MES38B free of charge).

Order As X-122Y (Leaflet MES 38)

**Metalwork**

Full details of the metalwork are given in the construction leaflet. The following parts are required.

Order As	LW00A (Mixer Metalwork Kit No. 1)	Order As	LR13P (HO Mixer PCB No. 2)
	LW06G (Mixer Metalwork Kit No. 2)		LR140 (HO Mixer PCB No. 3)
	W10L (Mixer Metalwork Kit No. 3)		LR15R (HO Mixer PCB No. 4)
	LR18U (Mic Mod Front Panel)		LR34M (HO Mixer PCB No. 24)
	LR11M (Mono GP Front Panel)		LR16S (HO Mixer PCB No. 5)
	LR12N (Stereo GP Front Panel)		LR35O (HO Mixer PCB No. 25)
	LR17T (Cart/Hi-Z Front Panel)		LR21X (HO Mixer PCB No. 6)
	LR29N (Mixer Bus Mng Plate)		LR28F (HO Mixer PCB No. 18)
	LR32K (Mixer Bus Securer)		LR33L (HO Mixer PCB No. 23)
	LR43W (Mixer Module Chassis)		LR36P (HO Mixer PCB No. 26)
	LR19R (Mixer Amp Mtg Plate)		LR41U (HO Mixer PCB No. 27)
	LR19V (Main Mix Front Panel)		LR22Y (HO Mixer PCB No. 7)
	LR29G (Mix Pot Bkt)		LR23A (HO Mixer PCB No. 8)
	LR10L (Group Mix Front Panel)		LR24B (HO Mixer PCB No. 9)
	LR43TS (Mixer I/P Mts Plate)		LR42V (HO Mixer PCB No. 29)
	LR31J (Pan Bkt Bkt)		LR25C (HO Mixer PCB No. 10)
	LR30H (Mixer Mic Tr Bkt)		LR26D (HO Mixer PCB No. 14)
	LR19K (Mixer Blank Panel)		LR27E (HO Mixer PCB No. 15)
	LR20W (Mixer Blank Underpan)		
	LR40T (Mixer Module Tab)		
	LR0BJ (I/P Jack Identification Tab)		



**150W STEREO DISCO**

A superb fully stereophonic discothèque capable of delivering 150W rms continuous sine wave power per channel simultaneously into 4Ω loads. The unit features an automatic voice operated fader, extensive monitor facilities and the light show described below.

**Specification**

Output power:	continuous rms sine wave into
	4Ω      8Ω
One channel driven	225W    146W
Both channels driven (per channel)	160W    112W
Frequency response:	±1dB (30Hz to 20k Hz)
Total harmonic distortion at 150W:	>0.1% at 1k Hz.

*Continued on page 24*

**LIGHT MODULATOR**

A high quality light modulator with 3 channels each capable of driving loads in excess of 1kW each. The unit has automatic gain control and very steep filters to ensure that signals proper to one channel do not operate the bulbs of another channel.

**Construction Details**

Full construction details are given in our leaflet MES42.

Order As XH23A (Leaflet MES42)

**Cabinet**

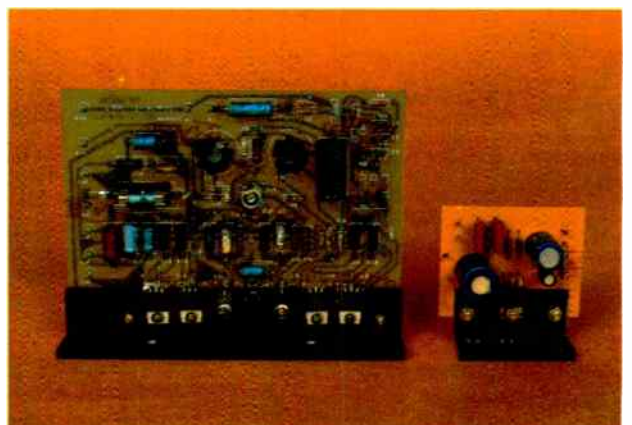
A very attractive orange enamelled case with black front panel fully punched and printed in white. Overall size 216 x 202mm.

Order As XB37S (Sound To Light Unit Case)

(For PCB, see Disco unit)

**AMPLIFIER MODULES**

Turn to the project section of this catalogue for details of our high fidelity 8W, 50W, and 100W amplifier modules for you to build. Our picture shows the 8W and 50W amplifiers after construction.





**BURGLAR ALARM**

A high quality burglar alarm based on a balanced bridge system that gives the ultimate in security. As well as allowing you to use as many simple contact type detectors, pressure mats etc as you require, the design allows the use of up to four ultrasonic movement detectors as well.

The ultrasonic detector simply sticks on to a wall and guards the whole room. It produces a very high frequency sound pattern in the room, way above audio frequencies so that you can't hear it. If the sound pattern is disturbed by a movement the detector will signal to the main control box and the alarm will go off. The ultrasonic detector has a variable sensitivity control to suit room size etc. so that very small movements are not detected.

The main control box can differentiate between a contact type detector operating, an ultrasonic detector being triggered and the line to an ultrasonic detector being interfered with. In each case a different combination of lamps light on the main control box. In addition if an ultrasonic detector is the cause of the alarm going off a lamp lights on the triggered unit.

Full construction details of the main control box and the ultrasonic unit are given in the project section towards the end of this catalogue.



**MODEL TRAIN CONTROLLER**

A pulse width speed controller which delivers full voltage to the model train even at very slow speeds to achieve smooth train movements at all speeds. Added features are the acceleration and deceleration controls which allow smooth acceleration and braking to and from the speed set by the main speed control.

An emergency brake is provided which stops the train instantly at the press of a button, and another press button is provided to momentarily apply full power to the track to help to overcome any inertia or resistance due to dirt and dust which is stopping an engine from moving off.

The controller is fully protected against short circuits on the output and an overload lamp lights if a short circuit is present. The controller will deliver up to 1.6A at 12V DC; powerful enough to drive even the biggest locomotives

For full construction details turn to the project section towards the end of this catalogue.

## MICHRON MK II

A digital alarm clock kit complete with a beautifully finished silver and white case that will look very attractive in any room in the house. The clock features a big 0.7 in. (17.75 mm) bright red display with automatic dimming as night falls. In addition the clock has battery back up. If the mains fails the clock will continue to function on the battery until the mains returns. Also there are all the usual functions: flashing seconds indicator, seconds display, loud audible alarm with 'set' indicator, snooze timer, sleep timer, no radio frequency interference, will switch your radio or other appliance on or off, time-set security switch to stop "little fingers" interfering with the displayed time plus all the usual features. We are offering these superb clock kits at a really low price, so turn to the project section of this catalogue, now, to see how simple it is to make one.



## MONITOR TIMER

A very accurate timer that will switch mains appliances on and off again at preset times. An attractive case is available, fully punched and printed to which fits a double 13A socket so that appliances up to 1kW total (5A) may be transferred from normal mains outlets directly to the timer. Simply plug them into the timer and they will switch on and off at the times you have pre set. In addition the timer functions as a normal 24-hour clock, with alarm on and off set indicators, flashing seconds indicator, high brightness 1/2 in. (12.7 mm) red display, test button to check that appliance connected will operate correctly at 'on' time, very simple 'one-finger' setting of time and on/off times with security to stop "little fingers" interfering with displayed times. For full construction details turn to the projects section in this catalogue.

## VERY LOW DISTORTION AUDIO OSCILLATOR

An audio oscillator is an essential piece of test equipment for anyone building audio equipment, hi fi gear etc. Because of its very low distortion sine wave output this oscillator is suitable for use with even the most sophisticated hi fi equipment.

Range: 20Hz to 26k Hz in three ranges.  
Distortion: Better than 0.01% (sine wave 1kHz)  
Outputs: Sine or square wave variable voltage up to 1V.

Printed Circuit Board  
Order As BB72P (Sine/Square Gen PCB)

### Front Panel

A fully punched and printed front panel finished in semi-gloss black with white lettering. Panel is a direct replacement for the panel supplied with the Verobox 213.

Order As BB73Q (Audio Osc Front Panel)

### Construction details

All the construction details are given in our leaflet MES 15.  
Order As XH24B (Leaflet MES 15)



## CAR BATTERY/MAINS VOLTAGE CONVERTER

A voltage converter with fully stabilised outputs, short circuit protection (followed by immediate recovery), input of battery version protected against polarity reversal, and a maximum output of 400mA. Details of two versions are available, one for mains operation and one for 12V battery operation. On both types the output is switchable between three output voltages: 6V, 7.5V and 9V.

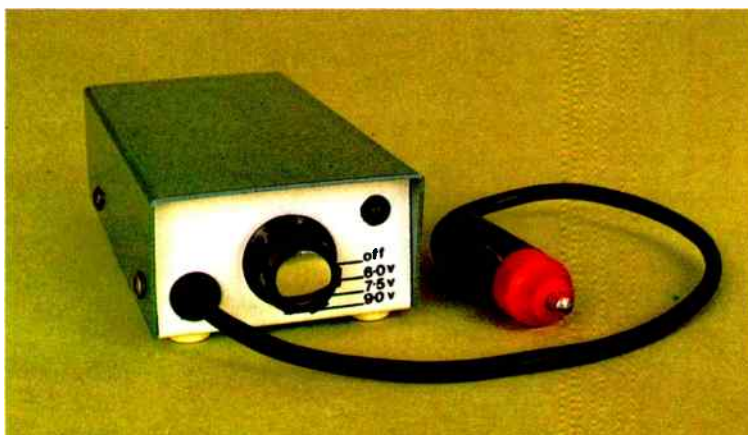
### Construction details

All the construction details are given in our leaflet MES 17.

Order As XH25C (Leaflet MES 17)

### Printed Circuit Board

Order As BB74R (Car PSU PCB)







**ASCII KEYBOARD AND TV DISPLAY INTERFACE**

A 63 key keyboard generating an ASCII encoded output with 96 character codes and 32 control codes, 9 of which are available directly to control cursor position on the TV set. The keyboard has a repeat facility and a 2 key rollover which ensures that only one code is generated however many keys are pressed. The keyboard generates capitals and lower case characters (although the VDU only displays capitals regardless of whether capitals or lower case codes are input to it), but can be strapped to generate capitals only for microprocessors that will not recognise lower case codes. Provision is made on the keyboard for direct connection to microprocessor and via interface boards to a standard home cassette tape-recorder and to a standard 625-line colour or monochrome television set. The VDU interface allows the TV to display 16 lines of 64 characters per line. Full cursor control is available in all four directions from the keyboard. The VDU controller will also store up to 4 pages (with extra memory boards) with automatic scrolling through the pages, and forward and backward stepping through the pages. The cassette interface functions via a modem which can be used to transmit via telephone lines or amateur radio transmissions. The whole unit can easily be built into our Verocase Type 502 and a front panel ready-cut to suit our keyboard is available to fit

this box. The unit can be built in stages since each section is a separate pcb which simply solters on to a mother board for complete flexibility.

**Construction Details**

A leaflet giving full construction details is available, MES71, the first of a series describing microprocessor projects.

**Order As XH26D (Leaflet MES 71)**

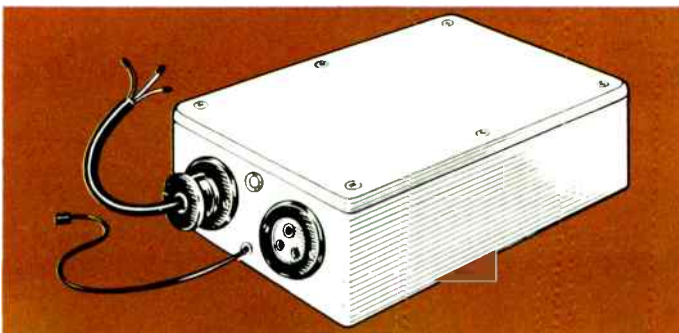
**Printed Circuit Boards**

**Order As**

- |                           |                               |
|---------------------------|-------------------------------|
| BB82D (Keyboard PCB)      | BB91Y (Graphics Gen PCB)      |
| BB83E (VDU Mother Board)  | BB92A (Output Timing PCB)     |
| BB84F (UART PCB)          | BB93B (Address Switching PCB) |
| BB85G (Control PROM PCB)  | BB94C (VDU Interface PCB)     |
| BB86T (Clear Logic PCB)   | BB95D (Cassette/Modem PCB)    |
| BB87U (RAM Board)         | BB96E (3-Page Extn Mem PCB)   |
| BB88V (VDU Control Board) | BB97F (4-Page Control PCB)    |
| BB89W (Latch PCB)         | BB98G (VDU PSU PCB)           |
| BB90X (Character Gen PCB) | BB99H (VDU Mixer PCB)         |

**Front Panel**

**Order As XY12N (VDU Front Panel)**



## CAR ELECTRONIC IGNITION SYSTEM

A high performance electronic ignition system for negative earth cars. The unit is very easily connected and the conventional ignition system can be returned to at any time simply by transferring the input plug on the box to the second socket. The electronic ignition system has many advantages over conventional systems, for example, fuel saving, quick starting on very low battery voltages, more power at high revs, points wear reduced.

### Construction Details

Full construction details are given in our leaflet MES 16.

Order As XH27E (Leaflet MES 16)

### Printed Circuit Board

Order As BB75S (Car Ignition PCB)

Disco (continued from page 20)

### Construction Details

Full specification and construction details are given in our leaflet MES 41.

Order As XF04E (Leaflet MES 41)

### Printed Circuit Boards

#### Order As

BB81C	(Disco Pre-Amp and Tone PCB)	BB22Y	(FET-Ceramic PU Bd)
BB19V	(Disco PSU PCB)	BB24B	(Disco Fader Bd)
BB20W	(100W Amp Board)	BB25C	(VUM & HP Amp Bd)
BB26D	(Motor Switch PCB)		
BB27E	(Light Mod Bd)		

### Heatsink DR2

An aluminium heatsink formed and punched to fit directly onto our Disco Power Amp PCB to mount the driver transistors.

Order As BB18U (Heatsink DR2)

### Front Panel

A fully punched and formed front panel finished in semi-gloss black with lettering in white and hinged along its lower edge to facilitate construction.

Order As XB76H (Disco Front Panel)

### Woodwork

A sturdy wooden cabinet finished in hard-wearing black plasticised cloth with a white laminated motor board. Supplied complete with lid and carrying handles.

Order As XB77J (Disco Cabinet)



## 'ELECTRONICS TODAY INTERNATIONAL' INDUCTION BALANCE METAL DETECTOR

A really superior metal detector using the really sensitive induction balance system. It will detect a man's gold ring at 8 in and a 6 in. square of copper at 22 in. Full construction details are given in ETI's 'Top Projects No. 5' described on page 14.

(Note: For a meter, use our Level Meter)

### Printed Circuit Board

Order As (XX00A) (IB Metal Det PCB)

### Bass Pedal Unit (continued from page 16)

Output suitable for feeding directly into a power amp.

(i.e. into 'line' or 'guitar' or 'tape' or 'aux' input)

13-note pedalboard C to C.

Frequency range: C<sub>1</sub> (~32Hz) to C<sub>3</sub> (~128Hz) (25 notes)

Whole unit tuned with one control

Highly stable, temperature compensated, voltage stabilised master oscillator.

### Construction Details

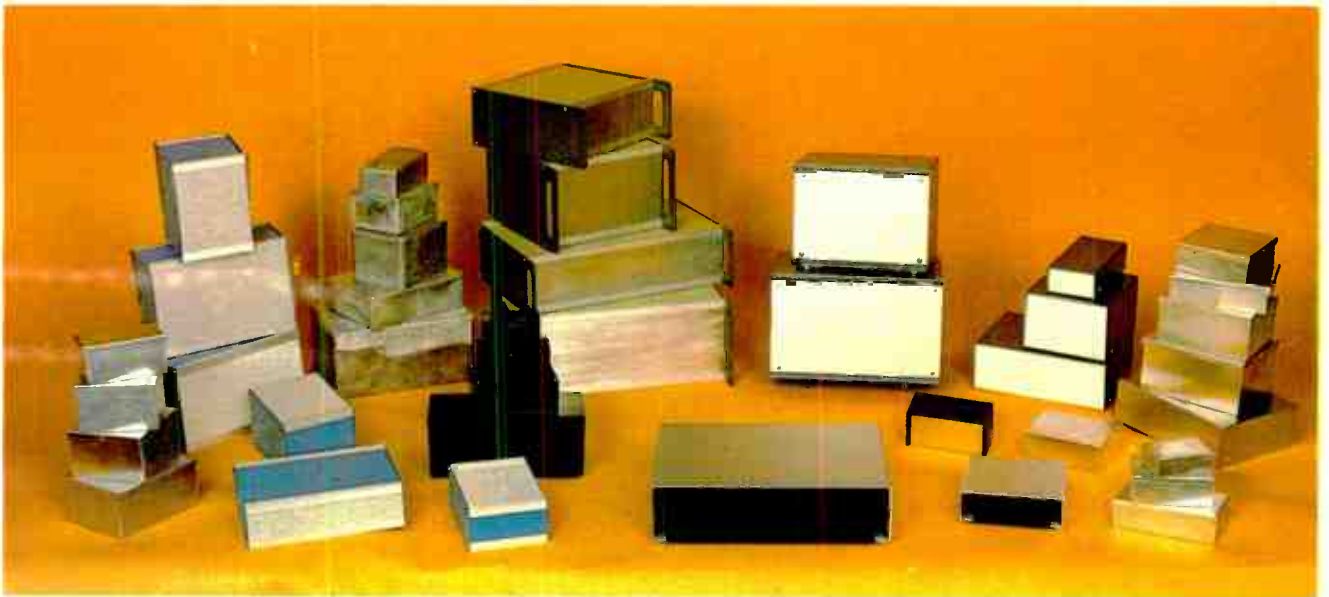
A leaflet giving full construction details is available.

Order As XH20W (Leaflet MES 25)

### Printed Circuit Board

Order As BB16S (Organ/Guitar Bass PCB)





**BOXES, CABINETS & CASES**

A vast range of boxes, cabinets and cases to suit just about every application. From low-cost plastic (MB range) and low cost metal boxes (AB range) to the high quality Vero plastic boxes and Centurion metal boxes. We've got diecast boxes, potting boxes and even boxes with battery compartments.

There's a range of boxes in black vinyl finish and a similar range with a teak-effect finish. There are sloping front boxes and boxes for use with foot switches. In fact well over a hundred different boxes. You'll find them all described on pages 52 to 57 of this catalogue.



**WIRES AND CABLES**

An excellent range of wires and cables to cover many of the most common needs in electronics and home electrical work. We also stock a range of accessories to help you when cabling such as lacing cord, tie wraps, Hiatts etc.



**GENERAL COMPONENTS**

We stock a very wide range indeed of all the most popular electronic components and they're all fully described in this catalogue. Resistors from precision 1% types up to 25W high power types. Capacitors from 1.8pF to 10,000µF in lots of different voltages, tolerances and dielectrics. Our transistor and IC range is very large, covering TTL, CMOS, op-amps, linears, microprocessors, memories etc. etc.

**KNOBS & DRIVES**

Our range of highly attractive knobs gives you a really big choice to finish off your project the way you want. From the universal plastic pointer to large all shiny metal knobs we've got the lot. We also stock a range of dials, slow motion drives and cord drive parts. We've got collet knobs with different coloured caps, and slide knobs in five different colours. See pages 76 to 80 in this catalogue for full details





**FIBRE OPTIC TABLES AND LAMPS**

These beautiful lighting effects will create the centre of attraction in any room. The swirling coloured patterns of the large and small tables are fascinating to watch and the lamp with its hundreds of pin-pricks of light creates a very relaxed atmosphere. The lamp is shown below in a lit and unlit room. For full details turn to page 83.





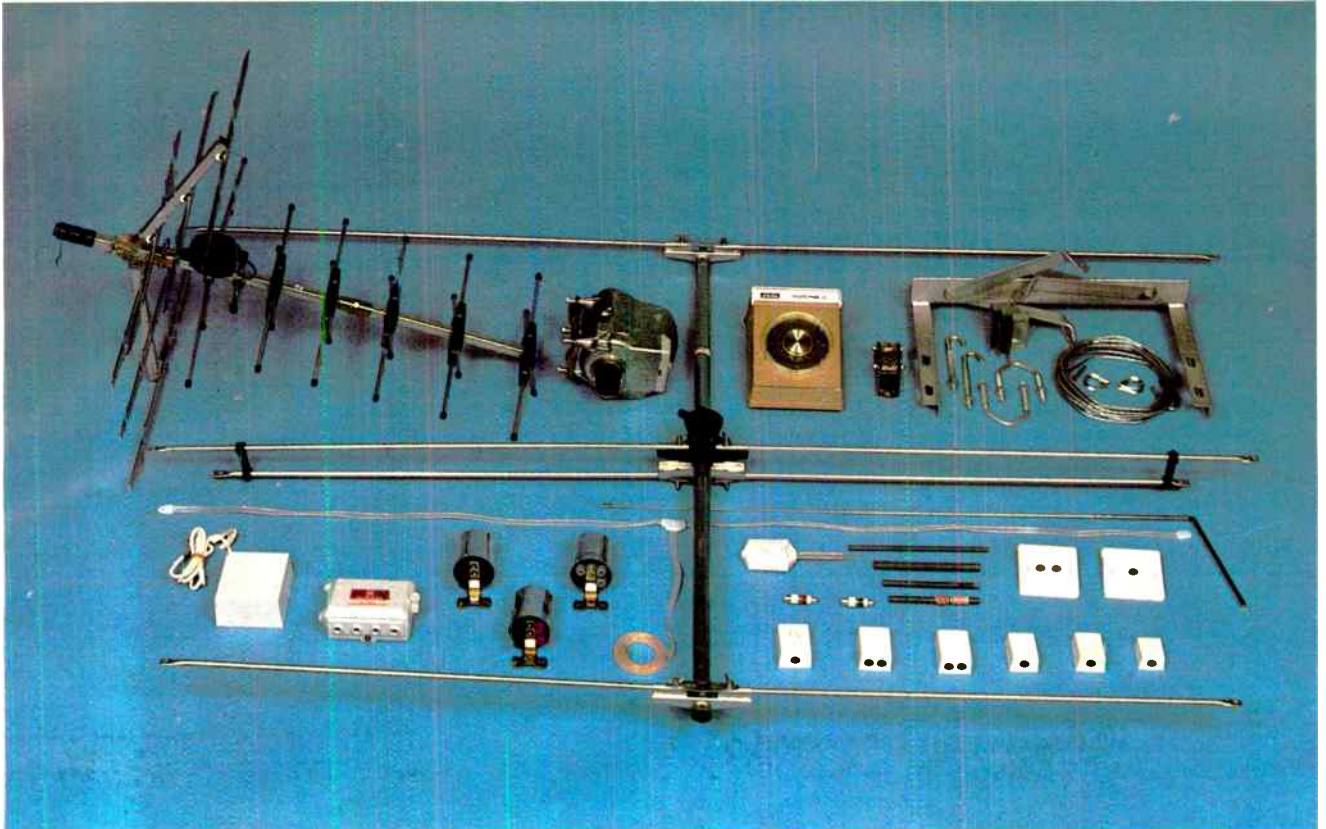
## LAMP HOLDERS

A range of highly attractive lampholders to suit LES and MES bulbs. There are also some mains neons and a really unusual item, little covers that clip over LED's to give them a very neat appearance.

## SWITCHES

We stock a very large range of switches and relays. Push-button, rocker, toggle, rotary and slide switches with lots of different types in each category. Our modular rotary and latch switches are excellent value for money and allow many combinations of different switch actions to be made up.





**AERIALS**

A completely new section in this catalogue is the section covering TV and radio aerials. Our range covers standard TV aerials and very high gain types as well as a range of FM stereo radio aerials from a simple dipole and reflector right up to the giant Mushkiller 8-element for long range reception. And they're all high quality aerials made by one of Britain's biggest and most respected names in aerials: Antiference.

We also stock their brackets and lashing kits to give long-lasting support to your aerial in even the fiercest weather conditions. In addition we stock their range of co-axial outlets, splitters and dividers and an aerial amplifier.

Also shown in the picture is our very high quality aerial rotator so that with a wideband TV aerial you can pull in lots of stations or with an FM aerial pick up good stereo from several local radio stations.

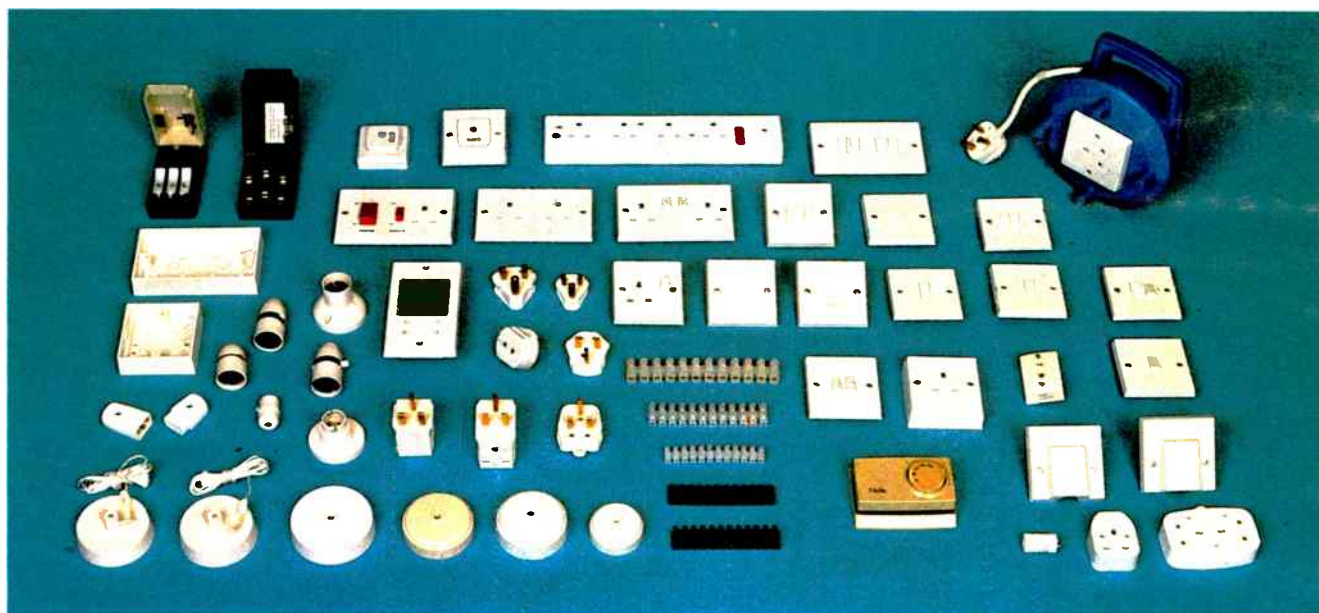
As usual there's a massive range to choose from and everything's at excellent prices.



**MOBILE RADIO ANTENNAE**

We are major stockists of one of the finest ranges of mobile radio antennae in the world. Our range covers 66 MHz to 470 MHz with an excellent range of mounts. Our picture shows an amateur with two of our aerials in use (the 3dB gain whip and the 5dB gain collinear) just about to pull away after visiting our busy shop in Southend. For full details of our mobile radio antennae turn to pages 105 and 106





### CONNECTORS

We have a truly superb range of connectors, all at marvellous prices. There are fifteen pages in this catalogue devoted solely to connectors commencing on page 114. New this time are lockable DIN connectors, XLR "Canon"-type connectors, some extra mains plugs and sockets, a range of 'UHF' connectors and adaptors to complement our range of mobile radio antennae, jack sockets with chromed bezels and an extended range of phono sockets. Also we've re-introduced our excellent low-cost range of edge connectors.

So if you're looking for a connector to suit your special application turn to pages 114 to 129 and the chances are you'll find something there that will fit the bill.

### ELECTRICAL ACCESSORIES

Another completely new section in this catalogue is the section devoted to electrical accessories. Virtually everything you need for electrical jobs at home from putting in a new socket to rewiring the entire house. And if you've never done anything like it before, our books, "Home Electrics" by Geoffrey Burdett or "Practical Electrical Rewiring and Repairs" by Charles Miller explain everything you need to know in simple, practical terms. Turn to pages 43 and 44 for cables and pages 130 to 133 for a wide range of quality British made electrical accessories all at excellent prices. You can be completely confident about the quality and safety of your work if you follow the instructions in the books using our high quality components.





**SPEAKERS**

Our excellent range of speakers covers tiny miniature speakers less than two inches diameter up to the mighty McKenzie 15 inch bass speaker. In between we've got some beautiful speakers all at marvellous prices.

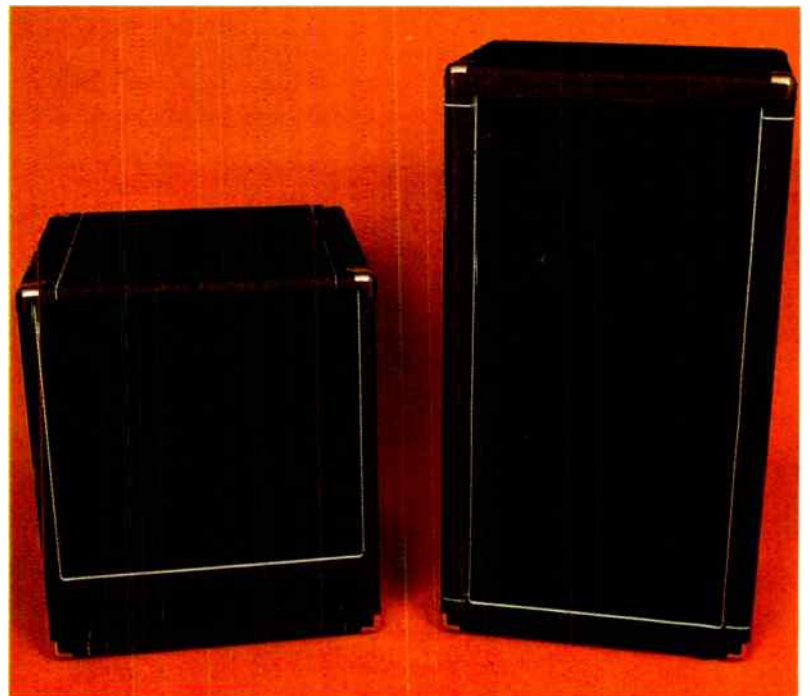
We must be the cheapest in the country for the new Piezo tweeters, and if you've never tried them, you should. They've got a sharp crystal clarity that has to be heard to be believed and at our prices they're a spectacular bargain.

For the more conventionally minded we've got a range of crossover networks, a mid-range speaker and a selection of tweeters.

For the power men we've got a good range of 12 inch speakers at 50W and 80W and the big 15 inch speaker that will deliver a massive 150W rms.

In addition we stock a portable megaphone with a dual microphone connected in antiphase to help to avoid feedback, and two types of car-top public address horns that are extremely reasonably priced. Also there are three very nice pairs of stereo headphones at prices you'll find hard to beat.

So if you're looking for speakers, tweeters, woofers, crossovers, headphones, megaphone or PA horns turn to pages 137 to 141 and pick something from our range at our low, low prices.



**SPEAKER CABINETS AND ACCESSORIES**

Our picture shows our two high power speaker cabinets. One to house our 15 inch McKenzie and one to house two of our 12 inch units. This latter cabinet also has cut-outs which are normally blocked off for fitting two of our 3 inch piezo tweeters.

We also stock the special acoustic wadding you will need to cover the insides of the cabinet. You will be surprised how dramatically different and improved the sound is when this is done. If you prefer to make your own cabinets we sell speaker grille material in black and brown and a hard-wearing plasticised cloth for covering the outsides of the cabinet. Coupled with our sealing strip, Velcromounts, cabinet corners and carrying handles you'll see that we've got just about everything you need (except the wood, of course) to put together your own speaker cabinets using the same materials the professionals use.





## BOOKS

We stock over 200 titles of books on or relating to electronics. The book section in this catalogue is just like having a superb technical bookshop in your home. There are plenty of new books in this catalogue including a whole new section of superb books about microprocessors and programming, in fact even a book and tape-cassette home study course on programming.

For the absolute beginner try our superb set of "Basic Electronics" books that teach you while you experiment with the actual components. And once you've mastered that, there's an absolutely massive selection of books with projects to build in them.

And don't forget that there are new titles coming on to the market all the time. You'll find details of all the best ones in our newsletters which are published about once every two months.

**5600S Synthesiser** (continued from page 12)

### Construction Book

A book is available giving full construction details of this and the 3800 synthesiser.

Order As XF11M (5600S Stereo Synthesiser Book)

The following is a list of parts used in this project which are not shown elsewhere in this catalogue.

### Printed Circuit Boards

Order As	BB38R	(Synth Oscillator PCB)
BB41U	(Synth Mixer PCB)	BB48C (Synth Ext I/P's PCB)
BB44X	(Synth VCA PCB)	BB65V (3600 VCF PCB)
BY87U	(Synth Preset Mtg Board)	
BY88V	(Synth 1979 Keyboard Controller)	
BY89W	(Synth Binary Encoder)	
BB40T	(Synth Power Supply Mk. II PCB)	
BY90X	(Synth Sample and Noise PCB)	
BB43W	(Synth Trans Gen 1 PCB)	
BB45Y	(Synth Trans Gen 2 PCB)	
BY81C	(Synth Trans Repeat PCB)	
BY82D	(Synth Reverb and Phase PCB)	
BY83E	(Synth VC Pan and Anc PCB)	

### Hinges

A cadmium plated flat steel plate with a pin welded to it which serves to hinge the front panel of the 5600S so that it may be easily swung forward. Two are required for each synthesiser.

Order As BB64U (4600 Hinge)

### Mounting Brackets

Aluminium mounting brackets punched and angled for fixing the pcb's to the front panel

#### Order As

BB63T	(Synth Ext I/P's Bkt)	BB52G	(Synth Mixer Chassis)
BB67X	(3600 VCF Mtg Bkt)	BB60Q	(Synth VCA Mtg Bkt)
BB49D	(Synth Oscillator Mtg Bkt)		
BB50E	(Synth Keyboard Controller Bkt)		
BB51F	(Synth Power Supply Heatsink)		
BB56L	(Synth Mixer Mtg Bracket)		
BB58N	(Synth Trans 1/Env Bkt)		
BB59P	(Synth Trans 2 Mtg Bkt)		

### Front Panel

A semi-gloss black finish panel, punched and printed in white.

Order As XQ01B (5600S Front Panel)

### Rear Panel

A semi-gloss black finish panel, punched and printed in white, which provides a mounting for the mains and input and output sockets of the synthesiser.

Order As BY84F (5600S Rear Panel)

### Wooden Cabinet

A heavy-duty black-plasticised-cloth covered cabinet complete with lid and carrying handle.

Order As XQ02C (5600S Cabinet)

(Note this synthesiser will also fit in the 4600 Cabinet if a teak finished unit is required. Similarly the 4600 Synthesiser will fit in the 5600S Cabinet if a portable unit is required.)





**DISCO EFFECTS**

The pages in this catalogue devoted to disco lighting effects cover projectors with a wide range of accessories such as prisms and a new range of beautiful "TR" wheels, a mirror ball which rotates to create some beautiful effects, fuzz

lights, strobes, and sound to light units; one with a whole range of stunning visual effects.

As always we've got all this top quality gear at bargain prices so you can buy with complete confidence.

**3800 Synthesiser** (continued from page 13)

**Free run:** Internal voltage source manually adjusts oscillator over full range. Oscillator 2 can be synchronised with oscillator 1, i.e. every time oscillator 1 starts a new cycle so does oscillator 2 with free run operative. A 'sync off' position is provided on oscillator 2.

**Shape:** Varies mark/space ratio of square wave output plus switch to enable shape to be voltage controlled from either low oscillator or transient or off.

**Waveform:** Selects sine, triangular, sawtooth, inverted sawtooth or square wave as output.

**Output switch:** Routes signal to filter, envelope, signal input of VCA or direct to output stage.

**Output level:** Adjusts level of output.

**Stability:** Frequency change with change in temperature: <0.015%/°C typical.  
Frequency change with constant temperature over one week: <0.05% typical.

**Low Oscillator**

Range: 0.2Hz to 20Hz Outputs: Sine wave.

**Noise**

A pseudo-random noise generator with colour control to allow spectrum to be continuously variable between white and pink. Level control adjusts level fed to VCF.

**Sample And Hold**

Samples incoming waveforms and stores the voltage.  
Input switch: Switches between oscillator 1, oscillator 2 and noise.

**Filter**

An active voltage controlled filter (VCF).  
Inputs: Mixed signals from oscillators, noise and external inputs.  
Cut-off rate: 24dB per octave  
Control range: >2 decades  
Controls  
Control source: Keyboard, modulation, transient, modulated keyboard or off by front panel switch  
Tune: Tunes filter to control source  
High/Low: Selects tuning range  
Resonance: Adjusts Q of filter

**VCA**

A voltage controlled amplifier (VCA) in addition to the envelope. Allows ring modulation.

**Controls:**

Control input: From oscillator 1, oscillator 2 or transient.  
Function switch: VCA or Ring modulation.  
Output: Switches output between filter, envelope or output direct.

**Envelope**

Input trigger: See "Triggers"  
Attack, Decay 1 and Decay 2: All adjustable from 5msec to 5sec.  
Hold level: Adjustable 0 to 5 volts.  
Delay: Adjustable 5msec to 5sec or duration of key contact closure as selected by switch.  
Control mode: Linear or exponential voltage controlled amp with range of 60dB.  
Signal input: From oscillator 1, oscillator 2 or VCA.  
Output: Direct to output stage.

**Transient**

Trigger input: See "Triggers"  
Levels: Start, hold and final adjustable 0 to 5 volts.  
Delay 1, Slopes 1 and 2: Adjustable 5msec to 5sec.  
Hold delay: Adjustable 5msec to 5sec or for duration of key contact closure.  
Output: Direct to filter input switch, modulation input and VCA control input switch.

**External Input**

Allows external signals to be matched to the synthesiser and also generates a trigger pulse.  
Sensitivity: 50mV to 2V at 10kΩ. Variable from front panel.  
Trigger level: Decides at what voltage amplitude, trigger pulse occurs. Variable from front panel.

Continued on page 36



## MUSICAL EFFECTS UNITS

These ready-built units offer a wide range of effects for professional musicians or the amateur. From simple fuzz pedals to sophisticated echo chambers, we're certain you'll be hard-pressed to beat our prices for any of these units. They all offer excellent value for money.

### Drumsette (continued from page 16)

The superbly finished back-screened perspex front panel and the chromed touch-pads give the unit an air of distinction and quality; a quality that extends right through the instrument with close approximations of the sounds of the actual instrument being generated.\* The Drumsette will grace the finest organs, piano; or whatever you want to add a drum set to.

*\*When amplified through a high quality amplifier and loudspeaker.*

#### Specification

Output impedance: 3k $\Omega$   
 Output voltage (max): 100mV rms  
 Overall size: 434x110x186mm (wxhxd)  
 Standard phono socket output.  
 Fifteen touch-selected rhythms:  
 Waltz; Jazz Waltz; Tango; March; Swing; Fox Trot; Slow Rock;  
 Rock Pop; Shuffle; Mambo; Beguine; Cha Cha; Bajon; Samba;  
 Bossa Nova.  
 LED indicator shows rhythm selected. Indicator LED extinguishes to indicate down-beat.  
 Nine instrument drum set:  
 Snare Drum; Bass Drum; Conga Drum; Low Bongo; High Bongo;  
 Short Cymbal; Long Cymbal; Claves; Maracas.  
 Volume control.  
 Tempo control with scale marked on front panel.  
 Balance control adjusts comparative volume of brush and drum sounds.  
 Two linked stop/start touch pads so that rhythm may be stopped whilst playing and re-started on the same rhythm without searching through the rhythm-select pads. The rhythm always re-starts on the down-beat.  
 240V Mains operated.

*t Thus it may be connected to any amplifier or organ, tape, radio or aux. input.*

#### Construction Details

A leaflet is available giving full construction details and written in such a way that someone with no prior knowledge of electronics could build this project.

Order As XH19V (Leaflet MES 49)

#### Drumsette Kit

A complete kit of parts including the leaflet is available. It offers a substantial cost saving over buying all the parts individually.

Order As XL13P (Drumsette Kit<sup>t</sup>)

If you wish to buy all the parts separately, the following is a list of parts used in this project that are not shown elsewhere in this catalogue.

#### Printed Circuit Boards

Order As XX16S (Drumsette 1 PCB)  
 XX17T (Drumsette 2 PCB)

#### Cabinet

The following parts fit together to form the chassis, front and back panel, and the wrap-round teak-effect finish wooden cabinet.

Order As LY01B (Drumsette Front Panel)  
 LY02C (Drumsette Rear Panel)  
 HY02C (Drumsette Bracket Set)  
 XB98G (Drumsette Cabinet)





**MICROPHONES**

A superb range of microphones and accessories with everything at really low prices. In particular our range of electret microphones is almost unbeatable at the price. For small projects we stock a crystal insert microphone and

for the professional vocalist or musician the superb Unisound dynamic microphone.

In addition we've got microphone stands, mixers and input matching transformers. So if you're looking for a good microphone, check our range and you'll find real value for money.

**LEAFLETS**

The following books and leaflets are published by Maplin. Those marked 'Free' are not shown on our price list and will be sent to you on request. An s.a.e. would be appreciated. However, please note that when you order any book or leaflet, its component schedule is automatically included.

—	4600 Synthesiser Book	XF00A
MES 11B	4600 Component Schedule	XH15R (Free)
MES 11S	4600 Synthesiser Specification	XH09K (Free)
MES 12	5600S/3800 Synthesiser Book	XF11M
MES12B	5600S/3800 Component Schedule	XF 13P (Free)
MES 14	String Ensemble Component Schedule	XH17T (Free)
MES 15	Audio Oscillator Leaflet:	XH24B
MES15B	Audio Osc. Component Schedule	XF 14Q (Free)
MES16	Car Ignition Leaflet	XH27E
MES16B	Car Ign. Component Schedule	XF 15P (Free)
MES17	Voltage Converter Leaflet	XH25C
MES17B	Voltage Conv. Component Schedule	XF 16S (Free)
MES18	Semiconductor Data Book Vol. 1	XF17T
MESD19	MC1496 Data Sheet	XH11M (Free)
MES 22	Touch-Sensitive Piano Leaflet	XH18J
MES22B	Piano Component Schedule	XF18L (Free)

MES24	Spring Lines and Driver Module Details	XH06G (Free)
MES25	Bass Pedal Unit Leaflet	XH20W
MES25B	Pedal Unit Component Schedule	XF20W (Free)
MES26	'PE' Radio Control Book	XF03D
MES26B	Radio Control Component Schedule	XF24B (Free)
MES27	DM02T Data Sheet	XH13P (Free)
MES32	Dynamic Noise Filter Leaflet	XH07H
MES32B	Noise Filter Component Schedule	XH28F (Free)
MES33B	40W Stereo Amp Component Schedule	XF21X (Free)
MES34B	Stereo Tuner Component Schedule	XF22Y (Free)
MES35B	50W Amp Component Schedule	XF25C (Free)
MES36B	Touch Organ Component Schedule	XF27E (Free)
MES37	10-Channel Graphic Equaliser Leaflet	XH21X
MES37B	10-Chan G.E. Component Schedule	XF06G (Free)
MES38	Audio Mixer Leaflet	XH22Y
MES38B	Mixer Component Schedule	XH08J (Free)
MES41	150W Stereo Disco Leaflet	XF04E
MES41B	Disco Component Schedule	XF05F (Free)
MES42	Light Modulator Leaflet	XH23A
MES42B	Light Mod Component Schedule	XF23A (Free)
MES46B	Train Controller Component Schedule	XF28F (Free)
MES47B	Burglar Alarm Component Schedule	XF29G (Free)
MES48B	ETI's Metal Detector Component Schedule	XH29G (Free)

*Continued on page 36*



## RECORD-PLAYER & TAPE ACCESSORIES

An excellent selection of hi-fi care kits for record-players and cassette and reel-to-reel tape-recorders. The range covers

cleaning cloths, anti-static devices, stylus balance, tape splicers, spare cassette boxes, demagnetisers for tape heads and lots more as well as a very attractive range of cassette storage cabinets.

### 3800 Synthesiser (continued from page 33)

#### Triggers

Switches trigger pulses to envelope and transient.

Envelope: Selects trigger to control envelope from low oscillator, keyboard or external input.

Transient: Selects trigger to control transient from low oscillator, keyboard, external input or repeat.

#### Output Equaliser

Number of stages: Five  
 Centre frequencies: 60Hz, 240Hz, 1kHz, 3.4kHz and 10kHz.  
 Type: Active filter  
 Range of adjustment: >±10dB.

#### Reverberation

Type: Multi-spring  
 Output: Adjustable mix-fader from full reverb to original sound with no reverb.

#### Signal Output

Level control: 0 to 1V rms approx.  
 Load impedance: 1kΩ

#### Phones Output

Power output: 1W rms (mono)  
 Load impedance: 8Ω Output level control provided.

#### Construction Book

Full construction details of this synthesiser are to be found in the 5600S Stereo Synthesiser Book (XF11M).

The following is a list of parts used in this project which are not shown elsewhere in this catalogue.

#### Printed Circuit Boards

Order As BY86T (3800 Interface PCB)

Order As BB47B (Synth Output Stage PCB)

#### Front Panel

A semi-gloss black finish panel, punched and printed in white.

Order As XQ03D (3800 Front Panel)

#### Rear Panel

A semi-gloss black finish panel, punched and printed in white, which provides a mounting for the mains and input and output sockets of the synthesiser.

Order As BY85G (3800 Rear Panel)

#### Wooden Cabinet

A heavy-duty black-plasticised-cloth covered cabinet complete with lid and carrying handle.

Order As XQ04E (3800 Cabinet)

### Leaflets (continued from page 35)

MES49	Drumsette Leaflet	XH19V
MES49B	Drumsette Component Schedule	XF19V (Free)
MES51	Basic Organ Leaflet	XH00A
MES51B	Basic Organ Component Schedule	XH01B (Free)
MES52	Two-Keyboard Organ Leaflet	XH02C
MES52B	Two-Kbd Organ Component Schedule	XH03D (Free)
MES53	Full Scale Organ Stage 1 Leaflet	XH04E
MES53B	Stage 1 Organ Component Schedule	XH05F (Free)
MES54	32-Note Pedalboard	XH31J
MES54B	Pedalboard Component Schedule	XH32K (Free)
MES55	Auto-Organ Leaflet	XH33L
MES55B	Auto-Organ Component Schedule	XH34M (Free)
MES56	Full Scale Organ Stage 2 Leaflet	XH35Q
MES56B	Stage 2 Organ Component Schedule	XH36P (Free)
MES57	String and Brass Symphoniser Leaflet	XH37S
MES57B	Symphoniser Component Schedule	XH38R (Free)
MES71	ASCII Keyboard and VDU Leaflet	XH26D
MES71B	TV Display Component Schedule	XF26D (Free)
MES92	Michron Mk II Leaflet	XF31J (Free)
MES93B	Monitor Timer Component Schedule	XF32K (Free)
MES98	Current Newsletter	XF08J (Free)
MES99	Current Catalogue	XF07H





CAR ACCESSORIES

We've greatly extended our range of parts for the car owner in this catalogue. Lots of the new lines are shown in the picture above. Our telescopic car radio aerial is one of the longest of its type that we've ever come across and at our price its a bargain. Inside the car we've got three types of stereo speakers including a superb sounding 20W per channel pair.

There are lots of spare parts for the electrical side of the car and we even stock a few non-electrical parts that we couldn't resist because the price we can offer them to you is so low. They include foot pumps, tow-rope, luggage elastic, even an ice scraper, and a really useful "Keep Clean Kit" that includes gauntlets, a long apron and a pre-moisturised towelette sachet, all for just a few pence, but worth its weight in gold if your car breaks down when you've got your best suit on.

MAPLIN POSTER

This beautiful colour picture, an original water-colour painting by famous artist Rod Brown was specially commissioned by Maplin Electronic Supplies. Full size reproductions of the painting are available. They measure a massive 36 in x 25 in., the size of the original. They have been carefully printed in full colour or to glossy art paper and are available to you for just £1 including postage and packing (or 75p in our shop). A stunning picture to hang in your office or at home. Your children will love it. Order your copy now.



Order As X-F12N (Maplin Poster)



**TOOLS AND SERVICE AIDS**

We stock a superb range of tools offering you a tremendous choice from low-cost to precision. There's a big selection of screwdrivers, wiring pliers, cutters, wire-strippers, spanners and small wrenches. There are some beautiful little precision miniature screwdriver and spanner sets as well as miniature drills and needle files. In the heavy duty department we've got a big torque wrench at a really low price.

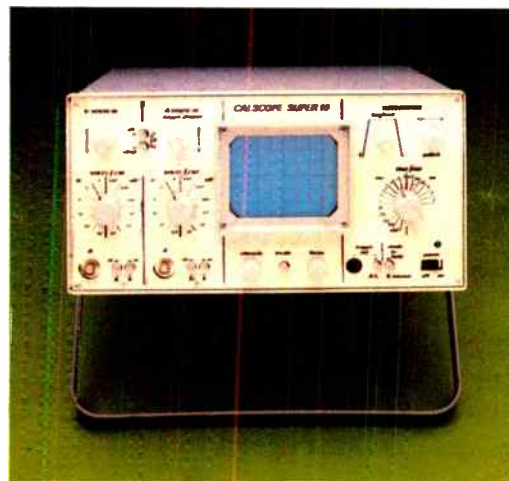
Our miniature electric drills are tremendous value for

money and the ideal thing for making pcb's or model making. Our range of soldering irons covers almost every application and we stock exclusively the superb 'Antex' range, because we've used all types and we think 'Antex' are quite simply the best.

In addition we have a good range of service aids including spray cleaners, silicone grease etc., adhesives, conductive paint, and two types of solder to cover most requirements.

For full details turn to the tool section towards the end of this catalogue.



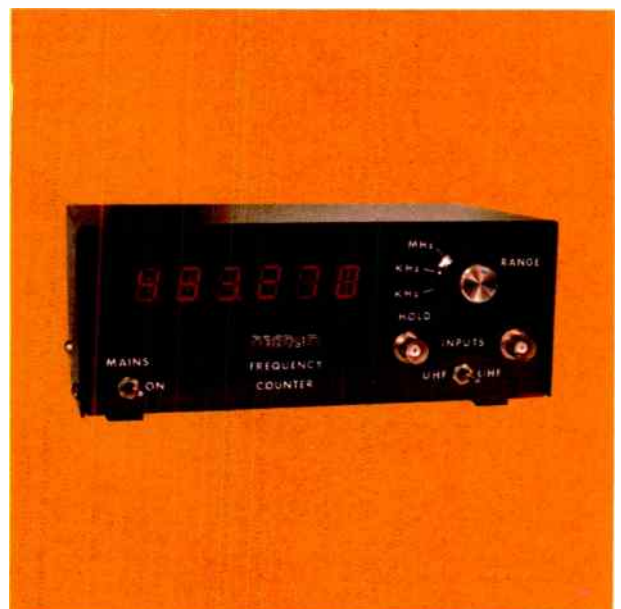


**TEST EQUIPMENT**

Our range of multimeters goes from our neat little Pocket Multimeter which must be just about the lowest priced multimeter you'll find anywhere, to our superb digital multimeter module that for the quality breaks new price barriers. On the way there are the three precision ICE meters with some 80 ranges on the biggest one and with accuracies as high as 1%!

In addition to multimeters we've got a very high quality frequency counter whose top-class specification is hard to believe at the price, an LCR bridge, audio oscillator, logic probe, transistor tester and two oscilloscopes designed especially for home constructors, small laboratories and service engineers.

Also especially for the amateur radio enthusiast we stock a grid-dip meter, SWR meter, transmitted power meter and relative field strength meter all described on page 104. All the other high quality test equipment in our range is described in the test equipment section towards the end of this catalogue.



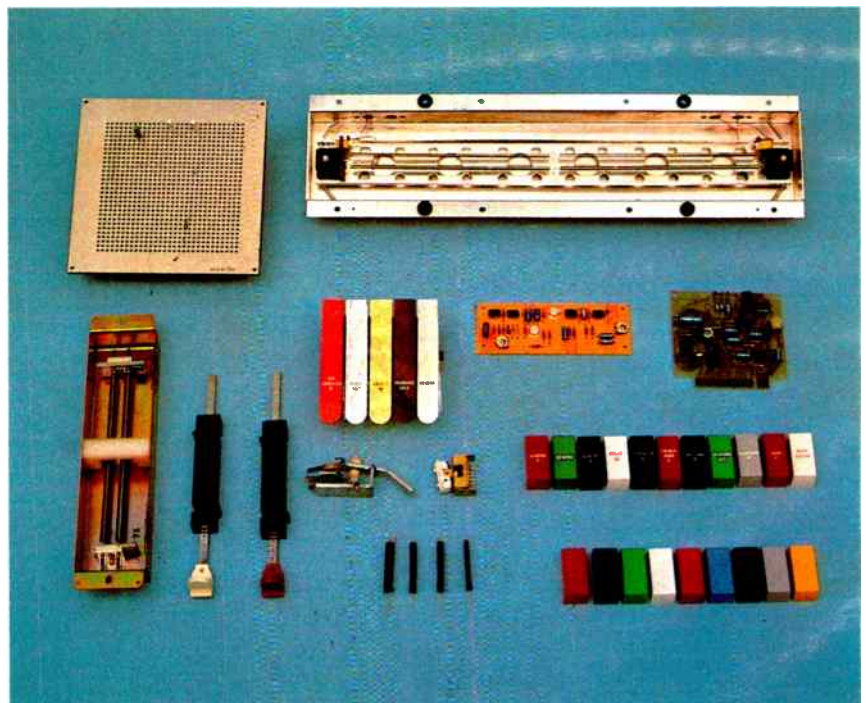




## ELECTRONIC MUSIC COMPONENTS

Maplin are renowned for their range of components for electronic organs, synthesisers and other musical equipment. In this catalogue the range is extended even further to encompass some beautiful new marbled-effect stop tabs in several lovely colours, a new stop tab switch and a massive 32-note pedalboard in addition to all the components we've stocked before.

Like keyboards at unbeatable prices – our Moulded keyboard, for instance, is about half the price of the only other equivalent keyboard being sold by other retailers in this country, whilst our top quality keyboards are still cheaper than our competitors' Moulded keyboards. The same goes for our pedalboard, excellent quality, but at a price which is unbelievable.



Our master oscillator board the DM02T has been available for over four years now yet is still a very low cost solution to tone generation for organs, and with thousands sold you'll know you won't be wrong to join the bandwagon. Another massive seller has been our reverberation module and the spring lines that go with it. In addition we stock engraved and unengraved stop tabs,

drawbars, contact blocks, rotating baffles for use in "Lesley" type speaker units, swell pedals, piano pedals, effects lever and even gold wire and palladium earth bar for making your own contacts. Like the rest of our catalogue the organ component section is a fascinating treasure-trove of unusual and everyday components.



## Special Summer Price Fighter Edition

### MAPLIN - YOUR FIRST CHOICE FOR COMPONENTS

In this special edition of Maplin News we've got lots of special offers, a very low priced very high quality cassette recorder and a low, low price on the famous Space Invaders video game. We've cut our prices on hundreds of our lines — check the price list for details. And if you need any more reasons for making Maplin your No. 1 supplier check this list against the competition:

We give discount vouchers which can be worth up to 8% off when used against your next order — we even give them on special offers — so next time you compare prices remember that for every £13 you spend with us you'll get a whole £1 off your next order.

Our prices include VAT so the price you see is the price you pay. Don't get caught by the small print in our competitors' advertising that tells you to add VAT. And it's not a small amount either — on an order worth £6.67 there's a whole £1 extra to pay. But with Maplin there's nothing extra to pay, except on small orders under £4.

Same day service. Now that our computer is running smoothly we are posting the goods on the day we receive the order for all UK orders (and for overseas customers if you pay by bank draft in sterling drawn on a British bank).

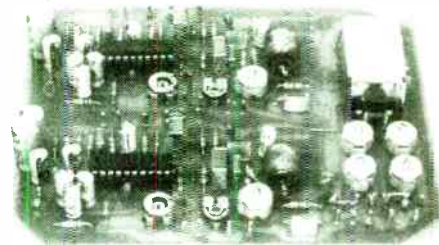
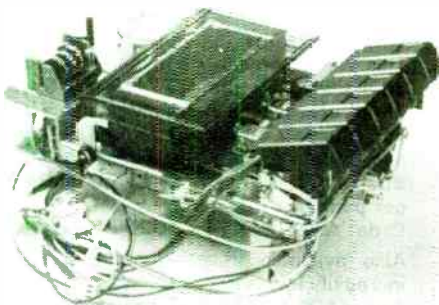
Excellent stock levels. We have nearly half a million pounds of stock and over 97% of our stock lines in stock and it's improving all the time. Regular telephone checks with our competitors show that we are more likely to have what you want in stock than they are.

Large range. Our wide range of useful components means that you can often get everything from us which saves writing to lots of different companies and probably having to pay postage or handling charges several times.

Post paid. With every order we send a first class reply paid envelope to make ordering as easy as possible for you. And we send the goods to you by first class post (if total weight under 750 grammes) so you get them, fast.

Quality components. There are definitely no rejects or re-marks in our stock. There are plenty of sub-standard components around, we are being offered them all the time and it's inevitable that someone buys them — so if you see prices very much lower than ours, remember: we buy more than any other supplier so we generally get the best prices. Anyone can say that stock is genuine, and it may even have a manufacturer's mark, but it could be reject or even untested stock. With Maplin you can be

## STEREO CASSETTE TAPE-RECORDER FOR UNDER £40!!



We've acquired lots more of the superb JVC cassette mechanisms that were offered in our last newsletter, and we've got a complete electronics module to match it. Now you can make a high quality stereo cassette tape recorder for under £40. A kit is available complete or in three parts: mechanism; module; remainder of parts.

#### Typical Specification of Complete Cassette Deck

Stereo record and playback  
Electronic record/playback switching  
Dual VU meter  
Adjustable bias (preset for TDK 'D' range tapes)

Microphone input 0.8mV at 10k $\Omega$   
Line input 100mV at 47k $\Omega$   
Output Up to 1V  
Output impedance 500 $\Omega$  nominal  
Total harmonic distortion 2.5%  
Signal to noise ratio 50dB  
Crosstalk better than 50dB  
Frequency response 30Hz to 14.5kHz (-3dB)

Wow and flutter 0.1% (DIN weighted)

## SPACE INVADERS ARE HERE



*And at a fabulous new price too!*

Fight the space invaders, be a Polaris captain or a spaceship commander. Full colour action on your own TV set and over 450 games to play on a choice of 26 different action-packed cartridges with new ones being released all the time. Yes, it's the fantastic Atari Video Computer, the greatest thing to happen to home games since Monopoly; it'll keep you and your children entertained for hours, day after day.

First you'll need the Atari Computer Console that simply plugs straight into the

*Continued on page 6*

absolutely certain that all our stock is good quality at a realistic price.

Security: The electronics magazines in general will accept advertising from anyone so when you send your money off remember that, just because they have an advertisement in your favourite magazine does not mean they are necessarily a reputable company. With Maplin you can be confident that your money is safe.

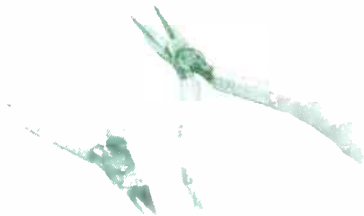
You won't be surprised to learn now, that we are the biggest retail supplier of electronic components in the UK. With our new computer watching the progress of your order and keeping an eye on our stock levels, our service is better than its ever been. On price, service, stock, quality and security, it makes more sense now than ever to make Maplin — your first choice for components every time!

# SUMMER

## TOP OCTAVE FREQUENCY GENERATOR: LOWEST PRICE EVER!

The M087 is a direct pin for pin replacement for the well-known AY-1-0212 IC, with virtually all parameters improved e.g. supply currents 25% lower, output current up by 20%, input frequency 15kHz to 2MHz etc. The only difference is that pin 9 must be connected to about -17V not -27V. If you have a -27V supply connect it to pin 9 via a Min Res 390Ω. And now you can buy it at the lowest price there has ever been — and lower than it's ever likely to be! **Special Offer Price Only £2.50 incl. VAT each**  
**Order As WH22Y (M087)**

## CUTTERS AND PLIERS



A pair of miniature (4½in) box-jointed side-cutters and a pair of miniature (4½in) box-jointed pliers. The cutters have precision edges and the pliers have a snipe nose with smooth inside faces to the jaws. Both tools have insulated handles and are similar to BR69A and BR70M described in catalogue pages 174 and 175. We offer a saving of over £1.50 on these, so take advantage of this offer now!

**Special Offer Price Only £6.95 per pair of tools**  
**Order As SP49D (Cutters & Pliers)**

## SOLDER

Four packs of our solder (10m per pack) as described on page 181 of our catalogue. The solder is standard tin/lead alloy Multicore solder made by Ersin. Usual price 57p per pack.

**Special Offer Price Only £1.99 for four packs**  
**Order As SP50E (4 x Solder D622)**

## HIGH QUALITY 6½in. LOUDSPEAKER



A high quality 6½in round loudspeaker having a full range frequency response by virtue of a centre cone designed to give a smooth response up to very high frequencies. The speaker is ideal for use with our 8W Amp kits and features 8W power handling and 8Ω nominal impedance.

Usual price £6.30 each.  
**Special Offer Price Only £7.50 incl. VAT per pair**  
**Order As SP47B (2 x 6-5in Speaker)**

# SAVERS

## Z80 MICROPROCESSOR 2-5MHz CPU IC

This amazingly powerful 8-bit microprocessor is a direct upgrade from the popular 8080 with the same instruction set plus 80 more instructions. Full details in our book RQ54J (Z80 Data Sheets).

Available for three months only at this amazing price.

**Special Offer Price Only £7.50 incl. VAT each**

**Order As QW00A (Z80CPU)**

Also available in packs of ten at an incredibly low price.

**Only £63.55 incl. VAT per pack of ten**  
**Order As SP43W (10 x Z80CPU)**

## DYNAMIC RAM MEMORIES

### 4k 4027 250ns

This very popular 4k dynamic random access memory, the 4027, 16-pin IC with 250ns access time, normally available from us at just £2.49 each is offered here in a pack of four to save over £2.

**Special Offer Price Only £7.50 incl. VAT per pack of four**

**Order As SP44X (4 x 4027 250ns)**

Also available in packs of 100 at an incredibly low price.

**Only £172.50 incl. VAT per pack of 100.**  
**Order As SP45Y (100 x 4027 250ns)**

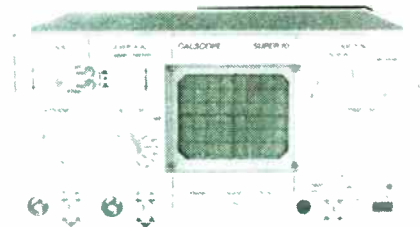
### 16k 4116 200ns

This direct replacement for the 4027 upgrades your system to give it four times the memory. The chip is a 16-pin IC, 16k dynamic random access memory with 200ns access time. Normally available from us at the low price of £5.75 each, it is offered here in a pack of four at a saving of over £3.

**Special Offer Price Only £19.85 incl. VAT per pack of four**

**Order As SP46A (4 x 4116 200ns)**

## DUAL-BEAM OSCILLOSCOPE



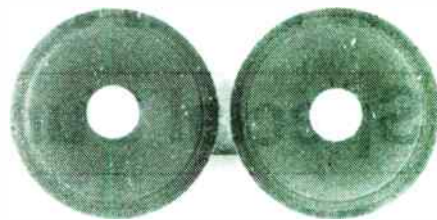
The superb Calscope Super 10 described on page 187 of our catalogue is available for just three months at this unrepeatable price, giving you a saving of over £45! Don't miss this once-in-a-lifetime opportunity to add this superb test instrument to your workbench.

**Special Offer Price Only £199.00 incl. VAT plus £9.45 postage**

**Order As XB83E (Calscope Super 10)**

# SUMMER

## HIGH POWER LOUDSPEAKER



Save £8 on these 50W high-power speakers having 4Ω nominal impedance. These speakers have a 50Hz to 8kHz frequency response matching extremely well with our Piezo Horns. The speaker is 12in with a pressed steel chassis and a 2in extra high power voice coil.

**Special Offer Price Only £29.66 incl. VAT per pair**

**Order As SP48C (2 x Fane 50 4Ω)**

## LIQUID CRYSTAL DISPLAY, 7106IC & PCB FOR OUR DIGITAL VOLTMETER

The three major parts to build either a 200mV or 2V fsd voltmeter or a -100°C to +100°C thermometer. Full construction details are supplied with the pcb. In addition you will need the following parts:

### Voltmeters

- 1 Min Res 22k (200mV meter only)
- 1 Min Res 15k (2V meter only)
- 1 Min Res 470k
- 1 Min Res 100k
- 1 Min Res 1M
- 1 Carbonate 0.1μF
- 1 Carbonate 0.047μF
- 1 Carbonate 0.22μF
- 1 Ceramic 100pF
- 1 Carbonate 0.01μF
- 1 DIL Socket 40-pin
- 1 15-Turn Cermet 1k (200mV meter only)
- 1 15-Turn Cermet 10k (2V meter only)

### Thermometer

- 1 Min Res 1M
- 1 Min Res 47k
- 1 Min Res 100k
- 1 Min Res 220k
- 1 Min Res 22k
- 1 Carbonate 0.1μF
- 1 Carbonate 0.47μF
- 1 Carbonate 0.22μF
- 1 Ceramic 100pF
- 1 Carbonate 0.01μF
- 1 2N3704
- 1 DIL Socket 40-pin
- 2 15-Turn Cermet 100k

The extra parts for the voltmeters cost around £2 and for the thermometer around £3.25. With our special offer price for the board, display and IC this becomes a very low-cost yet very accurate meter. A saving of over £3.50 on our usual prices. Order now!

**Special Offer Price Only £17.50 incl. VAT for 1 LCD display, 1 7106 IC and 1 PCB (BY76H)**

**Order As SP51F (DVM Kit)**

**DON'T FORGET!  
 IN ADDITION TO THESE LOW, LOW PRICES, YOU GET DISCOUNT VOUCHERS THAT CAN BE WORTH UP TO 8% FOR USE WITH YOUR NEXT ORDER.**

These ten Super Summer Savers are open to anyone to order (you do not have to be on our mailing list) and you may order as many as you wish.



# SAVERS

## PLUS THESE TWO SPECIALS FOR COUPON HOLDERS ONLY

### SUPERB NEW MULTIMETER

#### Includes Transistor Tester

This very low cost, high specification multi-tester features a 20,000 ohms per volt DC and 8,000 ohms per volt AC movement. It has a three-colour mirrored scale, and incorporates a transistor tester.



#### Specification

Overall size: 148 x 96 x 55mm  
 Weight: 410gms  
 Sensitivity: 20,000 ohms per volt DC  
 8,000 ohms per volt AC  
 Accuracy: DC:  $\pm 3\%$  of full scale deflection  
 AC:  $\pm 4\%$  of full scale deflection  
 hFE:  $\pm 3\%$  of arc

#### Ranges:

DC Volts: 0.1, 0.5, 2.5, 10, 50, 250, 1,000

AC Volts: 10, 50, 250, 1,000

DC Current: 50 $\mu$ A, 2.5mA, 25mA, 250mA

Resistance: 0-2k $\Omega$  (20 $\Omega$  at centre of scale)  
 0-20k $\Omega$  (200 $\Omega$  at centre of scale)  
 0-2M (20k at centre of scale)  
 0-20M (200k at centre of scale)  
 (Minimum reading 0.2 $\Omega$ )  
 -10dB to +22dB

#### Decibels:

Transistor tester: hFE: 0 to 1,000  
 I<sub>CEO</sub>: 0 to 150mA

Supplied complete with 18-page instruction booklet, a pair of test leads with probes, a set of leads terminated in crocodile clips for use with the transistor tester, two 1.5V cells (replacement type HP7) and one 9V battery (replacement type PP3). The meter has a carrying handle.

**Our Price Only £14.95 incl. VAT**

**Order As SP53H (Multimeter Type 320)**

# 15W AMP KIT

## 15W AMP KIT

A hi-fi 15W amplifier based on the TDA2030 power amp IC described on cat. page 237.

At full power:

24V min (for  
 14W in 4 $\Omega$ ):  
 30V max.

Supply current at 14W,  
 4 $\Omega$ :

900mA

At 10W, 8 $\Omega$ :

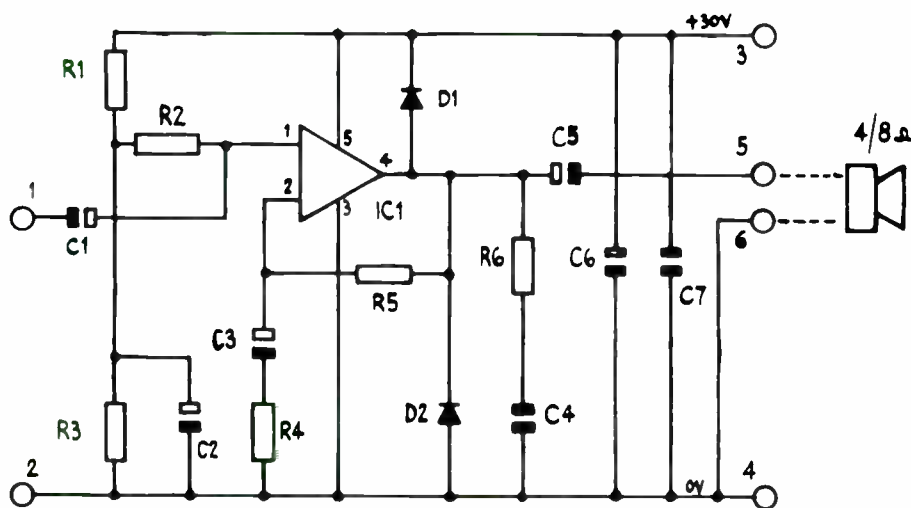
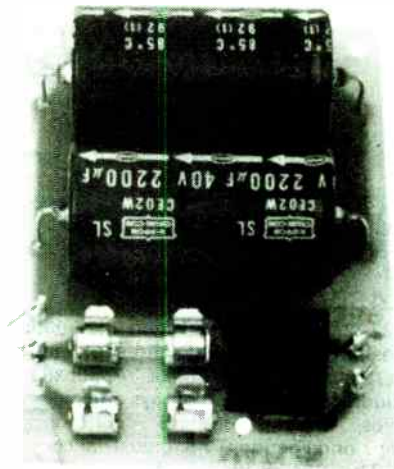
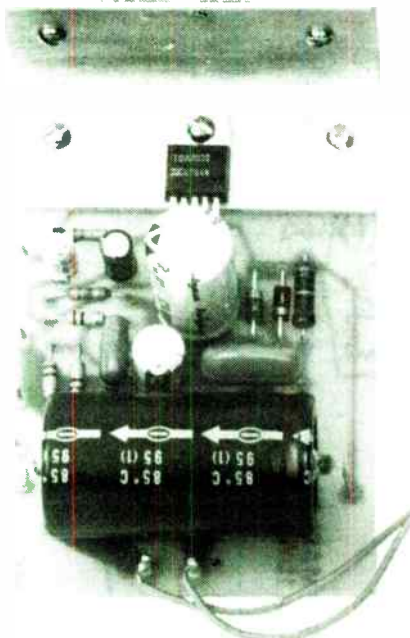
500mA

With no signal:

30mA

Short circuit duration:

Continuous



#### Specification:

Supply voltage with  
 no signal: 36V abso. max.

Thermal characteristics: Shuts down at  
 110°C  
 (case temp)

Total harmonic distortion: 0.1% (0.1W to  
 10W)  
 <5% (10W to  
 14W)

Input sensitivity: 250mV (for full  
 power out)

Frequency response: 10Hz to 140kHz  
 (-3dB)

The heatsink bracket must be bolted to a metal chassis or to a heatsink; Heatsink 4Y (FL41U) will be adequate. The IC should be bolted directly to the heatsink bracket after smearing with Thermpath (not supplied in kit).

#### List of Parts in Kit

R1,2,3 Min Res 100k  
 R4 Min Res 4k7  
 R5 Min Res 150k  
 R6 Std Res 1 $\Omega$   
 C1 PC Elect 1 $\mu$ F 100V  
 C2 PC Elect 22 $\mu$ F 63V  
 C3 PC Elect 2.2 $\mu$ F 63V

Continued on page 6

## CMOS 555 TIMER

A direct replacement for the standard NE555 8-pin DIL IC, but requiring only one hundredth of the supply current making it ideal for battery operation. Full details in our July 1979 newsletter reprint XF38R price 15p or manufacturers data sheet ICM 7555 price 25p. We offer a pack of four IC's at a saving of over 60p on our usual price. **Special Offer Price Only £3.99 per pack of four**

**Order As SP52G (4 x ICM 7555)**

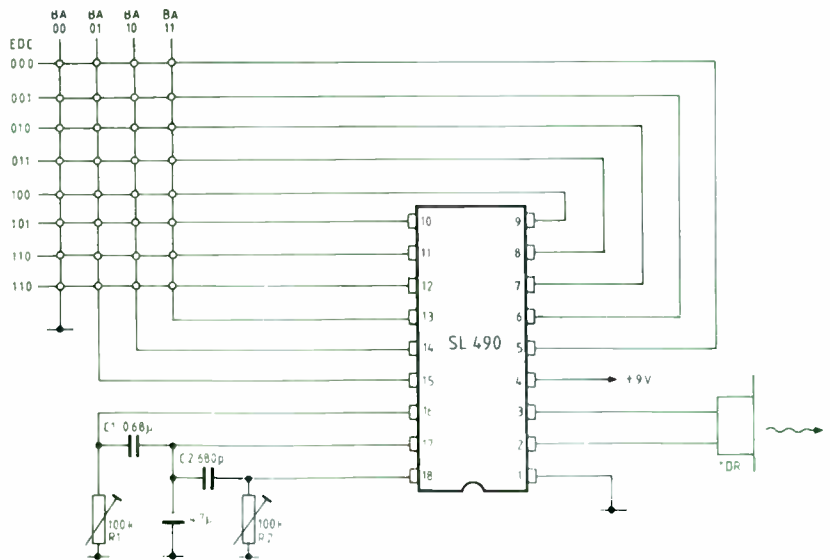
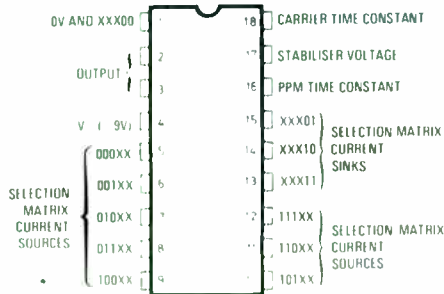
OFFERS CLOSE SEPTEMBER 13th 1980  
 ORDERS PLACED WITH US AT THE SPECIAL OFFER PRICES WILL ONLY BE ACCEPTED IF ACCOMPANIED BY THE SPECIAL OFFER COUPON SUPPLIED FREE TO EVERYONE ON OUR MAILING LIST.  
**THIS PANEL IS NOT THE SPECIAL OFFER COUPON**

# REMOTE CONTROL



## SL490 TRANSMITTER

A 32-channel pulse position modulation transmitter for use with ultrasonic, infra-red, cable or radio links. Applications include remote control of toys and models, radios, tuners, tape and record decks, lamps and lighting, TV's, industrial control etc. The IC is ideally driven from a PP3 9V battery and can generate carrier frequencies of up to 200kHz so that for example an ultrasonic transmitter may be directly driven. Alternatively transmission may be achieved without a carrier for example for infra-red. Each of the 32 channels is initiated by one of 32 simple push-to-make switches directly connected to the IC in a 4 by 8 matrix. Only four or five external components are required to complete the circuit.



**Specification (typical)**  
 Supply current (operating) 8mA  
 Supply current (standby) 6µA  
 Supply voltage +7V to +9.5V  
 Output current 1mA

ultrasonic transmitter. If an infra-red link is required make C1 a Carbonate 0.22µF, remove C2 and R2 and connect pin 18 via a Min Res 2k2 to ground. Connect pin 3 to the input of the infra-red driver circuit and leave pin 2 unconnected.  
 Order As YH66W (SL490) Price £3.69

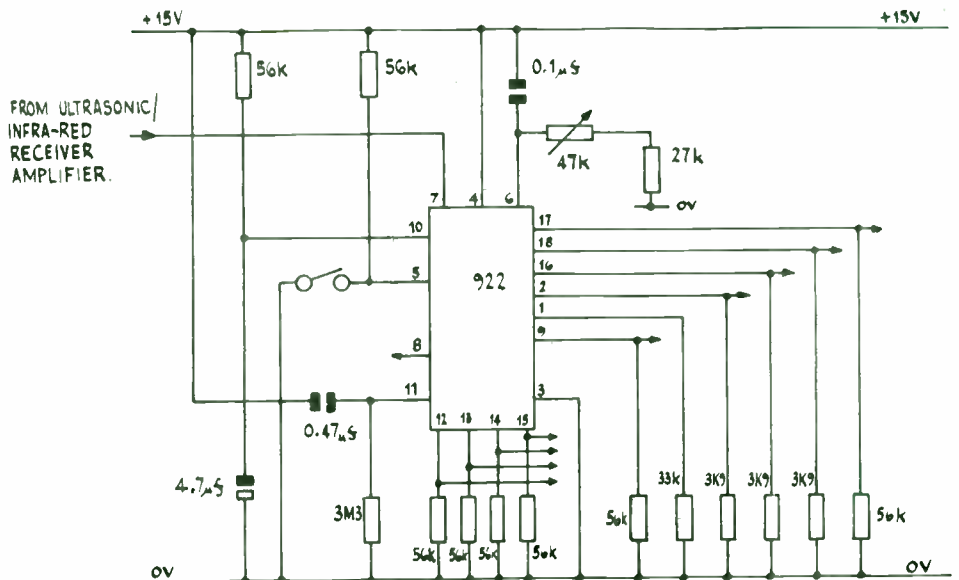
An application circuit is shown for an

## ML922 RECEIVER

The ML922 demodulates the pulse position modulated signal from the SL490 and then after error checking produces either one of 10 different four-bit codes which may be decoded to give one of 10 different off or on outputs or one of three analogue outputs. In addition there are three digital control outputs. The analogue outputs have 32 steps.

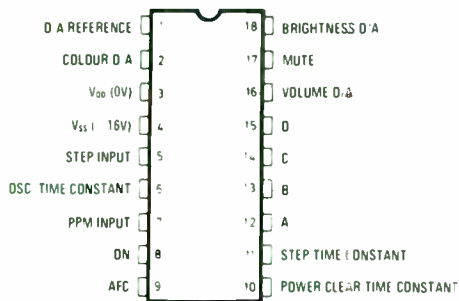
**Specification (typical)**  
 Supply current 8mA  
 Supply voltage +16V (+14V to +18V (pin 4))  
 Analogue output current range 0 to 1.3mA approx.  
 Analogue step size 43µA approx. (i.e. with 3k9 to pin 3 range is 0V to +5V)

Please note that this chip uses negative logic, i.e. logic 1 is 0V and logic 0 is +15V. In following details X means that either a 1 or 0 in that position gives output shown.





**ML922 (continued)**

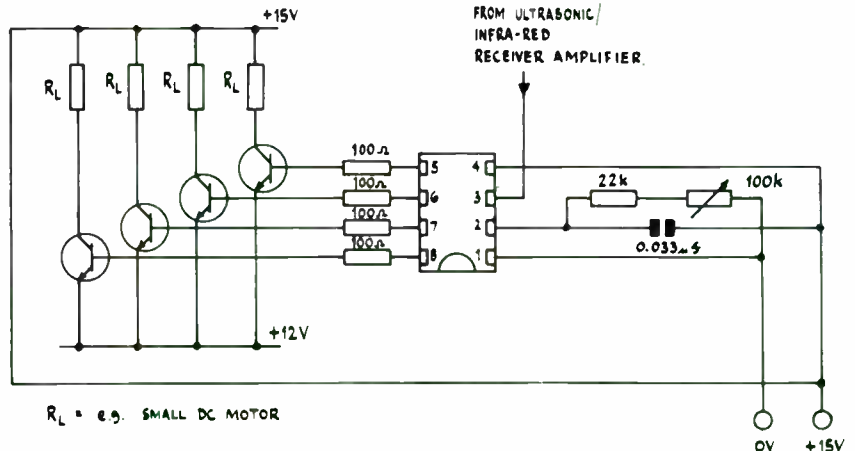
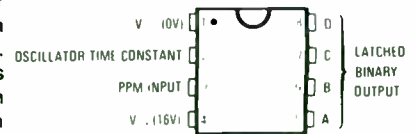


Transm'tr Code	Receiver Outputs			
	Pin 15 (D)	Pin 14 (C)	Pin 13 (B)	Pin 12 (A)
0000X	0	0	0	0
0001X	0	0	0	1
0010X	0	0	1	0
0011X	0	0	1	1
0100X	0	1	0	0
0101X	0	1	0	1
0110X	0	1	1	0
0111X	0	1	1	1
1000X	1	0	0	0
1001X	1	0	0	1

**10100** Pin 2 goes more negative  
**10101** Steps DCBA to next binary number (connecting pin 5 to 0V has same effect)  
**10110** Pin 16 goes more negative  
**10111** Pin 18 goes more negative  
**11000** Pin 8 goes negative (also goes negative while DCBA are changing)  
**11001** Pin 17 goes negative then next time goes positive and so on, but will go positive then not change if pin 16 is at zero.  
**11010** Not used  
**11011** Pins 2, 16 and 18 go to 3/8 max. Pin 17 goes positive  
**11100** Pin 2 goes more positive  
**11101** Steps DCBA to previous binary number  
**11110** Pin 16 goes more positive  
**11111** Pin 18 goes more positive  
 Pin 9 is normally at +15V and changes to 0V while DCBA is changing.  
 Order As YH67X (ML922) Price £5.95

**ML928/929 RECEIVERS**

These two chips can be used separately or together to give a different output for each of the 32 codes transmitted by the SL490. The ML928 responds to the first 16 codes and the ML929 to the last 16 as shown in the table below. The four outputs can each source 15mA from open drain drives.



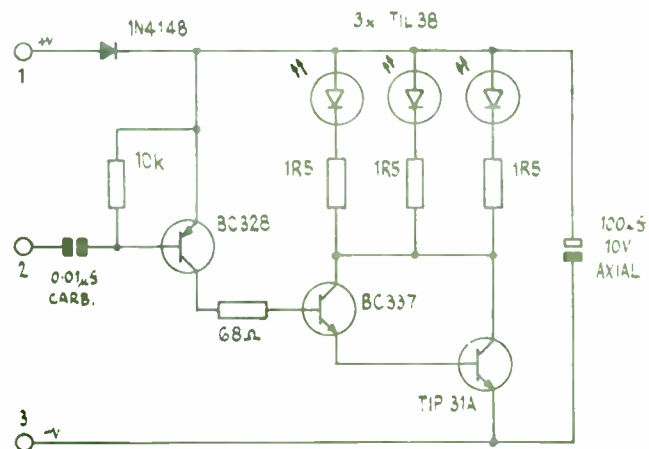
**Specification**  
 Supply current 4mA  
 Supply voltage +16V (+14V to +18V) (pin 4)  
 Please note that this chip uses negative logic, i.e. logic 1 is 0V and logic 0 is +15V.

Transmitter code		ML928	ML929	01111	1111	No change
		DCBA	DCBA			
00000	0000	No change		10000	No change	0000
00001	0001	No change		10001	No change	0001
00010	0010	No change		10010	No change	0010
00011	0011	No change		10011	No change	0011
00100	0100	No change		10100	No change	0100
00101	0101	No change		10101	No change	0101
00110	0110	No change		10110	No change	0110
00111	0111	No change		10111	No change	0111
01000	1000	No change		11000	No change	1000
01001	1001	No change		11001	No change	1001
01010	1010	No change		11010	No change	1010
01011	1011	No change		11011	No change	1011
01100	1100	No change		11100	No change	1100
01101	1101	No change		11101	No change	1101
01110	1110	No change		11110	No change	1110
01111	1111	No change		11111	No change	1111

In the application circuit we have shown each output driving one transistor, however these outputs could of course be used to drive a 4-line to 16-line decoder e.g. 4514BE.  
 Order As YH68Y (ML928) Price £1.99  
 YH69A (ML929) Price £1.99

**HIGH POWER INFRA-RED EMITTING DIODE**

A high power infra-red emitter in a standard 5mm (0.2in.) diameter package designed primarily for remote control. Cathode denoted by flat on package.  
 Radiant power output: 12mW at I<sub>r</sub> = 100mA  
 Wavelength 940nm  
 Forward voltage 1.4V at I<sub>r</sub> = 100mA  
 2.55V at I<sub>r</sub> = 1A,  
 Pulse width = 10μs and duty cycle < 1%  
 Capacitance 25pF (f = 1MHz)  
 Order As YH70M (IR Emitter TIL38) Price 55p



INFRA-RED Tx.

**LARGE AREA PHOTODIODE**

A high speed PIN photodiode designed to operate in the reverse-bias mode. It provides low capacitance with high speed and high photosensitivity. The photodiode chip is moulded in a black infra-red transmissive plastic. It is designed for infra-red remote control systems and is spectrally matched with the TIL38 infra-red emitter.

The package is 7.3 x 5.6 x 4mm; the cathode is denoted by the shorter lead and the sensitive surface is the large side farthest from the leads. The active chip area is about 8.83 square millimetres.  
 Breakdown voltage: 30V  
 Dark current: 5nA at V<sub>r</sub> = 10V

Light current: 15μA at V<sub>r</sub> = 10V (Incident radiance 2.5μW/mm<sup>2</sup> at 940nm)  
 Capacitance 30pF at V<sub>r</sub> = 3V (f = 1MHz)  
 Order As YH71N (Photodiode TIL100) Price £1.25  
 Continued on page 6

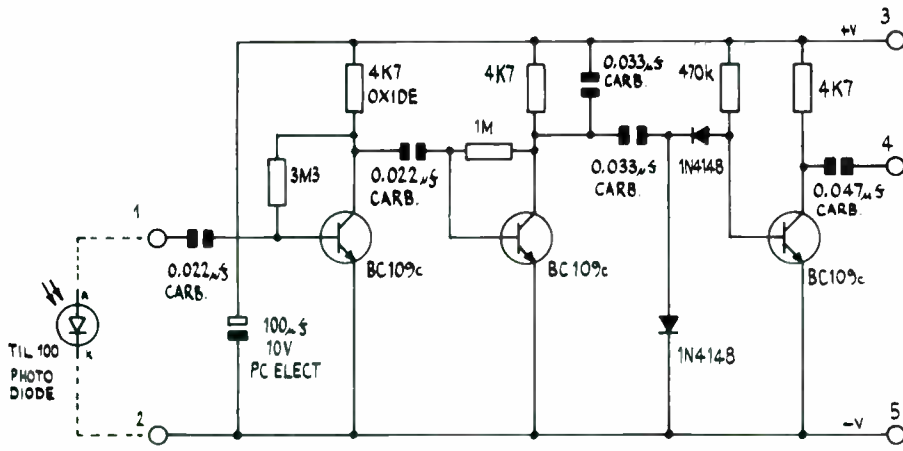
# RADIO CONTROL

(Continued from page 5)

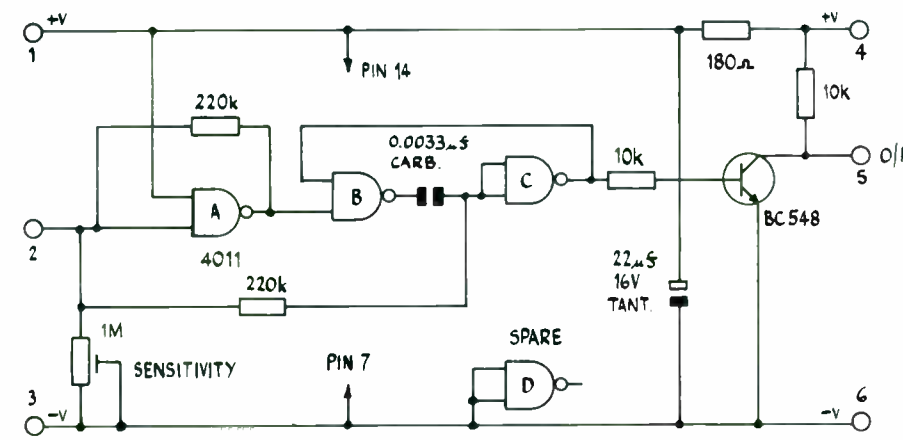
## INFRA-RED LINK

The transmitter and receiver circuits shown here are capable of a 40m (120ft) range, although at this distance, the pulse shaper circuit shown would be needed if

more than a simple off/on was being used e.g. if the pulse coded modulation of the SL490 series IC's was being used. All three circuits operate on 9V and the transmitter can be run from a PP3 battery.



INFRA-RED Tx.



PULSE SHAPER

## 15W AMP KIT (Continued from page 3)

- C4 Polyester 0.22µF
- C5 Axial 2200µF 40V
- C6 PC Elect 100µF 63V
- C7 Polyester 0.1µF
- D1,2 1N4001
- IC1 TDA2030
- 1 15W Amp PCB
- 1 15W Amp Bracket
- 6 Veropin 2141
- 3 Bolt 6BA ½in.
- 3 Nut 6BA
- 3 Washer 6BA

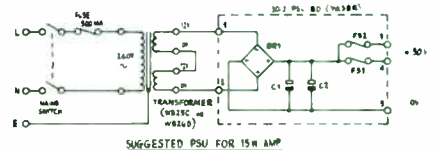
The kit is supplied with full building instructions.

**Order As YQ43W (15W Amp Kit) Price £5.49**

**Module**  
The above kit is also available as a ready-built, fully tested and working module.

**Order As YQ37S (15W Amp Module) Price £6.49**

### Recommended Power Supply Parts List



- C1,2 Axial 2200µF 40V (FB91Y)
- BR1 SO4 (QL10L)
- FS1,2 Fuse 20mm 1A (WR03D) (FS2 only required for stereo pair)
- 1 30/2 PSU PCB (YQ38R)
- 4 Fuse Clips (WH49D)
- 5 Veropin 2141 (FL21X)
- 1 Tr 12V 1A (WB25C) (one amp only)
- 1 Tr 12V 2A (WB26D) (for stereo pair)

You may also require a DPST (or DPDT) mains switch and a mains fuse (500mA for one amp and 1A for a stereo pair).

The following parts from the above lists are new items and all are available separately:

- 15W Amp PCB
- Order As YQ35Q Price £1.45**
- 15W Amp Bracket
- Order As YQ36P Price 45p**
- 30/2 PSU PCB
- Order As YQ38R Price 95p**

# ATARI VIDEO COMPUTER GAME

Once you have the basic console there are another 25 cartridges to choose from at the moment and another seven are planned for release before the end of the year. Here are the 25 available so far.

Order As	Title	No. of Games	Controller	Price
AC01B	Air Sea Battle	27	Joystick	£16.95
AC02C	Space War	17	Joystick	£16.95
AC03D	Outlaw	16	Joystick	£16.95
AC04E	Video Olympics	50	Paddles	£16.95
AC06F	Breakout	12	Paddles	£16.95
AC06G	Basketball	2	Joystick	£16.95
AC07H	Surround	14	Joystick	£16.95
AC08J	Blackjack	7	Paddles	£16.95
AC09K	Basic Maths	8	Joystick	£16.95
AC10L	Codebreaker	20	Keyboard	£16.95
AC11M	Hunt & Score	8	Keyboard	£16.95
AC12N	Miniature Golf	2	Joystick	£16.95
AC13P	Skydiver	5	Joystick	£16.95
AC14Q	Street Racer	27	Paddles	£16.95
AC15R	Bowling	6	Joystick	£16.95
AC16S	Brain Games	19	Keyboard	£16.95
AC18U	Golf	9 holes	Joystick	£16.95
AC19V	Slot Racers	36	Joystick	£16.95
AC21X	Superman	1	Joystick	£23.95
AC22Y	Adventure	3	Joystick	£23.95
AC24B	Indy 500 (complete with steering controllers)	14	—	£34.50
AC26C	Backgammon	8	Paddles	£34.50
AC26D	Space Invaders	112	Joystick	£34.50
AC27E	Programming	—	Keyboard	£34.50
AC28F	Chess	8 levels	Joystick	£45.00

(Continued from page 1)

aerial socket on your colour or black and white TV (UK standard only). Included with the console is your first game cartridge: Combat which has 27 different games. Also included are two joystick controllers, two paddle controllers, an aerial switchover



**PLEASE NOTE: DISCOUNT VOUCHERS NOT GIVEN WITH ANY OF THE ABOVE ITEMS**

unit and a mains adaptor. And now you can get all this at a new fabulous price of only £99.50 including VAT. We can't deliver until first week in August, but at this price demand is going to be heavy, so to make certain of delivery then, send a deposit of £19.50 now. We will bill you for the remaining £80 as soon as we have your game ready for despatch.

**Order As AC00A (Video Game Console) Price £99.50**

Plus Carriage: £2.50 in UK

**PLEASE NOTE: DISCOUNT VOUCHERS NOT GIVEN WITH THIS ITEM**

### Keyboard Controller

Some of the cassettes require a different controller from those supplied with the console. A pair of keyboard controllers is available for those games.

**Order As AC29G (Video Game Keyboards) Price £18.95 per pair**

### Extra Paddles

Some of the games using paddle controllers can be played by more than two people, so extra pairs of paddles are available.

**Order As AC30H (Video Game Paddles) Price £12.95 per pair**

















1979/80 Catalogue Page No.	VAT inclusive PRICE	1979/80 Catalogue Page No.	VAT inclusive PRICE	1979/80 Catalogue Page No.	VAT inclusive PRICE	1979/80 Catalogue Page No.	VAT inclusive PRICE
<b>Page 119</b>		<b>Page 122</b>		<b>Page 142</b>		<b>Page 149</b>	
BW99W XLR Line Plug £1.79		YB08J Large Patchboard £113.62		WF52G Rd Speaker LT610		XV06G Mirror Ball 12in £73.23	
BW90X XLR Chassis Socket £2.56		WQ00A Mod PB Pin Black £19.55		WF01B Rd Speaker CM620	£6.30	XV07H Mirror Ball Stand £15.97	
BW91Y XLR Line Socket £2.02		WQ01B Mod PB Pin Blue £21.50		WF07H Rd Speaker LT630	£3.90	LB91Y Flasher Unit 2-Way £4.15	
BW92A XLR Chassis Plug £1.35		WQ02C Mod PB Pin Green £21.50		WF08J Rd Speaker CM920	£7.30	YB29G Spot Holder £3.30	
BW93B Dinlatch 3-pin Plug 94p		WQ03D Mod PB Pin Red £21.50		WF11M Rd Speaker LT830	£10.23	YB09A 3-Bank Lampholder £13.59	
BW94C Dinlatch 5-pin A Plug £1.15		WQ04E Mod PB Pin White £21.50		WF53H 20W Squawker	£2.67	BK31J BC Clip-On Hdr Sngl £3.86	
BW95D Dinlatch In-In 3-pin £1.14		WQ05F WPB Plug Blue 58p		XQ77J Pane 50 4R	£18.83	BK32K BC Clip-On Hdr Twin £3.86	
BW96E Dinlatch In-In 5-pin £1.13		WQ06G WPB Plug Green 58p		XB26D Pane 50 8R	£21.73	WF25C Spot Lamp Amber £2.59	
BW97F Dinlatch Sckt 3-pin 50p		WQ07H WPB Plug Red 58p				WF26D Spot Lamp Blue £2.19	
BW98G Dinlatch Sckt 5-pin A 59p		WQ08K WPB Plug White 58p				WF27E Spot Lamp Clear £2.60	
HH24B DIN L/S Plug 10.5p		WQ09K WPB Plug Yellow 37.5p				WF28F Spot Lamp Green £2.59	
HH25C DIN Plug 3-pin 13p		WQ10A Patch Plug Black 37.5p				WF29G Spot Lamp Red £2.75	
HH26D Din Plug 4-pin 20p		WQ13B Patch Plug Blue 37.5p				WF30H Spot Lamp Violet £2.89	
HH27E DIN Plug 5-pin A 14p		WQ14V Patch Plug White 37.5p				WF22Y Gooseneck Lamp £4.65	
HH28F DIN Plug 5-pin B 14p		WQ14W Patch Plug Yellow 37.5p					
HH29G DIN Plug 6-pin 26p							
HH30H DIN Plug 7-pin 17p							
HH31J DIN L/S Socket 7p							
HH32K DIN L/S Socket 3-pin 13p							
HH33L DIN Socket 4-pin 14p							
HH34M DIN Socket 5-pin A 14p							
HH35Q DIN Socket 5-pin B 17p							
HH36P DIN Socket 6-pin 16p							
HH37S DIN Socket 7-pin 21p							
<b>Page 120</b>							
HH40T DIN Line Skt 2-pin 13p							
HH41U DIN Line Scket 3-pin 13p							
HH42V DIN Line Scket 4-pin 18p							
HH43W DIN Line Skt 5-pin A 16p							
HH44X DIN Line Skt 5-pin B 19p							
HH45Y DIN Line Scket 6-pin 23p							
HH46A DIN Line Scket 7-pin 23p							
HH48R Universal Plug £1.20							
HH49B Multi-Position Plug 67p							
HH47M Multiplug 4-way 73p							
HH53H Multiplug 8-way £1.19							
HH54U Multiplug 12-way £1.40							
HH57N Multiplug 18-way £2.37							
HH78K Multiplug 25-way £2.71							
HH48C Multistk 4-way 90p							
HH54J Multistk 8-way 86p							
HH55V Multistk 12-way £1.16							
HH56W Multistk 18-way £1.44							
HH57L Multistk 25-way £1.56							
HH49D Multicover 4-way £1.95							
HH55K Multicover 8-way £1.28							
HH56W Multicover 12-way £2.36							
HH57L Multicover 18-way £2.47							
HH58B Multicover 25-way £2.33							
HH59S Sidecover 4-way £1.95							
HH56L Sidecover 8-way £1.80							
HH57K Sidecover 12-way £2.85							
HH58A Sidecover 18-way £2.14							
HH59F Sidecover 25-way £2.47							
HH57M Multilatch 8-way 50p							
HH58Y Multilatch 12-way 16p							
HH59Z Multilatch 18-way 14p							
HH60A Multilatch 25-way 26p							
HH52G Multithinge 4-way 29p							
HH58M Multithinge 8-way 19p							
HH59A Multithinge 12-way 19p							
HH59B Multithinge 18-way 30p							
HH59C Multithinge 25-way 30p							
HH59P Springlatch 8-way 43p							
HH60N Springlatch 12-way 55p							
HH60P Springlatch 18-way 56p							
HH60R Springlatch 25-way 59p							
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HL01B Octal Ch Plug 44.5p							
HL00A Octal Ch Skt 46p							
HL02C 8-way Socket 50p							
HL03D 8-way Plug 48p							
HF35Q Voltage Selector Skt 33p							
HF37S Voltage Selector Plug 20p							
HL04B Wafercon Plug 3-pin 10p							
HL05P Wafercon Plug 4-pin 11.5p							
HL06G Wafercon Plug 6-pin 11.5p							
HL07H Wafercon Plug 8-pin 14p							
HL08J Wafercon Plug 12-pin 19p							
HL09K Wafercon Skt 3-pin 7p							
HL10L Wafercon Skt 4-pin 10p							
HL11M Wafercon Skt 6-pin 12p							
HL12N Wafercon Skt 8-pin 12.5p							
HL13P Wafercon Skt 12-pin 20p							
HL14Q Wafercon Terminal 2p							
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YB07H Patchboard Module £19.55							
WQ00A Mod PB Pin Black £19.55							
WQ01B Mod PB Pin Blue £21.50							
WQ02C Mod PB Pin Green £21.50							
WQ03D Mod PB Pin Red £21.50							
WQ04E Mod PB Pin White £21.50							
WQ05F WPB Plug Blue 58p							
WQ06G WPB Plug Green 58p							
WQ07H WPB Plug Red 58p							
WQ08K WPB Plug White 58p							
WQ09K WPB Plug Yellow 37.5p							
WQ10A Patch Plug Black 37.5p							
WQ13B Patch Plug Blue 37.5p							
WQ14V Patch Plug White 37.5p							
WQ14W Patch Plug Yellow 37.5p							
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YB08J Large Patchboard £113.62							
WQ01L Large Patch Plug 26p							
HH60Q Std Pwr Plug 2.1 11.5p							
HH61R Long Pwr Plug 1.4 14p							
HH62S Std Pwr Plug 2.5 11.5p							
HH63T Long Pwr Plug 2.5 14p							
HH85G Power Skt 2.1 17.5p							
HH86F Power Skt 2.5 17.5p							
HH87U Cassette Skt Nivico 34p							
HH88V Cassette Skt Paros 38p							
HL17T USA Mains Plug 18p							
HL18B Flat Pin M/S 26p							
HL19V Flat Pin Conn 24p							
HL16S Eurosocket 79p							
HL15R Europlug 41.5p							
HL42V Euro Facility Outlet £1.14							
HL43M Euro Facility Plug £1.49							
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BW99H Euroconn Lead £1.46							
HL20W Mains Plug P429 53p							
HL44X Mains Socket P446 £1.16							
HL23A Mains Socket P430SE 96p							
HL46A Mains Socket P650 88p							
HL47B Mains Plug SA240J £1.17							
HL48C Mains Socket SA2404 66p							
HL27E Mains Plug SA2190 38p							
HL28F Mains Socket SA1962 39p							
HL49D Mains Socket SA2111 £1.37							
HL30L Mains Plug SA2019A £1.23							
HL31J Mains Socket SA2020 86p							
HL33L Mains Plug SA2367 £1.35							
HL34M Mains Socket SA2368 80p							
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HL36P Mains Plug P427 76p							
HL37S Mains Socket P428 83p							
HL39M Mains Plug P551 £2.17							
HL40T Mains Socket P552 79p							
HL50G Sleeve 8037 99p							
HL51F Boot 9455 19p							
HL52G Boot 8878 25p							
RW00A Adaptor A 37p							
RW01B Adaptor B 37p							
RW02C Adaptor C 37p							
RW03D Adaptor D 37p							
RW04E Adaptor E 37p							
RW05F Adaptor F 37p							
RW06G Adaptor G 46p							
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RW07H Adaptor H 37p							
RW08J Adaptor J 37p							
RW09K Adaptor K 37p							
RW11M Adaptor M 37p							
RW12N Adaptor N 39.5p							
HL53H Adaptor P £1.37							
RW27E Dinpak P 46p							
RW26D Dinpak N 59p							
RW45Y Dinpak 273 £1.70							
RW44X Dinpak 262 60p							
RW47B Dinpak 275 93p							
RW25C Dinpak M £1.69							
RW22A Dinpak 274 £1.18							
RW23A Dinpak K 59p							
RW22X Dinpak J 59p							
RW24B Dinpak L 79p							
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RW18U Dinpak Z 80.5p							
RW17V Dinpak Y £1.13							
RW17W Dinpak D £1.13							
RW41U Dinpak 251 97p							
RW42V Dinpak 252 97p							
RW20W Dinpak G £1.34							
RW49D Dinpak 280 £1.20							
RW21X Dinpak H DIS							
RW21Y Dinpak B £1.13							
RW21Z Dinpak A 86.5p							
RW43W Dinpak 254 £1.39							
RW43X Dinpak 259 89p							
RW37S Dinpak 205 £1.39							
RW16S Dinpak C £1.33							
RW48C Pluupak 279 88p							
RW52G Pluupak 289 DIS							
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RW54J Pluupak 291 £1.55							
RW50E Pluupak 282 89p							
RW51F Pluupak 283 £2.45							



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FQ38R Ctrdg Goldring G800H	E8.99	LK140 Cass Tape Care 26A	24.59	BR57M Phillips Driver	D15	FY65V Bit 1101	63p
<b>Page 160</b>		LK16S Cassette Care Kit 51	25.89	BR71N Mains Tester	52p	FR31J Bit 7/1101	E1.21
FQ39N Ctrdg Goldring G800E	E11.99	YB57M 1/4" Tape Cre Kit 111	D15	FY19V Low Cost Min Cutters	E3.95	FY66W Bit 1102	69p
FQ40T Ctrdg Tenorel T2001D	E4.65	YB58N Uni Tape Care Kit 150	D15	BR75S Ins Min Cutters	E6.93	FY67X Bit 1103	63p
FQ41U Cdg Tenorel T2001E	E9.75	RB04L Cass Head Clnr 62	D15	BR70M Box-Joint Min Cutter	E3.99	<b>Page 180</b>	
HR62S Stylus GP915C SS	37p	LX11M Tape Cleaning Kit J	E2.46	FY20U Box-Joint End Cutter	E4.99	FR01B Element Type CN	E2.20
HR24B Stylus GP915C DS	59p	YB60Q Head Cleaning Kit 25	E3.20	FY21X Low-Cost Cutters	E2.63	FR02C Handle Type CN	69p
HR25C Stylus GP915C DD	89p	RB02C Tape Hd Maint Kit 99	D15	FY76H Large Low Cost Cutts	E2.66	FR03D Bit 102	63p
HR26D Stylus GP915C SS	39p	FQ61R Replmnt Felts 99A	D15	<b>Page 175</b>		FR04E Bit 104	69p
HR27E Stylus GP915C DS	59p	<b>Page 167</b>		BR74R Side Cutters	E5.11	FR05F Bit 106	63p
HR28D Stylus GP93 DS	89p	FR54J Cassette Clnr Tape31	E1.75	FY22Y Box Jt Side Cutters	E5.57	FR06G Bit 820	69p
HR63T Stylus GP95 SS	50p	FR62S Demagnetiser	E3.50	BR72Z Side Cutters 555	E4.98	FR07H Bit 821	67p
HR64U Stylus GP95 DS	77.5p	FQ625 Curved Probe Demag	E4.15	FY23A High Leverage Cutter	E4.73	FR08J Bit 822	65p
HR65V Stylus GP95 DD	E1.00	YB61U Univ Splicing Kit 56	E3.55	FY24B Low Cost Min Pliers	E4.12	FR12N Iron X25	E5.49
HR29H Stylus GP104 SS	35p	YB62S Splicing Kit 98	D15	BR78K Ins Min Snipe	E5.99	FR13P 12V Iron MLX12	E5.98
HR30J Stylus GP104 DS	67p	YB63T Cassette Editor	D15	BR69A Box Joint Min Pliers	E4.52	FR14Q Element X25	E2.49
HR31J Stylus GP104 DD	79p	FR57M Cass Repair Kit 108	D15	BR77J Bright Pliers	E3.89	FR15R Element MLX12	E2.20
HR66G Stylus AcoS SMC6	E3.63	FR58X Tape Splicer 1/4 in	D15	FY25C Low-Cost Pliers	E2.49	FR16E Bit No. 50	75p
HR67K Stylus AT55-5	E3.63	FR56L Cass Tape Splicer30A	E2.11	FY26D Box Combined Pliers	E5.55	FR17T Bit No. 51	75p
HR68Y Stylus WMB	E4.06	LX17T Splicing Tape 33	73.5p	BR73Q Long Snipe Pliers	E5.64	FR18U Bit No. 52	75p
HR38R Stylus BSR TC8 S	18.5p	RB03D Cassette Case Pck 5	90p	BR00K Box Combined Pliers	E6.37	FR20W Stand ST3	E2.47
HR39N Stylus BSR TC8 D	39p	FR61R Cassette Titles 83	D15	FY27E Low-Cost Long Pliers	E6.99	FR11M Sponge	10p
<b>Page 161</b>		RB01B Cassette Fast Winder	E1.99	FY28A Combination Pliers	E6.99	FY69A Kit SK4	E8.90
HR69A Stylus BSR ST 3	37p	<b>Page 168</b>		<b>Page 176</b>		FR10L Heat Sink Tweezers	19p
HR70M Stylus BSR ST4 DS	50p	FR59P Set Cassette 53	E4.98	FY28F Low-Cost Elec Pliers	E3.14	FR23A Solder Sucker	E3.15
HR71N Stylus BSR ST4 DD	72p	RB05P Cassette Tray 52A	E1.65	FY29G Low-Cost HD Pliers	E3.14	FR24B Sucker Tiplet	E1.22
HR40T Stylus BSR ST8	45p	YB64U Cassette Case 34	E4.85	BR91Y Electricians Pliers	E4.85	FR24D Desolder Tool	E6.99
HR41U Stylus BSR ST9	47p	YB65V Luxury Case 37	D15	FY30H Pincers	E3.37	HV13P Desldr Nozzle Type 2	29p
HR42V Stylus BSR ST10	67.5p	RB07H Rotta-Rack 73	D15	FY31J Crimp Tool	E1.95	FR63T Desldr Washer Type 2	23.5p
HR43W Stylus BSR ST12	69p	RB06G Cassette Cabinet 86	D15	BR76H End Action Strippers	E5.78	FR27E Desolder Washer	28p
HR44X Stylus BSR ST14	69p	YB66G Cassette Cabinet 37	E18.62	BR93B Wire Strippers 3A	E1.73	FR28F Desolder Nozzle	E1.23
HR45Y Stylus BSR ST15	89p	FQ63T GF Cassette Head	E1.92	BR95D Wire Strippers 8B	E1.89	<b>Page 181</b>	
HR72P Stylus BSR ST16	53p	FQ65V Stereo Cassette Head	E4.10	BR96E Stripmaster	E1.23	FR29G Solda-Mop	71.5p
HR46A Stylus BSR ST17 DS	68p	FQ66G Cassette Erase Head	E1.80	BR97F Blade L5361	E4.73	FR21K Solder D622	56p
HR47B Stylus BSR ST17 DD	93p	<b>Page 169</b>		XR11M Blade L4421	E5.22	FY70M 1/2kg Reel Solder	E9.69
HR73Q Stylus BSR ST20	50p	FQ67X Tape Hd Two-Track RP	E12.80	<b>Page 177</b>		FY71M Alum Solder 1m PK	41p
HR74R Stylus BSR ST21	77.5p	FQ68Y Tape Hd Four-Track RP	E11.89	FY32K Hand Wrap Tool	E3.73	LH03D Switch Cleaner	E1.43
HR75S Stylus Decca Derram	E3.31	FQ70M Tape Hd Four-Trk Eras	E8.35	RY16S Verwire Spool	84p	YB71T Servisol	E1.46
HR76H Stylus D110E	E4.63	FQ71N 2-Head Bracket	E4.36	FY33L Verwire Comb	7p	LH02C Aero-Klene	E1.21
HR77J Stylus D110H	E3.52	QW72P 3-Head Bracket	E4.18	FY34M Allen Keys AF	E1.31	YB73J Aero-Duster	E1.32
HR84C Stylus D120SR	E3.52	HR18U Car Aerial Pull Up	E2.39	FY35O Allen Keys Metric	E1.31	YB74R Silicone Grease	E1.56
HR49D Stylus D120SR	E3.52	YB67K Car Aerial Roof Top	E5.12	FY36P Min Spanner 24	E1.59	BY75S Plastic Seal	E1.20
HR78K Stylus Hitachi ST101	E4.06	HW11M Cigar Lighter	E2.52	FY37S Min Spanner 68	E1.38	YB76F Foam Cleanser	E1.79
HR79L Stylus Hitachi ST103	E5.57	HW12N Car Accessory Plug	45p	FY38R Ring Spanner 02	E1.68	YB78K Excel Polish	E1.32
HR80B Stylus LV65977S	50p	HR11N Car Accessory Plug	45p	FY39N Ring Spanner 46	E1.87	<b>Page 182</b>	
HR81C Stylus LV65977D	79p	QW73Q Map Light	64p	FY40T Box Spanner 2BA	98p	YB79L Anti-Static Spray	E1.28
HR82D Stylus NP EPS19	E2.10	HR68Y Car Lighter Ext Lead	E2.77	FY41U Box Spanner 4BA	98p	YB80V Fire Extinguisher	E3.55
HR83E Stylus NP EPS36	E1.53	<b>Page 170</b>		FY42V Box Spanner 6BA	98p	FL43W Evostik Impact	59p
HR84F Stylus NP EPS52	E3.68	FQ74R Car Power Supply 0.3	D15	FY43W Box Spanner 8BA	98p	FL44X Araldite Rapid	E1.69
HR85G Stylus Philips GP200SS	77p	FQ75S Car Power Supply 0.8	D15	FY44X Quick Grips	E4.71	FL45Y Double Bubble Sachet	14.5p
HR86T Stylus Philips GP200DS	77.5p	HW10L Car Speaker Control	D15	FY45 Crescent Wrench 160	E2.75	FL46A Cyanoacrylate	99p
HR87U Stylus Philips GP200DD	E1.05	HW22Y 12V Inspection Lamp	E1.28	FY46A Crescent Wrench 210	E3.93	LQ02C Potting Compound	E3.30
HR88V Stylus Philips 22/GP204	77p	QW76H Inspection Lamp L86	E2.22	FY47B Adjustable Wrench	E3.73	FL47B PVC Tape Black	35p
HR89N Stylus Philips 22/GP205	E1.06	FQ77J Jumper Leads	E3.45	<b>Page 178</b>		FL48C PVC Tape Blue	35p
HR90X Stylus Philips GP400	E4.09	HQ30B Wiper Control	E9.83	XY04E Torque Wrench	E7.55	FL49D PVC Tape Green	35p
<b>Page 162</b>		HQ35O Charger Ammeter	21.5	XY04C Socket Converter	E2.93	FL50E PVC Tape Brown	35p
HR91J Stylus RIG-28B SS	53p	QW78K Car Ammeter	E2.85	FY49D Needle File Flat Wrd	E1.20	FL51F PVC Tape Red	35p
HR92A Stylus RIG-28B DS	77.5p	HW11R Car Flash 4-Lamp	E1.63	FY50S Needle File Hand	E1.20	FL52G PVC Tape White	39p
HR93B Stylus RIG-28B DD	E1.22	HW17T Car Flash 6-Lamp	E1.44	FY51F Needle File Halfrd	E1.30	<b>Page 183</b>	
HR95O Stylus BF40S	33p	<b>Page 171</b>		FY52G Needle File Round	E1.20	FY72P Conductive Paint	E3.60
HR95P Stylus BF40D	76p	QW79L Car Flash 6-Lamp	E1.44	BR63T 6in Hack Saw	E1.99	HB22J Quickstick Pads	7p
HR95D Stylus Sanau	E3.61	<b>Page 172</b>		BR64Q 6in Hack Saw	99p	HB21K Velcrocombs	11p
HR96E Stylus Sanyo ST28	E3.61	QW80A Ign Coil Straight	E6.30	BR65P Punch 3/8in	E3.73	FL42X Fleaxing	6.5p
HR97F Stylus Sanyo 2611	E4.24	FQ81C Ign Coil Ballast	E6.45	BR66Q Punch 7/16in	E3.71	LQ21N Sealing Strip	53p
HR98G Stylus Sharp 706	E3.11	QW82D Ign Cap 367	53p	BR61A Punch 1/2in	E3.75	LH05F Transistor Testr HE	E13.82
HR99H Stylus Sharp 717	E3.69	QW83E Ign Cap 368	53p	BR62B Punch 9/16in	E3.95	YB82V Potting Sig Gen	E24.30
FQ42V Stylus 2529 DS	77.5p	QW84F Ign Cap 369	53p	BR60B Punch 5/8in	E3.79	FL60Q Pocket Multimeter	E6.75
FQ43W Stylus 2529 DD	E1.19	QW85S Thermostat 82	E2.47	BR61B Punch 3/4in	E3.99	<b>Page 184</b>	
FQ44X Stylus 2539 DS	E1.28	QW86T Thermostat 88	E2.49	BR62C Punch 7/8in	E4.30	YB84F Microtester 80	E19.09
FQ45Y Stylus 2539 DD	71p	HR01E Supp Cap Small Lucar	49p	BR63E Punch 1in	E4.55	YB85G Supertester 680G	E28.96
HR52Z Stylus KS40A DS	71p	HW02C Supp Cap Large Lucar	49p	BR98G Punch 1 1/8in	E4.65	YB86T Supertester 680R	E37.80
HR53H Stylus KS40A DD	89p	QW87U Supp Cap Spd	49p	BR99H Punch 1 3/16in	E4.65	<b>Page 185</b>	
HR54J Stylus KS41B DS	97p	QW88V Plug-Top Supp Strt	33p	HW01B Punch 1 1/2in	E5.98	YB83E Small Multimeter	E13.70
HR55K Stylus KS41B DD	E1.20	QW89W Plug-Top Supp Ang	43p	HW02C Punch 2 1/2in	E16.49	YB87U 100K Multimeter	E39.30
HR56L Stylus KS41C DS	E1.29	QW90X In-Line Plug Supp	18p	HW03D Punch 3in	E16.49	YB27E 100K Multimeter Kit	D15
HR57M Stylus KS41C DD	E1.53	QW91Y Suppressor Choke	79p	HW04E Mini Vice	E2.78	YB28F DMM Module	D15
HR58N Stylus 9TABC SS	38p	QW92A 7-Pin Trailer Plug	E2.61	HW03D Mini Drill	E6.55	<b>Page 186</b>	
HR59P Stylus 9TABC DS	68p	QW93B 7-Pin Trailer Socket	E2.98	HW02C Titan Drill	E10.63	XY05P 500MHz Freqncy Cntr	E106.03
HR60O Stylus 9TABC DD	91p	<b>Page 173</b>		XN12N Drill Stand	E13.84	FY78V Continuity Probe	E1.70
HR61R Stylus Sonotone V100	4.19	QW94C Trailer Socket Bolts	26p	BR04E Reliant Collar	53p	FY73Q Logic Probe	E13.31
QW46A Stylus Sony ND100	E3.97	HW03D Supp Cap Spd	49p	HW04E Drill Power Supply	E10.88	FL61I Signal Injector	E5.99
QW47B Stylus Sony ND114	E3.68	QW97U Supp Cap Large	99p	BR85G HS Twist Drill 0.8mm	68.5p	FY74K IC Test Clip	E2.00
<b>Page 163</b>		QW98V Plug-Top Supp Strt	33p	BR87U HS Twist Drill 1.4mm	68.5p	FR25C Insertion Tool	68p
QW48C Stylus Sony ND128	E1.51	QW99W Plug-Top Supp Ang	43p	BR65V Twist Burr 0.8mm	35p	<b>Page 187</b>	
QW49D Stylus Sony ND133	E4.65	QW90X In-Line Plug Supp	18p	BR66W Twist Burr 1.4mm	35p	XB82D Calscope Super 6 ++	E176.30
QW50E Stylus Sony ND134	E3.99	QW91Y Suppressor Choke	79p	<b>Page 174</b>		XB83E Calscope Super 10 ++	E199.00
QW51F Styl Tenorel N2001D	E2.45	QW92A 7-Pin Trailer Plug	E2.61	HQ00C HS Drill 1/16in	22p	Car in UK with XB82	E9.45
QW52G Styl Tenorel N2001E	E6.99	QW93B 7-Pin Trailer Socket	E2.98	HQ00B HS Drill 5/64in	25p	Car in UK with XB83	E9.45
QW53H Stylus Toshiba N-3C	E1.91	<b>Page 175</b>		HQ00S HS Drill 1/32in	25p	<b>Page 188</b>	
QW54J Stylus Victor DT33	E3.99	QW94C Trailer Socket Bolts	26p	HQ00F HS Drill 7/64in	28p	BM05F Scope Probe BNC	E16.93
LK00A Popular Care Kit 59	D15	QW95D Sign 50mph	26p	HQ00G HS Drill 1/8in	28p	XL07H MA1003	E17.99
YB46I Golden Disc Kit 57	D15	QW96E Sign GB	22p	HQ00H HS Drill 9/64in	28p	<b>Page 189</b>	
LK01B Record Care Kit 43	E6.85	QW97F Anti-Glare Strip	55p	HQ00I HS Drill 5/32in	38p	* XX05F UHF Mod No. 1	E4.99
YB47B Record Care Kit 107	E7.43	QW98G Luggage Elastic	48p	HQ00J HS Drill 11/64in	45p	QL02C SAR77	E1.58
<b>Page 164</b>		QW99H Ice Scraper	22p	HQ00K HS Drill 1/4in	45p	<b>Page 190</b>	
LK02C Golden Care Kit 79	D15	YB72P Tow Rope	E3.77	HQ00L HS Drill 3/16in	43p	XB10L DMO2	E14.82
YB48C Autochgrng Care Kit 81	D15	FY00A Keep Clean Kit	26p	HQ00M HS Drill 1/2in	49p	XB11M DMO2T	E16.82
LK03D Musicrete Kit 105	E2.15	XY02C Foot Pump Standard	E6.99	HQ00N HS Drill 11/32in	93.5p	XB04F Short Spring Line	E11.13
YB49D Hi-Fi Care Kit 89	E9.36	XY03D Foot Pump Gauge	E10.40	HQ00O HS Drill 3/8in	98p	XB85G NES Driver Module	E6.14
YB50E Groov Kleen 50	E2.32	<b>Page 176</b>		HQ00P HS Drill 7/32in	56p	<b>Page 191</b>	
LX06G Groov Kleen 42	E3.57	YB94C Plug Spanner	E1.39	HQ00Q HS Drill 15/64in	68p	* XB10Q Keyboard 48-Note	E25.94
FR44X Roller Pack GK42/S	40.25p	FY01B Tyre Pressure Gauge	E1.24	HQ00R HS Drill 1/4in	56p	* XB15R Keyboard 49-Note	E26.42
FQ55K Roller Pack 45/S	31p	FY02C Utility Knife	E1.36	HQ00S HS Drill 17/64in	89p	* XB16S Keyboard 61-Note	E32.33
FR42Z Roller Pack 50/S	33p	FY04E Retractable Knife	E2.39	HQ00T HS Drill 9/32in	78p	XB17K MB Mounting Strip	29p
FR43M Roller Pack PC/60S	31p	FY05F Scalpel Handle	E1.86	HQ01T HS Drill 19/64in	85p	XB17T HD Rbd 49-Note C-C	E21.87
FQ56L Electroscope	D15	FY06G Scalpel Blade	E1.86	HQ01U HS Drill 5/16in	76.5p	<b>Page 192</b>	
FR52C Anti-Stat Fluid 69	56p	FY07H Min Screwdriver Set	E1.28	HQ01V HS Drill 11/64in	81.9p	* XB18Q Keyboard 48-Note	E25.94
LX10L Anti-Stat Mat 102	E2.95	BR58N Jewellers Screwdriver	E2.70	HQ01W HS Drill 11/32in	93.5p	* XB15R Keyboard 49-Note	E26.42
<b>Page 165</b>		BR79L Interchngl Scrdrvr	E2.40	HQ01X HS Drill 23/64in	98p	* XB16S Keyboard 61-Note	E32.33
LX04E Anti-Stat Gun	E4.99	FY08J Utility Set	E4.49	HQ02Y HS Drill 3/8in	E1.49	XB17K MB Mounting Strip	29p
YB52G Groove-Stat 3000	D15	BR46C Hex Trimmer	22p	HQ02A HS Drill 25/64in	E1.19	XB17T HD Rbd 49-Note C-C	E21.87
FQ57M Record Cleaner 28	E1.23	BR51F Trim Tool	33p	HQ02B HS Drill 13/32in	E1.30	XB94C Contact Block 1W	20.5p
FR48C Dust-Off 71	33p	BR50E Press Trimmer	53p	HQ02C HS Drill 17/64in	E1.45	XB01B Contact Block GB2	49p
YB53B Groov Guard 114	D15	BR50E Trim TT5					



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				QF23A BF348	30p			WQ00I VM88AF	35p
				QF24B BF385	30p			WQ00J VM88AF	35p
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				QF43W BY164	69p			WQ012 VM88AF	35p
				QF44X BY206	30p			WQ013 VM88AF	35p
				QF45Y BZ3614V7	17.5p			WQ014 VM88AF	35p
				QF46A BZ3615V1	17.5p			WQ015 VM88AF	35p
				QF47B BZ3615V6	17.5p			WQ016 VM88AF	35p
				QF48C BZ3616V2	17.5p			WQ017 VM88AF	35p
				QF49D BZ3616V8	17.5p			WQ018 VM88AF	35p
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				QF53H BZ3619V1	17.5p			WQ022 VM88AF	35p
				QF54J BZ3619V1	17.5p			WQ023 VM88AF	35p
				QF55K BZ3619V1	17.5p			WQ024 VM88AF	35p
				QF56L BZ3619V1	17.5p			WQ025 VM88AF	35p
				QF57M BZ3619V1	17.5p			WQ026 VM88AF	35p
				QF58N BZ3619V1	17.5p			WQ027 VM88AF	35p
				QF59P BZ3619V1	17.5p			WQ028 VM88AF	35p
				QF60Q BZ3619V1	17.5p			WQ029 VM88AF	35p
				QF61R BZ3619V1	17.5p			WQ030 VM88AF	35p
				QF62S BZ3619V1	17.5p			WQ031 VM88AF	35p
				QF63T BZ3619V1	17.5p			WQ032 VM88AF	35p
				QF64U BZ3619V1	17.5p			WQ033 VM88AF	35p
				QF65V BZ3619V1	17.5p			WQ034 VM88AF	35p
				QF66W BZ3619V1	17.5p			WQ035 VM88AF	35p
				QF67X BZ3619V1	17.5p			WQ036 VM88AF	35p
				QF68Y BZ3619V1	17.5p			WQ037 VM88AF	35p
				QF69A BZ3619V1	17.5p			WQ038 VM88AF	35p
				QF70M BZ3619V1	17.5p			WQ039 VM88AF	35p
				QF71N BZ3619V1	17.5p			WQ040 VM88AF	35p
				QF72P BZ3619V1	17.5p			WQ041 VM88AF	35p
				QF73Q BZ3619V1	17.5p			WQ042 VM88AF	35p
				QF74R BZ3619V1	17.5p			WQ043 VM88AF	35p
				QF75S BZ3619V1	17.5p			WQ044 VM88AF	35p
				QF76T BZ3619V1	17.5p			WQ045 VM88AF	35p
				QF77U BZ3619V1	17.5p			WQ046 VM88AF	35p
				QF78V BZ3619V1	17.5p			WQ047 VM88AF	35p
				QF79W BZ3619V1	17.5p			WQ048 VM88AF	35p
				QF80X BZ3619V1	17.5p			WQ049 VM88AF	35p
				QF81Y BZ3619V1	17.5p			WQ050 VM88AF	35p
				QF82Z BZ3619V1	17.5p			WQ051 VM88AF	35p
				QF83A BZ3619V1	17.5p			WQ052 VM88AF	35p
				QF84B BZ3619V1	17.5p			WQ053 VM88AF	35p
				QF85C BZ3619V1	17.5p			WQ054 VM88AF	35p
				QF86D BZ3619V1	17.5p			WQ055 VM88AF	35p
				QF87E BZ3619V1	17.5p			WQ056 VM88AF	35p
				QF88F BZ3619V1	17.5p			WQ057 VM88AF	35p
				QF89G BZ3619V1	17.5p			WQ058 VM88AF	35p
				QF90H BZ3619V1	17.5p			WQ059 VM88AF	35p
				QF91I BZ3619V1	17.5p			WQ060 VM88AF	35p
				QF92J BZ3619V1	17.5p			WQ061 VM88AF	35p
				QF93K BZ3619V1	17.5p			WQ062 VM88AF	35p
				QF94L BZ3619V1	17.5p			WQ063 VM88AF	35p
				QF95M BZ3619V1	17.5p			WQ064 VM88AF	35p
				QF96N BZ3619V1	17.5p			WQ065 VM88AF	35p
				QF97O BZ3619V1	17.5p			WQ066 VM88AF	35p
				QF98P BZ3619V1	17.5p			WQ067 VM88AF	35p
				QF99Q BZ3619V1	17.5p			WQ068 VM88AF	35p
				QF00R BZ3619V1	17.5p			WQ069 VM88AF	35p
				QF00S BZ3619V1	17.5p			WQ070 VM88AF	35p
				QF00T BZ3619V1	17.5p			WQ071 VM88AF	35p
				QF00U BZ3619V1	17.5p			WQ072 VM88AF	35p
				QF00V BZ3619V1	17.5p			WQ073 VM88AF	35p
				QF00W BZ3619V1	17.5p			WQ074 VM88AF	35p
				QF00X BZ3619V1	17.5p			WQ075 VM88AF	35p
				QF00Y BZ3619V1	17.5p			WQ076 VM88AF	35p
				QF010 BZ3619V1	17.5p			WQ077 VM88AF	35p
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		YF35H 74LS78	39p	YH33L 76489	£1.76	QW68Y NE 565	£1.69	BY73Q 8W Amp PCB	46p
		QK63T 7485	78p	YH34M 8T28	£3.99	WQ56L NE 566	£1.60	LM36P 8W Amp Kit	£3.83
		YF35O 74LS85	93p	YH35O 8T95	£3.99	Page 250		Page 263	
		QK64U 7486	24p	YH36P 8T97	£5.84	YH38R 8038	£4.20	HQ68Y 50W Hi-Fi PCB	£2.29
		YF36P 74LS86	22p	YH37S 8T98	£1.76	YH39N 8069	£1.69	LM350 50W Amp Kit	£13.73
		QK65V 7489	£2.75	YH38R 8038	£1.76	YH40T 8080A	£5.69	Page 264	
		YF37S 74LS89	NA	YH41U 8085A	£16.93	YH41U 8085A	£16.93	XF05F Disco Schedule	FREE
		QK66W 7490	59p	YH42B 8225	£1.19	YH42B 8225	£1.19	WL32R 150W Power Amp Kit	£15.89
		YF38R 74LS90	69p	YH43M 8211	£3.99	YH43M 8211	£3.99	Page 265	
		QK86T 7491	£1.02	YH44X 8212	£3.99	WQ50E MC6875L	£6.89	HY21X Clock Timer PCB	£1.65
		QK67K 7492	50p	YH44X 8224	£3.99	QW00A 280-CPU	£7.50	LM30H Clock Timer Case	£12.90
		YF39N 74LS92	68p	YH47B 8228	£5.84	QW03D 280-PIO	£6.41	XF32K Monitor Schedule	FREE
		QK68Y 7493	69p	YH48C 8250	£10.17	QW04E 280-SIO	£30.85	Page 267	
		YF40T 74LS93	79p	YH49D 8251	£7.40	QW07C 280-DMA	£10.17	XL14Q MA1023	£8.41
		QK69A 7494	67p	YH50E 8255A	£7.50	QW12X 280-CTC	£5.86	BY74R Michron MkII PCB	58p
		QX70M 7495	67p	YH51F 8279	£12.72			YH92A Michron MkII Case	£6.81
		YF41U 74LS95	99p	YH52G 82S126M1	£3.36	Page 252		LM376 Ultrasonic Dctr Kit	£19.40
		QK73Q 74121	49p			WQ43W MC6800P	£8.98	XF31J Michron MkII Leaflet	FREE
		WH00A 74122	34p	Page 253		WQ44X MC6802P	£14.11	Page 269	
		WH01B 74123	59p	QK36P LM301A	31p	WQ46A MC6821P	£5.93	BY75B Train Control PCB	£2.23
		YF48C 74LS123	99p	QH37S LM308	73p	WQ48C MC6850P	£5.26	YB93B Train Control Case	£7.60
		WH02C 74LS124	£1.79	WQ54J NE531	£1.48	WQ49D MC6852P	£12.51	LM49D Train Controller Kit	£31.20
		YF49D 74LS125	99p	QK70M 74125	53.5p	WQ50E MC6875L	£6.89	XF28F Train Cntrl Schedule	FREE
		YF50E 74LS126	49p	QK71N 74107	22.5p	QW00A 280-CPU	£7.50	Page 273	
		WH03D 74132	49p	QK72Y uA741C 8-pin DIL	47.5p	QW03D 280-PIO	£6.41	BY91Y Ultrasonic Dctr PCB TEMP *	
		YF51F 74LS132	85p	QK73Q uA741C 14-pin DIL	47.5p	QW04E 280-SIO	£30.85	BY92A Burglar Alarm PCB	£4.87
		YF52G 74LS136	49p	QK74R 74118	89p	QW07C 280-DMA	£10.17	BY93B External Alarm PCB	55p
		YF53H 74LS138	99p	QK75P 74119	49p	QW10I 280-CTC	£5.86	BY94C Alarm Buzzer 12V	£1.52
		YF54J 74LS139	99p	WH00A 74122	34p			XY13P Burglar Alarm Box	£9.63
		WH05E 74141	£1.17	WH01B 74123	59p	Page 254		BY95D Alarm Box Bracket	23.5p



# NEW BOOKS

## 110 IC Timer Projects by Jules H. Gilder

The book contains 110 circuits using the ever popular NE555 including 9 monostables, 13 astables, 8 logic circuits, 37 test instrument circuits, 20 car circuits, 11 alarm and control circuits and 12 power supplies and converters. American book. 1980. 124 pages. 228 x 146mm. Illustrated. Order As XW38R (Book NB480) Price £4.35 NV



## Choosing Your Hi-Fi by Maurice L. Jay

Contains all the basic information necessary to understand the technical specifications of hi-fi equipment, so that you can make a more informed choice from the wide range of equipment available. The author also indicates what he considers the minimum standard to look for. 1980. 96 pages. 180 x 108mm. Illustrated. Order As XW36P (Book BP68) Price £1.80 NV

### Choosing and Using Your Hi-Fi



## Electronic Games by R. A. Penfold

Circuits for 19 different games including noughts and crosses, combination lock game, electronic roulette, one-armed bandit, snap indicator, electronic die, etc. All the projects are inexpensive and easy to construct. 1980. 96 pages. 180 x 108mm. Illustrated. Order As XW37S (Book BP69) Price £1.90 NV



## The Personal Computer Book by Robin Bradbeer

Today's personal computers are the start of something which, within a few years, will bring about radical changes in our lives at home and at work. This book explains right from the beginning what it's all about, how to get started, what the computer is and how it works, what equipment is available and what can be done with it. The author is generally regarded as one of the foremost experts in the personal computing field. 1980. 200 pages. 210 x 148mm. Illustrated. Order As XW41U (Book ITN1) Price £5.25 NV



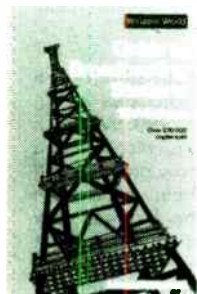
## BASIC With Style by Nagin & Ledgard

If you can programme in BASIC then this book will help to show you how to write efficient programmes that work correctly first time. The book introduces superior methods of programme design and construction in BASIC. American book. 1978. 144 pages. 227 x 147mm. Illustrated. Order As XW42V (Book HD115) Price £4.15 NV



## Guide To Broadcasting Stations by Wireless World

The book contains lists both in geographical order and in frequency order of long and medium wave European stations and short-wave stations world wide. In addition there is a list of European VHF radio stations and a concise guide to suitable aeriels, signal identification and reception reports. New 18th edition. 1980. 236 pages. 185 x 120mm. Order As XW43W (Book NB467) Price £3.45 NV



## More Basic Computer Games by D. H. Ahl & Steve North

Talk to Eliza the psychologist, evade a man-eating rabbit, crack a safe, tame a wild horse, become a millionaire, race a Ferrari, joust with a knight, navigate in deep space, hunt a wumpus, play close encounters. This book contains 84 new games with programme listings, sample run and description. All run in standard Microsoft Basic. A sequel to RQ21X Basic Computer Games which has now sold more than 100,000 copies worldwide. 1980. 185 pages. 280 x 220mm. Illustrated. Order As XW48C (Book R6) Price £5.50 NV



## Remote Control Projects by Owen Bishop

The book contains lots of circuits, designs and applications for remote control projects. Not only are radio control methods covered, but also ultrasonics and infra-red. All the circuits are fully explained and therefore easily adapted for your particular application. 1980. 176 pages. 180 x 108mm. Illustrated. Order As XW39N (Book BP73) Price £2.15 NV



## Electronic Music Projects by R. A. Penfold

Contains circuits and construction details of many not too complex electronic music projects including fuzz box, waa-waa pedal, sustain unit, reverb, phaser unit, tremolo generator and many more. 1980. 112 pages. 180 x 108mm. Illustrated. Order As XW40T (Book BP74) Price £1.90 NV



## Test Gear Projects by Terry Dixon

Contains full constructional details of over 30 projects including a selection of power supplies, signal injectors, a reference oscillator, noise generator, a logic probe, multimeter, capacitance bridge, transistor tester, oscilloscope calibrator and an oscilloscope dual trace adaptor. 1980. 120 pages. 216 x 134mm. Illustrated. Order As XW47B (Book MM396) Price £4.35 NV



## Electronic Household Projects by R. A. Penfold

Constructional projects include two-tone door buzzer, automatic porch light, electronic thermostat, lamp dimmer, bedside radio, burglar alarm, baby alarm, smoke and gas detectors and many more. 1980. 112 pages. 180 x 108mm. Illustrated. Order As XW44X (Book BP71) Price £1.90 NV



## A Microprocessor Primer by E. A. Parr

The book starts by designing a simple computer whose programming language is simple and easy to understand. The shortcomings of this machine are then discussed and in this way such things as relative addressing and index registers and the like, fall logically into place as the simple machine is developed. 1980. 96 pages. 180 x 108mm. Illustrated. Order As XW45Y (Book BP72) Price £1.90 NV

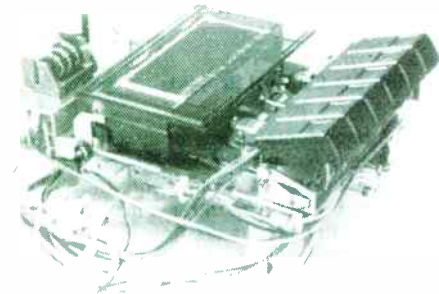


# STEREO CASSETTE RECORDER

(Continued from page 1)

## Mechanism

A high quality JVC mechanism originally made to a Tandberg of Norway specification for inclusion in a high quality music centre. The mechanism features a close-tolerance top-loading transport with an automatic head-cleaning device and there is a solenoid-driven end-of-tape auto-stop circuit. Pressing the stop/eject button operates the air-damped soft-eject mechanism. If tape is still playing this button stops the tape and must be pressed again to eject.



The record/playback head is a 1.5µ Sen Alloy head with the following characteristics:

DC resistance: 225Ω  
 Impedance: 1100Ω at 1kHz  
 Record current: 33µA (50µA chrome)  
 Bias current: 280µA (480µA chrome)  
 Playback sensitivity: 300µV at 333Hz

The erase head has the following characteristics:

Impedance: 95Ω at 50kHz  
 Erase current: 40mA

Both heads are pre-aligned for immediate use. There is a built-in calibrated tape speed regulator and a three-digit tape counter with reset button. The 12V DC motor has a high mass balanced flywheel with permanent lubrication spindle and

requires about 100mA on record/playback and 200mA on fast forward/rewind. The six piano-key switches are record, rewind, fast forward, play, stop/eject, pause. To record, press record and play together.

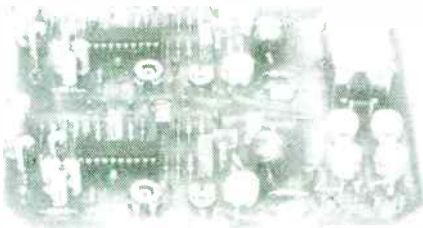
The wires should be connected as follows:

Red to +12V  
 Black to 0V  
 Red/Blue/Screen to left channel record/replay equalised pre-amplifier  
 Red/Blue/Screen to right channel record/replay equalised pre-amplifier.  
 White/Screen to bias oscillator for erase head

Order As XY32K (Cassette Mechanism)  
 Price £14.95

## Cassette Player Module

A complete, built, tested and pre-aligned electronics module designed to precisely complement the JVC cassette mechanism. The module connects directly to the mechanism and the output is suitable for feeding to the line, radio, or tape input of



any hi-fi amplifier. The module contains a stereo microphone pre-amplifier, stereo line input pre-amplifier, stereo record and playback amplifiers with 120µs equalisation for standard tapes, a stereo motional peak level VU meter drive circuit, bias and erase oscillator and electronic record/playback switching.

## Specification (typical)

Supply voltage: 12V DC  
 Supply current: 50mA  
 Signal to noise ratio 74dB (playback) 69dB (record)  
 Total harmonic distortion 0.5%  
 Bias and erase oscillator 95kHz  
 Suits record/replay head impedance 500Ω to 1500Ω  
 Suits erase head 10Ω to 300Ω  
 Output level variable up to 1V rms  
 VU meter output variable  
 Output impedance 500Ω nominal  
 Microphone input (for max output) 0.8mV at 10kΩ  
 Line input (for max output) 100mV at 47kΩ  
 Supplied complete with leaflet showing how to connect module to power supply, mechanism etc. and how to put together the complete stereo cassette deck.

Order As XY34M (Stereo Tape Module)  
 Price £19.73

## Additional Parts

To make the complete stereo cassette deck the following parts are also required:

R1,2	Min Res 470k (M470k)
R3,4	Min Res 47k (M47k)
SK1,2	Phono Skt Twin (HH03D)
SK3,4	Jack Skt Open (HF91Y)
VR1,2	Pot Lin 10k (FW02C)
M1	Dual VU Meter (YQ47B)
<b>Price £3.90</b>	
T1	Min Tr 15V (WB15R)
FS1	Fuse 20mm 500mA (WR02C)
1	Tape Switch Board (YQ30H)
<b>Price 33p</b>	
1	Tape Switch Bracket (YQ33L)
<b>Price 48p</b>	
1	Latchswitch 4-pole (FH68Y)
1	Latchbracket Single (FH75S)
1	Chassis F/Holder 20mm (RX49D)
23 (1pk)	Veropin 2145 (FL24B)
10 (1pk)	Veropin 2141 (FL21X)
(for connectors A, B and C)	
2 (1pk)	Bolt 6BA ¼in. (BF05F)
2 (1pk)	Nut 6BA (BF18U)
2 (1pk)	Shake 6BA (BF26D)
2 (1pk)	Self-tapper No. 2 x 3/16in. (BF64U)
2 (1pk)	Self-tapper No. 4 x 3/16in. (BF65U)
1 (1pk)	Tag 4BA (BF28F)
2m	Min Mains (XR01B)
2m	Cable Twin (XR21X)
1pk	Hook-up Wire (BL00A etc.)

## Parts for Power Supply

R1	W/W Min 68Ω (W68R)
C1,2	PC Elect 1000µF 25V (FF18U)
C3	Disc 0.1µF (BX03D)
BR1	W01 (QL38R)
IC1	µA78L12AWC (WQ77J)
1	Tape PSU PCB (YQ31J) <b>Price 39p</b>
6 (1pk)	Veropin 2141 (FL21X)

All the above parts are available as a kit.  
 Order As XY35Q (Cassette Parts Kit)  
 Price £12.98

Alternatively the above three parts are available as one complete kit saving over £7.  
 Order As XY36P (Cassette Recorder Kit)  
 Price £39.95

For a limited period the module and parts kit are available together saving over £7 for the benefit of those who have already bought the cassette mechanism from our previous offer.

Order As XY37S (Cassette Module & Parts Kit)  
 Price £25.00

## MAPLIN'S TOP TWENTY BOOKS

- |   |  |
|---|--|
| 1. (1) Basic Electronics Set (XX10L) (Cat P196).  | 13. (46) Newnes Radio and Electronics Engineer's Pocket Book (RL06G) (Cat P196).       |
| 2. (8) How To Make Walkie-Talkies by F. G. Rayer (RF18U) (Cat P201).                              | 14. (16) Electronic Circuits For Model Railways by M. H. Babani (RH45Y) (Cat P200).    |
| 3. (3) IC555 Projects by E. A. Parr (LY04E) (Cat P199).   | 15. (20) Home Electrics by G. Burdett (RQ22Y) (Cat P196).                              |
| 4. (7) Z80 IC's Data Sheets (RQ54J) (Cat P258).   | 16. (19) Electronic Projects In The Car by M. George (XW12N) (N/L Nov 1979).           |
| 5. (5) Electronic Music and Creative Tape Recording by M. K. Berry (RQ36P) (Cat P203).            | 17. (14) Master Electronics In Music by T. D. Towers (RR16S) (Cat P203).               |
| 6. (2) How To Build Your Own Working 16-Bit Microcomputer by Ken Tracton (XW15R) (N/L Nov 1979).  | 18. (—) Transistor Radio Fault-Finding Chart by C. E. Miller (XW32K) (N/L March 1980). |
| 7. (10) Second Book of Transistor Equivalents and Substitutes by B. B. Babani (RH11M) (Cat P197). | 19. (25) Radio & Electronics Colour Codes & Data Chart (RH05F) (Cat P196).             |
| 8. (6) First Book of Transistor Equivalents and Substitutes by B. B. Babani (RH00A) (Cat P197).   | 20. (31) Microprocessors by Rodney Zaks (RQ01B) (Cat P204).                            |
| 9. (—) Towers' International Transistor Selector Update 2 by T. D. Towers (RR39N) (Cat P197).     |  |
| 10. (11) 52 Projects Using IC741 by R. & U. Redmer (RH18U) (Cat P199).                            |  |
| 11. (4) Microprocessors and Microcomputers by Eric Huggins (XW14Q) (N/L Nov 1979).                |  |
| 12. (18) BASIC Computer Games by D. H. Ahl (RQ21X) (Cat P205).                                    |  |

These are our top twenty best-selling books based on mail-order and shop sales during February, March and April 1980. We stock over 250 books relating to electronics and in every newsletter from now on, we shall be publishing this list to help you choose from our large range. The highest new entry is the new edition of Towers, now a much expanded book with 284 pages and over 6500 new entries making a total of over 18,750 different transistors listed.



# Letters to the Editor

## Make Love Not War

Dear Sir,  
If the Wagners and Duncan Munn are so determined to seek out 'sin' in the Electronics Industry, they should look first to such companies as Ferranti, Marconi and Racal to name but three. These companies make a large proportion of their profits, selling expensive and sophisticated weapons to Third World countries. The effect on children of this immoral traffic (it affects adults too, but children, as the Wagners know, are always better for emotive appeal) is twofold. It destroys them directly, when what would otherwise have been minor tribal or sectional conflicts are escalated to bloody and destructive proportions. As frequently, it leads to indirect hardship and often death, by sponging off the cream of the resources of the area that should be being used for development.

When the Wagners, Mr. Munn and the morality mafia in general turn their attention to such genuinely harmful pervasions of electronics technology, the rest of us might be disposed to listen with greater tolerance to their claims about the alleged harmful effects of the two-inch black and white drawing of two people making love on page 147 of the Maplin catalogue.

Personally, I cannot help feeling that if our children were brought up to suppress their violent rather than their sexual nature, to regard war as a perversion and to recognise sex as relatively harmless, the world would be a much better place.

Sincerely  
JOHN HIND  
Belfast, N. Ireland

## Those Erotic Wheels Again

Dear Sir,  
May I first congratulate you on an excellent service which I have been making use of for some time now. I have had many orders and was more than satisfied with your prompt replies every time.

I was prompted to write, having put up with the complaints long enough, after reading Mr. Munn's letter concerning your disco picture wheels. How many more narrow-minded people are going to complain to you I ask myself! I myself am a deejay and, although I do not use these wheels, see nothing wrong with or ever have seen any annoyed faces, when these type of effects were being used. The people complaining about their use have obviously never attended a good disco where the emphasis is on entertainment and the audience have the maturity to take any special effects with a pinch of salt. Most deejays are responsible enough only to use such effects with a mature audience and if anyone complains then they would more than likely remove the "offending" material. As for influencing the younger generation just take a look at most of the daily papers.

Yours Faithfully  
PAUL BIRT  
Gourcock, Renfrewshire

## Ultra-Violet Tubes

Dear Sir,  
Would you please consider two suggestions of items to add to your excellent range of stock:

1) Replacement U-V tubes for your U-V pcb exposure box — or failing this could you suggest where they may be obtained as obviously their life is not unlimited!

2) Professional jack (1/4") plugs and line sockets (the type having a cable clamp fitted).

I find these type very hard to get hold of and I'm sure there would be a demand for them — I would certainly like to be able to buy a few myself.

I hope you will be able to include these items in your range in the near future. Thanking you for your excellent service.

Yours Faithfully  
MR. D. TAYLOR  
Hayes, Middlesex

*Unless you're going to do an extraordinary amount of etching, I should imagine the tubes will last for many years, but if you ever do need to replace them any good electrical shop should be able to get one for you. The type to ask for is a 12-inch RW/bi pin Philips T1.8W05.*

## Ten Brain-Teasers

To the Editorial Department,  
May I put a few questions to you?

1) What would you call an ultra-miniature toggle switch (e.g. SPST, SPDT, ...) with 3 tags?

2) When making the MES53 in stages (as I presume you have to) is the 49-note keyboard later wasted if you wanted two 61-note keyboards eventually? If not — why not (as there's no point in having a £26 keyboard spare is there)?

3) You say the organ will be to your own specification — however — if I wanted some different sounds to those given how is it possible? Or do you mean that it will be your choice of sounds from those available on MES53?

4) What is one supposed to do about woodwork casing if you don't supply it?

5) How can you join the Auto-Organ to the MES53 (full scale)? Is it just all explained in construction leaflet MES55.

6) Is MES53 Stage 2 available yet?

7) When is MES71 and MES71B coming out?

8) How can one get hold of 1,000-pin packs? What price are they?

9) On component schedules — when an item is available in packets — is the quantity you quote in packets or individual items needed?

10) If you add MES55 to MES54 how many: mixer and master tuning pcsbs, organ mixer pcsbs, 2G05 PSU pcsbs and master tuning modules will you need?

Yours Sincerely  
P. GOBEY  
Romford, Essex

1. This would be an SPDT switch (single-pole, double-throw).

2. The organ is designed to be made in stages and it is easier to do so. If you want 61-note keyboards then you must start with them. It is not possible to extend a 49-note keyboard.

3. We mean that there is a choice from all the facilities shown.

4. You have to make your own woodwork.

5. Yes it is explained in MES55.

6. MES53 Stage 2 is actually MES56 and this will be available in Spring 1981.

7. MES71 and 71B will be available in July 1980.

8. We can no longer supply 1,000-pin packs — you have to buy ten 100-pin packs.

9. Usually we quote actual numbers of pins or if we do quote packs we usually say 3pks or whatever.

10. You only require one of each of the parts you mention for the complete organ.

## What About 3800 Kits

Dear Sir,  
I am a student at Exeter College and I am building your 3800 synthesiser. When it comes to buying parts for the various sections it is a little disappointing to find out of stock chips etc. This obviously cannot be helped at times, but can I make a suggestion. Would it be possible to sell a "kit of parts" for the different sections e.g. for the output, oscillators etc. like you do for your amps etc. This would, I feel, make things a little easier for us budding Gary Newmans.

Yours 7802!

ADRIAN BEASLEY

P.S. and all the other Maplin Freaks at the College, Exmouth, Devon

*We are extending our range of kits gradually and it may be possible to include the modules from the synthesisers, but of course it won't really help us to be in stock. Obviously if we can't supply you with a particular part then we won't have it to put in our kit either. However, our stock levels are gradually improving thanks to the computer and at the moment we have less lines out of stock than ever before.*

## Wireless Sets For Sale

Dear Editor,  
If anyone of your readers is interested I have a 1936 MURPHY and a 1927 one-valve radio and a lot of other valve equipment left over from a craze I had some years ago. Both sets work.

I would like to swap for a really selective short wave radio or a mutually agreed value Credit Note on Maplins.

Yours Truly  
H. I. HAMBING  
37 Hanover Close,  
Charlbury, Oxford

## Synthesiser Book

Dear Sir,  
Having just received my copy of your book, '3800 & 5600 Stereo Synthesisers', I was somewhat disappointed to find that it did not, as advertised, contain full constructional details of how to build the two instruments.

My complaint is that no details were given of the pcb track layouts. As I normally etch my own pcbs I found this annoying in a book which claimed to give 'complete constructional details'.

The other comment I would like to make is that should you ever reprint the book, you might consider dividing it into two parts, one section for the 3800, and the other for the 5600 synthesiser. Customers could then just buy the relevant section.

I realise that this would mean some duplication, but I personally found it irritating continually flipping past details of the instrument I didn't intend building.

Hoping these comments have been of use.

Yours Faithfully  
DAVID P. PACK  
Edinburgh

*It is quite unfair to say that the book does not contain full constructional details since the book does show exactly how to make the synthesisers from the parts shown in the parts list. If we didn't supply the pcbs this would be another matter. The electronics magazines give track layouts because they want to sell magazines; that's their livelihood. But for us, we sell components and recoup some of the huge design costs on selling the items peculiar to a project such as the pcbs.*

*The book has actually been a great success and we have already had one reprint and are about to have another, but it would be much too expensive at this stage to split the book up.*

## Wire-Wrap Sockets

Dear Sirs,  
Could I suggest that you stock a range of DIL wire-wrap sockets as these are one of the few items I find I have to go elsewhere for at present.

Yours Faithfully  
RALPH C. BOWSFIELD  
Cheltenham

*Yes, we shall be including a range of wire-wrap DIL sockets in our next catalogue.*

## Same Day Service?

Dear Sir,  
I have read your newsletters as they arrive, and seeing some of the correspondence that you receive one would imagine that Maplin give nothing but supersonic first day service.

My own experience and that of many of my colleagues is that you should change your "same day service" title to "same year service"!

I have had many occasions to deal with you and always I have received very slow service. My last order is no exception, after one week I received a note saying that my order was out of stock. In a shop one may expect to wait a week for out of stock items to arrive, but not Maplin — my order was placed on the 12th March, it is now very nearly April! Please publish this letter in your newsletter (if you dare)!

My only reason for dealing with you is because of your comprehensive catalogue — I would say your prayers that a rival company does not start up because you will lose my trade and that of my colleagues and I'm sure many others!

R. WILLIAMS  
Selby, Yorks

*The reason our service was slow on this occasion was that the item ordered was out of stock. We must admit that if an order is out of stock then we send acknowledgement of the order by second class post, but we did actually manage to despatch everything by 3rd April which was only about 21 days. I notice that many mail-order companies advertising in the national press want you to allow anything up to 28 days for items they have in stock! I can't understand why you are looking for a rival company to start up; the electronics magazines are already full of them. The fact is that no-one with such a comprehensive catalogue could provide a better service than we provide. Even so, if we could think of a way to improve it, we'd do it!*

## Discount Vouchers Are Tiresome

Dear Sir,  
I note that the eulogies have been easily outnumbering the brickbats of late. Fearing that you may become complacent and suffer a relapse, I write to redress the balance.

Your performance immediately after the publication of your current catalogue was abysmal. At your nadir, I received a £10 credit note on a £14 order, not less than 47% of the items ordered being out of stock. However, that was long ago and in recent times your service has been highly satisfactory.

My present objection is to the manner in which you give discount. I find the storing and counting of your masses of multi-coloured coupons exceedingly tiresome. If you were in the grocery trade it would be understandable. Women seem to actually enjoy collecting box tops, wrappers and labels etc.

Perhaps I'm a weirdo and not at all typical of your customers, but I find ordering parts the most tedious aspect of our hobby and I strongly disapprove of all practices which make it more complicated and time consuming.

Why can we not receive any discount due in the form of a single credit note instead of all this irritating confetti?

Be advised Sir, our hobby is electronics and not stamp collecting.

Yours Faithfully  
NIGEL G. MACKAY  
Stafford

*The discount vouchers are a way of paying back the postage you overpay on large orders (since all prices include postage). We can only give as large discounts as we do because we can offset the costs against the fact that (we hope) they entice you to place more orders. If they were not multi-coloured they would be even more difficult to count, but surely as they are, it only takes a few seconds.*

## Computer Could Do More

Dear Editor,  
The introduction of your new computer seems to have been to everyone's advantage. I feel, however, that it is not (yet) being put to full use.

How about this suggestion: with every order (on request) an "Accounts status" could be given. This could include a list of items which are out of stock, but are to follow. Also the amount of credit (or debit) could be given.

The distribution of your newsletters still seems to be done manually, and with a number of mistakes. I have received three of the March 1980 newsletters (see special offer coupons enclosed, none of which I wish to use).

Could you get your new-fangled toy to print out the address labels for these, and also to keep a record of how many newsletters have already been paid for by each customer? (This could also be printed out on the account status previously mentioned.)

Yours Faithfully  
R. A. BARWICK  
Newcastle upon Tyne

*There are still a lot of programmes to be written for the computer even though the order throughput programmes are now more or less complete. We will be despatching the newsletters using the computer in the near future, but the other suggestion is a problem. Our invoice print programme is already very complex since there are so many different types of order to deal with and in fact uses 28K bytes of memory and we are loath to add even another line to it.*

## Shortwave Kit Wanted

Dear Sir,  
May I add my voice to W. Chrigwin's (March newsletter) in requesting a simple, superhet shortwave kit?

However, I'd like to add that it should be made compatible with the Maplin tuner modules, enabling it to be made up on its own or with, say, the Maplin a.m. board. That would really plug a gap in the market: since no such l.w. mw sw unit has been available to add to an existing fm set since the demise of the Quad AM3.

Yours Faithfully  
COLIN SHELBOURN  
Staveley-in-Cartmel  
Cumbria

Continued on page 18

# AMENDMENTS TO LEAFLETS

## Drumsette

On schedule please amend numbers required of DIL Sockets 14 and 16-pin. You will require 5 DIL Socket 14-pin and 6 DIL Socket 16-pin.

In the leaflet, on page 1, para 2 under heading 'Construction', should read: "Fit five of the 16-pin sockets..." In Fig 3C64 is shown the wrong way round. The +ve side connects to the bridge. C64 is also shown reversed on the pcb. Some constructors have complained that the downbeat indicator does not always extinguish on the downbeat. If you have this problem, connect a Min Res 1M between the junction of R5, R6 and C2, and the 'downbeat lamp supply' to ensure reliable operation.

## Micron Mk II Clock

Please note that in the 'test' mode the top left-hand segment of the top left-hand digit and the dot next to it should not light. In the section 'Controlling Mains Appliances' delete the sentence: "Disconnect the wire at the jack socket..." Note 3 should read: P22 (clock) to jack socket. Delete note 4. The diode across the relay is shown reversed; the banded end (cathode) should be connected to the +ve of the capacitor.

## Train Controller

In the parts list and in the component schedule (MES48B) we have shown C2 as Axial 100µF 25V. It should be Axial 1000µF 25V.

Also the transformer should be WB25C (Tr 12V 1A) and not Tr 34V 1A as stated in the parts list and component schedule. A revised wiring drawing is being sent out with the Train Control PCB (BY755).

## 40W Stereo Amplifier

The headphone amplifier in this amp is designed for use with electret headphones which tend to be insensitive. If you use conventional headphones you may find hum and noise audible from this output. This may be totally eliminated by changing R1 in the 8W Amp Kit to a Min Res 220k and R3 in the 8W Amp Kit to a Min Res 1k.

The following parts used in this project are not shown in the catalogue:

XX30H (Equaliser Pot Core) Price £1.76

XX31J (PCB Guides) Price 18p  
XX32K (Headphone Skt Bkt) Price 52 1/2p  
XY21X (Hi-Fi Amp Chassis) Price £18.93  
XY22Y (Hi-Fi Amp Screen) Price £1.85  
XY23A (Hi-Fi Amp Front Panel) Price £5.86  
XY24B (Hi-Fi Amp Cover Black) Price £6.95  
FL94C (Hi-Fi Amp Sel. Mthr. PCB) Price £2.82  
FL96D (Hi-Fi Amp Selector PCB) Price £2.29  
FL98E (Hi-Fi Amp Equ. Mthr. PCB) Price £2.25  
FL97F (Hi-Fi Amp Equaliser PCB) Price £1.97  
FL98G (Hi-Fi Amp Pk. Det. PCB) Price 95p  
FL99H (Hi-Fi Amp PSU PCB) Price £1.65

## 10-Channel Graphic Equaliser

Please note that the mains transformer required is the Min Tr 15V (WB15R) not Min Tr 12V.

## 3800 & 5800S Synthesiser

The setting-up instructions for the Transient A & B in the 5800S and the Transient in the 3800 are incorrect. Setting-up should be carried out as follows: On the Transient pcb turn VR3 and VR4 fully clockwise. Turn the 'final level' control to +10 and connect a scope to pin 25. Adjust VR4 until the maximum voltage is attained. Now turn VR3 fully anticlockwise and then turn it slowly clockwise until the maximum voltage is attained. If oscillation occurs turn VR4 slightly further anticlockwise and readjust VR3. In 5800S only, repeat for Transient B. On the Transient, R20 should be removed and replaced by a wire strap. In the VCF, R11 should be a Min Res 390k.

In Fig. 69 there is a wire from FPC12 shown connected to OV. There should not be anything connected to this point. Also FPC2 has a wire shown connected to Keyboard Controller pin 23. This wire should, however, be connected to Interface pin 15.

On the Interface pcb connect a ceramic 10pF across R1 and another across R4. In the 3800 only on the 'sample and noise' board link pins 13 and 17.

On the component schedule for the 5800S only, 7 Hor S-Min Presets 47k are listed under 'Keyboard Controller' column. They should be under 'Oscillator 1' column.

In the schedule for the 5800S synthesiser one part has been omitted. In addition to the

parts shown, the sample and noise module also requires one Rotary Sw38 (FF76H).

The following parts used in these projects are not shown in the catalogue:

BF95D (Joy Lever PCB) Price 69p  
BF98E (3800 External I/P Bkt) Price 50p  
BF98G (3800 VCA Bkt) Price 50p  
BF99H (3800 Interface Mtg Bkt) Price 48p  
LB99H (Rd Woodscrew Black No. 4 1/2in.) Price 13p per pack of 10  
LR76S (C/S Panel Screw 48A 1in.) Price 4p each  
LR76H (Cup Washer 48A) Price 2p each  
XY28F (Remote Foot Control) Price £9.35

## Bass Guitar And Organ Pedal Unit

In the component list on leaflet MES25 the following items have been omitted:

T2 Sub-Min Tr 6V  
D45-46 1N4002  
D47-53 LED Red  
R151-157 Min Res 270

Also required

1 Mains Plug P429  
1 Mains Socket P646  
1 Jack Skt Brk  
1 Recess Plate

In addition C55 should be Axial 470 F 63V (not 40V)

ZD1 should be BZX61C12 (not 13).  
LP1 Pan Neon is not required.  
FS1 should be mounted in a Chassis F/H 20mm.  
The six Press Toe Switches Type 1 are SW2 to 7.

The Component Schedule (MES25B) lists all these parts correctly.

## 150W Amp Kit

We recommend making Q1, 2 and 3 either all ZTX541 or all ZTX542, changing Q5 to BF337 and R11 to Std Res 1k. Only two Heatsinks Clip-On will now be required. LW32K is now being supplied as standard with the parts listed above.

## 150W Stereo Disco

The following parts used in this project are not shown in the catalogue:

XY26D (Heatsink Mtg Plate) Price £3.35  
XY27E (Heatsink Cover) Price £5.87

On the component schedule the two mylars required are 0.001µF (WW15R) not 0.047µF as stated. Also the box should be AB10 (LF11M) not AB7 as stated, and the Low Loss Co-Ax should be Low-C Cable (XR19V). In the leaflet the last line of the penultimate para on page 3 should read: "Link 8 to B and E to E on SW9 and 10."

## Audio Mixer

The Terry clip spacer previously sold only as part of mixer metalwork kit No. 1 is now available separately.

Order As LW03D (Spacer TC) Price 16p

## Electronic Car Ignition

In the new leaflet the circuit has been changed and therefore the pcb (BB75S) described on page 24 of the catalogue will not be suitable. Leaflet MES16 gives details. On comp. schedule Toggle Switch Cover is YL01B (not XX42V).

The following parts used in this project are not shown in the catalogue:

XX40T (Ignition PCB) Price £1.30  
XX41U (Ignition Mtg Plate) Price £1.28  
YL01B (Toggle Switch Cover) Price 36p

## Burglar Alarm

In the parts list for the ultrasonic detector and in the component schedule (MES47B) we have shown C9 as Axial 10µF 25V. It should be Ceramic 10pF. Also R16 is shown as Min Res 1k. It should be Min Res 2k. The Octal Ch Skt shown on the schedule is not required.

Also R41 and R43 should be Min Res 1k.

## MES54, 32-Note Pedalboard and MES55 Auto-Organ Rhythm Generator

The following parts used in these projects are not shown in the catalogue:

YL00A (Organ Mtg PCB) Price £2.93  
YL18U (2G05 PSU PCB) Price £1.24  
YL20W (Master Tuning Module) Price £19.87  
YL21X (32-Note Pedal PSU PCB) Price £2.65  
YL22Y (36-Way Plug and Socket) Price £14.99  
XX38R (Downbeat Indicator PCB) Price £2.20

# ERRORS IN CATALOGUE

We regret that the following errors have occurred in the catalogue although they are shown correctly in the price list. Please amend your catalogue as follows:

**Page 47**  
BF92A is a Tie-Wrap 140.

**Page 49**  
Under 'Panel-Head Screws' second line from the bottom should begin M2.5 not M3.5.

**Page 50**  
The length of the threaded spacer 68A is 6.35mm (1/4in.) and not 4.76mm as stated.

**Page 54**  
The order code for the metal detector shell should be XQ99H (not XQ85G). Box PB301 dimensions should read 107 x 57 x 38mm.

**Page 69**  
A new type of Min Tuner now available: YQ24B (AM Varitone) see "Back Issues of Newsletters" March 1980 section in this newsletter for price. Suitable for use with ZN414 and in place of Dilecon 500pF in circuit on cat. page 109.

**Page 72**  
Constantan wire is sold as a 1oz reel (not 2oz).

**Page 72**  
3 Watt W/W Min. Resistors. 3.9Ω, 120Ω and 270Ω are also stock values.

**Page 75**  
2-Axis Joystick is now fitted with 220k lin pots not 100k as stated.

**Page 79**  
Slide Knob 'F' is now being supplied in a slightly different style owing to manufacturer discontinuing previous type. The new type will only fit vertically i.e. with longer side of knob parallel with longer side of slide pot.

**Page 83**  
The round bulb is being replaced by a 15W Pygmy bulb as stocks of the round bulb run out.

**Page 89**  
A new specification Microswitch is now available. The new type is not enclosed, contacts are rated at 250V AC 3A, overall size 30 x 21 x 4mm.

**Page 104**  
The Aerial Rotator (XB54J) is now slightly different from the one described. The main change is that now only a 3-core cable is required between control box and drive unit.

**Page 104**  
Telescopic Aerial 4ft is replaced by an eight section 54in. type.

**Page 111**  
MP Crystal 2MHz (FY80B) will in future be supplied in case style HC-33/U. The adjustment tolerance is now ±80ppm, temperature stability is ±100ppm, temperature range is 0 °C to 50 °C and load is 30pF. MP Crystal 2.5MHz. This crystal will be supplied with a frequency of 2.467800 MHz so that it may be divided by 2" to give standard transmission rates of 300 x 2."

**Page 112**  
The OV on the clock transformer are not internally commoned.

**Page 120**  
The Universal Plug plug and socket is 200mm. from the end of the lead.

**Page 133**  
The BC Adaptor should be marked 'Foreign'.

**Page 136**  
The buzzers we are now supplying cover the voltage range 4½V to 17V and therefore the same buzzer will be supplied on orders calling for either FL39N or FL40T.

**Page 143**  
The lengths of the leads on the earpieces is measured in centimetres not mm.

**Page 162**  
Tie-Clip Mic is supplied with lead terminated in a ¼in. standard mono jack plug.

**Page 149**  
We are now supplying 75W spot lamps.

**Page 165**  
The intercom now being supplied is a higher quality type than the one shown. It is supplied with 15 metres of plug-in cable and staples, but the battery (PP3 required) is not supplied.

**Page 178**  
Drill stand: Second sentence should read: "Lever on stand lowers drill for drilling operation;—"

**Page 189**  
UHF modulator now being supplied is a higher quality design suitable for use with teletext, and computer interfaces.

**Page 192**  
Keyboards 48-note, 49-note and 61-note are not supplied with end mounting brackets as shown in the picture (and they have not been that type for three years). We apologise for reprinting the wrong picture.

**Page 193**  
The legend engraved on the stop tab BY09K

is PRESETS CANCEL (not PRESETS & D/B as stated).

**Page 194**  
A new type of drawbar will be available in early August. They are in marbled red (BR41U) or marbled white (BR42V). Resistance 22k lin.

**Page 206**  
The matched pair MEF4220 is no longer available. In the Dynamic Noise Filter use a matched pair MEF102. Price B1p. Order As YH65V.

**Page 230**  
In the fourth row, the third picture shows the 4502BE (not 4098BE).

**Page 233**  
IC type 4136 pins 1, 6, B and 14 are - inputs and pins 2, 5, 9 and 13 are + inputs.

**Page 245**  
MM57180 pin 26 is D2 and pin 27 is D3, not as shown.

**Page 259**  
The DD Display as now being supplied differs from the type shown in the catalogue as follows: Overall dimensions: 24.5 x 19 x 8mm. Pin spacing: 15.9 x 2.5mm. Type A is marked MAN6710; Type AF is marked MAN6730; Type C is marked MAN6740; Type CF is marked MAN6750.

**Page 263**  
In the parts list for the power supply D1-4 for the stereo pair should be PW06 (not KBPC606).

**Page 270**  
Ultrasonic Detector Project. This project has been withdrawn temporarily owing to the difficulty of setting-up correctly. Customers having problems should write to our Technical Dept. who can advise you of a modification to make the detectors work correctly.

(Continued from page 17)

## Out Of Stock Items

Dear Sir,  
On the 25th of January you despatched part of Order No. 20605, which I received. Approximately one month later you despatched part of the remaining order, which I also received. However, over four months after posting the original order, I am still awaiting the arrival of 2 two-Octave boards, 2 Min Tr 15V and 61 BC 214L Transistors.

Come on! Pull your socks up. Prove that yours is still the best service around.

Yours in anticipation  
A. WINTERBOTTOM  
Dewsbury, Yorks

Now that the computer is running smoothly and one can look back, I suppose

*it was inevitable that something would go wrong when changing a massive manual system over to computer in one fell swoop. It was the back order file which was completely messed up. Unfortunately it was a subtle error that gradually made things worse and worse before anyone noticed and by then it was irretrievable. It has taken us a long while to sort it out and there are still about thirty sets of goods that we have not been able to tie up. So if you are still waiting for goods from orders placed before mid-February 1980, please let us know what you are waiting for, along with any other details you can give us about your order.*

# Letters to the Editor

## Fans Keep You Cool, Man!

Dear Sir,  
Last November I purchased your 150W amp kit which I have since built and used with my twin turntable at discos, parties etc. It is an excellent amp producing high quality, high power sound.

For convenience I mounted the amp inside my disco unit with the heatsink horizontal, but worried as I was about overheating I fitted a small fan with a 3" blade. I now find the heatsink stays so cool that I am going to purchase another kit shortly and 'stereo-ise' my unit. To ensure enough air flows past the sinks I will have

to make a duct from aluminium sheet but that will present no problem.

My question to you is: Can you not offer a small cooling fan as a stock item? Such an item may prove to be very useful to constructors who need to dissipate a lot of heat and would like to do it without using a lot of heatsinking. As well as the fan, how about a circular grille to fit a hole about 3" diameter. I made a crude one from aluminium sheet (3" square with lots of holes drilled in it) but I am sure you could do better.

IAN OLIPHANT  
Glasgow

Well, we've looked at cooling fans a few times for possible inclusion in our catalogue, but always found them rather expensive, nevertheless we'll look again.



## BACK ISSUES OF NEWSLETTERS

Copies of all previous issues of our newsletter since our current catalogue was issued are available. The reprints do not include the price list or letters pages or any item repeated in a later issue. The list below gives details of articles included, along with current prices of any new items shown in that newsletter.

**January 1979 Order As XF33L (Newsletter MES121) Price 15p**  
This newsletter carries details of the following:

Power Supply for one or two 8W Amp Kits  
Constant Current charger circuit for use with our quick charge nickel-cadmium cells.  
Keyboard Console — a black plastic case with slightly sloping aluminium front panel. Overall size 405 x 210 x 57/30mm.  
Order As XY15R (Verobox 503) Price £11.90

NE 544 Servo Motor Driver application circuit.  
MMS7160 Timer circuits and programming details.

**New Books as follows:**  
Radio Stations Guide by B. B. Babani & M. Jay  
Order As RQ58N (Book BP55) Price £1.55NV

The Best Of Creative Computing Vol 1  
Order As RQ60Q (Book Sybx R1) Price £9.72NV

The Best Of Creative Computing Vol. 2  
Order As RQ61R (Book Sybx R2) Price £8.37NV

The Best Of Byte  
Order As RQ62S (Book Sybx R3) Price £11.80NV

Questions And Answers Radio Repairs  
by Les Lawry-Johns  
Order As RQ59P (Book NB367) Price £1.78NV

Artist And Computer  
Order As RQ63T (Book Sybx R5) Price £5.57NV

Some Common BASIC Programmes  
Order As RQ64U (Book Sybx P10) Price £7.61NV

**March 1979 Order As XF34M (Newsletter MES122) Price 15p**  
This newsletter carries details of the following:

Dual-In-Line-Switches  
DIL Switch SPST Dual Order As XX26D Price 77p

DIL Switch SPST Octal Order As XX27E Price £2.49

DIL Switch SPDT Single Order As XX28F Price 73p

DIL Switch SPDT Quad Order As XX29C Price £3.25

**0.1in Matrix Breadboard**

Breadboard 217L Order As XX18U Price £5.59

Breadboard 234L Order As XX19V Price £5.92

Breadboard 248L Order As XX20W Price £6.93

Breadboard 264L Order As XX21X Price £8.72

Breadboard 206R Order As XX22Y Price £1.54

Breadboard 209R Order As XX23A Price £1.08

Breadboard 212R Order As XX24B Price £1.95

Breadboard SS-2 Order As XX25C Price £11.59

7109 A/D Converter Order As YH59P Price £14.70

CA3080E Transconductance Op-amp  
Order As YH58N Price 83p

**Flexible Laminate Panels**

Laminate Japan Teak Order As XY17T Price £3.71

Laminate Penang Walnut Order As XY18U Price £3.71

Laminate Alumin. Sml. Order As XY19V Price £1.59

Laminate Alumin. Lrg. Order As XY20W Price £2.11

Modification to 100W Stereo Disco to stop power amps exceeding 100W and overheating.

**May 1979 Order As XF35Q (Newsletter MES123) Price 15p**  
This newsletter carries details of the following:

Teak Cabinet for Piano Project Order As XY11M Price £63.63

Remote Control Dimmer Order As XX35Q Price £23.21

Dimmer Control Box Order As XX36P Price £9.63

Square LED Green Order As YH00Q Price 29p

Square LED Yellow Order As YH01R Price 29p

Square LED Clip Ogder As YH02S Price 7p

Automatic Car Cassette Carrier Order As LY06G Price £3.48

Universal Headshell Order As XX34M Price £4.16

PP3 Battery Holder Order As XXL Price 84p

Verobox 303 Order As LH50E Price £1.05

Verobox 305 Order As LH51F Price £1.93

**New Books as follows:**  
Basic Basic by James S. Coan  
Order As RL45Y (Book HD106) Price £6.16NV

Designing A Microprocessor System (cassette course) by Rodney Zaks  
Order As RQ65V (Course 53) DIS

Projects In Radio And Electronics by I. R. Sinclair  
Order As RL36P (Book NB345) Price £2.64NV

Electronic Projects In Audio by R. A. Penfold  
Order As RL40T (Book NB338) Price £2.63NV

Electronic Projects In Hobbies by F. G. Rayer  
Order As RL41U (Book NB354) Price £2.63NV

Electronic Security Devices by R. A. Penfold  
Order As RL43W (Book BP56) Price £1.55NV

Z80 Instruction Handbook by Nat Wadsworth  
Order As RL39N (Book Sybx L8) Price £3.73NV

Game Playing With Basic by D. D. Spencer  
Order As RL47B (Book HD109) Price £5.76NV

Electronic Projects In The Home by Owen Bishop  
Order As RL42V (Book NB346) Price £2.63NV

50 Circuits Using 7400 Series IC's by R. N. Soar  
Order As RL44X (Book BP58) Price £1.45NV

How To Build A Computer-Controlled Robot by T. Loofburrow  
Order As RL46A (Book HD681) Price £5.40NV

The Mind Appliance: Home Computer Applications by T. G. Lewis  
Order As RL48C (Book HD112) Price £4.65NV

CBer's Wordbook  
Order As RL49D (Book HD765) Temp out of stock

8080 Galaxy Game by R. Edwards  
Order As RL37S (Book Sybx L9) Price £5.56NV

**July 1979 Order As XF38R (Newsletter MES124) Price 15p**

The newsletter carries details of the following:

CMOS NE555V the ICM 7555  
Order As YH63T Price £1.17

Car Aerial Booster  
Order As XX37S Price £6.25

Adjustable Angle Lamp  
Order As XY25C Price £12.96

Maplin Teeshirts in three designs and six sizes. Good quality shirt. Chest sizes: Child 26in. (66cm) SC, Child 28in. (71cm) MC, Child 32in. (81cm) LC, Adult 34in. (86cm) S, Adult 36/38in. (91/97cm) M, Adult 40/42in. (102/107cm) L.

Slogans: Maplin — For A Bit At The Right Price  
Maplin Supplied My Parts  
Make It With Maplin

Size	Order As	Order As	Order As	Price
SC	T500A	T506G	T512N	£2.00NV
MC	T501B	T507H	T513P	£2.00NV
LC	T502C	T508I	T514Q	£2.05NV
S	T503D	T509K	T515R	£2.50
M	T504E	T510L	T516S	£2.50
L	T505F	T511M	T517T	£2.50

**New Books as follows:** ALL NV

A Guide To Amateur Radio by Pat Hawker

Order As RR05F (Book NB204) Price £7.49

Second Book Of CMOS IC Projects by R. A. Penfold

Order As RQ66W (Book BP59) Price £1.00

Beginners Guide To Digital Techniques by G. T. Rubaroe

Order As RQ67X (Book BP51) Price £1.05

How To Build Your Own Solid State Oscilloscope by F. G. Rayer

Order As XW07H (Book BP57) Price £1.65

Practical Construction Of Pre-Amps, Tone Controls, Filters And Attenuators by A. D. M. Smith

Order As XW08J (Book BP60) Price £1.60

**Full details of the following books are included:**

Towers International FET Selector by T. D. Towers

Order As RQ68Y (Book FT938) Price £3.91

Towers Op Amp Linear IC Selector by T. D. & N. S. Towers

Order As RQ69A (Book FT986) Price £7.25

Transistorised Radio Control For Models by D. W. Aldridge

Practical Solid State DC Supplies by T. D. Towers

Order As RQ71N (Book FT905) Price £5.75

Repair Your Own Home Electrical Appliances

by G. Burdett & J. Mattick

Order As RQ72P (Book FT832) Price £6.27

Understanding High Fidelity by Martin Clifford

Order As RQ73Q (Book FT879) Price £3.74

Introduction To Video Recording by W. Oliver

Order As RQ74R (Book FT780) Price £2.11

How To Repair Video Games Order As RQ75S (Book FT1028) Price £6.35

Servicing Cassette & Cartridge Tape Players

Order As RQ76H (Book FT716) Price £5.45

Electronic Musical Instruments

Order As RQ79L (Book FT546) Price £4.80

Model Railways Electronics

Order As RQ80B (Book FT926) Price £4.79

Transistor Ignition Systems

Order As XW00A (Book FT882) Price £4.80

The Complete Short Wave Listener's Handbook

Order As XW01B (Book FT685) Out of print

Radio Astronomy For The Amateur

Order As XW02C (Book FT714) Price £4.80

Beginners Guide To Computer Programming

Order As XW03D (Book FT574) Price £7.55

The Basic Cookbook

Order As XW04E (Book FT1055) Price £3.95

24 Tested, Ready-To-Run Programmes In Basic Order

Order As XW05F (Book FT1085) Price £4.80

The Complete Handbook Of Robotics

Order As XW06G (Book FT1071) Price £6.35

Japanese Consumer Service Manual

Order As RQ77J (Book FT732) Price £5.98

Servicing Electronic Organs

Order As RQ78K (Book FT503) Price £7.95

**November 1979 Order As XF39N (Newsletter MES125) Price 15p**

This newsletter carries details of the following:

New set-top TV aerial, the Toptenna

Order As XY30H Price £7.75

Loudspeaker mounting brackets:

Bracket Minor 5 (max. weight 11lb)

Order As YL15R Price £5.97 per pair

Bracket Bek 100 (max. weight 55lb)

Order As YL16S Price £12.77 per pair

Cabinet fittings

Handwheel Bolt Order As YL23A Price 35p

Butterfly Catch spring loaded

Order As YL06G Price £3.63

Lift-off Hinge chromed

Order As YL04E Price £2.07 per pack of two

Flight-Case Handle heavy duty

Order As YL05F Price £3.45

Car accessories

Magnilamp, illuminated hand-held magnifier

Order As YL02C Price 79p

Fog lamp red for rear bumper fixing

Order As YL07H Price £4.45

Reversing lamp white for bumper fixing

Order As YL08J Price £4.95

Rear window wiper kit, self-parking

Order As LQ13P Price £22.95

Rear window washer kit

Order As LQ14Q Price £13.90

Acoustic quality transducers

Professional quality Pick-up Transducer

AJ21 Order As YL08J Price £27.95

Standard quality Pick-up Transducer AJ51

Order As YL09K Price £19.95

General purpose Pick-up Transducer AJ15

Order As YL10L Price £13.70

**General**

Screened side-entry mono jack plug

Order As YL03D Price 29p

Verobloc plug-in breadboard

Order As YL11M Price £4.47

25kV High voltage probe

Order As YL12N Price £8.91

Shunt 25A DC

Order As YL13P Price £8.91

Shunt 100A DC

Order As YL14Q Price £8.91

Liquid Crystal Clock Module

Order As YL19V Price £13.40

Chromed portable legs for piano cabinet

Order As YL31J Price £22.60

**New Books** ALL NV

Electronic Projects in Music by A. J. Flind

Order As XW09K (Book NB391) Price £2.73

Electronic Projects in The Workshop by R. A. Penfold

Order As XW10L (Book NB383) Price £2.73

Electronic Game Projects by F. G. Rayer

Order As XW11M (Book NB379) Price £2.73

Electronic Projects in The Car by M. George

Order As XW12N (Book NB386) Price £2.73

Book of Audio by K. G. Jackson

Order As XW13P (Book NB429) Price £5.73

Microprocessors And Microcomputers by Eric Huggins

Order As XW14Q (Book MM604) Price £5.50

How To Build Your Own Working 16-Bit Microcomputer by Ken Tracton

Order As XW15R (Book HDB13) Price £3.25

Microprocessor Programming For Computer Hobbyists by Neill Graham

Order As XW16S (Book FT952) Price £7.10

March 1980 Order As XF40T

(Newsletter MES126) Price 15p

This newsletter carries details of the following:

**General:**

Smoke detector type 1 ready-built

Order As XY33L Price £11.75

LM13600N dual transconductance amp

Order As YH64U Price £1.55

Xtra Set Amp for running two TV's from one aerial

Order As YQ22Y Price £13.24

Splitter CS200 for combining or splitting two TV signals

Order As YQ23A Price £3.65

AM Varitune 500pF miniature variable capacitor

Order As YQ24B Price £1.20

**PCB's For New MM Books**

McM Encoder PCB

Order As YQ03D Price £1.10

McM Transmitter PCB

Order As YQ07H Price £2.05

McM Receiver PCB

Order As YQ04E Price £1.18

McM Receiver-Decoder PCB

Order As YQ05F Price £1.05

McM Stereophoner PCB

Order As YQ06G Price £1.10

McM Elect Ign/DC Conv PCB

Order As YQ08J Price £1.70

McM Flasher PCB

Order As YQ09K Price £1.15

**Details of how to put our tuner modules together to make an AM tuner, FM tuner or TV sound tuner:**

IF Tuner Mono Module

Order As YQ00A Price £10.42

12/30V PSU Module

Order As YQ10L Price £6.70

**New Books**

Interrelated Integrated Electronics Circuits

by R. M. Mendelson

Order As XW17T Price £4.35 NV

Stimulating Simulations

## 5600S AND 3800 DEMONSTRATION TAPE

A one hour demonstration tape of our superb synthesisers will be available in July. The tape comprises the following:

**SIDE 1:** A discussion of the technical capabilities of the 5600S and 3800 with some examples of sound effects produced by the machines. Two backing tracks for you to play the melody line to. (Patches for the sound effects and the music for the melody line are contained in the book described below.)

**SIDE 2:** Seven complete compositions in full stereo to show off the type of music you can play on these machines. These are all original compositions by Mike Beecher: I Got You, Morning, Bandit Rock, Whirlpool, Space Race (the Maplin theme), Etherius, and Theme B.

All the music is played by Mike Beecher.  
**Order As YQ46A (Synth Demo Tape) Price £4.50**

## MIKE BEECHER'S HOW TO PLAY THE 3800 & 5600S SYNTHESISERS

This book available in August helps the musician understand how to use the two Maplin synthesisers. The book covers: getting started, setting-up and testing; the external amplifier and speaker; cautions, connections, keyboard controlling and interfacing. Following chapters discuss how the synthesisers work in general and there is then a detailed explanation of each section of the synthesisers split into four main headings: sound sources, signal modifiers, controllers and final treatment. Then after some hints on using the synthesisers there are 30 patch charts for the 5600S and 15 for the 3800 to give you instant access to just a few of the sounds you can make with these amazing machines. Finally, the book contains the solo

melody line for the backing tracks on side 1 of the cassette.

**Order As XF41U (Synth Guide) Price £2.00 NV**

### Patch Charts

We also have available blank front panel drawings for you to fill in your favourite patches so that they are never forgotten.

**Order As XF42V (5600S Patch Chart) Price 10p NV**

**XF43W (3800 Patch Chart) Price 10p NV**

## SYNTHESISER AND ORGAN DEMONSTRATION



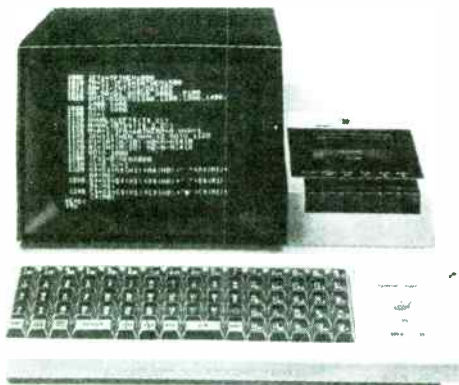
Our synthesisers and organ will be on demonstration in our shop on Saturday June 28th from 10 a.m. to 1 p.m. and 2 p.m. to 5 p.m. Mr. Mike Beecher will be putting the machines through their paces and he will welcome any questions you may have. Do call in and find out all you want to know about these great machines.

## NEW DRAWBAR

These new drawbars available in early August are marbled white (BR42V) or marbled red (BR41U) and 22k lin.



## SHARP MZ-80K MICRO-COMPUTER



Now on demonstration and available in our shop the new Sharp MZ-80K microcomputer. Complete with a 10in. black and white monitor, cassette tape unit and 78-key keyboard this superb micro features a Z80 CPU with 24K RAM (14K BASIC and 10K user), 1200bps cassette interface, loud-speaker so that music can be played (two special BASIC statements for this), an excellent set of graphic symbols, and direct screen addressing to an 80 x 50 pixel matrix. Memory expandable to 34K user. Come and see it in our shop now!

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## WRITE FOR MAPLIN

We are looking for good projects to publish. If you have any good ideas drop us a note with a brief outline and we'll tell you whether we're interested. Alternatively, we can suggest lots of projects that we would like designed and we'll give you a choice of some if you could tell us where your design strengths lie e.g. digital, analogue, car electronics, teaching etc., etc.

If you have yet to have any of your designs published then we would be interested to see any work you have done. If you are an established author or once you become one of our authors then we can supply you with all the parts you need for your experiments free of charge, and we'll pay you an excellent page rate for the finished articles. For further details write to us now at P.O. Box 3, Rayleigh, Essex with all relevant details and mark your letter for the attention of the Projects Editor.

## 'PRACTICAL ELECTRONICS' MAGNUM METAL DETECTOR

This superb new metal detector is due for publication in the August and September issues of 'Practical Electronics'. All the parts are available individually from us including the circuit boards. Two pcb's are required and these are both fibre glass, punched and printed with the component designations.

Power supply, auto-tune and output pcb:  
**Order As YQ44X (Magnum 1 PCB) Price £2.49**

Front end pcb:  
**Order As YQ45Y (Magnum 2 PCB) Price £2.49**

## ACCESS — YOUR FLEXIBLE FRIEND

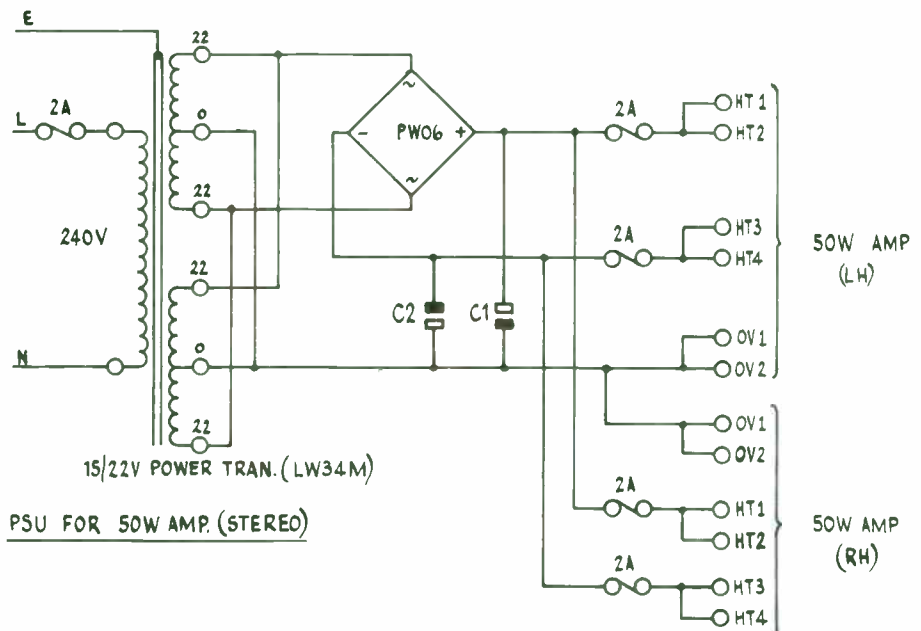


With all our special prices this summer it makes sense to buy now, and there's no better way to pay than with your Access card. You can even telephone your order to us for fastest possible service if you pay with Access.

## POWER SUPPLY

To Run Two 50W Amps (LW35Q)

The power supply shown here will run a stereo pair of our 50W Amps. C1 and C2 are Can 4700µF 40V.





**WIRE-WRAPPING WIRE**



A solid-core single silver-plated copper conductor designed especially for wire-wrapping. Insulation resists shrinkage when soldering.

Single core: 1/0.25mm silver-plated copper conductor  
30AWG. (33SWG)  
Sheath: 0.125mm Kyna  
Overall diameter: 0.5mm  
Nominal conductor area: 0.05mm<sup>2</sup>  
Max. working voltage: 300V RMS  
Max. current: 0.4A  
Colours available: Black, Blue, Green, Natural, Orange, Red, White, Yellow

On 25m reels only

Order As **BL77J (Wire-Wrap Black)**  
**BL78K (Wire-Wrap Blue)**  
**BL79L (Wire-Wrap Green)**  
**BL80B (Wire-Wrap Natural)**  
**BL81C (Wire-Wrap Orange)**  
**BL82D (Wire-Wrap Red)**  
**BL83E (Wire-Wrap White)**  
**BL84F (Wire-Wrap Yellow)**

**SOLID CORE WIRE**



A wire having a single solid core ideal for plate-wiring (running wires across a chassis with all wires straight or at right-angles to one another) because wire stays exactly in formed shape without ties.

Single core: 1/0.6mm copper conductor 22AWG (23SWG)  
Sheath: 0.3mm PVC — conforms to DEF61-12 (part 6) Type 2  
Overall diameter: 1.2mm  
Nominal conductor area: 0.28mm<sup>2</sup>  
Max. working voltage: 1000V RMS  
Max. current: 1.8A (commercial rating 3A)  
Colours available: Black, Blue, Brown, Green, Grey, Orange, Pink, Red, Violet, White, Yellow.

In 10m packs only.

Order As **BL85G (Bell Wire Black)**  
**BL86T (Bell Wire Blue)**  
**BL87U (Bell Wire Brown)**  
**BL88V (Bell Wire Green)**  
**BL89W (Bell Wire Grey)**  
**BL90X (Bell Wire Orange)**  
**BL91Y (Bell Wire Pink)**  
**BL92A (Bell Wire Red)**  
**BL93B (Bell Wire Violet)**  
**BL94C (Bell Wire White)**  
**BL95D (Bell Wire Yellow)**

**LIGHT-DUTY CONNECTION WIRE**

A flexible wire, which is ideal for signal interconnections within apparatus where it is necessary to pack a large number of wires into a small space.

Stranded core, single: 10/0.1mm copper conductor  
Sheath: 0.3mm PVC  
Overall diameter: 0.9mm  
Nominal conductor area: 0.0785mm<sup>2</sup>  
Max. working voltage: 1000V RMS  
Max. current: 0.5A  
Colours available: Black, Blue, Brown, Green, Grey, Orange, Pink, Red, Violet, White, Yellow

On 25m reels only

Order As **BL46A (L/C Wire Black)**  
**BL47B (L/C Wire Blue)**  
**BL48C (L/C Wire Brown)**  
**BL49D (L/C Wire Green)**  
**BL50E (L/C Wire Grey)**  
**BL51F (L/C Wire Orange)**  
**BL52G (L/C Wire Pink)**  
**BL53H (L/C Wire Red)**  
**BL54J (L/C Wire Violet)**  
**BL55K (L/C Wire White)**  
**BL56L (L/C Wire Yellow)**

**HOOK-UP WIRE**

A flexible wire, for general interconnections within apparatus.

Stranded core, single: 7/0.2mm copper conductor  
Sheath: 0.3mm PVC—conforms to DEF61-12 (part 6) Type 2  
Overall diameter: 1.2mm  
Nominal conductor area: 0.22mm<sup>2</sup>  
Max. working voltage: 1000V RMS  
Max. current: 1.4A (commercial rating 3A)  
Colours available: Black, Blue, Brown, Green, Grey, Orange, Pink, Red Violet, White, Yellow

In 10m packs only

Order As **BLOOA (Wire 10M Black)** **BL06G (Wire 10M Pink)**  
**BL01B (Wire 10M Blue)** **BL07H (Wire 10M Red)**  
**BL02C (Wire 10M Brown)** **BL08J (Wire 10M Violet)**  
**BL03D (Wire 10M Green)** **BL09K (Wire 10M White)**  
**BL04E (Wire 10M Grey)** **BL10L (Wire 10M Yellow)**  
**BL05F (Wire 10M Orange)**

Special pack containing eleven 10m coils (one of each colour of above WIRE 10M).

Order As **XL10L (Wire 11C)**

**POWER CONNECTION WIRE**

A flexible wire, for earth and power interconnections within apparatus.

Stranded core, single: 32/0.2mm copper conductor  
Sheath: 0.6mm PVC—Conforms to DEF61-12 (Part 6) Type 3  
Overall diameter: 2.5mm  
Nominal conductor area: 1.0mm<sup>2</sup>  
Max. working voltage: 1500V RMS  
Max current: 6A (commercial rating 10A)  
Colours available: Black, Blue, Brown, Green, Red, White, Green/Yellow

Sold per metre (max. length in one piece 50m)

Order As **XR32K (Wire 3202 Black)**  
**XR33L (Wire 3202 Blue)**  
**XR34M (Wire 3202 Brown)**  
**XR35Q (Wire 3202 Green)**  
**XR36P (Wire 3202 Red)**  
**XR37S (Wire 3202 White)**  
**XR38R (Wire 3202 Green/Yellow)**

**EXTRA-FLEXIBLE WIRE**

A very flexible wire ideal for test leads, and as interconnection wires which are frequently being moved.

Stranded core, single 55/0.1mm copper conductor  
Sheath: 1mm very flexible PVC  
Overall diameter: 2.8mm  
Nominal conductor area: 0.43mm<sup>2</sup>  
Max. working voltage: 2000V RMS  
Max. current: 6A  
Colours available: Black, Blue, Green, Red, Yellow  
Sold per metre (max. length in one piece 25m)

Order As **XR40T (Extra Flex Black)**  
**XR41U (Extra Flex Blue)**  
**XR43W (Extra Flex Green)**  
**XR44X (Extra Flex Red)**  
**XR45Y (Extra Flex Yellow)**

## E.H.T. WIRE



A heavily insulated wire for very high voltage use. Ideal for use with our laser tube.

Stranded core, single: 13/0.2mm copper conductor  
 Sheath: 2.1mm red PVC  
 Overall diameter: 5.1mm  
 Nominal conductor area: 0.41mm<sup>2</sup>  
 Max. working voltage: 18kV

Sold per metre (max. length in one piece 25m.)

Order As XR22Y (EHT Wire)

## TINNED COPPER WIRE

A 2oz roll of tinned copper wire.

Available in the following sizes:

16, 18, 20, 22 and 24 s.w.g.

Order As BL11M (Strapping Wire 16 swg.)  
 BL12N (Strapping Wire 18 swg.)  
 BL13P (Strapping Wire 20 swg.)  
 BL14Q (Strapping Wire 22 swg.)  
 BL15R (Strapping Wire 24 swg.)



## ENAMELLED COPPER WIRE

A 2oz roll of enamelled copper wire.

Available in the following sizes:

14, 16, 18, 20, 22, 24, 26, 28, 30,  
 32, 34, 36, 38, 40, 42, 44, 48 s.w.g.  
 (14, 42, 44 and 48 swg are on 1oz reels.)

Order As BL16S (EC Wire 14 swg.)  
 BL24B (EC Wire 16 swg.)  
 BL25C (EC Wire 18 swg.)  
 BL26D (EC Wire 20 swg.)  
 BL27E (EC Wire 22 swg.)  
 BL28F (EC Wire 24 swg.)  
 BL29G (EC Wire 26 swg.)  
 BL39N (EC Wire 28 swg.)  
 BL40T (EC Wire 30 swg.)  
 BL41U (EC Wire 32 swg.)  
 BL42V (EC Wire 34 swg.)  
 BL43W (EC Wire 36 swg.)  
 BL44X (EC Wire 38 swg.)  
 BL60Q (EC Wire 40 swg.)  
 BL61R (EC Wire 42 swg.)  
 BL62S (EC Wire 44 swg.)  
 BL63T (EC Wire 48 swg.)



## 2-CORE MAINS CABLE



A 2-core mains cable with double insulation suitable for low power use, lighting etc.

Stranded core, two 13/0.2mm copper conductors

Sheath: Brown and blue PVC in an oval PVC overall sheath.

Overall dia. 3.3x5.2mm

Nominal conductor area: 0.41mm<sup>2</sup>

Max. current: 2.5A

Colours of outer sheath: Black or White.

Sold per metre (Max. length in one piece 100m).

Order As XR47B (Twin Mains DS Black)  
 XR00A (Twin Mains DS White)

## ZIP CONNECTING WIRE



A flexible twin cable having a "figure 8" shape. Ideal for loud-speaker connections etc.

Stranded core, twin: 7/0.25mm copper conductors

Sheath: 0.32mm white PVC with one side ribbed for identification of polarity

Overall size: 4.0x1.63mm

Nominal conductor area: 0.34mm<sup>2</sup>

Max working voltage 60V RMS

Max current 1A

Sold per metre (max. length in one piece 100m)

Order As XR39N (Zip Wire)

## RIBBON CABLES

A flat ribbon-type cable which facilitates wiring in confined spaces. Any conductor may be branched off at any point without disturbing neighbouring wires.

Stranded cores, 7 x 0.2mm tinned copper conductors sheathed in various colour PVC then bonded to its neighbours to form a flat 'ribbon'.

Nominal conductor area: 0.22mm<sup>2</sup>  
 Max. working voltage: 1000V DC  
 750V RMS AC  
 Max. current per core: 1.4A

Core colours: 1 Black; 2 Brown; 3 Red; 4 Orange; 5 Yellow;  
 6 Green; 7 Blue; 8 Violet; 9 Grey; 10 White; 11 Black;  
 12 Brown; 13 Red; 14 Orange; 15 Yellow; 16 Green; 17 Blue;  
 18 Violet; 19 Grey; 20 White

Two types are available: 10 way (overall size 13 x 1.3mm)  
 20 way (overall size 26 x 1.3mm)

Sold per metre (max. length in one piece 50m)

Order As XR06G (Ribbon Cable 10-Way)  
 XR07H (Ribbon Cable 20-Way)



## MINIATURE MAINS CABLE



A three core mains cable ideal for equipment having power ratings up to 600W.

Stranded core, three 13/0.2mm copper conductors

Sheath: Brown, Blue and Green/Yellow PVC in overall PVC sheath

Overall dia.: 5mm

Nominal conductor area: 0.41mm<sup>2</sup>

Max. current: 2.5A

Colours of outer sheath: Black or White

Sold per metre (max. length in one piece 100m)

Order As XR01B (Min Mains Black)  
 XR02C (Min Mains White)



## 6 AMP MAINS CABLE



A three core mains cable with a thick outer sheath available also in orange for added safety when used as a trailing lead e.g. on power tools.

Stranded core, three 24/0.2mm copper conductors  
 Sheath: Brown, Blue and Green/Yellow PVC in a substantial overall PVC sheath—Conforms to BS6500 Table 2  
 Overall dia.: 6.9mm  
 Nominal conductor area: 0.75mm<sup>2</sup>  
 Max. current: 6A  
 Colours of outer sheath: Black, White or Orange

Sold per metre (max. length in one piece 50m)

Order As **XR03D (C6A Mains Black)**  
**XR04E (C6A Mains White)**  
**XR05F (C6A Mains Orange)**

## 13 AMP MAINS CABLE



A three core mains cable with a thick outer sheath available also in orange for added safety when used as a trailing lead e.g. on power tools.

Stranded core, three 40/0.2mm copper conductors  
 Sheath: Brown, Blue and Green/Yellow PVC in a substantial overall PVC sheath—Conforms to BS6500 Table 2  
 Overall dia.: 7.5mm  
 Nominal conductor area: 1.25mm<sup>2</sup>  
 Max. current: 13A  
 Colours of outer sheath: Black, White or Orange

Sold per metre (max. length in one piece 50m)

Order As **XR09K (HD Mains Black)**  
**XR10L (HD Mains White)**  
**XR11M (HD Mains Orange)**

## COTTON COVERED MAINS CABLE



A three core heat resistant mains cable for use on irons, toasters, small electric fires (up to 1.4kW) etc.

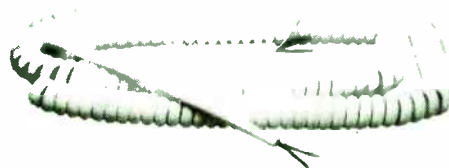
Stranded core, three 24/0.2mm copper conductors  
 Sheath: Brown, Blue and Green/Yellow rubber in an overall rubber sheath covered by black/white cellulose braid—Conforms to BS6500 Table 5

Overall dia.: 6.3mm  
 Nominal conductor area: 0.75mm<sup>2</sup>  
 Max. current: 6A

Sold per metre (max. length in one piece 50m)

Order As **XR24B (Cotton Mains)**

## COILED MAINS CABLE



Three core extendible mains cables for use on tools, instruments etc. Two types are available; 1A type and 6A type.

### 1A Type

Stranded core, three 25/0.1mm copper conductors  
 Sheath: Brown, Blue and Green/Yellow PVC in a coiled black PVC sheath

Max. current 1A  
 Extended length: 1.8m

Order As **BL71N (Stretchflex 1A)**

### 6A Type

Stranded core, three 196/0.07mm copper conductors  
 Sheath: Brown, Blue and Green/Yellow PVC in a coiled black PVC sheath

Max. current: 6A  
 Extended length: 3.5m

Order As **BL72P (Stretchflex 6A)**

## 4-CORE MAINS CABLE



A four-core flexible mains cable for use in mains control applications.

Stranded core, four 24/0.2mm copper conductors  
 Sheath: Brown, Blue, Black and Green/Yellow rubber in a hard-wearing overall black rubber sheath to BS6500 Table 6.

Overall diameter: 8.35mm  
 Nominal conductor area: 0.75mm<sup>2</sup>  
 Max. current: 6A

Sold per metre (max. length in one piece 50m.)

Order As **XR48C (4-Core Mains)**

## HOUSE WIRING CABLES

All cables conform to BS6004:1975 Tables 4 and 5.  
**1mm<sup>2</sup> Twin and Earth**



A twin core and earth flat domestic wiring cable for use on lighting circuits. Three 1/1.13mm copper conductors, 300/500 Volt.  
 Sheath: Red and Black PVC plus unsheathed earth-continuity conductor, in an overall white PVC sheath.

Overall size: 7.5 x 4mm  
 Nominal conductor area: 1mm<sup>2</sup>  
 Max current surface: 12A  
 enclosed: 11A

Sold per metre (max. length in one piece 50m).

Order As **XR49D (1.0mm<sup>2</sup> TE Cable)**

## 1.5mm<sup>2</sup> Twin and Earth



A twin core and earth flat domestic wiring cable for use on separately fused spurs from ring main circuits. Two 1/1.38mm copper conductors, 300/500 Volt and earth.

**Sheath:** Red and Black PVC plus unsheathed earth-continuity conductor, in an overall white PVC sheath.  
**Overall size:** 8.5 x 4.75mm  
**Nominal conductor area:** 1.5mm<sup>2</sup>  
**Max current surface:** 15A enclosed: 13A

Sold per metre (max length in one piece 50m)

Order As **XR50E (1.5mm<sup>2</sup> TE Cable)**

## 2.5mm<sup>2</sup> Twin and Earth



A twin core and earth flat domestic wiring cable for use on ring mains and unfused spurs. Two 1/1.78mm copper conductors and earth 300/500V.

**Sheath:** Red and Black PVC plus unsheathed earth-continuity conductor, in an overall white PVC sheath.  
**Overall size:** 9.5 x 5.25mm  
**Nominal conductor area:** 2.5mm<sup>2</sup>  
**Max current surface:** 21A enclosed: 18A

Sold per metre (max length in one piece 50m).

Order As **XR51F (2.5mm<sup>2</sup> TE Cable).**

## 6mm<sup>2</sup> Twin and Earth



A twin core and earth flat domestic wiring cable for use on cooker points. Two 7/1.04mm copper conductors and earth 300/500V.

**Sheath:** Red and Black PVC plus unsheathed earth-continuity conductor, in an overall white PVC sheath  
**Overall size:** 14 x 7.5mm  
**Nominal conductor area:** 6mm<sup>2</sup>  
**Max current surface:** 35A enclosed: 30A

Sold per metre (max length in one piece 50m)

Order As **XR52G (6mm<sup>2</sup> TE Cable)**

## 1mm<sup>2</sup> Three Core and Earth



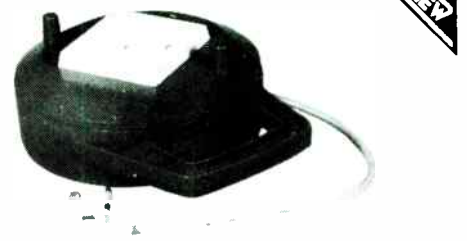
A three-core and earth flat domestic wiring cable for use on lighting circuits requiring double switching. Three 1/1-13mm copper conductors and earth 300/500V.

**Sheath:** Blue, Red and Yellow PVC plus unsheathed earth-continuity conductor, in an overall white PVC sheath.  
**Overall size:** 10.5 x 4.6mm  
**Nominal conductor area:** 1mm<sup>2</sup>  
**Max current surface:** 10A enclosed: 9A

Sold per metre (max length in one piece 50m).

Order As **XR53H (1mm<sup>2</sup> Triple & ECC Cable).**

## EXTENSION LEADS



### 5A

A 15 metre mains extension lead in a blue plastic drum with carrying handle. A standard 13A socket is fixed on one side of the drum and the orange PVC sheathed cable is terminated in a standard 13A plug. The top of the drum revolves on the base so that the cable may be wound onto and unwound from the reel.

Max load with cable fully wound: 500W  
 with cable fully unwound: 1kW  
 Size: 235 x 190 x 100mm.

Order As **XY08J (Extn Lead 5A)**

### 13A

A 10 metre mains extension lead in a blue plastic drum with carrying handle. A standard 13A socket is fixed on one side of the drum and the white PVC sheathed cable is terminated in a standard 13A plug. The top of the drum revolves on the base so that the cable may be wound onto and unwound from the reel.

Max load with cable fully wound: 1kW  
 with cable fully unwound: 3kW  
 Size: 235 x 190 x 100mm.

Order As **XY09K (Extn Lead 13A)**

## SCREENED CABLES

### MINIATURE SINGLE-CORE LAPPED SCREEN



A single screened cable ideal for general audio connections especially in equipment where a large number of cables have to be packed into a small area.

Stranded core, 7/0.1mm copper conductor with PVC insulation, lap screened and sheathed overall in grey PVC.

**Overall dia.:** 2mm  
**Nominal conductor area:** 0.055mm<sup>2</sup>  
**Capacitance (core to screen):** 320pF/m

Sold per metre (max. length in one piece 100m)

Order As **XR15R (Min Screened)**

### SINGLE-CORE LAPPED SCREEN



A single screened cable ideal for general audio connections.

Stranded core, 7/0.2mm copper conductor with PVC insulation, lap screened and sheathed overall in PVC.

**Overall dia.:** 3.1mm  
**Nominal conductor area:** 0.22mm<sup>2</sup>  
**Capacitance (core to screen):** 320pF/m

Available sheathed overall in Black, Grey or White

Sold per metre (max. length in one piece 100m)

Order As **XR12N (Cable Single Black)**  
**XR13P (Cable Single Grey)**  
**XR14Q (Cable Single White)**



## SINGLE-CORE BRAIDED SCREEN



A single screened cable ideal for connections to microphones.

Stranded core, 16/0.2mm copper conductor with PVC insulation, braided screen and sheathed overall in black PVC.

Overall dia.: 3.75mm  
 Nominal conductor area: 0.5mm<sup>2</sup>  
 Capacitance (core to screen): 360pF/m

Sold per metre (max. length in one piece 100m)

**Order As XR16S (Single Mic Cable)**

## LOW NOISE SCREENED CABLE



A very low noise single screened cable ideal for use in low-level signal circuits.

Stranded core, 10/0.1mm copper conductor with polythene insulation over which there is a layer of semi-conducting polythene. This is covered with a braided screen and sheathed overall in black PVC.

Overall dia.: 2.54mm  
 Nominal conductor area: 0.0785mm<sup>2</sup>  
 Capacitance (core to screen): 103pF/m  
 Nominal impedance: 50Ω

### IMPORTANT NOTE

It is most important when connected that the semi-conducting sheath should not be able to come into contact with the centre conductor or anything connected to the centre conductor, but that it should be stripped back to the braiding. This cable is only suitable for use at audio frequencies.

Sold per metre (max. length in one piece 25m)

**Order As XR18U (Low Noise Scnd)**

## LOW CAPACITY SCREENED CABLE



A high quality single screened cable for high performance audio connections.

Stranded core, 19/0.18mm tinned copper conductor with polythene insulation, braided screen and sheathed overall in black PVC.

Overall dia.: 4.95mm  
 Nominal conductor area: 0.48mm<sup>2</sup>  
 Capacitance (core to screen): 100pF/m  
 Max. voltage: 15kV DC  
 Nominal impedance: 50Ω

This cable is also suitable for use at rf and has characteristics similar to UniRadio UR76/RG58C.

Attenuation per 10m: 1.7dB at 100 MHz  
 5.6dB at 1000MHz

Sold per metre (max. length in one piece 50m)

**Order As XR19V (Low C Cable)**

## TWIN OVERALL LAPPED SCREEN



A twin screened cable ideal for general audio connections where crosstalk is not a problem.

Stranded cores, 7/0.1mm copper conductors with red and blue PVC insulation lap screened and sheathed overall in grey PVC. Cores are laid side by side in the cable such that the cable is oval in shape.

Overall size 2 × 2.8mm  
 Nominal conductor area: 0.055mm<sup>2</sup>  
 Capacitance (core to screen): 305pF/m  
 (core to core): 170pF/m

Sold per metre (max. length in one piece 100m)

**Order As XR20W (Lapped Pair)**

## TWIN OVERALL BRAIDED SCREEN



A twin screened cable ideal for use in low level balanced circuits e.g. low impedance balanced microphones. The cores are twisted together to assist in hum reduction.

Stranded cores, 16/0.2mm copper conductors with red and black PVC insulation, braided screen and sheathed overall in black PVC.

Overall dia.: 6.3mm  
 Nominal conductor area: 0.5mm<sup>2</sup>  
 Capacitance (core to screen): 288pF/m  
 (core to core): 171pF/m

Sold per metre (max. length in one piece 100m)

**Order As XR08J (Twin Mic Cable)**

## TWIN INDIVIDUALLY SCREENED



A twin screened cable having each core individually screened and laid side by side in a figure '8' outer sheath thus keeping cross-talk problems to a minimum, but maintaining the advantages of a single cable.

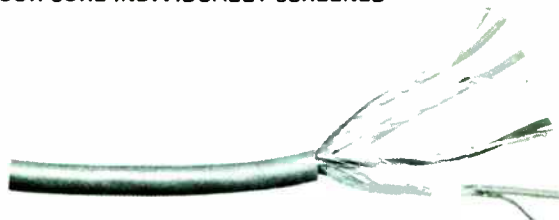
Stranded cores, 10/0.1mm copper conductor with PVC insulation lap screened and sheathed overall in grey PVC.

Overall size: 2 × 4.1mm  
 Nominal conductor area: 0.0785mm<sup>2</sup>  
 Capacitance (core to screen): 350pF/m

Sold per metre (max. length in one piece 100m)

**Order As XR21X (Cable Twin)**

## FOUR-CORE INDIVIDUALLY SCREENED



A four-core screened cable having each core individually screened, thus keeping crosstalk problems to a minimum.

Stranded cores, 7/0.1mm copper conductor with yellow, blue, red and white polythene insulation, lap screened and sheathed overall in grey PVC.

Overall size: 5mm  
 Nominal conductor area: 0.055mm<sup>2</sup>  
 Capacitance (core to screen): 95pF/m  
 Sold per metre (max. length in one piece 50m)

Order As XR23A (Cable Quad)

## FOUR-CORE OVERALL SCREEN



A four-core screened cable with particular applications in quadrasonic equipment where crosstalk is not a problem.

Stranded cores, 7/0.1mm tinned copper conductor with PVC insulation (red, blue, green and yellow), wrapped overall in Melinex tape then covered with a braided screen and sheathed in grey PVC.

Overall dia.: 3.15mm  
 Nominal conductor area: 0.055mm<sup>2</sup>  
 Max. working voltage: 250V RMS  
 Max. current per core: 0.25A  
 Capacitance (core to screen): 390pF/m  
 Sold per metre (max. length in one piece 100m)

Order As XR25C (Multi-Core 4-Way)

## MULTI-CORE SCREENED CABLE

A range of multi-core cables having overall screens.

Stranded cores, 7/0.1mm tinned copper conductors with PVC insulation wrapped overall in Melinex tape then covered with a braided screen and sheathed in grey PVC.

Nominal conductor area 0.055mm<sup>2</sup>  
 Max. working voltage: 250V RMS  
 Max. current per core: 0.25A  
 Capacitance (core to screen): 390pF/m  
 Core colours:

1 Red; 2 Blue; 3 Green; 4 Yellow;  
 5 White; 6 Black; 7 Brown; 8 Violet;  
 9 Orange; 10 Pink; 11 Turquoise;  
 12 Grey; 13 Red/Blue;  
 14 Green/Red; 15 Yellow/Red;  
 16 White/Red; 17 Red/Black;  
 18 Red/Brown; 19 Yellow/Blue;  
 20 White/Blue; 21 Blue/Black;  
 22 Orange/Blue; 23 Yellow/Green;  
 24 White/Green; 25 Orange/Green  
 26 Green/Blue; 27 Grey/Blue; 28 Green/Black;  
 29 Grey/Green; 30 Yellow/Brown; 31 White/Brown;  
 32 Brown/Black; 33 Grey/Brown; 34 Yellow/Violet;  
 35 Violet/Black; 36 White/Violet.



The following sizes are available:

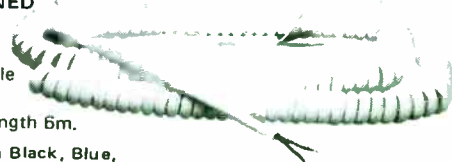
6-core (overall dia. 3.55mm) 25-core (overall dia. 6.3mm)  
 9-core (overall dia. 4.25mm) 36-core (overall dia. 6.9mm)  
 15-core (overall dia. 5.35mm)

Sold per metre (max length in one piece 100m)

Order As XR26D (Multi-Core 6-Way)  
 XR27E (Multi-Core 9-Way)  
 XR28F (Multi-Core 15-Way)  
 XR46A (Multi-Core 25-Way)  
 XR54J (Multi-Core 36-Way)

## COILED SCREENED CABLE

A single screened extendible cable with tinned prepared ends. Length 6m.



Sheath available in Black, Blue, Psychedelic multi-colour, and Red.

Order As BH30H (Scr Stretchflex Black)  
 BH31J (Scr Stretchflex Blue)  
 BH33L (Scr Stretchflex Psychedelic)  
 BH34M (Scr Stretchflex Red)

## TWIN COILED SCREENED CABLE

A coiled extendible cable with two overall screened conductors in a black PVC sheath. Length 6m.



Order As HQ49D (Twin Stretchflex)

## STANDARD CO-AX



A standard co-axial cable intended for use as aerial down-leads for VHF television sets and FM tuners.

Stranded cores, 7/0.25mm copper conductors with cellular polythene insulation, braided screen and sheathed overall in brown PVC.

Overall dia.: 5.0mm  
 Nominal conductor area: 0.34mm<sup>2</sup>  
 Capacitance (core to screen): 56pF/m  
 Nominal impedance: 75 Ω  
 Attenuation per 10m: 0.4dB at 10MHz  
 1.1dB at 100MHz  
 4.0dB at 900MHz

Sold per metre (max. length in one piece 100m)

Order As XR30H (Standard Co-Ax)

## LOW-LOSS CO-AX



A low-loss co-axial cable intended for use as aerial downleads for UHF television sets.

Solid core, 1/1.12mm copper conductor with cellular polythene insulation, braided screen and sheathed overall in brown PVC.

Overall dia.: 7.25mm  
 Nominal conductor area: 0.985mm<sup>2</sup>  
 Capacitance (core to screen): 56pF/m  
 Nominal impedance: 75 Ω  
 Attenuation per 10m: 0.75dB at 100MHz  
 2.6dB at 900MHz

Sold per metre (max. length in one piece 50m)

Order As XR29G (Low-Loss Co-Ax)

## 300-OHM FEEDER



A balanced feeder cable intended for use as aerial downleads on European, Japanese and American tuners having a 75 ohm input. Stranded cores, 7/0.25mm copper conductors with clear polythene insulation.

Overall size: 8.9x2.9mm  
 Nominal conductor area: 0.34mm<sup>2</sup>  
 Capacitance (core to core): 13.2pF/m  
 Nominal impedance: 300 Ω  
 Attenuation per 10m: 0.12dB at 100MHz  
 1.68dB at 1000MHz

Sold per metre (max. length in one piece 100m)

Order As XR31J (Bal Feeder)



## HEAT-SHRINKABLE SLEEVING

A heat-shrinkable crosslinked polyolefin material which will shrink to 50% of its original diameter when heated over 121°C. For more rapid shrinking higher temperatures may be used without detrimental effect. Shrinkage can be achieved by hot air blowers, gas flame, hot air or infra-red ovens.

Sleeving has high tensile strength (1500lbs/in<sup>2</sup>: 10.3MPa). It is resistant to solvents, acids, alkalis, fuel and oil. The continuous operating temperature should be between -55°C and +105°C.

Self-extinguishing. Breakdown voltage >7kV.

Colour is Black.

Type	Size (as supplied)	Size (max) after shrinkage	Wall thickness (min) after shrinkage
CP16	1.6mm	0.79mm	0.35mm
CP24	2.4mm	1.17mm	0.43mm
CP32	3.2mm	1.57mm	0.43mm
CP48	4.8mm	2.36mm	0.43mm
CP64	6.4mm	3.18mm	0.55mm

Supplied in 1 metre lengths only.

Order As **BF86T** (Heat Shrink CP16)  
**BF87U** (Heat Shrink CP24)  
**BF88V** (Heat Shrink CP32)  
**BF89W** (Heat Shrink CP48)  
**BF90X** (Heat Shrink CP64)

## HEAT-RESISTING SLEEVING

An impregnated glass fibre sleeving resistant up to 400°C. Bore: 2mm.

Available in the following colours:  
 Black, Blue, Brown, Green, Red.  
 Sold only in one metre lengths.

Order As **BL66W** (Heat-Resist Sleeve Black)  
**BL67X** (Heat-Resist Sleeve Blue)  
**BL68Y** (Heat-Resist Sleeve Brown)  
**BL69A** (Heat-Resist Sleeve Green)  
**BL70M** (Heat-Resist Sleeve Red)

## INSULATING SLEEVE

A PVC insulating sleeve suitable for use up to 85°C.

Available in the following sizes and colours:

1mm bore: Black, Blue, Green, Red, White and Yellow  
 2mm bore: Black, Blue, Green, Red, White and Yellow  
 4mm bore: Black, Blue, Green, Red, White and Yellow  
 6mm bore: Black  
 10mm bore: Black

	Actual size	
1mm	2mm	4mm

Available only in one metre lengths.

Order As **BH00A** (Systoflex 1mm Black)  
**BH01B** (Systoflex 1mm Blue)  
**BH02C** (Systoflex 1mm Green)  
**BH03D** (Systoflex 1mm Red)  
**BH04E** (Systoflex 1mm White)  
**BH05F** (Systoflex 1mm Yellow)  
**BH06G** (Systoflex 2mm Black)  
**BH07H** (Systoflex 2mm Blue)  
**BH08J** (Systoflex 2mm Green)  
**BH09K** (Systoflex 2mm Red)  
**BH10L** (Systoflex 2mm White)  
**BH11M** (Systoflex 2mm Yellow)  
**BH12N** (Systoflex 4mm Black)  
**BH13P** (Systoflex 4mm Blue)  
**BH14Q** (Systoflex 4mm Green)  
**BH15R** (Systoflex 4mm Red)  
**BH16S** (Systoflex 4mm White)  
**BH17T** (Systoflex 4mm Yellow)  
**BH42V** (Systoflex 6mm Black)  
**BH43W** (Systoflex 10mm Black)

## Lacing Cord

A high grade tubular nylon-cored cord covered with a flexible PVC coating. Suitable for lacing wire and cable forms. Conforms to DEF5020.

Outside diameter 1.1mm  
 Working load 10 lbs  
 Breaking strain 17 lbs

Sold on 25m reels

Order As **BL65V** (Lacing Cord)



## SPIRAL CABLE WRAP



An expandable polythene spiral binding which simply wraps around the cable-form gripping it tightly. It will follow any route taken by the cable-form and wires can be easily led out from the form. Resistant to chemical attack and has high electrical resistance. Available in three sizes

Type	Unexpanded outside dia.	Wall thickness	Pitch between lead out points	Suitable for cable forms - diameter
1/8 in	3.18mm	0.79mm	5.56mm	1.59 to 12.7mm
1/4 in	6.35mm	1.15mm	9.53mm	4.76 to 50.8mm
1/2 in	12.7mm	1.58mm	12.7mm	9.53 to 101.6mm

Supplied per metre (max length in one piece 30 metres).

Order As **BL57M** (Spirawrap 1/8in.)  
**BL58N** (Spirawrap 1/4in.)  
**BL59P** (Spirawrap 1/2in.)

## CABLE TIES

Self locking cable ties for simple and quick binding of cables or components. Simply slip a Tie-Wrap around the bundle, thread tip through head, pull tight and cut-off.

Available in three sizes:

Length	Min dia	Max dia
92	1.59	15.9
140	1.59	28.6
186	1.59	44.5

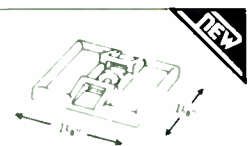
Order As **BF91Y** (Tie-Wrap 92)  
**BF92A** (Tie-Wrap 140)  
**BF93B** (Tie-Wrap 186)

## Cable Tie Base

A self-adhesive base moulded in nylon for use with our cable ties.

Size: 29 x 29mm.

Order As **BF94C** (Cable Tie Base)



## CABLE 'P' CLIPS

A range of nylon cable clamps. All inside edges of the clip are bevelled so that cables cannot be abraded. Colour is natural white. Fixing hole is 5.1mm dia. (2BA clear). Thickness of nylon is 1.3mm

and width of clip is 9.5mm. The following sizes are available.

Suits cables diameter.

4.8 to 6.3mm	Order As <b>LR44X</b>	(Cable P Clip 3/16 in.)
6.3 to 7.9mm	Order As <b>LR45Y</b>	(Cable P Clip 1/4 in.)
7.9 to 9.5mm	Order As <b>LR46A</b>	(Cable P Clip 5/16 in.)
9.5 to 12mm	Order As <b>LR04E</b>	(Cable P Clip 3/8 in.)



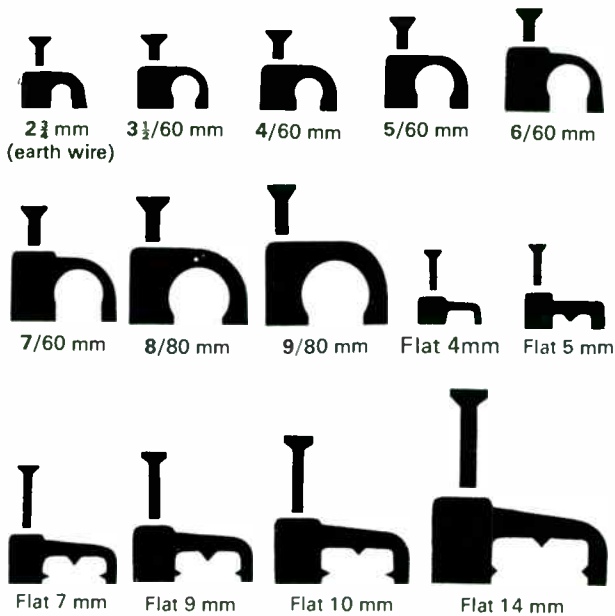
## Plastic Wall Plugs

A plastic plug suitable for use in solid and cavity walls, including plasterboard, fibreboard etc. As the screw is inserted the plug opens out deep in the hole to give maximum grip. Manufactured in grey, rust-proof, rot-proof, polypropylene. Requires a 30mm deep hole drilled with a 1/4in. masonry drill. May be used with screws No. 6, 8, 10 or 12. Supplied in packs of ten.

Order As **BH44X** (Plas Fixing)



## PLASTIC CABLE CLIPS



A range of plastic cable clips manufactured from high impact polystyrene which is weatherproof and shatterproof. All round clips push fit onto the cable and grip it firmly leaving both hands free for positioning and fixing. Plated long-life masonry nails are supplied with all clips except Round 2 3/4mm and Flat 4mm and 5mm which have carbon steel nails, blued for extra resilience. The following sizes are available

Type	Pin length	Pin diameter	Suits cable of overall size
Round 2 3/4mm	15mm	1mm	2 to 3mm
Round 3 3/4mm	15mm	1.5mm	3 to 3 3/4mm
Round 4mm	15mm	1.5mm	3 3/4 to 4 1/2mm
Round 5mm	20mm	1.5mm	4 1/2 to 5 1/2mm
Round 6mm	22mm	1.5mm	5 1/2 to 6 1/2mm
Round 7mm	22mm	1.5mm	6 1/2 to 7 1/2mm
Round 8mm	25mm	2mm	7 1/2 to 8 1/2mm
Round 9mm	25mm	2mm	8 1/2 to 9 1/2mm
Flat 4mm	15mm	1mm	Zip Wire
Flat 5mm	15mm	1mm	Twin Mains DS
Flat 7mm	22mm	1.5mm	1.0mm <sup>2</sup> TE
Flat 9mm	25mm	2mm	1.5mm <sup>2</sup> TE
Flat 10mm	25mm	2mm	2.5mm <sup>2</sup> TE and 1mm <sup>2</sup> Triple ECC
Flat 14mm	25mm	2mm	6mm <sup>2</sup> TE

In packs of 20

Order As

BH18U (Hiatt Rd 2 3/4mm)	BH36P (Hiatt Rd 9mm)
BH19V (Hiatt Rd 3 3/4mm)	BH25C (Hiatt Flat 4mm)
BH20W (Hiatt Rd 4mm)	BH37S (Hiatt Flat 5mm)
BH21X (Hiatt Rd 5mm)	BH38R (Hiatt Flat 7mm)
BH22Y (Hiatt Rd 6mm)	BH39N (Hiatt Flat 9mm)
BH23A (Hiatt Rd 7mm)	BH40T (Hiatt Flat 10mm)
BH24B (Hiatt Rd 8mm)	BH41U (Hiatt Flat 14mm)

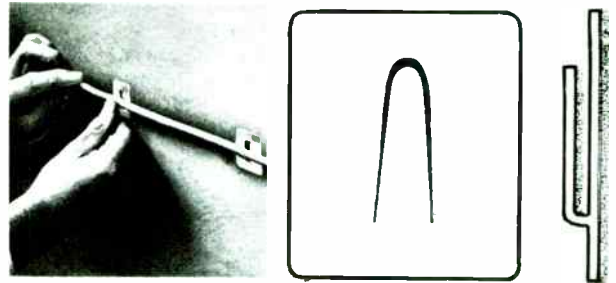
## FLEX TIDY



An unbreakable plastic flex-tidy which shortens cables, speaker leads, mains cables etc., without cutting them. Supplied in a pack of 5.

Order As BH29G (Flex Tidy D2)

## SELF-ADHESIVE CABLE FIXINGS



Makes cabling simplicity itself. No more hammering nails into concrete, plaster etc. just wipe the fixing surface to ensure that it is free from moisture, dust, oil or grease, peel off the clip's protective backing and press firmly to the surface. An average workman can fix 20 per minute – an enormous saving in labour time over conventional fixings. Also there is no noise – a further valuable advantage if cabling in occupied premises, hospitals etc.

The fixings are manufactured in 26swg zinc-finished electro-galvanised mild steel with a cross-linked, acrylic adhesive coating on a cushion of closed cell polyethylene foam. The fixings will adhere to any clean flat surface; the foam cushion taking up any slight unevenness in the fixing surface giving maximum adhesion area.

Three types are available to suit different size cables:

Type	Width	Size	Height	Maximum Cable Diameter
4	25mm		25mm	4mm
8	25mm		38mm	8mm
12	38mm		42mm	12mm

Order As BH26D (Safix 4)  
BH27E (Safix 8)  
BH28F (Safix 12)

## GROMMETS

### Small Grommet

PVC grommets, bore 1/4in dia. chassis hole 3/8in dia.

Order As FW59P (Grommet Small)

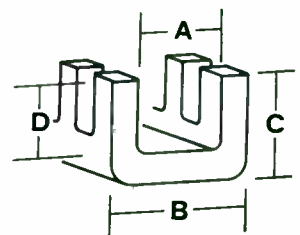
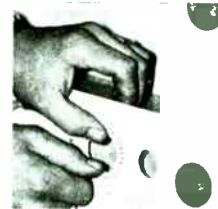


### Large Grommet

PVC grommets, bore 3/8in dia., chassis hole 1/2in dia.

Order As FW60Q (Grommet Large)

## FLEXIBLE GROMMET STRIP



A unique continuous grommet strip ideal for all shapes and sizes of holes in panels. Easily cut with scissors and fitted without the aid of tools or adhesives, it can be used on any type of panel material.

Available in white polythene in three sizes:

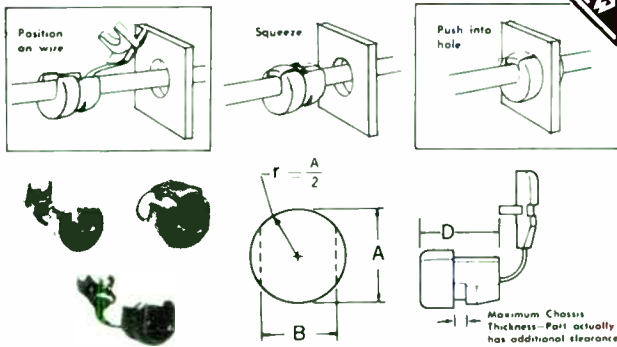
Size	Dimensions (mm)				For panel thickness	
	A	B	C	D	mm	swg
A	1.4	3.8	4.0	2.5	0.4 to 1.3	27 to 18
B	2.3	4.5	4.0	2.5	1.3 to 2.1	16 and 14
C	3.3	5.6	4.0	2.5	2.1 to 3.3	12 and 10

Sold per metre (max length in one piece 25m).

Order As BL74R (Flexigrommet A)  
BL75S (Flexigrommet B)  
BL76H (Flexigrommet C)



## STRAIN RELIEF GROMMETS



A range of moulded black nylon strain relief grommets which eliminate the need for knot tying, screw-down cable clamps etc. Simply place cable in grommet, squeeze closed and snap into chassis cut-out. Four sizes are available:

Type	To fit cable	B (to stop twisting) (mm)	A (mm)	Max chassis thickness (mm)	D (mm)
3P-4	Twin Mains DS	9.7	11.0	1.6	10.3
5M-3	Min Mains	11.0	11.7	2.5	11.1
6W-1	C6A Mains/Cotton Mains	11.5	12.2	2.3	11.1
6P3-4	HD Mains/4-Core Mains	13.7	15.5	3.2	14.7

Supplied individually

- Order As **LR47B** (SR Grommet 3P-4)  
**LR48C** (SR Grommet 5M-3)  
**LR49D** (SR Grommet 6W-1)  
**LR50E** (SR Grommet 7K-2)

## Cable Sealing Grommet

A black moulded PVC grommet that provides a seal around cables from 5mm to 10mm dia. Chassis hole size: 16mm (5/8 in.) Max chassis thickness: 1.6mm (1/16 in. 16 ewg).

- Order As **LR51F** (Sealing Grommet)

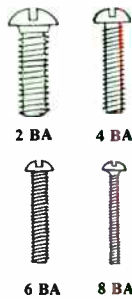


## NUTS AND BOLTS

### BA NUTS AND BOLTS

Nickel-plated brass round-head screws. All types supplied in packs of ten.

- 2BA 1/2in. Order As **BF00A** (Bolt 2BA 1/2in.)  
 2BA 1in. Order As **BF01B** (Bolt 2BA 1in.)  
 4BA 1/4in. Order As **BF02C** (Bolt 4BA 1/4in.)  
 4BA 1/2in. Order As **BF03D** (Bolt 4BA 1/2in.)  
 4BA 1in. Order As **BF04E** (Bolt 4BA 1in.)  
 4BA 1 1/2in. Order As **LR52G** (Bolt 4BA 1 1/2in.)  
 6BA 1/4in. Order As **BF05F** (Bolt 6BA 1/4in.)  
 6BA 1/2in. Order As **BF06G** (Bolt 6BA 1/2in.)  
 6BA 1 1/2in. Order As **BF07H** (Bolt 6BA 1 1/2in.)  
 6BA 1 1/2in. Order As **LR53H** (Bolt 6BA 1 1/2in.)  
 8BA 1/4in. Order As **BF08J** (Bolt 8BA 1/4in.)  
 8BA 1/2in. Order As **BF09K** (Bolt 8BA 1/2in.)



### Countersunk-Head BA Bolts

Cadmium-plated steel countersunk-head screws. All types supplied in packs of ten.

- 2BA 1/2in. Order As **LR54J** (C/S Screw 2BA 1/2in.)  
 4BA 1/4in. Order As **LR55K** (C/S Screw 4BA 1/4in.)  
 4BA 1/2in. Order As **BF10L** (C/S Screw 4BA 1/2in.)  
 4BA 1in. Order As **BF11M** (C/S Screw 4BA 1in.)  
 6BA 1/4in. Order As **LR56L** (C/S Screw 6BA 1/4in.)  
 6BA 1/2in. Order As **BF12N** (C/S Screw 6BA 1/2in.)  
 6BA 1in. Order As **BF13P** (C/S Screw 6BA 1in.)  
 8BA 1/2in. Order As **LR00A** (C/S Screw 8BA 1/2in.)



### Panel Screw

Chrome-plated steel panel-headed screw. 4BA 1/2in. Supplied singly.

- Order As **BF14Q** (Panel Screw)



### BA Full Nuts

Nickel-plated brass full nuts. All types supplied in packs of ten.

- 2BA Order As **BF16S** (Nut 2BA)  
 4BA Order As **BF17T** (Nut 4BA)  
 6BA Order As **BF18U** (Nut 6BA)  
 8BA Order As **BF19V** (Nut 8BA)



### BA Washers

Nickel-plated brass washers. All types supplied in packs of ten.

- 2BA Order As **BF20W** (Washer 2BA)  
 4BA Order As **BF21X** (Washer 4BA)  
 6BA Order As **BF22Y** (Washer 6BA)  
 8BA Order As **BF23A** (Washer 8BA)



### BA Shake-Proof Steel Washers

Cadmium-plated and passivated steel shake-proof washers. All types supplied in packs of ten.

- 2BA Order As **BF24B** (Shake 2BA)  
 4BA Order As **BF25C** (Shake 4BA)  
 6BA Order As **BF26D** (Shake 6BA)  
 8BA Order As **LR01B** (Shake 8BA)



### BA Solder Tags

A heavily tinned steel solder tag. All supplied in packs of ten.

- 2BA Order As **BF27E** (Tag 2BA)  
 4BA Order As **BF28F** (Tag 4BA)  
 6BA Order As **BF29G** (Tag 6BA)  
 8BA Order As **LR02C** (Tag 8BA)



## I.S.O. METRIC NUTS AND BOLTS

### Countersunk-Head Metric Bolts

Cadmium-plated and passivated steel countersunk-head screws with pozidrive head. All types supplied in packs of ten.

The following types are available:

- M5 x 6mm Order As **BF30H** (Pozi Screw M5 6mm)  
 M5 x 12mm Order As **BF31J** (Pozi Screw M5 12mm)  
 M5 x 25mm Order As **BF32K** (Pozi Screw M5 25mm)  
 M4 x 6mm Order As **BF33L** (Pozi Screw M4 6mm)  
 M4 x 12mm Order As **BF34M** (Pozi Screw M4 12mm)  
 M4 x 25mm Order As **BF35Q** (Pozi Screw M4 25mm)  
 M3 x 6mm Order As **BF36P** (Pozi Screw M3 6mm)  
 M3 x 9mm Order As **LR57M** (Pozi Screw M3 9mm)  
 M3 x 12mm Order As **BF37S** (Pozi Screw M3 12mm)  
 M3 x 25mm Order As **BF38R** (Pozi Screw M3 25mm)  
 M3 x 40mm Order As **LR58N** (Pozi Screw M3 40mm)  
 M2.5 x 6mm Order As **BF39N** (Pozi Screw M2.5 6mm)  
 M2.5 x 12mm Order As **BF40T** (Pozi Screw M2.5 12mm)  
 M2 x 6mm Order As **BF41U** (Pozi Screw M2 6mm)



### Panel-Head Screws

Nickel-plated brass panel-head screws with slotted head. All types supplied in packs of ten.

The following types are available.

- M5 x 12mm Order As **BF46A** (Isobolt M5 12mm)  
 M5 x 25mm Order As **BF47B** (Isobolt M5 25mm)  
 M4 x 6mm Order As **BF48C** (Isobolt M4 6mm)  
 M4 x 12mm Order As **BF49D** (Isobolt M4 12mm)  
 M4 x 25mm Order As **BF50E** (Isobolt M4 25mm)  
 M3 x 6mm Order As **BF51F** (Isobolt M3 6mm)  
 M3 x 12mm Order As **BF52G** (Isobolt M3 12mm)  
 M3 x 25mm Order As **BF53H** (Isobolt M3 25mm)  
 M3.5 x 6mm Order As **BF54J** (Isobolt M2.5 6mm)  
 M2.5 x 12mm Order As **BF55K** (Isobolt M2.5 12mm)



### Full Nuts

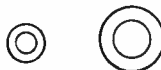
Nickel-plated brass full nuts. All types supplied in packs of ten.

- M5 Order As **BF56L** (Isonut M5)  
 M4 Order As **BF57M** (Isonut M4)  
 M3 Order As **BF58N** (Isonut M3)  
 M2.5 Order As **BF59P** (Isonut M2.5)  
 M2 Order As **LR59P** (Isonut M2)



## Washers

Nickel-plated brass washers. All types supplied in packs of ten.



The following types are available.

- M5 Order As BF60Q (Isowasher M5)
- M4 Order As BF61R (Isowasher M4)
- M3 Order As BF62S (Isowasher M3)
- M2.5 Order As BF63T (Isowasher M2.5)
- M2 Order As LR60Q (Isowasher M2)

## Shakeproof Washers

Cadmium-plated and passivated steel shakeproof washers. All types supplied in packs of ten. The following types are available.



- M5 Order As BF42V (Isoshake M5)
- M4 Order As BF43W (Isoshake M4)
- M3 Order As BF44X (Isoshake M3)
- M2.5 Order As BF45Y (Isoshake M2.5)
- M2 Order As LR61R (Isoshake M2)

## Solder Tags

Heavily tinned steel solder tags supplied in packs of ten. The following types are available.



- M5 Order As LR62S (Isotag M5)
- M4 Order As LR63T (Isotag M4)
- M3 Order As LR64U (Isotag M3)
- M2.5 Order As LR65V (Isotag M2.5)
- M2 Order As LR66W (Isotag M2)

## SELF-TAPPING SCREWS

Steel self-tapping screws supplied in packs of ten. The following types are available.



- No. 8 x 3/8in. Order As BF68Y (Self-Tapper No. 8 x 3/8in.)
- No. 8 x 1/2in. Order As BF69A (Self-Tapper No. 8 x 1/2in.)
- No. 6 x 3/8in. Order As LR67X (Self-Tapper No. 6 x 3/8in.)
- No. 6 x 1/2in. Order As BF67X (Self-Tapper No. 6 x 1/2in.)
- No. 4 x 3/8in. Order As BF65V (Self-Tapper No. 4 x 3/8in.)
- No. 4 x 1/2in. Order As BF66W (Self-Tapper No. 4 x 1/2in.)
- No. 2 x 3/16in. Order As BF64U (Self-Tapper No. 2 x 3/16in.)
- No. 2 x 3/8in. Order As LR68Y (Self-Tapper No. 2 x 3/8in.)

## NYLON NUTS AND BOLTS

### Nylon Bolts

An ivory finish nylon cheese-head bolt.



All types supplied in packs of ten.

The following types are available.

- 2BA 1/2in. Order As BF70M (Nyl 2BA 1/2in.)
- 2BA 1in. Order As BF71N (Nyl 2BA 1in.)
- 4BA 1/2in. Order As BF72P (Nyl 4BA 1/2in.)
- 4BA 1in. Order As BF73Q (Nyl 4BA 1in.)
- 4BA 1 1/2in. Order As BF74R (Nyl 4BA 1 1/2in.)
- 6BA 1/2in. Order As BF75S (Nyl 6BA 1/2in.)
- 6BA 1in. Order As BF76H (Nyl 6BA 1in.)
- 8BA 1/2in. Order As BF77J (Nyl 8BA 1/2in.)

### Nylon Nuts

An ivory finish nylon nut. All types supplied in packs of ten. The following types are available.



- 2BA Order As BF78K (Nyl Nut 2BA)
- 4BA Order As BF79L (Nyl Nut 4BA)
- 6BA Order As BF80B (Nyl Nut 6BA)
- 8BA Order As BF81C (Nyl Nut 8BA)

### Nylon Washers

An ivory finish nylon washer. All types supplied in packs of ten. The following types are available.



- 2BA Order As BF82D (Nyl Washer 2BA)
- 4BA Order As BF83E (Nyl Washer 4BA)
- 6BA Order As BF84F (Nyl Washer 6BA)
- 8BA Order As BF85G (Nyl Washer 8BA)

### Metric Nylon Nut and Bolt

An ivory finish metric thread nylon nut and bolt. Supplied individually.

- M3 x 12mm countersunk bolt
- M3 full nut

- Order As WH18U (Nylon C/S Screw M3 x 12mm)
- WH19V (Nylon Nut M3)

## SPRING CLIP

A black finish 4BA panel fixing spring clip for use where it would be impractical or impossible to hold a nut still while turning the screw. Sold singly.



- Order As BF15R (Spring Clip)

## Screw Sizes

The size of a metric screw is defined by the numbers M5, M4, M3, M2.5, etc., where the number after the M is the overall diameter of the thread in mm. and by the length in mm. (6mm = 1/4in. approx., 9mm = 3/8in. approx., 12mm = 1/2in. approx., 25mm = 1in. approx. and 40 mm = 1 1/2in. approx.). For comparison the overall diameter of the thread in BA sizes is as follows: 8BA = 2.25mm, 6BA = 2.85mm, 4BA = 3.68mm, 2BA = 4.78mm, OBA = 6.12mm, and in No. screws is: No. 8 = 4.25mm, No. 6 = 3.6 mm, No. 4 = 3.0mm, and No. 2 = 2.25mm.

## SPADE TERMINALS

Supplied in packs of ten.

- 2BA Order As FW10L (Spade 2BA)
- 4BA Order As FW11M (Spade 4BA)
- 6BA Order As FW12N (Spade 6BA)



## BRASS STUDDING

A 6in. length of screwed brass rod. Available in the following sizes.

- 2BA Order As FW13P (Studding 2BA)
- 4BA Order As FW14Q (Studding 4BA)
- 6BA Order As FW15R (Studding 6BA)



## SPACERS

Circuit board mounting spacers, 4BA, 6BA or 8BA clearance nickel-plated brass tube. Available in the following lengths only.



Supplied in packs of 10.

4BA	6BA	8BA
3.18mm (1/8 in)	3.18mm (1/8 in)	3.18mm (1/8 in)
6.35mm (1/4 in)	6.35mm (1/4 in)	6.35mm (1/4 in)
12.7mm (1/2 in)	12.7mm (1/2 in)	

- Order As FW30H (4BA Spacer 1/8 in)
- FW31J (4BA Spacer 1/4 in)
- FW32K (4BA Spacer 1/2 in)
- FW33L (6BA Spacer 1/8 in)
- FW34M (6BA Spacer 1/4 in)
- FW35Q (6BA Spacer 1/2 in)
- LR69A (8BA Spacer 1/8 in)
- LR70M (8BA Spacer 1/4 in)

## THREADED SPACERS

Nickel-plated brass spacers 1/2in. (12.7mm) long with the centre hole tapped to accept 4BA or 6BA screws.

Thread is continuous through spacers.

Overall dia. 4BA: 6.35mm (1/4in); 6BA: 4.76mm (3/16 in) Supplied in packs of 10.



- Order As LR71N (Threaded Spacer 4BA)
- LR72P (Threaded Spacer 6BA)

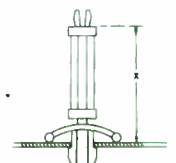
## STAND-OFFS



A range of plastic snap-in stand-offs which eliminate the need for nuts and bolts when mounting printed circuit boards etc. The bottom snaps permanently into a chassis hole 5mm (0.2in) dia. in any chassis with a thickness 1.5mm to 2.5mm. The top snaps into a 4mm (0.15in) dia. hole in the circuit board which can be removed and re-fitted as required. These standoffs provide mechanically secure, insulated mounting, yet boards can be quickly removed.

Type	Dimension X	Overall Length
Short	6mm (0.2in)	15mm (0.6in)
Medium	15mm (0.6in)	24mm (0.9in)
Long	19mm (0.75in)	28mm (1.1in)

- Order As FW16S (Standoff Short)
- FW17T (Standoff Medium)
- FW18U (Standoff Long)





## TERRY CLIPS

Two sizes available:  
 1/2in. Order As LR03D (Terry Clip 1/2in.)  
 1 1/2in. Order As LR73Q (Terry Clip 1 1/2in.)



## HOLE PLUGS

Moulded nylon plugs which snap-lock with finger pressure into holes in chassis which are to be blanked off. Two sizes are available. Colour: black.



Type	Fits hole dia.	Head dia	Overall height	Max chassis thickness
1/4	6.35mm	7.94mm	7.94mm	1.57mm
3/8	9.53mm	11.91mm	10.32mm	3.18mm

Order As FW36P (Hole Plug 1/4 in.)  
 FW37S (Hole Plug 3/8 in.)

## ALUMINIUM SHEET

Aluminium sheet having one side coated with a protective polythene layer to prevent scratching.

Two sizes are available:  
 18 swg 295 x 195mm (12 x 8in)  
 16 swg 490 x 295mm (20 x 12in)

Order As LH12N (Al Sheet 18 swg)  
 LH13P (Al Sheet 16 swg)



## ALUMINIUM TRIM

A decorative trim in the form of a channel. Internal width: 4mm. Overall width 6mm. Overall height 9.5mm. Available in four lengths: 415, 623, 831, 1040mm.

415mm Order As LW21X (Mixer Trim 4)  
 623mm Order As LW22Y (Mixer Trim 8)  
 831mm Order As LW23A (Mixer Trim 12)  
 1040mm Order As LW24B (Mixer Trim 16)

## ALUMINIUM TUBE

An aluminium tube inside diameter 9.5mm, outside diameter 12.7mm. Available in four lengths 415, 623, 831, 1040mm.

415mm Order As LW17T (Mixer Mtg Tube 4)  
 623mm Order As LW18U (Mixer Mtg Tube 8)  
 831mm Order As LW19V (Mixer Mtg Tube 12)  
 1040mm Order As LW20W (Mixer Mtg Tube 16)

## MAINS WARNING LABEL

A self-adhesive label bearing the legend "WARNING Mains Voltage" Printed in red on a silver background. Size 45 x 18mm. Order As WH48C (Mains Warning Label)

## BATTERY CLIPS

PP9 Type  
 Standard separate clips, press-stud type. 19.1mm diameter. For PP1, 4, 7, 8, 9, etc.  
 Order As HF27E (Clips PP9)



## PP3 Type

Dual miniature clip for PP3, 6, etc. Insulated overall with lead.  
 Order As HF28F (PP3 Clip)



## BATTERY HOLDERS

Seven types are available as shown in the table. The connecting clips are not supplied with the boxes and must be ordered separately. The boxes are moulded in natural white polythene.

Battery	No. of Cells	Voltage	Layout	Size (mm)	Connector required	Type
HP7 type	4	6V	Side-by-side	60 x 31 x 30	PP3 Clip	6V Batt Box
HP7 type	4	6V	2 x 2	110 x 26 x 17	PP3 Clip	Long HP7 Box
HP7 type	6	9V	Side-by-side	62 x 46 x 30	PP3 Clip	9V Batt Hldr
HP11 type	4	6V	2 x 2	109 x 53 x 24	Solder to tag	HP11 Batt Box
HP11 type	4	6V	In-line	212 x 30 x 26	Solder to tag	Long HP11 Box
HP2 type	4	6V	In-line	251 x 37 x 28	Solder to tag	HP2 Batt Box

Order As HF29G (6V Batt Box)  
 HF94C (Long HP7 Batt Box)  
 HQ01B (9V Batt Holder)  
 HF95D (HP11 Batt Box)  
 HF96E (Long HP11 Batt Box)  
 HF97F (HP2 Batt Box)

Long HP11 Batt Box and HP2 Batt Box

Long HP7 Batt Box

HP11 Batt Box

## TRANSFERS

### Graphic Transfers

A range of rub-down letters and numbers which utilise a novel system so that letters are automatically on a straight line and correctly spaced, making them extremely quick and simple to use. A truly professional finish can be achieved with this remarkable system.



Two sizes are available. Letter height 1/8 in. and 1/4 in. Each sheet contains lower case letters, capitals and numerals as well as full stops, and commas. Both types are available in black white and red. Sheet size: 12in. x 9 in.

### Order As

XH39N (Transfer 1/8 in. Black) XH42V (Transfer 1/4 in. Black)  
 XH40T (Transfer 1/8 in. Red) XH43W (Transfer 1/4 in. Red)  
 XH41U (Transfer 1/8 in. White) XH44X (Transfer 1/4 in. White)

### Panel Transfers

A sheet of words, symbols and numerals commonly used on front and rear panels of hi-fi and electronic equipment. Letter height is 2.5mm. Words etc. rub-down onto panel. Available in Black, Red or White.

Order As XH45Y (Panel Transfer Black)  
 XH46A (Panel Transfer Red)  
 XH47B (Panel Transfer White)

## RECHARGEABLE CELL

A nickel cadmium rechargeable cell of equivalent size to AA(HP7) types. Quick charge type.

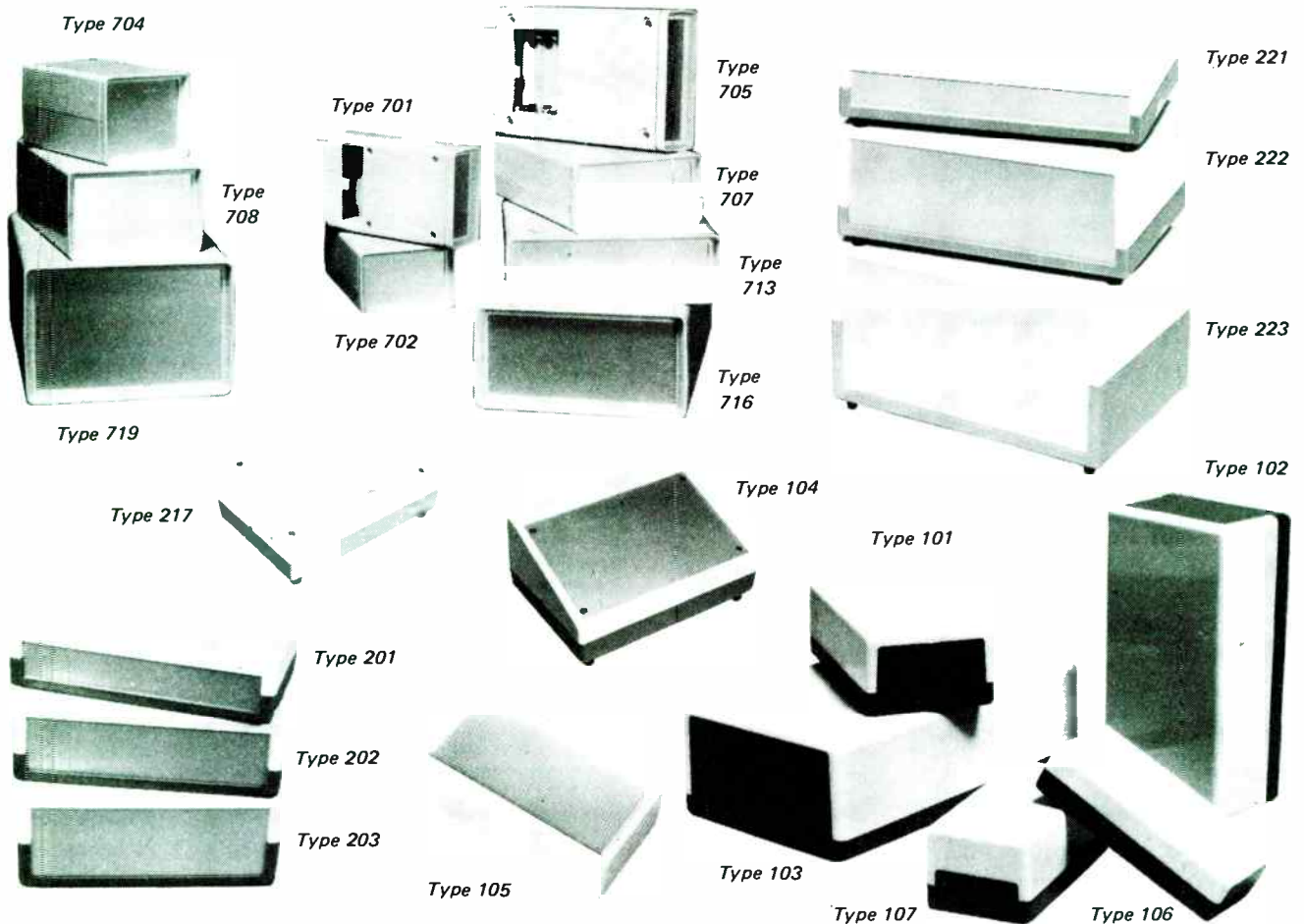
Nominal capacity: 450mAh  
 Nominal voltage: 1.2V  
 Max charging current: 150mA  
 Max charging voltage: 1.6V  
 Charging time: 4 to 6 hours  
 Operating temperature: -20 to +60°C  
 Internal resistance: 15mΩ (at 15% discharge)  
 Max dimension: 50 x 15mm dia.  
 Weight: 24gms  
 Life: At least 500 full charge/discharge cycles)  
 Discharge times (to 1V) at 20°C  
 11 hours at 45mA  
 5h20m at 90mA  
 2h10m at 225mA  
 1 hour at 450mA  
 27 mins at 900mA  
 10 1/2 mins at 1.8A



This cell may be charged at any current up to 150mA, but will take progressively longer to charge at lower currents. E.g. at 150mA charge time is 5 hours approx, at 45mA charge time is 15 hours approx. No harm will result if cells are charged for longer periods.

### IMPORTANT NOTE

This cell must not be charged with an ordinary battery charger. It must be charged from a constant current source.  
 Order As LR74R (Ni Cad AA)



A range of high quality moulded boxes featuring a tongue and groove construction to ensure a perfect fit.

### 100 Series

Type 100 boxes are moulded in two-tone grey high impact polystyrene with the two parts held together by screws. The lower section is provided with threaded (M3) brass inserts for mounting circuit boards. Types 104 and 105 have removable anodised aluminium front panels, and in the type 105 this panel is attached to the bottom part of the box so that the wiring of components is not disturbed when the box lid is removed.

### 200 Series

Type 200 boxes are moulded in two-tone grey high impact ABS. Top and bottom sections which include fixing points for circuit boards or chassis plates are held together by four screws entering through the base concealed by plastic feet through which they pass. Anodised aluminium front and rear panels are automatically retained in position when the two halves of the box are screwed together. Moulded guide slots are provided to allow circuit boards to be mounted vertically.

### 210 and 220 Series

These boxes are the same as type 200 except that they clip together and therefore have no screws. Four self-adhesive feet are provided.

### 217 Box

This box is the same as the type 200 boxes except that the front panel is fixed with four screws and vertical guide slots are not provided.

### 300 Series

These boxes are moulded in high impact ABS and are supplied with lid and four self-tapping screws. Type 301 is black and type 302 is white.

### 401 Box

This box is moulded in white high impact ABS. It is designed as a hand-held plastic control box and will find many applications including model control, car-racing controllers, ultrasonic controllers etc.

### 500 Series

Two attractive enclosures designed for mounting keyboards and displays. Cases are vacuum-formed from textured black ABS in two sections which fit together with four screws that enter through the base and are concealed by moulded-in recesses. The plastic may be easily cut and a clearly defined area at the rear is available for cable entry. An anodised aluminium front panel complete with screws and corner holes is supplied along with four self-adhesive rubber feet. Case 502 is large enough to mount a full width ASCII keyboard.

### 600 Series

A range of boxes with hinged snap-shut lids. Moulded in black or yellow matt finish polypropylene. A clear anodised aluminium alloy front panel is supplied which clips into box. Pillars are moulded into base and a pcb may be mounted on these using self-tapping screws (supplied). A flat area is located at the back of the box, designed for mounting sockets etc.

### 700 and 710 Series

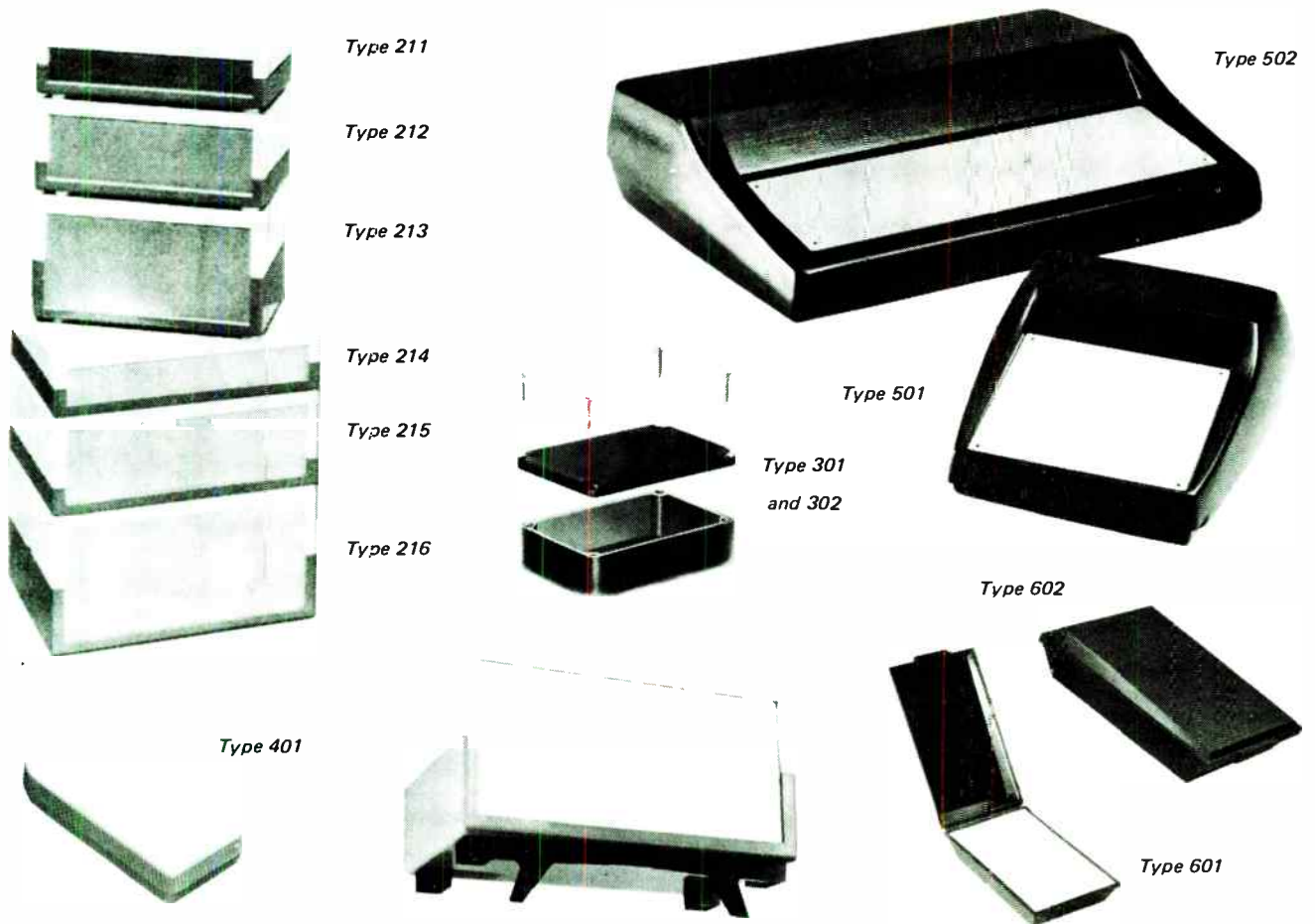
These boxes have a very smart front bezel styling and are moulded in two sections (top and bottom) from light grey high impact polystyrene. Vertical guide slots are provided for fixing up to three circuit boards (four in type 710 series boxes) vertically and mounting points are provided for mounting circuit boards horizontally. Fixing into these points requires Self Tapper No. 4 x  $\frac{3}{8}$  in. (not supplied).

An all-round tongue and groove joint between box sections ensures rigidity and excellent sealing. The two sections are held together by four screws which enter through countersunk holes in the base. Feet are not supplied, but our Stick-On Feet are suitable for use with these boxes. Plastic film covered aluminium front panel is supplied.

Type 700 series boxes have a moulded-in battery compartment with a clip-on lid which fits tightly into place. Types 701 and 702 provide space for one PP3 type battery. Types 704, 705, 707 and 708 have moulded-in holders for four HP7 type batteries, with sprung metal connectors to hold batteries in place and provide the electrical connection.







**Overall Dimensions:**

Type	Vero Part Number	Width (mm)	Depth (mm)	Height (mm)	Type	Vero Part Number	Width (mm)	Depth (mm)	Height (mm)	Front Panel	Max PCB Size
101	65-2518-H	65	120	40	501	75-1800-J	220	276	100	145 x 152	160 x 220
102	65-2520-J	80	150	50	502	75-3960-E	550	340	120	430 x 115	250 x 450
103	65-2522-K	110	188	60	601 (Black)	75-3018-C	75	130	34	70.2 x 125.8	61 x 110
104	65-2523-E	220	174	52/100	601 (Yellow)	75-2676-J	75	130	34	70.2 x 125.8	61 x 110
105	65-3851-A	120	65	40	602 (Black)	75-3019-J	127	196	51	121.2 x 189.8	100 x 160
106	65-2514-F	50	100	25	602 (Yellow)	75-2677-D	127	196	51	121.2 x 189.8	100 x 160
107	65-2516-G	50	100	40	*701	65-2036-H	68	110	33	57 x 23	
201	75-1410-J	205	140	40	*702	65-2037-C	68	110	45	57 x 35	
202	75-1411-D	205	140	75	*704	65-2067-G	92	155	33	79 x 21	
203	75-1412-K	205	140	110	*705	65-2068-B	92	155	45	79 x 33	
211	75-1237-J	153	84	39.5	*707	65-2072-D	138	190	45	122 x 31	
212	75-1238-D	153	84	59	*708	65-2073-K	138	190	68	122 x 54	
213	75-1239-K	153	84	79	713	65-2035-B	68	110	57	57 x 47	
214	75-3007-C	180	120	40	716	65-2066-A	92	155	57	79 x 45	
215	75-3008-J	180	120	65	719	65-2071-J	138	190	91	122 x 77	
216	75-3009-D	180	120	90							
217	75-1798-K	171	121	75/37.5							
221	75-2682-L	125	65	30							
222	75-2683-F	125	65	40							
223	75-2684-A	125	65	50							
301(Black)	75-1413-E	71.5	49	24.5							
302(White)	75-1469-L	71.5	49	24.5							
401	75-1799-E	94	61	27.1							

\* Includes battery compartment and clip-on lid.

**TILT LEG ASSEMBLIES**

A tilt leg which fits our 200 and 210 series Veroboxes. Supplied with four rubber feet and a tilt leg which hinges up when not in use.

For use with Veroboxes type:

211, 212, 213 Order As HQ45Y (Tilt Leg Small)  
 214, 215, 216 Order As HQ46A (Tilt Leg Medium)  
 201, 202, 203 Order As HQ47B (Tilt Leg Large)

- Order As
- LH00A (Verobox 101)
  - LH01B (Verobox 102)
  - LL00A (Verobox 103)
  - LL01B (Verobox 104)
  - LL02C (Verobox 105)
  - LL03D (Verobox 106)
  - LL04E (Verobox 107)
  - LL05F (Verobox 201)
  - LL06G (Verobox 202)
  - LL07H (Verobox 203)
  - LL08J (Verobox 211)
  - LL09K (Verobox 212)
  - LL10L (Verobox 213)

- LQ07H (Verobox 214)
- LQ08J (Verobox 215)
- LQ09K (Verobox 216)
- LL11M (Verobox 217)
- LH24B (Verobox 221)
- LH25C (Verobox 222)
- LH26D (Verobox 223)
- LL12N (Verobox 301)
- LL13P (Verobox 302)
- LL14Q (Verobox 401)
- XB88V (Verobox 501)
- XB89W (Verobox 502)

- LQ03D (Flip-Top Box 601 Black)
- LQ04E (Flip-Top Box 601 Yellow)
- LQ05F (Flip-Top Box 602 Black)
- LQ06G (Flip-Top Box 602 Yellow)
- LH27E (Verobox 701)
- LH28F (Verobox 702)
- LH29G (Verobox 704)
- LH30H (Verobox 705)
- LH31J (Verobox 707)
- LH32K (Verobox 708)
- LH33L (Verobox 713)
- LH34M (Verobox 716)
- LH35Q (Verobox 719)

## PLASTIC CASES DC2

Small plastic case moulded in strong ABS and finished in a light grey colour. Size: 111x60x27mm



Order As **LF00A** (Plastic DC2)

## PB1

Small plastic box available in black or white.

Size: 114 x 76 x 38mm.

Order As **LF01B** (Box PB1 White)  
**LH14Q** (Box PB1 Black)

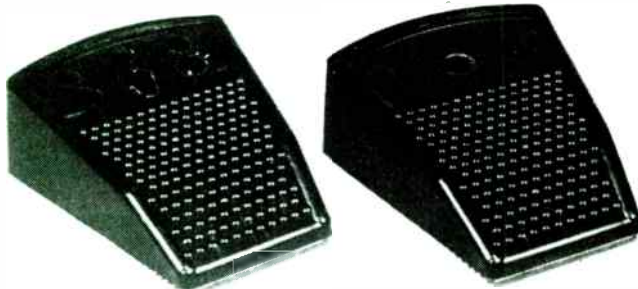
## PLASTIC CASE

A moulded black plastic case with ventilation holes in top and base. Various holes are punched in the case -- a 1/2in hole central in each end and various fixing holes in the base. The base has four plastic feet moulded on it. Internal dimensions: 207 x 57 x 38mm high. Designed primarily for small power supplies.



Order As **LF03D** (Box PB301)

## FOOT-OPERATED SWITCH BOX



A tough unbreakable black plastic moulded box with six cut-outs (three: 10mm dia. and three: 12.5mm dia.) and an aluminium cover which fits into moulding and is finished in shiny green with one hole 12.5mm punched in it. Supplied with heavy metal base with non-skid rubber pad on one side.

Outside dimensions: 132x102x103mm high max.

Order As **LH09K** (Foot Sw Box)

## POTTING BOXES

A range of potting boxes for use with our potting compound. Moulded in grey ABS.

Internal Dimensions (mm)

Type	Length	Width	Height
GP05	30	30	20
GP1	48	28	23
GP2	51	38	25
GP3	80	60	42



Note: Length and width are approx. 2mm less at base of box as sides taper slightly. Dimensions shown are measured at top of box.

Order As **LH16S** (Potting Box GP05)  
**LH17T** (Potting Box GP1)  
**LH18U** (Potting Box GP2)  
**LH19V** (Potting Box GP3)

## HOBBY BOX



A grey plastic tray 256 x 155 x 39mm high, divided into 13 compartments. Five measure 58 x 29mm, six measure 58 x 49mm, one measures 90 x 49mm and one measures 201 x 30mm. Box comes complete with a transparent plastic lid.

Order As **LH15R** (Hobby Box)

## STORAGE DRAWER

Interlocking plastic slide drawer. A grey plastic outer into which slides a clear plastic drawer which may be divided centrally with divider (supplied). Drawer has a 15mm long lip handle and a location for a card indicating contents. Grey outer has grooves on four sides (not rear) so that it can quickly be joined with other drawers to make a secure set of drawers in which components etc. may be stored.



Internal dimensions of drawer: 115 x 51 x 50mm high.  
External dimensions: (excl. lip): 125 x 61 x 60mm high.

Order As **FR22Y** (Storage Drawer)

## METAL DETECTOR SHELL

A black plastic shell for a metal detector e.g. ET1's induction balance detector described on page 24. The hollow rod through which the wire passes to the search coil is easily adjustable in length for comfortable handling. The search coil housing pivots on the rod and has an outside diameter of 240mm. The rod is curved at the top, loaded with a steel rod for perfect balance and finished with a heavily knurled finger-grip. A box 188 x 89 x 44mm deep is bolted to the handle. It is cut-out with one 15 x 7mm rectangular hole with 3.5mm wide rebate around it for a 1/2mm thick label, one 7mm round hole, one 12.7mm round hole and one 69mm round hole with four 6BA clear holes around it with their centres on the points of a 57mm square. (Thus our level meter or a speaker could be fixed to a black-sprayed metal plate bolted on here).



Order As **XQ85G**  
(Metal Detector Shell)

## MB PLASTIC BOXES

A range of glossy finish black plastic boxes moulded in ABS with brass inserts. Lid and screws to fix lid are supplied. Lid is lipped to ensure a good fit. Insides of all except MB1 are grooved on all walls to accept pcb's etc.



Dimensions:		
Type	Internal (mm)	External (mm)
MB1	76 x 56 x 35	80 x 61 x 41
MB2	95 x 71 x 35	100 x 76 x 41
MB3	115 x 95 x 37	119 x 99 x 44
MB4	210 x 125 x 77	215 x 130 x 85

Order As **LH20W** (ABS Box MB1)  
**LH21X** (ABS Box MB2)  
**LH22Y** (ABS Box MB3)  
**LH23A** (ABS Box MB4)



## ALUMINIUM BOXES

A range of low cost aluminium boxes with lid.

Type	Length mm (ins)	Width mm (ins)	Height mm (ins)
AB 12	76 (3ins)	51 (2ins)	25 (1ins)
AB 11	102 (4ins)	64 (2½ins)	51 (2ins)
AB 9	102 (4ins)	70 (2¾ins)	38 (1½ins)
AB 28	102 (4ins)	70 (2¾ins)	64 (2½ins)
AB 8	102 (4ins)	102 (4ins)	38 (1½ins)
AB 23	102 (4ins)	102 (4ins)	64 (2½ins)
AB 7	133 (5¼ins)	70 (2¾ins)	38 (1½ins)
AB 10	133 (5¼ins)	102 (4ins)	38 (1½ins)
AB 24	133 (5¼ins)	102 (4ins)	64 (2½ins)
AB 13	152 (6ins)	102 (4ins)	51 (2ins)
AB 31	152 (6ins)	114 (4½ins)	76 (3ins)
AB 15	203 (8ins)	152 (6ins)	76 (3ins)

Order As	LF08J (Box AB7)	LF09K (Box AB8)	LF10L (Box AB9)	LF11M (Box AB10)	LF12N (Box AB11)	LF13P (Box AB12)	LF14Q (Box AB13)	XB71N (Box AB15)	LF15R (Box AB23)	LF16S (Box AB24)	LH10L (Box AB28)	XB69A (Box AB31)
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## CHASSIS

Aluminium chassis with four sides and corner plates, and aluminium base panel.

Dimensions:

Type No.	Length	Height	Width
AC64	152.5	63.5	102
AC86	203	63.5	152.5

Order As	XB56L (Chassis AC64)	XB68Y (Chassis AC86)
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## VINYL-COVERED BOXES



A range of very low cost aluminium boxes consisting of a 'U' shaped base and a cover of PVC-coated aluminium. Two finishes are available: Black Morocco finish\* or Teak wood-grain finish. Each finish is available in the following sizes:

\* This finish may be supplied as dark blue Morocco. We regret that we cannot guarantee which colour will be supplied, though we shall always try to supply black.

Dimensions (mm)			Type No.	
Width	Depth	Height	Black Morocco*	Teak Wood-Grain
127	63.5	57	Case WB1 Vinyl	Case TP1 Teak
152	114	44	Case WB2 Vinyl	Case TP2 Teak
203	127	51	Case WB3 Vinyl	Case TP3 Teak
229	133	63.5	Case WB4 Vinyl	Case TP4 Teak
279	159	76	Case WB5 Vinyl	Case TP5 Teak
279	190	89	Case WB6 Vinyl	Case TP6 Teak
305	159	133	Case WB7 Vinyl	Case TP7 Teak

Order As	LF02C (Case WB1 Vinyl)	LH37S (Case WB2 Vinyl)	LH38R (Case WB3 Vinyl)	LH39N (Case WB4 Vinyl)	LH40T (Case WB5 Vinyl)	LH41U (Case WB6 Vinyl)	LH42V (Case WB7 Vinyl)	LH43W (Case TP1 Teak)	LH44X (Case TP2 Teak)	LH45Y (Case TP3 Teak)	LH46A (Case TP4 Teak)	LH47B (Case TP5 Teak)	LH48C (Case TP6 Teak)	LH49D (Case TP7 Teak)
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## DIECAST BOXES

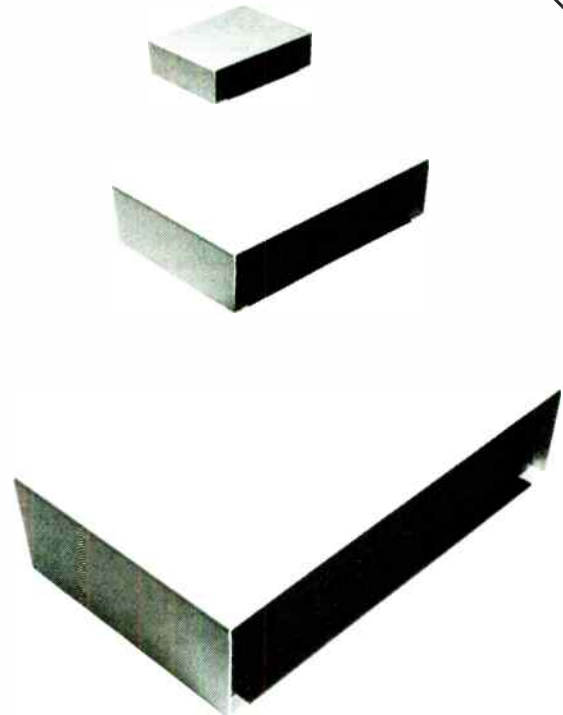
Aluminium alloy diecast boxes ideally suited for small construction projects. Box DC84 is provided with internal guide slots so that the interior can be simply sub-divided by screens, dividers or component mounting boards. Effective screening is provided by a lipped lid.



Overall size (mm)				
Type	Length	Width	Depth (incl. lid)	Aluminium thickness
DC24	114.3	63.5	54.8	1.5
DC43	114.3	88.9	54.8	1.5
DC62	171.5	120.7	54.8	2
DC74	171.5	120.7	105.6	2
DC84	222	146	106	2

Order As	LF04E (Box DC24)	LF05F (Box DC43)	LF07H (Box DC62)	LH36P (Box DC74)	XB57M (Box DC84)
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## G-RANGE CASES



A range of beautifully finished cases featuring a black PVC clad aluminium alloy upright front panel surrounded by a sloping visor. The case top which slides on over the front and rear panels and is fixed by four screws through the feet on the base is 14 s.w.g. (2mm thick) solid aluminium alloy etched and anodised to give a superb hard glistening silver finish. The front and rear panels are also removable and although the working surfaces, front, rear and base are totally accessible for drilling and component assembly, the fastenings that hold the box together are completely hidden when the box is assembled.

The boxes are available in three sizes:

Overall Dimensions (mm)			
Width	Depth	Height	
134	123	44	Order As XQ08J (G-Range 2A)
224	176	64	Order As XQ09K (G-Range 3G)
304	210	84	Order As XQ10L (G-Range 4B)

# CENTURION CASES



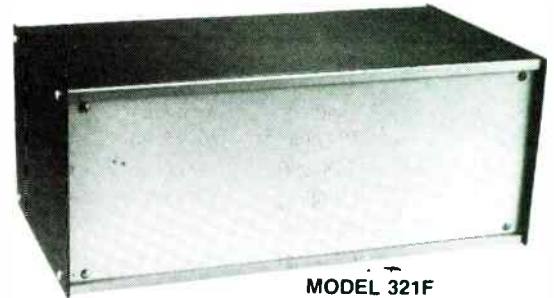
## CENTURION INSTRUMENT CASES



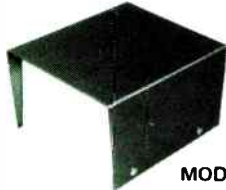
MODEL 222F



MODEL 221F



MODEL 321F



MODEL 118, 119



MODEL 121



Model	Width	Depth	Height
118	70	150	40
119	127	152	89
121	203	152	76
221F	203	152	152
222F	254	197	159
321F	406	204	167

A range of high quality beautifully finished instrument cases to give a superb finish to any project.

### Model 118, 119, 121

All aluminium two part construction having front and rear panels integral with the base and finished in white gloss. Detachable hooded cover is finished in a smart blue hammer stove enamel.

### Model 221F, 222F, 321F

Supplied in a flat pack. Front and rear panels are aluminium for ease of drilling and cutting, whilst the remainder of the case is in mild steel for strength. The front panel is finished in white gloss and all other parts are in a smart blue hammer stove enamel, except 321F which is in black acrylic paint.

Order As	Model	Case Name
XB73Q	(Centurion 118)	
XB67X	(Centurion 119)	
XB70M	(Centurion 121)	
XB55K	(Centurion 221F)	
XB58N	(Centurion 222F)	
XB72P	(Centurion 321F)	

## CENTURION INSTRUMENT CASES



Type 1



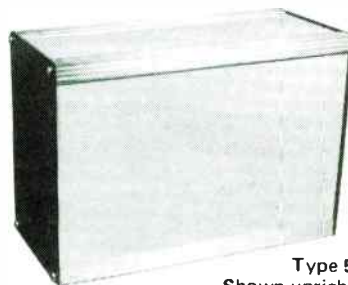
Type 2



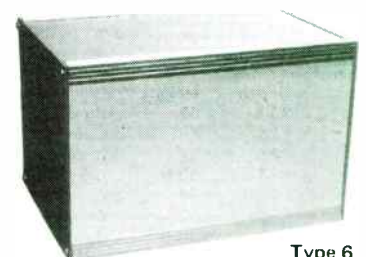
Type 3



Type 4



Type 5  
Shown upright



Type 6

A range of attractively styled cases with a blue texture finish on the side, top and back panels, the top and back panels being painted on one side only. The edges are finished with an aluminium angle trim into which the panels slide. The cases are supplied in a flat pack form.

Order As	Model	Case Name
XB61R	(Centurion Type 1)	
XB62S	(Centurion Type 2)	
XB63T	(Centurion Type 3)	
XB64U	(Centurion Type 4)	
XB65V	(Centurion Type 5)	
XB66W	(Centurion Type 6)	

Type	Overall Dimensions			Max. usable front panel area*	
	Height	Width	Depth	front/back	top/base
1	60mm	100mm	140mm	36 x 100mm	116 x 100mm
2	90mm	100mm	140mm	66 x 100mm	116 x 100mm
3	130mm	100mm	140mm	106 x 100mm	116 x 100mm
4	60mm	200mm	140mm	36 x 200mm	116 x 200mm
5	90mm	200mm	140mm	66 x 200mm	116 x 200mm
6	130mm	200mm	140mm	106 x 200mm	116 x 200mm

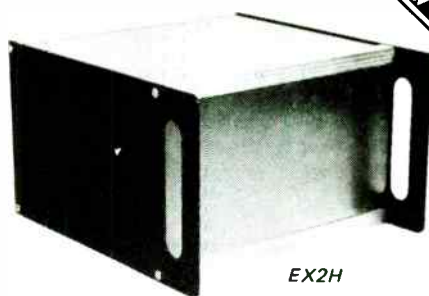
\*NOTE: Boxes may be used flat or upright.



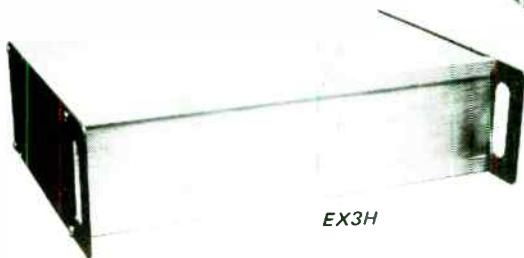
## CENTURION INSTRUMENT CASES WITH INTEGRAL HANDLES



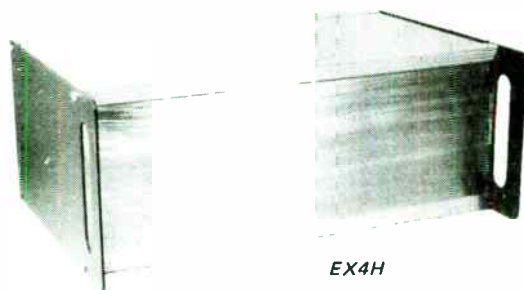
EX1H



EX2H



EX3H



EX4H

A range of high quality, beautifully finished instrument cases with integral handles to give a superb finish to any project. Case is finished in two-tone textured green with a plain brushed aluminium front panel protected by a PVC film.

Four sizes are available:

Overall Size (mm)

Width	Depth	Height	Type
200	187*	90	Centurion EX1H
200	187*	130	Centurion EX2H
325	187*	90	Centurion EX3H
325	187*	130	Centurion EX4H

\*Depth including handles: 222mm.

Order As XQ11M (Centurion EX1H)  
 XQ12N (Centurion EX2H)  
 XQ13P (Centurion EX3H)  
 XQ14Q (Centurion EX4H)

## CABINET FEET

Black soft synthetic rubber feet 15.9mm (5/8 in.) dia. 4BA clearance mounting hole. Supplied in packs of four.



Order As FW19V (Feet Cab)

## STICK-ON FEET

A cream coloured flexible plastic stick-on foot with a strong adhesive backing. Simply peel-off backing sheet and stick on – will adhere to most surfaces.

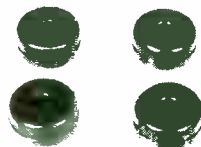


Size: depth 3.5mm; diameter 11.5mm. Supplied as a set of four.

Order As FW38R (Stick-on Feet)

## HEAVY-DUTY FEET

Large heavy duty plastic moulded cabinet feet with inset 2BA fixing hole. Overall diameter: 37mm. Height: 15mm.



Order As FW39N (HD Feet)

## CARRYING HANDLE



Strap-type carrying handle, with chrome end pieces and fixing bolts and grey plastic handle. Overall length with handle fully retracted 195mm approx.

Order As FW81C (Handle)

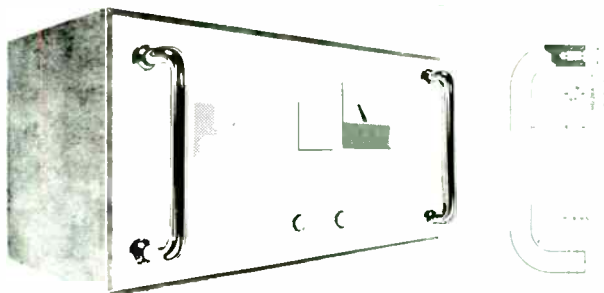
## HEAVY-DUTY STRAP HANDLE



A heavy duty strap-type flexible carrying handle. Moulded in a smart black ribbed flexible plastic with a strong sprung steel carrier. End pieces are chrome. Overall length with handle fully retracted: 288mm.

Order As FW82D (HD Strap Handle)

## INSTRUMENT CASE HANDLE



Mild steel handles fine chromed (on nickel on copper). Two sizes available: Fixing hole centres 3 1/4 in. (95.2mm, SMALL) or 6 in (152.4mm, LARGE).

Order As FX00A (Inst Handle Small)  
 FX01B (Inst Handle Large)

## FERRULE

A chrome plated brass ferrule is also available to suit INST. HANDLE.

Order As FX02C (Ferrule)



## PLASTIC HANDLE

A strong black plastic instrument case handle with threaded brass inserts fixing screws supplied. Fixing centres: 93.5mm—screws require 1/8in. hole (5BA). Overall size: 107×33×15mm.



Order As FX03D (Inst Handle Plastic)

## RECESS HANDLE

A flush fitting cabinet handle made from tough black impact and shatterproof material ideal for amplifier cabinets and other heavy casings. Cut-out required: 48×105mm. Total depth in cabinet: 75mm. Bezel dimensions: 134×68mm. Fixing centres: 113×46mm.



Order As LH08J (Recess Handle)

## HEAVY DUTY HANDLE

A heavy duty flush fitting black cabinet handle with a strong 25.4mm chromed bar, ideal for speaker cabinets and other very heavy casings.

Cut-out required: 225×125mm. Total depth in cabinet: 63mm. Bezel dimensions: 159×273mm. Fixing centres: 124 + 124 x 133mm.



Order As LH11M (Heavy Duty Handle)

## CABINET CORNERS

### Plastic Type

Moulded in extra tough black nylon, designed to protect the corners of portable cabinets.

Order As FX04E (Cab Corners)



### Metal Type

High quality chromed metal corner protectors available for two or three-side fixing.

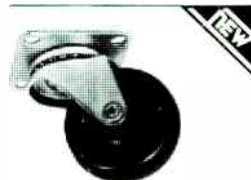
Order As FX94C (Corner Two-Side)  
FX95D (Corner Three-Side)



## CASTORS

A heavy duty castor with a 50mm (2in.) diameter plastic wheel connected via a ball race to a 50mm square mounting plate. Fixing by four corner holes 38 x 38 x 6.3mm. dia. Supplied in pairs only.

Order As FX96E (Castors)



## CASTOR CUP



Fitted in the top of a cabinet, these allow stacking of equipment which is mounted on castors. Finished in black, they will accept castor wheels up to 76mm dia. x 19mm wide.

Order As FX05F (Castor Cup)

## VENTILATION GRILLE

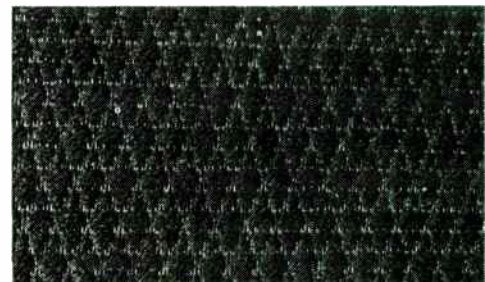


Manufactured in black in a specially heat-resistant nylon. Fits cut-out size 142 x 35mm.

Order As FX06G (Cool Grille)

## MATERIALS

### Loudspeaker Grille Cloth



A high quality Tygan material for use as grille cloths on loudspeaker cabinets. The material is acoustically highly transparent. It is available in two widths: 1.14m (45in) and 0.57m (22½in), and is sold per ¼m length (9.8in). Available in two colours, black or a bronze which will complement light or dark woods.

*Note: Price shown is for ¼m length. We will cut to length required in multiples of ¼m only. Max length in one piece: 30m.*

Order As RY00A (Black Tygan 45in)  
RY01B (Black Tygan 22½in)  
RY02C (Brown Tygan 45in)  
RY03D (Brown Tygan 22½in)

### Cabinet Covering Cloth



A high quality cloth-backed plastic material for covering cabinets. Very hard-wearing and similar to "Rexine" in appearance. To fix, simply glue to chipboard or plywood etc. Available in black only. It is available in two widths: 1.27m (50in) and 0.635m (25in) and is sold per ¼m length (9.8in).

*Note: Price shown is for ¼m length. We will cut to length required in multiples of ¼m only. Max length in one piece: 30m.*

Order As RY04E (Covering Cloth 50in)  
RY05F (Covering Cloth 25in)

### Loudspeaker Cabinet Wadding

A high quality wadding, acoustically designed for use in loudspeaker cabinets. The material is 25.4cm (1in) thick, but may be layered to make up greater thicknesses. Available in 0.61m (24in) widths only, and is sold per ¼m (19½in).

*Note: Price shown is for ¼m length. We will cut to length required in multiples of ¼m only. Max length in one piece: 18m.*

Order As RY06G (Acoustic Wadding)



Value					Value						
Value	Voltage	Tolerance	Type	Page	Value	Voltage	Tolerance	Type	Page		
pF.	nF	μF DCunless stated			pF	nF	μF DCunless stated				
1.8		63	±0.25pF	Ceramic	63	220		63	±2%	Ceramic	63
2.2		63	"	"	63	220		160	±5%	Polystyrene	64
2.2		350	±0.5pF	Mica	63	220		350	±1%	Mica	63
2.7		63	±0.25pF	Ceramic	63	220		500	±10%	HV Disc	62
3.3		63	"	"	63	220		500	±1%	1% Polysty.	64
3.3		350	±0.5pF	Mica	63	220		8000	±20%	8kV Cap	62
3.9		63	±0.25pF	Ceramic	63	270		63	±2%	Ceramic	63
4.7		63	"	"	63	270		350	±1%	Mica	63
5		350	±0.5pF	Mica	63	270		500	±1%	1% Polysty.	64
5.6		63	±0.25pF	Ceramic	63	330		63	±2%	Ceramic	63
6.8		63	"	"	63	330		160	±5%	Polystyrene	64
8.2		63	"	"	63	330		350	±1%	Mica	63
10		63	±2%	"	63	330		500	±10%	HV Disc	62
10		350	±0.5pF	Mica	63	330		500	±1%	1% Polysty.	64
10		500	±10%	HV Disc	62	390		100	±10%	Ceramic	63
10		8000	±20%	8kV Cap	62	390		350	±1%	Mica	63
12		63	±2%	Ceramic	63	390		500	±1%	1% Polysty.	64
15		63	"	"	63	470		100	±10%	Ceramic	63
18		63	±2%	Ceramic	63	470		160	±5%	Polystyrene	64
18		350	±0.5pF	Mica	63	470		350	±1%	Mica	63
22		63	±2%	Ceramic	63	470		500	±20%	HV Disc	62
22		160	±5%	Polystyrene	64	470		500	±1%	1% Polysty.	64
22		350	±0.5pF	Mica	63	560		100	±10%	Ceramic	63
22		8000	±20%	8kV Cap	62	560		125	±1%	1% Polysty.	64
27		63	±2%	Ceramic	63	560		160	±5%	Polystyrene	64
27		350	±0.5pF	Mica	63	560		350	±1%	Mica	63
33		63	±2%	Ceramic	63	680		100	±10%	Ceramic	63
33		160	±5%	Polystyrene	64	680		160	±5%	Polystyrene	64
33		350	±0.5pF	Mica	63	680		350	±1%	Mica	63
39		63	±2%	Ceramic	63	680		500	±20%	HV Disc	62
39		350	±0.5pF	Mica	63	750		125	±1%	1% Polysty.	64
47		63	±2%	Ceramic	63	820		100	±10%	Ceramic	63
47		160	±5%	Polystyrene	64	820		350	±1%	Mica	63
47		350	±0.5pF	Mica	63	1000	1	0.001	±10%	Ceramic	63
47		500	±10%	HV Disc	62	1000	1	0.001	±10%	Mylar	64
47		8000	±20%	8kV Cap	62	1000	1	0.001	±1%	1% Polysty.	64
56		63	±2%	Ceramic	63	1000	1	0.001	±5%	Polystyrene	64
56		350	±1%	Mica	63	1000	1	0.001	±10%	Carbonate	65
68		63	±2%	Ceramic	63	1000	1	0.001	±1%	Mica	63
68		160	±5%	Polystyrene	64	1000	1	0.001	-20%+80%	Feed Thro	64
68		350	±1%	Mica	63	1000	1	0.001	±20%	HV Disc	62
82		63	±2%	Ceramic	63	1000	1	0.001	±20%	Mix D	66
82		350	±1%	Mica	63	1200	1.2	0.0012	±10%	Ceramic	63
100		63	±2%	Ceramic	63	1200	1.2	0.0012	±1%	1% Polysty.	64
100		160	±5%	Polystyrene	64	1500	1.5	0.0015	±10%	Ceramic	63
100		350	±1%	Mica	63	1500	1.5	0.0015	±1%	1% Polysty.	64
100		500	±10%	HV Disc	62	1500	1.5	0.0015	±5%	Polystyrene	64
100		500	±1%	1% Polysty.	64	1500	1.5	0.0015	±10%	Carbonate	65
100		8000	±20%	8kV Cap	62	1500	1.5	0.0015	±1%	Mica	63
120		63	±2%	Ceramic	63	1800	1.8	0.0018	±10%	Ceramic	63
120		350	±1%	Mica	63	1800	1.8	0.0018	±1%	1% Polysty.	64
150		63	±2%	Ceramic	63	1800	1.8	0.0018	±1%	Mica	63
150		160	±5%	Polystyrene	64	2200	2	0.0022	±10%	Ceramic	63
150		350	±1%	Mica	63	2200	2.2	0.0022	±10%	Mylar	64
150		500	±1%	1% Polysty.	64	2200	2.2	0.0022	±1%	1% Polysty.	64
180		63	±2%	Ceramic	63	2200	2.2	0.0022	±5%	Polystyrene	64

# CAPACITOR FINDER



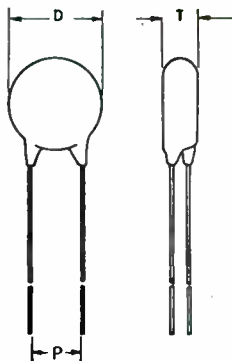
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2200	2.2	0.0022	250	± 10%	Carbonate	65	27	0.027	250	± 5%	Carbonate	65
2200	2.2	0.0022	350	± 1%	Mica	63	33	0.033	250	± 5%	Carbonate	65
2200	2.2	0.0022	500	-20%+40%	HV Disc	62	33	0.033	250	± 20%	Polyester	65
2700	2.7	0.0027	100	± 10%	Ceramic	63	39	0.039	250	± 5%	Carbonate	65
2700	2.7	0.0027	125	± 1%	1% Polysty.	64	47	0.047	40	-20%+80%	Disc	64
2700	2.7	0.0027	350	± 1%	Mica	63	47	0.047	25	± 5%	Polystyrene	64
3300	3.3	0.0033	100	± 10%	Ceramic	63	47	0.047	100	± 10%	Mylar	64
3300	3.3	0.0033	125	± 1%	1% Polysty.	64	47	0.047	250	± 5%	Carbonate	65
3300	3.3	0.0033	160	± 5%	Polystyrene	64	47	0.047	250	± 20%	Polyester	65
3300	3.3	0.0033	250	± 10%	Carbonate	65	47	0.047	250AC	± 20%	IS Cap	66
3600	3.6	0.0036	350	± 1%	Mica	63	47	0.047	1000	± 20%	Mix D	66
3900	3.9	0.0039	100	± 10%	Ceramic	63	56	0.056	250	± 5%	Carbonate	65
3900	3.9	0.0039	125	± 1%	1% Polysty.	64	68	0.068	250	± 5%	Carbonate	65
4700	4.7	0.0047	100	± 10%	Ceramic	63	68	0.068	250	± 20%	Polyester	65
4700	4.7	0.0047	100	± 10%	Mylar	64	82	0.082	250	± 5%	Carbonate	65
4700	4.7	0.0047	125	± 1%	1% Polysty.	64	100	0.1	25	-20%+80%	Disc	64
4700	4.7	0.0047	160	± 5%	Polystyrene	64	100	0.1	35	± 20%	Tant	66
4700	4.7	0.0047	250	± 10%	Carbonate	65	100	0.1	25	± 5%	Polysty	64
4700	4.7	0.0047	350	± 1%	Mica	63	100	0.1	100	± 10%	Mylar	64
4700	4.7	0.0047	500	-20%+40%	HV Disc	62	100	0.1	250	± 5%	Carbonate	65
4700	4.7	0.0047	1000	± 20%	Mix D	66	100	0.1	250	± 20%	Polyester	65
4,700	4.7	0.0047	1000	-20 + 40%	1000V Disc	62	100	0.1	250AC	± 20%	IS Cap	66
5600	5.6	0.0056	125	± 1%	1% Polysty.	64	100	0.1	600	± 20%	Mix D	66
5600	5.6	0.0056	160	± 5%	Polystyrene	64	100	0.1	1000	± 20%	Mix D	66
6800	6.8	0.0068	125	± 1%	1% Polysty.	64	120	0.12	250	± 5%	Carbonate	65
6800	6.8	0.0068	160	± 5%	Polystyrene	64	150	0.15	35	± 20%	Tant	66
6800	6.8	0.0068	250	± 10%	Carbonate	65	150	0.15	250	± 5%	Carbonate	65
6800	6.8	0.0068	350	± 1%	Mica	63	150	0.15	250	± 20%	Polyester	65
8200	8.2	0.0082	125	± 1%	1% Polysty.	64	180	0.18	250	± 5%	Carbonate	65
8200	8.2	0.0082	250	± 10%	Carbonate	65	220	0.22	10	20% - 80%	Disc	64
8200	8.2	0.0082	350	± 1%	Mica	63	220	0.22	35	± 20%	Tant	66
10,000	10	0.01	40	-20%+100%	Ceramic	63	220	0.22	100	± 10%	Mylar	64
10,000	10	0.01	40	-20%+80%	Disc	64	220	0.22	250	± 5%	Carbonate	65
10,000	10	0.01	63	± 1%	1% Polysty	64	220	0.22	250	± 20%	Polyester	65
10,000	10	0.01	100	± 10%	Mylar	64	220	0.22	250AC	± 20%	IS Cap	66
10,000	10	0.01	160	± 5%	Polystyrene	64	220	0.22	1000	± 20%	Mix D	66
10,000	10	0.01	250	± 5%	Carbonate	65	270	0.27	100	± 5%	Carbonate	65
10,000	10	0.01	250	± 20%	Polyester	65	330	0.33	35	± 20%	Tant	66
10,000	10	0.01	250AC	± 20%	IS Cap	66	330	0.33	100	± 5%	Carbonate	65
10,000	10	0.01	350	± 1%	Mica	63	330	0.33	250	± 10%	Polyester	65
10,000	10	0.01	500	-20%+40%	HV Disc	62	390	0.39	100	± 5%	Carbonate	65
10,000	10	0.01	1000	± 20%	Mix D	66	470	0.47	35	± 20%	Tant	66
12,000	12	0.012	250	± 5%	Carbonate	65	470	0.47	100	± 5%	Carbonate	65
15,000	15	0.015	250	± 5%	Carbonate	65	470	0.47	100	-10%+75%	P.C. Elect	68
15,000	15	0.015	250	± 20%	Polyester	65	470	0.47	250	± 10%	Polyester	65
18,000	18	0.018	250	± 5%	Carbonate	65	470	0.47	250	-10%+50%	Axial	67
22,000	22	0.022	25	-20%+80%	Disc	64	470	0.47	275AC	± 10%	IS Cap	66
22,000	22	0.022	40	-20%+100%	Ceramic	63	470	0.47	1000	± 20%	Mix D	66
22,000	22	0.022	63	± 1%	1% Polysty	64	560	0.56	100	± 5%	Carbonate	65
22,000	22	0.022	100	± 10%	Mylar	64	680	0.68	35	± 20%	Tant	66
22,000	22	0.022	160	± 5%	Polystyrene	64	680	0.68	100	± 5%	Carbonate	65
22,000	22	0.022	250	± 5%	Carbonate	65	680	0.68	250	± 10%	Polyester	65
22,000	22	0.022	250	± 20%	Polyester	65	820	0.82	100	± 5%	Carbonate	65
22,000	22	0.022	250AC	± 20%	IS Cap	66	1000	1	35	± 20%	Tant	66
22,000	22	0.022	1000	± 20%	Mix D	66	1000	1	63	-10%+50%	Axial	67
							1000	1	100	± 5%	Carbonate	65
							1000	1	100	-10%+75%	P.C. Elect	68



Value $\mu$ F	Voltage (DC)	Tolerance	Type	Page	Value $\mu$ F	Voltage (DC)	Tolerance	Type	Page
1	250	$\pm 10\%$	Polyester	65	47	10	$\pm 20\%$	Tant	66
1	500	$-10\%+50\%$	Axial	67	47	10	$-10\%+50\%$	Axial	67
1	600	$\pm 20\%$	Mix D	66	47	16	$\pm 20\%$	Tant	66
1.5	35	$\pm 20\%$	Tant	66	47	25	$-10\%+50\%$	P.C. Elect	68
1.5	63	$-10\%+50\%$	Axial	67	47	25	$-10\%+50\%$	Axial	67
1.5	63	$\pm 20\%$	Reversolytic	68	47	40	$-10\%+50\%$	Axial	67
1.5	250	$\pm 10\%$	Polyester	65	47	63	$-10\%+50\%$	P.C. Elect	68
2.2	35	$\pm 20\%$	Tant	66	47	63	$-10\%+50\%$	Axial	67
2.2	63	$-10\%+75\%$	P.C. Elect	68	47	63	$\pm 20\%$	Reversolytic	68
2.2	63	$-10\%+50\%$	Axial	67	47	100	$-10\%+50\%$	Axial	67
2.2	63	$\pm 20\%$	Reversolytic	68	47	500	$-10\%+50\%$	Axial	67
2.2	250	$\pm 10\%$	Polyester	65	68	6.3	$\pm 20\%$	Tant	66
2.2	500	$-10\%+50\%$	Axial	67	68	6.3	$-10\%+50\%$	Axial	67
3.3	35	$\pm 20\%$	Tant	66	68	16	$-10\%+50\%$	Axial	67
3.3	63	$-10\%+50\%$	Axial	67	68	63	$-10\%+50\%$	Axial	67
3.3	63	$\pm 20\%$	Reversolytic	68	100	3	$\pm 20\%$	Tant	66
4.7	16	$\pm 20\%$	Tant	66	100	4	$-10\%+50\%$	Axial	67
4.7	35	$\pm 20\%$	Tant	66	100	10	$\pm 20\%$	Tant	66
4.7	63	$-10\%+75\%$	P.C. Elect	68	100	10	$-10\%+50\%$	P.C. Elect	68
4.7	63	$-10\%+50\%$	Axial	67	100	10	$-10\%+50\%$	Axial	67
4.7	63	$\pm 20\%$	Reversolytic	68	100	25	$-10\%+50\%$	P.C. Elect	68
4.7	500	$-10\%+50\%$	Axial	67	100	25	$-10\%+50\%$	Axial	67
6.8	16	$\pm 20\%$	Tant	66	100	40	$-10\%+50\%$	Axial	67
6.8	35	$\pm 20\%$	Tant	66	100	63	$-10\%+50\%$	P.C. Elect	68
6.8	40	$-10\%+50\%$	Axial	67	100	63	$-10\%+50\%$	Axial	67
6.8	63	$-10\%+50\%$	Axial	67	100	100	$-10\%+50\%$	Axial	67
6.8	63	$\pm 20\%$	Reversolytic	68	100	250	$-10\%+50\%$	Axial	67
8	63	$\pm 20\%$	Reversolytic	68	150	6.3	$-10\%+50\%$	Axial	67
10	16	$\pm 20\%$	Tant	66	150	16	"	"	67
10	25	$-10\%+50\%$	Axial	67	150	25	"	"	67
10	25	$\pm 20\%$	Tant	66	150	40	"	"	67
10	35	$\pm 20\%$	Tant	66	150	63	"	"	67
10	35	$-10\%+50\%$	P.C. Elect	68	220	4	"	"	67
10	63	$-10\%+50\%$	P.C. Elect	68	220	10	"	"	67
10	63	$-10\%+50\%$	Axial	67	220	16	"	P.C. Elect	68
10	63	$\pm 20\%$	Reversolytic	68	220	16	"	Axial	67
10	100	$-10\%+50\%$	Axial	67	220	25	"	"	67
10	500	$-10\%+50\%$	Axial	67	220	40	"	"	67
15	16	$-10\%+50\%$	Axial	67	220	63	"	P.C. Elect	68
15	25	$\pm 20\%$	Tant	66	220	63	"	Axial	67
15	40	$-10\%+50\%$	Axial	67	220	100	"	"	67
15	63	$-10\%+50\%$	Axial	67	330	4	"	"	67
15	63	$\pm 20\%$	Reversolytic	68	330	10	"	"	67
22	10	$-10\%+50\%$	Axial	67	330	25	"	"	67
22	16	$\pm 20\%$	Tant	66	330	63	"	"	67
22	16	$-10\%+50\%$	P.C. Elect	68	470	6.3	"	"	67
22	25	$\pm 20\%$	Tant	66	470	10	"	"	67
22	25	$-10\%+50\%$	Axial	67	470	16	"	P.C. Elect	68
22	63	$-10\%+50\%$	P.C. Elect	68	470	25	"	"	68
22	63	$-10\%+50\%$	Axial	67	470	25	"	Axial	67
22	63	$\pm 20\%$	Reversolytic	68	470	63	"	PC Elect	68
22	100	$-10\%+50\%$	Axial	67	470	63	"	Axial	67
22	500	$-10\%+50\%$	Axial	67	470	100	"	"	67
33	6.3	$-10\%+50\%$	Axial	67	680	6.3	"	"	67
33	10	$\pm 20\%$	Tant	66	680	16	"	"	67
33	16	$-10\%+50\%$	Axial	67	680	25	"	"	67
33	40	$-10\%+50\%$	Axial	67	680	40	"	"	67
33	63	$\pm 20\%$	Reversolytic	68	1000	6.3	"	"	67
47	4	$-10\%+50\%$	Axial	67					

value $\mu$ F	Voltage (DC)	Tolerance	Type	Page	Value $\mu$ F	Voltage (DC)	Tolerance	Type	Page
1000	10	-10%+50%	Axial	67	2200	63	10%+50%	Axial	67
1000	16	"	P.C. Elect	68	2200	63	"	Can	68
1000	16	"	Axial	67	2200	100	"	"	68
1000	25	"	P.C. Elect	68	3300	6.3	"	Axial	67
1000	25	"	Axial	67	3300	25	"	"	67
1000	63	"	"	67	3300	40	"	Can	68
1000	100	"	Can	68	3300	63	"	"	68
1500	6.3	"	Axial	67	4700	10	"	Axial	67
1500	10	"	"	67	4700	25	"	"	67
1500	16	"	"	67	4700	25	"	Can	68
1500	63	"	Can	68	4700	40	"	"	68
2200	10	"	"	67	4700	63	"	"	68
<b>2,200</b>	16	"	<b>PC Elect</b>	<b>68</b>	4700	100	"	"	<b>68</b>
2200	25	"	Axial	67	6800	40	"	"	68
2200	40	"	"	67	10,000	25	"	"	68
2200	40	"	Can	68	10,000	63	"	"	68

## HIGH VOLTAGE DISC CERAMIC



A 500V standard disc ceramic capacitor for general purpose use.

Working voltage: 500V DC; 250V AC 50Hz rms

Insulation resistance:  $> 7.5 \times 10^9 \Omega$

Case sizes 10pF to 2200pF: D: 7.4; T:  $< 4$ ; P: 5

4700pF and 10,000pF: D: 15; T:  $< 4$ ; P: 7.5

The following values are available:

Value (pF)	Tolerance	Temperature coefficient	Power factor	Order As
10	$\pm 10\%$	Zero	$< 26 \times 10^{-4}$	<b>BX05F</b>
47	$\pm 10\%$	-1500ppm/ $^{\circ}$ C	$< 30 \times 10^{-4}$	<b>BX06G</b>
100	$\pm 10\%$	-3300ppm/ $^{\circ}$ C	$< 40 \times 10^{-4}$	<b>BX07H</b>
220	$\pm 10\%$	-5600ppm/ $^{\circ}$ C	$< 50 \times 10^{-4}$	<b>BX08J</b>
330	$\pm 10\%$	-5600ppm/ $^{\circ}$ C	$< 50 \times 10^{-4}$	<b>BX09K</b>
470	$\pm 20\%$	Hi-K	$< 250 \times 10^{-4}$	<b>BX10L</b>
680	$\pm 20\%$	Hi-K	$< 250 \times 10^{-4}$	<b>BX11M</b>
1000	$\pm 20\%$	Hi-K	$< 250 \times 10^{-4}$	<b>BX12N</b>
2200	-20+40%	Hi-K	$< 250 \times 10^{-4}$	<b>BX13P</b>
4700	-20+40%	Hi-K	$< 250 \times 10^{-4}$	<b>BX14Q</b>
10,000	-20+40%	Hi-K	$< 250 \times 10^{-4}$	<b>BX15R</b>

(HV Disc plus Value)

## 1000V DISC CERAMIC

A 1000V disc ceramic capacitor for general purpose use.

Working voltage: 1000V DC

Insulation resistance:  $7.5 \times 10^9 \Omega$

Tolerance: -20 + 40%

Temperature

coefficient: Hi-K

Power factor:  $< 250 \times 10^{-4}$

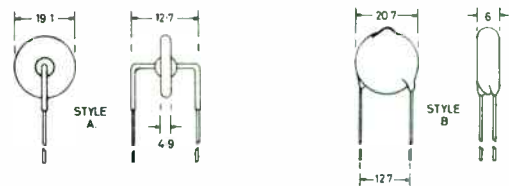
Case size: D: 15mm, T:  $< 5$ mm P: 7.5mm.

Case style: Same as HV Disc

Available in one value only: 4700pF.

Order As **HY18U (1000V Disc 4700pF)**

## 8kV DISC CERAMIC



A very high voltage capacitor featuring high stability for use where low ionisation working is essential.

Tolerance:  $\pm 20\%$

Working voltage: 8kV DC; 5.5kV AC 50Hz rms

Insulation resistance:  $> 7.5 \times 10^9 \Omega$

Max. rms current: 1.5A

The following values are available (pF):

Value (pF)	Temperature coefficient	Power factor	Style	Order As
10	Zero	$15 \times 10^{-4}$	A	<b>BX17T</b>
22	-750ppm/ $^{\circ}$ C	$15 \times 10^{-4}$	A	<b>BX18U</b>
47	-750ppm/ $^{\circ}$ C	$15 \times 10^{-4}$	A	<b>BX19V</b>
100	-1100ppm/ $^{\circ}$ C*	$20 \times 10^{-4}$	B	<b>BX20W</b>
220	-1600ppm/ $^{\circ}$ C*	$30 \times 10^{-4}$	B	<b>BX21X</b>

\*At frequencies over 1MHz the relationship becomes non-linear owing to self resonance effects.

(8kV Cap plus Value)



**METALLISED CERAMIC PLATE CAPACITORS**

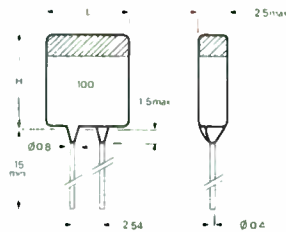
A miniature ceramic capacitor with a hard lacquer casing. Values up to and including 330pF are suitable for temperature compensation in tuned circuits where low losses, close tolerance and high stability are required. Values from 390pF to 4700pF are for use in coupling and decoupling applications, where a non-linear change of capacitance with temperature is permissible. Values 10,000pF and 22,000pF are suitable for use in coupling and decoupling applications, where capacitance stability is not critical.

Insulation resistance:  $> 1000M \Omega$

Temperature coefficient: 1.8 to 18pF: Zero; Black  
 22pF to 150pF: -150ppm/°C: Orange  
 180pF to 330pF: -750ppm/°C: Violet  
 (Colour indicates colour 390pF to 4700pF: medium K: Yellow  
 band marked on capacitor) 10,000pF to 22,000pF: high K: Green

Power Factor: 1.8pF to 47pF:  $< 55 \times 10^{-4}$   
 56pF to 330pF:  $< 15 \times 10^{-4}$   
 390pF to 22,000pF:  $< 350 \times 10^{-4}$

Case sizes: Size	L max	H max
1	3.5	4.5
2	4.5	5.5
3	5.5	6.5
4	6.5	7.5
5	6.5	10.5



The following values are available:

Cap (pF)	Voltage (DC)	Case Size	Tolerance
1.8	63	1	$\pm 0.25pF$
2.2	63	1	"
2.7	63	1	"
3.3	63	1	"
3.9	63	1	"
4.7	63	1	"
5.6	63	1	"
6.8	63	1	"
8.2	63	1	"



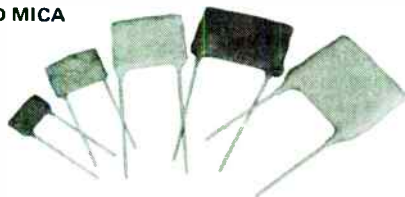
Order As

- WX35Q**
- WX36P**
- WX37S**
- WX38R**
- WX39N**
- WX40T**
- WX41U**
- WX42V**
- WX43W**

Cap. (pF)	Voltage (DC)	Case Size	Tolerance	
10	63	1	$\pm 2\%$	<b>WX44X</b>
12	63	1	"	<b>WX45Y</b>
15	63	1	"	<b>WX46A</b>
18	63	1	"	<b>WX47B</b>
22	63	1	"	<b>WX48C</b>
27	63	2	"	<b>WX49D</b>
33	63	2	"	<b>WX50E</b>
39	63	2	"	<b>WX51F</b>
47	63	2	"	<b>WX52G</b>
56	63	3	"	<b>WX53H</b>
68	63	3	"	<b>WX54J</b>
82	63	4	"	<b>WX55K</b>
100	63	4	"	<b>WX56L</b>
120	63	5	"	<b>WX57M</b>
150	63	5	"	<b>WX58N</b>
180	63	4	"	<b>WX59P</b>
220	63	4	"	<b>WX60Q</b>
270	63	5	"	<b>WX61R</b>
330	63	5	"	<b>WX62S</b>
390	100	1	$\pm 10\%$	<b>WX63T</b>
470	100	1	"	<b>WX64U</b>
560	100	1	"	<b>WX65V</b>
680	100	1	"	<b>WX66W</b>
820	100	1	"	<b>WX67X</b>
1000	100	2	"	<b>WX68Y</b>
1200	100	2	"	<b>WX69A</b>
1500	100	2	"	<b>WX70M</b>
1800	100	2	"	<b>WX71N</b>
2200	100	3	"	<b>WX72P</b>
2700	100	3	"	<b>WX73Q</b>
3300	100	4	"	<b>WX74R</b>
3900	100	4	"	<b>WX75S</b>
4700	100	4	"	<b>WX76H</b>
10,000	40	2	-20%+100%	<b>WX77J</b>
22,000	40	4	"	<b>WX78K</b>

(Ceramic plus Value)

**SILVERED MICA**



A capacitor featuring high stability for use in tuned circuits, and filters and for pulse operation. It has a solid wax impregnant with a tough cement coating.

Tolerance: 2.2pF to 47pF  $\pm 0.5pF$   
 56pF to 10,000pF  $\pm 1\%$

Working voltage: 350V DC  
 Insulation resistance: 50,000M  $\Omega$

Temperature coefficient: 2.2pF to 47pF +75ppm/°C ave.  
 56pF to 10,000pF +35ppm/°C ave.

Power Factor: 2.2pF to 47pF:  $< 25 \times 10^{-4}$   
 56pF to 820pF:  $< 15 \times 10^{-4}$   
 1000pF to 10,000pF:  $< 20 \times 10^{-4}$



Case sizes	W	H	T
2.2pF to 68pF	13	8	3.2
82pF to 220pF	17	12	3.2
270pF to 390pF	22	17	3.2
470pF to 560pF	27	17	3.2
680pF to 10,000pF	27	22	3.2

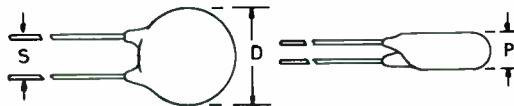
The following values are available (pF):

2.2, 3.3, 5, 10, 18, 22, 27, 33, 39, 47, 56, 68, 82, 100, 120, 150, 180, 220, 270, 330, 390, 470, 560, 680, 820, 1000, 1500, 1800, 2200, 2700, 3600, 4700, 5600, 6800, 8200, 10,000.

Order As

<b>WX00A</b> (2.2pF)	<b>WX12N</b> (82pF)	<b>WX24B</b> (820pF)
<b>WX01B</b> (3.3pF)	<b>WX13P</b> (100pF)	<b>WX25C</b> (1000pF)
<b>WX02C</b> (5pF)	<b>WX14Q</b> (120pF)	<b>WX26D</b> (1500pF)
<b>WX03D</b> (10pF)	<b>WX15R</b> (150pF)	<b>WX27E</b> (1800pF)
<b>WX04E</b> (18pF)	<b>WX16S</b> (180pF)	<b>WX28F</b> (2200pF)
<b>WX05F</b> (22pF)	<b>WX17T</b> (220pF)	<b>WX29G</b> (2700pF)
<b>WX06G</b> (27pF)	<b>WX18U</b> (270pF)	<b>WX30H</b> (3600pF)
<b>WX07H</b> (33pF)	<b>WX19V</b> (330pF)	<b>WX31J</b> (4700pF)
<b>WX08J</b> (39pF)	<b>WX20W</b> (390pF)	<b>WX32K</b> (6800pF)
<b>WX09K</b> (47pF)	<b>WX21X</b> (470pF)	<b>WX33L</b> (8200pF)
<b>WX10L</b> (56pF)	<b>WX22Y</b> (560pF)	<b>WX34M</b> (10,000pF)
<b>WX11M</b> (68pF)	<b>WX23A</b> (680pF)	(Mica plus Value)

## LOW VOLTAGE DISC CERAMIC



Tolerance: -25+50%

Power factor: 0.1

Cap (µF)	Voltage (DC)	Leakage resistance at max voltage	Dimensions		
			D max.	T max.	P
0.01	40	20M	7.5	3.5	5
0.022	25	5M	7.5	3.5	5
0.047	40	20M	15	4	7.5
0.1	25	5M	15	4	7.5
0.22	10	200k	15	4	7.5

Order As

BX00A (Disc 0.01µF) BX03D (Disc 0.1µF)  
 BX01B (Disc 0.022µF) BX04E (Disc 0.22µF)  
 BX02C (Disc 0.047µF)

## FEED THROUGH CAPACITOR



Feed through capacitor 1000pF 350V DC miniature, tubular solder-in construction. Body dimensions 9.4×3mm.

Order As BX16S (Feed Thro Cap)

## POLYSTYRENE



A high grade polystyrene foil capacitor. The extended foil construction achieves low self-inductance, low high frequency losses and long life. A red band indicates the lead connected to the outer foil which completely shields the inner foil. A fused polystyrene enclosure ensures high insulation resistance. The capacitors are suitable for computing circuits, coupling, filters, tuned circuits and applications requiring low losses at high frequencies, stability and reliability.

Tolerance	±5%
Working voltage	160V DC (22pF to 22000pF) 25V DC (47,000pF and 100,000pF)
Insulation resistance	>10 <sup>11</sup> Ω
Temperature coefficient	-160±80ppm/°C
Power factor	<5 × 10 <sup>-4</sup> @ 1MHz
Inductance	<30nH

The following values are available:  
Case size (mm)

Value (pF)	Dia.	Length	Order As
22	4.4	8	BX24B
33	4.4	8	BX25C
47	4.7	8	BX26D
68	4.2	8	BX27E
100	3.9	8	BX28F
150	4.3	8	BX29G
220	4.5	8	BX30H
330	4.8	8	BX31J
470	5.3	8	BX32K
560	5.4	8	BX33L
680	5.8	12	BX34M
1,000	6.2	12	BX35Q
1,500	6.8	12	BX36P
2,200	7.4	12	BX37S
3,300	8.6	12	BX38R
4,700	8.5	17	BX39N
5,600	8.0	22	BX40T
6,800	8.5	22	BX41U
10,000	9.7	22	BX92A
22,000	11.8	32	BX93B
47,000	12.2	22	BX94C
100,000	17.0	22	BX95D

(Polystyrene plus Value)

## CLOSE TOLERANCE POLYSTYRENE



A polystyrene film and tin/lead foil capacitor using extended techniques, resulting in low inherent inductance and low series resistance. This, combined with a low temperature coefficient, makes these capacitors suitable for use in professional and general purpose applications where precision, reliability, stability and low losses are of prime importance, e.g. in tuned circuits, filter networks, discriminators etc.

Tolerance: ±1%

Working voltage: 100pF to 510pF: 500V DC, 220V AC rms 50Hz  
 560pF to 8200pF: 125V DC, 63V AC rms 50Hz  
 10,000pF & 22,000pF : 63V DC

Insulation resistance: >10<sup>11</sup> Ω

Temperature coefficient: -150 ± 60ppm/°C

Power factor: <2 × 10<sup>-4</sup> at 1kHz

<5 × 10<sup>-4</sup> at 1MHz

The following values are available

Value (pF)	Case size		Order As
	L (max) (mm)	D (max) (mm)	
100	10.5	3.5	BX46A
150	10.5	3.5	BX47B
220	10.5	3.5	BX49D
270	10.5	3.5	BX50E
330	10.5	4	BX51F
390	10.5	4.5	BX52G
470	10.5	4.5	BX53H
560	10.5	3.5	BX54J
750	10.5	3.5	BX55K
1,000	10.5	3.5	BX56L
1,200	10.5	4	BX57M
1,500	10.5	4	BX58N
1,800	10.5	4.5	BX59P
2,200	10.5	5	BX60Q
2,700	10.5	5	BX61R
3,300	10.5	5.5	BX62S
3,900	10.5	6	BX63T
4,700	15	5.5	BX64U
5,600	15	5.5	BX65V
6,800	15	6	BX66W
8,200	15	6.5	BX85G
10,000	15	5.5	BX86T
22,000	15	7	BX87U

(1% Polysty plus Value)

## MYLAR FILM CAPACITORS

A general purpose capacitor supplementing the other film and foil capacitor ranges in this catalogue.

Tolerance: ±10%

Working voltage: 100V DC



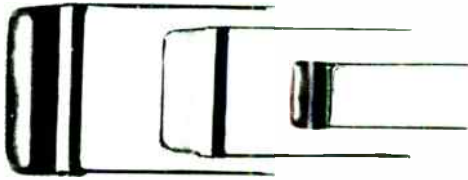
The following values are available:

Value (µF)	Case size				Order As
	H	W	T	P	
0.001	10	4.5	3	3.5	WW15R
0.0022	10	4.5	3	3.5	WW16S
0.0047	10	4.5	3	3.5	WW17T
0.01	10	4.5	3	3.5	WW18U
0.022	10	6	3.5	5	WW19V
0.047	10	8.5	4	6	WW20W
0.1	13	10	4.5	6	WW21X
0.22	18	12	5	8	WW83E

(Mylar plus Value)



**METALLISED POLYESTER FILM**  
**C280AE Series**



A polyester film capacitor manufactured by using extended foil techniques, resulting in low inherent inductance. Designed for use on printed circuit boards for coupling and decoupling applications.

Tolerance: 0.01  $\mu$ F to 0.22  $\mu$ F:  $\pm$  20%  
0.33  $\mu$ F to 2.2  $\mu$ F:  $\pm$  10%

Working voltage: 250V DC; 160V AC rms 50Hz

Insulation resistance: 0.01  $\mu$ F to 0.33  $\mu$ F:  $>$   $3 \times 10^{10} \Omega$

0.47  $\mu$ F to 2.2  $\mu$ F:  $>$   $10^{10} \Omega$

Temperature coefficient: 333ppm/ $^{\circ}$ C ave.

Power factor:  $<$   $150 \times 10^{-4}$  at 10kHz

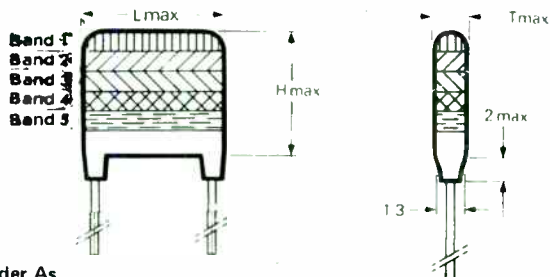
**The following values are available:**

Value ( $\mu$ F)	Case size			Colour code		
	L	T	H	Band 1	Band 2	Band 3
0.01	12.5	4	9	Brown	Black	Orange
0.015	12.5	4	9	Brown	Green	Orange
0.022	12.5	4	9	Red	Red	Orange
0.033	12.5	4	9	Orange	Orange	Orange
0.047	12.5	4	9	Yellow	Violet	Orange
0.068	12.5	5	10	Blue	Grey	Orange
0.1	12.5	6	11	Brown	Black	Yellow
0.15	17.5	6	11	Brown	Green	Yellow
0.22	17.5	7	12	Red	Red	Yellow
0.33	22.5	6.5	11.5	Orange	Orange	Yellow
0.47	22.5	7.5	12.5	Yellow	Violet	Yellow
0.68	22.5	9.5	14.5	Blue	Grey	Yellow
1	30	9.5	14.5	Brown	Black	Green
1.5	30	10	18	Brown	Green	Green
2.2	30	12.5	20.5	Red	Red	Green

Band 4: Black =  $\pm$  20%; White =  $\pm$  10%

Band 5: Red = 250V DC working; Yellow = 400V DC working

(please note that we do not normally supply the 400V type)



Order As	Value	Order As	Value
BX70M	(Polyester 0.01 $\mu$ F)	BX78K	(Polyester 0.22 $\mu$ F)
BX71N	(Polyester 0.015 $\mu$ F)	BX79L	(Polyester 0.33 $\mu$ F)
BX72P	(Polyester 0.022 $\mu$ F)	BX80B	(Polyester 0.47 $\mu$ F)
BX73Q	(Polyester 0.033 $\mu$ F)	BX81C	(Polyester 0.68 $\mu$ F)
BX74R	(Polyester 0.047 $\mu$ F)	BX82D	(Polyester 1 $\mu$ F)
BX75S	(Polyester 0.068 $\mu$ F)	BX83E	(Polyester 1.5 $\mu$ F)
BX76H	(Polyester 0.1 $\mu$ F)	BX84F	(Polyester 2.2 $\mu$ F)
BX77J	(Polyester 0.15 $\mu$ F)		

**POLYCARBONATE CAPACITORS**

A self-healing layer capacitor with polycarbonate dielectric. Designed specifically for use on printed circuit boards, they offer high values of capacitance in extremely small case sizes, and they have low inductance and low loss characteristics.

Tolerance: 0.001  $\mu$ F to 0.0082  $\mu$ F:  $\pm$  10%

0.01  $\mu$ F to 1  $\mu$ F:  $\pm$  5%

Working Voltage: 0.001  $\mu$ F to 0.22  $\mu$ F: 250V DC 100V AC rms 50Hz

0.27  $\mu$ F to 1  $\mu$ F: 100V DC, 63V AC rms 50Hz

Insulation resistance:

0.001  $\mu$ F to 0.22  $\mu$ F:  $>$   $7.5 \times 10^{10} M\Omega$  ave.

0.27  $\mu$ F and 0.33  $\mu$ F:  $>$   $3 \times 10^{10} M\Omega$  ave.

0.39  $\mu$ F:  $>$   $2.5 \times 10^{10} M\Omega$  ave.

0.47  $\mu$ F:  $>$   $2 \times 10^{10} M\Omega$  ave.

0.56  $\mu$ F:  $>$   $1.75 \times 10^{10} M\Omega$  ave.

0.68  $\mu$ F:  $>$   $1.4 \times 10^{10} M\Omega$  ave.

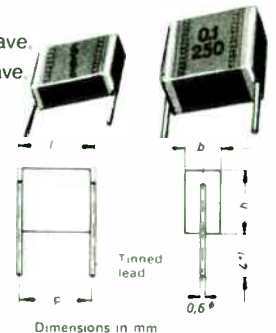
0.82  $\mu$ F:  $>$   $1.2 \times 10^{10} M\Omega$  ave.

1  $\mu$ F:  $>$   $10^{10} M\Omega$  ave.

Self-inductance: 20nH approx.

Power Factor:  $<$   $30 \times 10^{-4}$  at 1kHz

Temperature coefficient:  $\pm$  65ppm/ $^{\circ}$ C ave.



**The following values are available:**

Value ( $\mu$ F)	Case size			p max	Order As
	l max	b max	h max		
0.001	9	2.6	7.3	7.5	WW22Y
0.0015	9	2.6	7.3	7.5	WW23A
0.0022	9	2.5	7.3	7.5	WW24B
0.0033	9	2.3	7.3	7.5	WW25C
0.0047	9	2.3	7.3	7.5	WW26D
0.0068	9	2.7	7.3	7.5	WW27E
0.0082	9	2.3	7.3	7.5	WW28F
0.01	9	2.3	7.3	7.5	WW29G
0.012	9	2.5	7.3	7.5	WW30H
0.015	9	2.9	7.3	7.5	WW31J
0.018	9	2.3	7.3	7.5	WW32K
0.022	9	2.6	7.3	7.5	WW33L
0.027	9	2.4	7.3	7.5	WW34M
0.033	9	2.6	7.3	7.5	WW35Q
0.039	9	2.9	7.3	7.5	WW36P
0.047	9	3.2	7.3	7.5	WW37S
0.056	9	3.5	7.5	7.5	WW38R
0.068	9	3.5	9.1	7.5	WW39N
0.082	9	3.5	11	7.5	WW40T
0.1	9	3.9	11.5	7.5	WW41U
0.12	11.5	4.2	7.7	10	WW42V
0.15	11.5	4.2	9.6	10	WW43W
0.18	11.5	4.2	11.5	10	WW44X
0.22	11.5	4.9	11.5	10	WW45Y
0.27	9	5	11.5	7.5	WW46A
0.33	9	5.5	11.5	7.5	WW47B
0.39	9	6.6	11.5	7.5	WW48C
0.47	9	7.2	12.5	7.5	WW49D
0.56	9	8.4	12.5	7.5	WW50E
0.68	9	8	13	7.5	WW51F
0.82	11.5	8.3	11.5	10	WW52G
1	11.5	9.8	11.5	10	WW53H

(Carbonate plus Value)

## INTERFERENCE SUPPRESSION CAPACITORS



A metallised PETP film and impregnated paper dielectric moulded in yellow flame-retardant polypropylene. The capacitors are designed to suppress electrical interference from domestic appliances and should be connected directly across the mains.

Tolerance:	0.01 $\mu$ F to 0.22 $\mu$ F	$\pm 20\%$
	0.47 $\mu$ F	$\pm 10\%$
Working voltage:	0.01 $\mu$ F to 0.22 $\mu$ F	250V AC
	0.47 $\mu$ F	275V AC
Insulation resistance:	$> 15 \times 10^9 \Omega$	
Power factor:	$< 130 \times 10^{-4}$ at 10kHz	

The following values are available:

Value ( $\mu$ F)	Length (mm)	Height (mm)	Thickness (mm)
0.01	18	10.4	6.5
0.022	18	10.4	6.5
0.047	18	10.4	6.5
0.1	23.5	11.5	7.4
0.22	23.5	14.4	10.4
0.47	31.1	19.6	12.5

Order As	FF53H	(IS Cap 0.01 $\mu$ F)
	FF54J	(IS Cap 0.022 $\mu$ F)
	FF55K	(IS Cap 0.047 $\mu$ F)
	FF56L	(IS Cap 0.1 $\mu$ F)
	FF57M	(IS Cap 0.22 $\mu$ F)
	FF58N	(IS Cap 0.47 $\mu$ F)

## MIXED DIELECTRIC



A polyester film and paper dielectric moulded in polypropylene. The capacitors are suitable for mains operation. Non-inductive.

Tolerance:	$\pm 20\%$
Working voltage:	DC rating see table, 300V AC
Insulation resistance:	$> 5 \times 10^{10} \Omega$
Temperature coefficient:	$+600\text{ppm}/^\circ\text{C}$ ave.
Power factor	$< 70 \times 10^{-4}$ at 1kHz

The following values are available:

Value ( $\mu$ F)	Working voltage (DC)	Case size		Order As
		L	D	
0.001	1500	25.4	9.5	<b>BX22Y</b>
0.0047	1000	25.4	9.5	<b>BX42V</b>
0.01	1000	25.4	9.5	<b>BX43W</b>
0.022	1000	34.9	12.7	<b>BX44X</b>
0.047	1000	34.9	12.7	<b>BX45Y</b>
0.1	600	34.9	12.7	<b>BX67X</b>
0.1	1000	49.2	12.7	<b>BX68Y</b>
0.22	1000	49.2	15.9	<b>BX69A</b>
0.47	1000	49.2	22.2	<b>BX90X</b>
1.0	600	49.2	22.2	<b>BX91Y</b>

(Mix D plus Value plus Voltage)

## TANTALUM BEAD CAPACITORS

A range of resin-dipped solid tantalum bead capacitor featuring very high values of capacitance in an extremely small package.

Tolerance:	$\pm 20\%$
Reverse voltage must not exceed	0.5V (0.3V for 100 $\mu$ F 3V)
Leakage current:	0.02 $\mu$ A / $\mu$ FV or 1 $\mu$ A whichever is greater
Power factor:	$< 0.1$ except 100 $\mu$ F and 150 $\mu$ F which are $< 0.2$

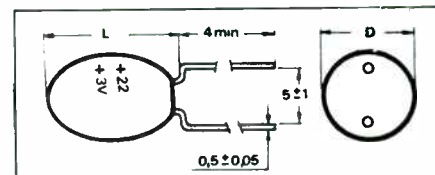
The following values are available:

Value ( $\mu$ F)	Working voltage (DC)	Case size		Order As
		L	D	
0.1	35	9	5	<b>WW54J</b>
0.15	35	9	5	<b>WW55K</b>
0.22	35	9	5	<b>WW56L</b>
0.33	35	9	5	<b>WW57M</b>
0.47	35	9	5	<b>WW58N</b>
0.68	35	9	5	<b>WW59P</b>
1.0	35	9	5	<b>WW60Q</b>
1.5	35	9	5.5	<b>WW61R</b>
2.2	35	10	5.5	<b>WW62S</b>
3.3	35	11	6	<b>WW63T</b>
4.7	16	10	5.5	<b>WW64U</b>
4.7	35	11	6	<b>WW65V</b>
6.8	16	11	6	<b>WW66W</b>
6.8	35	12	7	<b>WW67X</b>
10	16	11	6	<b>WW68Y</b>
10	25	12	7.5	<b>WW69A</b>
10	35	12	7.5	<b>WW70M</b>
15	25	12	7.5	<b>WW71N</b>
22	16	13	8	<b>WW72P</b>

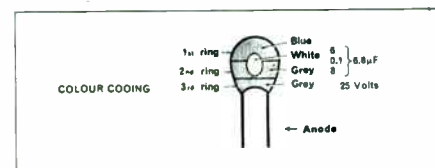


22	25	13	8	<b>WW73Q</b>
33	10	12	7.5	<b>WW74R</b>
47	10	13	8	<b>WW75S</b>
47	16	14	8.5	<b>WW76H</b>
68	6.3	13	8	<b>WW77J</b>
100	3	12	7.5	<b>WW78K</b>
100	10	17.5	9	<b>WW79L</b>

(Tant plus Value plus Voltage)



Some capacitors are still being supplied to us colour coded.



N.B. The above sketch shows the position of the coloured spot which serves both as multiplier and anode indicator.

Colour	Capacitance in $\mu$ F			Spot Polarity & Multiplier	Colour	Volts
	1st Ring	2nd Rng	3rd Ring D.C.			
Black	—	0		$\times 1.00$	White	3
Brown	1	1		$\times 10$	Yellow	6.3
Red	2	2			Black	10
Orange	3	3			Green	16
Yellow	4	4			Grey	25
Green	5	5			Pink	35
Blue	6	6				
Violet	7	7				
Grey	8	8		$\times 0.01$		
White	9	9		$\times 0.10$		



**AXIAL LEAD ELECTROLYTICS**



A range of miniature, general purpose aluminium electrolytic capacitors using high etch factor foils to enable wide operating temperatures and high capacitance to be achieved in a miniature can size.

Tolerance: -10+50%



Cap ( $\mu$ F)	Working voltage DC	Case size l (max.)	Case size d (max.)	Ripple current (max.) (mA) at 100Hz 50 C	Max leakage current ( $\mu$ A)	Power factor	Order As
0.47	250	17	6.3	16	33	0.2	<b>FB11M</b>
1	63	12.5	6.1	22	5	0.09	<b>FB12N</b>
1	500	21	13	27	115	0.2	<b>FB13P</b>
1.5	63	12.5	6.1	26	5	0.09	<b>FB14Q</b>
2.2	63	12.5	6.1	33	7	0.09	<b>FB15R</b>
2.2	500	21	13	42	133	0.2	<b>FB16S</b>
3.3	63	12.5	6.1	37	11	0.09	<b>FB17T</b>
4.7	63	12.5	6.1	48	15	0.09	<b>FB18U</b>
4.7	500	31	16	84	170	0.2	<b>FB19V</b>
6.8	40	12.5	4.8	50	14	0.12	<b>FB20W</b>
6.8	63	12.5	6.1	55	22	0.09	<b>FB21X</b>
10	25	12.5	4.8	50	13	0.15	<b>FB22Y</b>
10	63	20	6.7	97	7	0.09	<b>FB23A</b>
10	100	21	8.6	52	50	0.2	<b>FB24B</b>
10	500	41	16	131	250	0.2	<b>FB25C</b>
15	16	12.5	4.8	57	12	0.18	<b>FB26D</b>
15	40	12.5	6.1	81	30	0.12	<b>FB27E</b>
15	63	20	6.7	121	10	0.09	<b>FB28F</b>
22	10	12.5	4.8	57	11	0.26	<b>FB29G</b>
22	25	12.5	6.1	81	28	0.15	<b>FB30H</b>
22	63	20	8.3	176	13	0.09	<b>FB31J</b>
22	100	21	10	239	66	0.08	<b>FB32K</b>
22	500	41	22	259	430	0.2	<b>FB33L</b>
33	6.3	12.5	4.8	57	11	0.32	<b>FB34M</b>
33	16	12.5	6.1	97	27	0.18	<b>FB35Q</b>
33	40	20	6.7	159	12	0.11	<b>FB36P</b>
47	4	12.5	4.8	57	10	0.4	<b>FB37S</b>
47	10	12.5	6.1	97	24	0.26	<b>FB38R</b>
47	25	20	6.7	159	12	0.14	<b>FB39N</b>
47	40	20	8.3	232	16	0.11	<b>FB40T</b>
47	63	20	10.3	254	22	0.09	<b>FB41U</b>
47	100	27.2	13.7	351	161	0.1	<b>FB42V</b>
47	500	51	24.5	471	805	0.2	<b>FB43W</b>
68	6.3	12.5	6.1	97	22	0.32	<b>FB44X</b>
68	16	20	6.7	187	11	0.17	<b>FB45Y</b>
68	63	27.2	13.7	403	149	0.1	<b>FB46A</b>
100	4	12.5	6.1	97	20	0.4	<b>FB47B</b>
100	10	20	6.7	187	10	0.24	<b>FB48C</b>
100	25	20	8.3	232	19	0.14	<b>FB49D</b>
100	40	20	10.3	342	28	0.11	<b>FB50E</b>
100	63	27.2	13.7	507	42	0.1	<b>FB51F</b>
100	100	33.8	17	663	320	0.1	<b>FB52G</b>
100	250	41	22	623	780	0.2	<b>FB53H</b>

Cap ( $\mu$ F)	Working voltage DC	Case size l (max.)	Case size d (max.)	Ripple current (max.) (mA) at 100Hz 50°C	Max leakage current ( $\mu$ A)	power Factor	Order As
150	6.3	20	6.7	187	10	0.3	<b>FB54J</b>
150	16	20	8.3	276	19	0.17	<b>FB55K</b>
150	25	20	10.3	342	27	0.14	<b>FB56L</b>
150	40	27.2	13.7	598	200	0.1	<b>FB57M</b>
150	63	33.8	17	663	304	0.1	<b>FB58N</b>
220	4	20	6.7	187	9	0.38	<b>FB59P</b>
220	10	20	8.3	276	18	0.24	<b>FB60Q</b>
220	16	20	10.3	419	26	0.17	<b>FB61R</b>
220	25	26	10	809	165	0.17	<b>FB62S</b>
220	40	27.2	13.7	767	284	0.1	<b>FB63T</b>
220	63	33.8	17	897	436	0.1	<b>FB64U</b>
220	100	46.3	20	1170	680	0.1	<b>FB65V</b>
330	4	20	8.3	276	12	0.38	<b>FB66W</b>
330	10	20	10.3	419	24	0.24	<b>FB67X</b>
330	25	31	13	1012	248	0.17	<b>FB68Y</b>
330	63	33.8	20	1235	644	0.1	<b>FB69A</b>
470	6.3	20	10.3	419	22	0.3	<b>FB70M</b>
470	10	26	10	800	141	0.2	<b>FB71N</b>
470	16	26	13	1058	226	0.17	<b>FB72P</b>
470	25	33.8	13.7	1014	373	0.12	<b>FB73Q</b>
470	63	41	16	1420	596	0.1	<b>FB74R</b>
470	100	46.3	23.2	1690	1430	0.12	<b>FB75S</b>
680	6.3	27.2	13.7	689	129	0.25	<b>FB76H</b>
680	16	33.8	13.7	1040	347	0.15	<b>FB77J</b>
680	25	33.8	17	1300	530	0.12	<b>FB78K</b>
680	40	33.8	20	1690	836	0.1	<b>FB79L</b>
1000	6.3	26	13	1076	189	0.24	<b>FB80B</b>
1000	10	32	12.7	1251	300	0.2	<b>FB81C</b>
1000	16	33.8	17	1430	500	0.15	<b>FB82D</b>
1000	25	31	18	1748	750	0.17	<b>FB83E</b>
1000	63	46.3	23.2	2405	1910	0.12	<b>FB84F</b>
1500	6.3	33.8	13.7	1170	304	0.25	<b>FB85G</b>
1500	10	33.8	17	1495	470	0.18	<b>FB86T</b>
1500	16	39.8	17	1950	740	0.15	<b>FB87U</b>
2200	10	31	18	1748	660	0.2	<b>FB89W</b>
2200	25	46.3	20	2600	1670	0.15	<b>FB90X</b>
2200	40	46.3	23.2	3250	2660	0.12	<b>FB91Y</b>
2200	63	65.3	26.4	3900	4178	0.15	<b>FB92A</b>
3300	6.3	39.8	17	2119	644	0.25	<b>FB93B</b>
3300	25	46.3	23.2	3315	2495	0.15	<b>FB94C</b>
4700	10	39.8	20	2850	940	0.24	<b>FB95D</b>
4700	25	52.8	26.4	3900	3545	0.18	<b>FB96E</b>

(Axial plus Value)

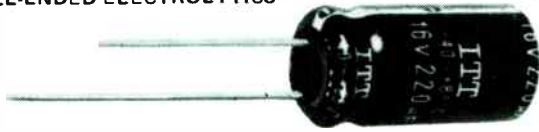
**CHOOSING AN ELECTROLYTIC TO SUIT YOUR NEEDS**

Since all electrolytic capacitors have a wide tolerance, one of the capacitors in the lists above will suffice in most cases where an electrolytic is specified. Choose the nearest value to the one specified, and the nearest voltage equal to or above the one specified, e.g. 50  $\mu$ F at 50V specified, nearest value 47  $\mu$ F; and 63V is the nearest voltage above. Thus a 47  $\mu$ F at 63V will perform exactly the same job as a 50  $\mu$ F at 50V, providing that its physical size is not too large.

# CAPACITORS



## SINGLE-ENDED ELECTROLYTICS



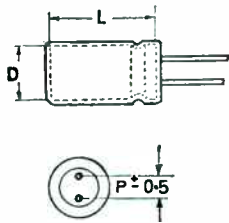
A range of small electrolytic capacitors designed for direct mounting on printed circuit boards.

Tolerance: 0.47  $\mu$ F to 4.7  $\mu$ F: -10+75%  
10  $\mu$ F to 1000  $\mu$ F: -10+50%

Leakage current:  $0.03 \times C \times V$   $\mu$ A where C is the capacitance in microfarads ( $\mu$ F) and V is the working voltage in volts.

### Case Sizes (mm)

Size	D	L	P
1	5	11	2
2	6	11	2.5
3	8	11	3.5
4	10	12	5
5	10	15	5
6	10	17	5
7	13	21	5
8	16	24	7.5
9	16	31	7.5



### The following values are available:

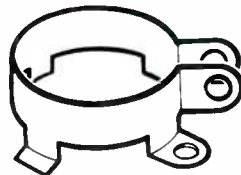
Value ( $\mu$ F)	Working voltage (DC)	Ripple current (mA) max at 100Hz 50°C	Power factor (max)	Case size	Order As
0.47	100	13	0.08	1	FF00A
1	100	22	0.08	1	FF01B
2.2	63	40	0.1	1	FF02C
4.7	63	70	0.1	2	FF03D
10	35	70	0.12	2	FF04E
10	63	90	0.1	3	FF05F
22	16	110	0.17	2	FF06G
22	63	160	0.1	4	FF07H
47	25	240	0.15	4	FF08J
47	63	320	0.1	5	FF09K
100	10	260	0.2	3	FF10L
100	25	400	0.15	5	FF11M
100	63	500	0.1	7	FF12N
220	16	640	0.17	6	FF13P
220	63	840	0.1	8	FF14Q
470	16	960	0.17	7	FF15R
470	25	1100	0.15	8	FF16S
470	63	1440	0.1	9	FF59P
1000	16	1400	0.17	8	FF17T
1000	25	1700	0.15	9	FF18U
2200	16	2000	0.19	9	FF60Q

(PC Elect plus Value plus Voltage)

## MOUNTING CLIPS FOR CAPACITORS

### Vertical

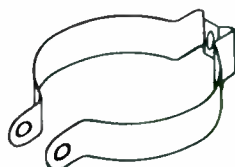
Dia. of cap (min.)	Fixing centres*	Order As
25.4	41.5	FF33L (Clip Can 25)
34.8	44.5	FF34M (Clip Can 35)
38.1	47.5	FF35Q (Clip Can 40)
50.5	65.0	FF36P (Clip Can 50)



\* Nominal with clip fully closed

### Horizontal

Dia. of cap. (min.)	Order As
25.4	FF37S (Horiz Clip 25)
34.8	FF38R (Horiz Clip 35)



## NON-POLARISED ELECTROLYTIC

A range of non-polarised electrolytic capacitors which are non-inductive throughout the entire audio range.

Tolerance: 20%

Insulation resistance:  $>30 \times 10^{10} \Omega$

Working voltage AC rms 50Hz: 50V

Leakage current (up to 15 $\mu$ F):  $0.06CV + 10 \mu$ A

(22 $\mu$ F to 47 $\mu$ F):  $0.04CV + 30 \mu$ A

(where V is the working voltage and C is the capacitance in  $\mu$ F).

Max current:  $0.0003142 \times f \times C$

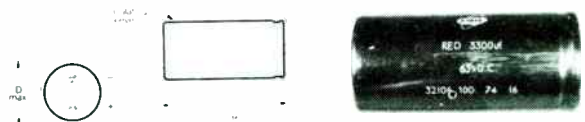
(where f is the frequency in Hz and C is the capacitance in  $\mu$ F).



### The following values are available:

Value ( $\mu$ F)	Case size (mm)		Order As
	L	D	
1.5	31.5	10	FB00A (Reversolytic 1.5 $\mu$ F)
2.2	31.5	13	FB01B (Reversolytic 2.2 $\mu$ F)
3.3	31.5	13	FB02C (Reversolytic 3.3 $\mu$ F)
4.7	36	13	FB03D (Reversolytic 4.7 $\mu$ F)
6.8	32	16	FB04E (Reversolytic 6.8 $\mu$ F)
8	41	16	FB05F (Reversolytic 8 $\mu$ F)
10	41	16	FB06G (Reversolytic 10 $\mu$ F)
15	41	16	FB07H (Reversolytic 15 $\mu$ F)
22	41	16	FB08J (Reversolytic 22 $\mu$ F)
33	41	16	FB09K (Reversolytic 33 $\mu$ F)
47	40	18	FB10L (Reversolytic 47 $\mu$ F)

## CAN-TYPE ELECTROLYTIC CAPACITORS



A range of general purpose can-type electrolytic capacitors employing high gain etched aluminium foil non-inductively wound with electrolytic tissue impregnated with long life electrolyte.

Tolerance - 10% - 50%

Cap ( $\mu$ F)	Working voltage (DC)	Case size (mm)		Ripple current (max) (A) at 100Hz 50°C	Max leakage current (mA)	Power factor (max)	Suitable mounting clip CLIP CAN
		L(max)	D(max)				
1000	100	53.5	36.5	4.0	2.0	0.1	35
1500	63	53.5	26.9	5.2	1.9	0.1	25
2200	40	53.5	22.5	4.3	1.8	0.15	-
2200	63	66	26.9	5.2	2.8	0.1	25
2200	100	82.5	41.5	6.5	4.4	0.1	40
3300	40	53.5	26.9	5.7	2.7	0.15	25
3300	63	78.5	36.5	8.6	4.2	0.1	35
4700	25	53.5	26.9	6.0	2.4	0.2	25
4700	40	53.5	36.5	7.3	3.8	0.15	35
4700	63	82.5	41.5	10.4	6.0	0.15	40
4700	100	78.5	52.5	7.0	9.4	0.2	50
6800	40	78.5	36.5	9.9	5.5	0.17	35
10,000	25	78.5	36.5	10.4	5.0	0.24	35
10,000	63	78.5	52.5	11.7	10.0	0.27	50

### Order As

FF19V (Can 1000 $\mu$ F 100V)	FF26D (Can 4700 $\mu$ F 25V)
FF20W (Can 1500 $\mu$ F 63V)	FF27E (Can 4700 $\mu$ F 40V)
FF21X (Can 2200 $\mu$ F 40V)	FF28F (Can 4700 $\mu$ F 63V)
FF22Y (Can 2200 $\mu$ F 63V)	FF29G (Can 4700 $\mu$ F 100V)
FF23A (Can 2200 $\mu$ F 100V)	FF30H (Can 6800 $\mu$ F 40V)
FF24B (Can 3300 $\mu$ F 40V)	FF31J (Can 10,000 $\mu$ F 25V)
FF25C (Can 3300 $\mu$ F 63V)	FF32K (Can 10,000 $\mu$ F 63V)



**MINIATURE FILM DIELECTRIC TRIMMERS**

A miniature trimmer sturdily constructed on a plastic frame. The dielectric is arranged so as to support the vanes giving a very high degree of stability. Adjustment is by means of a screwdriver slot on the upper face.

Working voltage: 100V DC  
 Insulation resistance: >10,000MΩ  
 Power factor: <10x10<sup>-4</sup> at 1MHz: <25x10<sup>-4</sup> at 100MHz

The following values are available:

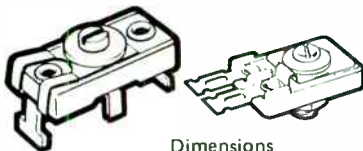
Max capacitance:	5.5pF	10pF	22pF	65pF
Capacitance swing:	1.4 to 5.5pF	2 to 10pF	2 to 22pF	5.5 to 65pF
Body colour:	Grey	Yellow	Green	Yellow
Temperature coefficient:	-750+300ppm/°C	-200+300ppm/°C	-350+250ppm/°C	-200+300ppm/°C
Height above board (max):	10	10	10	11
Max diameter:	8.8	8.8	8.8	11.5
Max dissipation:	0.35W	0.35W	0.35W	0.9W

Order As **WL68Y** (Trimmer 5.5pF)      **WL70M** (Trimmer 22pF)  
**WL69A** (Trimmer 10pF)                **WL72P** (Trimmer 65pF)



**COMPRESSION TYPE TRIMMERS**

Postage stamp type compression trimmer with a mica dielectric on a ceramic base. Screwdriver adjustment. Two types available.

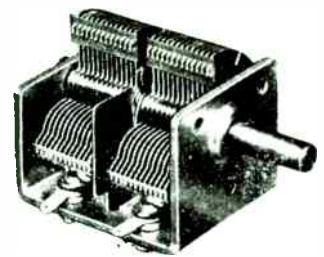


	Volts	Width	Depth	Height
3 to 40pF	250	21mm	10mm	6mm
100 to 500pF	350	24mm	16mm	5mm

Order As **WL71N** (Trimmer 40pF)      **WL73Q** (Trimmer 500pF)

**Type 0 2-Gang**

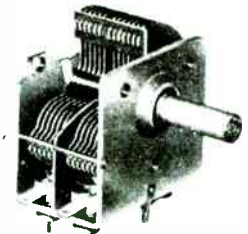
Length (excluding spindle) 43.25mm AM capacity 365 + 365pF.



Order As **FF40T** (DG Vari)

**Type 00**

Length (excluding spindle) 23.8mm. AM capacity (front section) 10 to 208pF, (rear section) 8.5 to 176pF. With screen and trimmers.



Order As **FF41U** (Twin 00)

**Jackson Type C804 Capacitors**

Air dielectric trimmer, SLC Law characteristics. Air gap 0.4mm 750V DC tested, air gap 1.15mm 1250V DC tested.

Front plate 23.8x31.75mm.

10pF	25pF	60pF	100pF
15pF	50pF	75pF	150pF

Order As

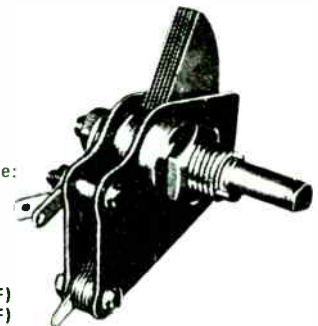
**FF42V** (Sw Trim 10pF)                      **FF46A** (Sw Trim 60pF)  
**FF43W** (Sw Trim 15pF)                      **FF47B** (Sw Trim 75pF)  
**FF44X** (Sw Trim 25pF)                      **FF48C** (Sw Trim 100pF)  
**FF45Y** (Sw Trim 50pF)                      **FF49D** (Sw Trim 150pF)



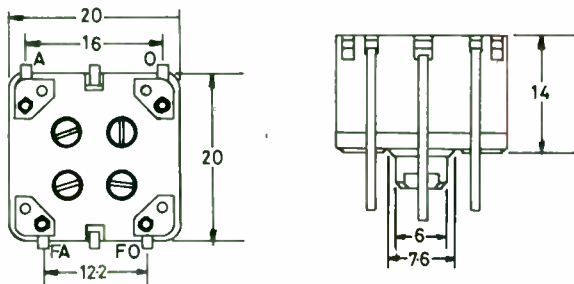
**Dilecon Capacitors**

Solid dielectric. Front area 44.5 x 46mm. The following values are available: 300pF, 500pF.

Order As **FF50E** (Dilecon 300pF)  
**FF51F** (Dilecon 500pF)



**MINIATURE TUNING CAPACITOR**



A miniature 4-gang tuning capacitor for AM/FM radios. The AM section is ideally suited to the ZN414 radio. The tuner is ideal for direct printed circuit mounting and is fully enclosed in a polystyrene case. Each gang has its own trimmer with a range of over 5pF.

AM gangs: 5pF (±1.5pF) to 126pF (±2pF +2%)  
 FM gangs: 4.5pF (±1.5pF) to 20pF (±1pF +1%)  
 Total rotation: 175° +3°  
 Max voltage: 100V  
 Insulation resistance: 100MΩ  
 Q of AM section: >500 at 10MHz, 50pF  
 Q of FM section: >150 at 100MHz, 10pF  
 Q of trimmers: >150 at 10MHz  
 Shaft to ground resistance: 10MΩ

Shaft is 6.3mm (¼in.) dia., 3.5mm long, drilled and tapped down the centre with an M2.5 thread.

Order As **FF52G** (Min Tuner)

**VARIABLE CAPACITORS**

All types with ¼in spindles.

**Jackson Type 0 Capacitors**

Mid-line O Law characteristics. Air gap 0.19mm, 500V DC tested. Front area (including vanes) 34.95x43.25mm. Cadmium plated steel frames. Aluminium vanes. Ceramic insulation. Silver plated wipers.

**Type 0 1-Gang**

Length (excluding spindle) 23.8mm AM capacity 365pF

Order As **FF39N** (Vari 0)

## How To Order Resistors

We stock ten different ranges of resistors and we have allocated each range a code letter as follows:

Type	Code Letter	Old Order Code
Carbon Film 1/3 W	M	Min Res
Carbon Film 1/2 W	S	Std Res
Carbon Film 1W	C	1W Res
Metal Oxide 1/2 W 2%	X	Oxide
Thick Film 1/2 W 1%	T	1% Res
3W Wirewound	W	W/W Min
7W Wirewound	L	7W W/W
10W Wirewound	H	10W W/W
25W Wirewound	P	25W W/W
High Voltage Resistor	V	HV Res

To order a particular resistor simply write the code letter followed by the value.

### Examples

To order	Write
Min Res 1.8Ω	M1.8Ω
Min Res 1k	M1k
Std Res 220k	S220k
Std Res 330Ω	S330Ω
W/W Min 0.22Ω	WO.22
10W W/W 0.47Ω	HO.47
HV Res 2M2	V2M2
Oxide 2k7	X2k7

## Carbon Film 1/3W



High stability. Low noise

Working voltage max.: 250V

Tolerance: 1Ω to 1MΩ ±5%  
1M2 to 10MΩ ±10%

Power rating: 1/3W at 70°C

Temperature coefficient: -250ppm/°C up to 10kΩ  
rising to -100ppm/°C at 10MΩ

Noise level: typically 0.5 μV/V

Dimensions of body: 8mm long, 2.8mm dia.

The following values (Ω) only are available:

1Ω	10Ω	100Ω	1k	10k	100k	1M	10M
1.2Ω	12Ω	120Ω	1k2	12k	120k	1M2	
1.5Ω	15Ω	150Ω	1k5	15k	150k	1M5	
1.8Ω	18Ω	180Ω	1k8	18k	180k	1M8	
2.2Ω	22Ω	220Ω	2k2	22k	220k	2M2	
2.7Ω	27Ω	270Ω	2k7	27k	270k	2M7	
3.3Ω	33Ω	330Ω	3k3	33k	330k	3M3	
3.9Ω	39Ω	390Ω	3k9	39k	390k	3M9	
4.7Ω	47Ω	470Ω	4k7	47k	470k	4M7	
5.6Ω	56Ω	560Ω	5k6	56k	560k	5M6	
6.8Ω	68Ω	680Ω	6k8	68k	680k	6M8	
8.2Ω	82Ω	820Ω	8k2	82k	820k	8M2	

Order As M plus Value (Min Res plus Value)

(e.g. M1.2Ω, M15Ω, M180Ω, M2k2, M27k, M330k, M3M9 etc.)

## Carbon Film 1/2W



High stability. Low noise

Working voltage: 500V max.

Tolerance: ±5%

Power rating: 1/2W at 70°C

Temperature coefficient: -180 to -500ppm/°C

Noise level: <0.5 μV/V

Dimensions of body: 10mm long, 3.8mm dia.

The following values (Ω) only are available

1Ω	10Ω	100Ω	1k	10k	100k	1M	10M
	11Ω	110Ω	1k1	11k	110k		
1.2Ω	12Ω	120Ω	1k2	12k	120k	1M2	
	13Ω	130Ω	1k3	13k	130k		
1.5Ω	15Ω	150Ω	1k5	15k	150k	1M5	
	16Ω	160Ω	1k6	16k	160k		
1.8Ω	18Ω	180Ω	1k8	18k	180k	1M8	
	20Ω	200Ω	2k	20k	200k		
2.2Ω	22Ω	220Ω	2k2	22k	220k	2M2	
	24Ω	240Ω	2k4	24k	240k		
2.7Ω	27Ω	270Ω	2k7	27k	270k	2M7	
	30Ω	300Ω	3k	30k	300k		
3.3Ω	33Ω	330Ω	3k3	33k	330k	3M3	
	36Ω	360Ω	3k6	36k	360k		
3.9Ω	39Ω	390Ω	3k9	39k	390k	3M9	
	43Ω	430Ω	4k3	43k	430k		
4.7Ω	47Ω	470Ω	4k7	47k	470k	4M7	
	51Ω	510Ω	5k1	51k	510k		
5.6Ω	56Ω	560Ω	5k6	56k	560k	5M6	
	62Ω	620Ω	6k2	62k	620k		
6.8Ω	68Ω	680Ω	6k8	68k	680k	6M8	
	75Ω	750Ω	7k5	75k	750k		
8.2Ω	82Ω	820Ω	8k2	82k	820k	8M2	
	91Ω	910Ω	9k1	91k	910k		

Order As S plus Value (Std Res plus Value)

(e.g. S1Ω, S1.5Ω, S18Ω, S220Ω, S2k7, S33k, S390k, S4M7 etc.)

## Carbon Film 1W



High stability. Low noise

Working voltage: 750V max.

Tolerance: ±5%

Power rating: 1W at 40°C

Temperature coefficient: -180 to -500ppm/°C

Noise level: <0.5 μV/V

Dimensions of body: 16mm long, 6.8mm dia.

The following values (Ω) only are available.

10Ω	100Ω	1k	10k	100k	1M	10M
12Ω	120Ω	1k2	12k	120k	1M2	
15Ω	150Ω	1k5	15k	150k	1M5	
18Ω	180Ω	1k8	18k	180k	1M8	
22Ω	220Ω	2k2	22k	220k	2M2	
27Ω	270Ω	2k7	27k	270k	2M7	
33Ω	330Ω	3k3	33k	330k	3M3	
39Ω	390Ω	3k9	39k	390k	3M9	
47Ω	470Ω	4k7	47k	470k	4M7	
56Ω	560Ω	5k6	56k	560k	5M6	
68Ω	680Ω	6k8	68k	680k	6M8	
82Ω	820Ω	8k2	82k	820k	8M2	

Order As C plus Value (1W Res plus Value)

(e.g. C22Ω, C270Ω, C3k3, C39k, C470k, C5M6 etc.)



**Metal Oxide ½W 2%**



Very high stability. Low noise  
 Working voltage: 350V max.  
 Tolerance: ±2%  
 Power rating: ½W at 70°C  
 Temperature coefficient: -100ppm/°C (typically 60ppm/°C)  
 Noise level: · 0.25 μV/V up to 100kΩ  
 · 0.5 μV/V over 100kΩ  
 Dimensions of body: 10mm long, 3.8mm dia.

**The following values (Ω) only are available**

10	100	1k	10k	100k	1M
11	110	1k1	11k	110k	
12	120	1k2	12k	120k	
13	130	1k3	13k	130k	
15	150	1k5	15k	150k	
16	160	1k6	16k	160k	
18	180	1k8	18k	180k	
20	200	2k	20k	200k	
22	220	2k2	22k	220k	
24	240	2k4	24k	240k	
27	270	2k7	27k	270k	
30	300	3k	30k	300k	
33	330	3k3	33k	330k	
36	360	3k6	36k	360k	
39	390	3k9	39k	390k	
43	430	4k3	43k	430k	
47	470	4k7	47k	470k	
51	510	5k1	51k	510k	
56	560	5k6	56k	560k	
62	620	6k2	62k	620k	
68	680	6k8	68k	680k	
75	750	7k5	75k	750k	
82	820	8k2	82k	820k	
91	910	9k1	91k	910k	

**Order As X plus Value (Oxide plus Value)**  
 (e.g. X27Ω, X330Ω, X3k9, X47k, X560k, X1M etc.)

**Thick Film ½W 1%**



High precision. Close tolerance. Very high stability. Very low noise.  
 Working voltage: 200V max  
 Tolerance: ±1%  
 Power rating: ½W at 70°C  
 Temperature coefficient: <100ppm/°C  
 Noise level: 0.1μV/V  
 Dimensions of body: 6.7mm long x 2.5mm dia.

**The following values (Ω) only are available:**

1Ω	10Ω	100	1k	10k	100k	1M
		110	1k1	11k	110k	
	12Ω	120	1k2	12k	120k	
		130	1k3	13k	130k	
	15Ω	150	1k5	15k	150k	
		160	1k6	16k	160k	
	18Ω	180	1k8	18k	180k	
	20	200	2k	20k	200k	
2.2Ω	22	220	2k2	22k	220k	
	24	240	2k4	24k	240k	
	27	270	2k7	27k	270k	
	30	300	3k	30k	300k	
	33	330	3k3	33k	330k	
	39Ω	390Ω	3k9	39k	390k	
	36	360	3k6	36k	360k	
	43	430	4k3	43k	430k	
4.7Ω	47	470	4k7	47k	470k	
	51	510	5k1	51k		
	56	560	5k6	56k		
	62	620	6k2	62k		
	68	680	6k8	68k		
	75	750	7k5	75k		
	82	820	8k2	82k		
	91	910	9k1	91k		

**Order As T plus Value (1% Res plus Value)**  
 (e.g. T2.2Ω, T33Ω, T390Ω, T4k7, T56k, T100k, T1M etc.)

**RESISTOR COLOUR CODES**

All our resistors except wirewound have coloured bands on them indicating their resistance value and tolerance.



The first band on the body of the resistor indicates the first figure of the value, the second band indicates the second figure of the value. The third band indicates the amount by which the first two numbers must be multiplied. (Except for Gold and Silver, it may be easier to remember that Band 3 may be read in the same way as Band 1 and 2 (i.e. that Red = 2, Orange = 3, etc. (Black means no zeros), except that in this case it indicates the number of zeros which follow the first two numbers). The fourth band indicates the tolerance.

Colour	Band 1 1st Figure	Band 2 2nd Figure	Band 3 Multiplier	Band 4 Tolerance
Black	0	0	x 1	
Brown	1	1	x 10	1%
Red	2	2	x 100	2%
Orange	3	3	x 1,000	
Yellow	4	4	x 10,000	
Green	5	5	x 100,000	
Blue	6	6	x 1,000,000	
Violet	7	7		
Grey	8	8		
White	9	9		
Gold			x 0.1	5%
Silver			x 0.01	10%

**Examples**

Band 1	Band 2	Band 3	Band 4	
Brown	Black	Black	Gold	= 10 x 1 = 10 ohms at 5%
Red	Violet	Gold	Gold	= 27 x 0.1 = 2.7 ohms at 5%
Green	Blue	Yellow	Red	= 56 x 10,000 = 560k ohms at 2%
Grey	Red	Green	Silver	= 82 x 100,000 = 8.2M ohms at 10%

**RESISTOR COLOUR CODE DISC CALCULATOR**

Simply set the three colours on the calculator in the same sequence as on the resistor and read off the value.



**Order As XL05F (Colour Wheel)**

## HIGH POWER RESISTORS

### 3 WATT

Type	4.7Ω and less Wirewound	10Ω and over Metal film
Tolerance	±5%	±5%
Power rating at 70°C	2.5W	2.5W
Power rating at 25°C	3W	3W
Temperature coefficient	±299ppm/°C	±500ppm/°C
Dimensions of body (length x dia.) mm	10.5 x 5.2	16.7 x 5.2

The following values (Ω) only are available:

1Ω	10Ω	100Ω	1k	10k
	15Ω	150Ω	1k5	15k
0.22Ω	2.2Ω	22Ω	220Ω	2k2
0.27Ω				
0.33Ω		33Ω	330Ω	3k3
0.47Ω	4.7Ω	47Ω	470Ω	4k7
		68Ω	680Ω	6k8

Order As W plus Value (W/W Min plus Value)  
(e.g. W0.22, W1Ω, W15Ω, W330Ω, W6k8, W10k etc.)



### 7 WATT WIREWOUND

Tolerance:	±5%
Power rating at 70°C:	6W
Power rating at 25°C:	7W
Temperature coefficient:	±200ppm/°C
Dimensions of body:	19mm long x 7.4mm dia.

The following values (Ω) only are available:

1Ω	10Ω	100Ω	1k
	15Ω		
2.2Ω	22Ω	220Ω	2k2
3.3Ω			
0.47Ω	4.7Ω	47Ω	470Ω
			4k7

Order As L plus Value (7W W/W plus Value)  
(e.g. L0.47, L3.3Ω, L22Ω, L100Ω, L4k7 etc.)



### 10WATT WIREWOUND

Tolerance:	±5%
Power rating at 70°C:	9W
Power rating at 25°C:	10W
Temperature coefficient:	±200ppm/°C
Dimensions of body:	34mm long x 7.4mm dia.

The following values (Ω) only are available:

1Ω	10Ω	100Ω	1k
	15Ω		
2.2Ω	22Ω	220Ω	2k2
3.3Ω			
0.47Ω	4.7Ω	47Ω	470Ω
			4k7

Order As H plus Value (10W W/W plus Value)  
(e.g. H0.47, H2.2Ω, H15Ω, H470Ω, H2k2 etc.)



### 25 WATT WIREWOUND

Tolerance:	±5%
Power rating at 70°C:	25W
Power rating without heatsink:	12.5W
Minimum heatsink for 25W at 25°C:	4.5°C/W
Working voltage (max):	550V AC/DC
Temperature coefficient:	0.47Ω: 90ppm/°C 1Ω to 47Ω: 50ppm/°C 100Ω: 25ppm/°C

Dimensions:	Length: 28mm
	Width: 28mm
	Height: 14.5mm
	Fixing centres: 18.3 x 19.8 mm x 6BA (M3) (2 holes)

The following values (Ω) only are available

1Ω	10Ω	100Ω
2.2Ω		
3.9Ω		
0.47Ω	4.7Ω	47Ω
	8.2Ω	

(3.9Ω and 8.2Ω are stocked for use as load resistors to replace loudspeakers in 4Ω and 8Ω systems. They may be built up in series/parallel networks to suit any power system.)

Order As P plus Value (25W W/W plus Value)  
(e.g. P0.47, P8.2Ω, P10Ω, P100Ω etc.)



## HIGH VOLTAGE RESISTOR



High stability, low noise  
Working voltage 1M to 33M: 2500V AC, 3500VDC  
47M: 7000V AC, 10,000V DC

Tolerance: ±5%  
Power rating 1M to 33M: ¼W at 70°C  
47M: 1W at 70°C  
Temperature coefficient: ±200ppm/°C  
Noise level: <0.5µV/V

Dimensions of body  
1M to 33M: 10mm long x 3.7mm dia.  
47M: 18mm long x 6.8mm dia.

The following values (Ω) only are available:

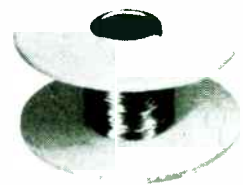
1M	10M
	15M
2M2	22M
	33M
4M7	47M

Order As V plus Value (HV Res plus Value)  
(e.g. V1M, V4M7, V10M, V47M etc.)

## RESISTANCE WIRE

A 2oz reel of 28swg Constantan (55-60% copper, 45-40% nickel) wire suitable for making rheostats etc. Can be used as a thermocouple when twisted with copper wire. A temperature difference between the wires of approx. 25°C gives around 1mV with temperatures in the range 0°C to 50°C.

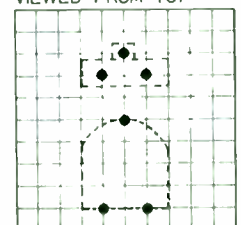
Resistance: 4.2Ω per metre.



Order As BL64U (Constantan 28 swg)

## SUB-MINIATURE CARBON PRESETS

VIEWS FROM TOP



0.1inch matrix

Sub-miniature horizontal and vertical mounting, linear carbon track, preset controls. Power rating: 0.1W. Tolerance: ±20%

The presets are either marked with their value or colour coded as follows:

Values available	Colour code if applicable			For horizontal types	For vertical types
	L.H. Tag	Centre	R.H. Tag		
100Ω	Brown	Black	Brown	Order As WR52G	Order As WR65V
220Ω	Red	Red	Brown	WR53H	WR66W
470Ω	Yellow	Violet	Brown	WR54J	WR67X
1k	Brown	Black	Red	WR55K	WR68Y
2k2	Red	Red	Red	WR56L	WR69A
4k7	Yellow	Violet	Red	WR57M	WR70M
10k	Brown	Black	Orange	WR58N	WR71N
22k	Red	Red	Orange	WR59P	WR72P
47k	Yellow	Violet	Orange	WR60Q	WR73Q
100k	Brown	Black	Yellow	WR61R	WR74R
220k	Red	Red	Yellow	WR62S	WR75S
470k	Yellow	Violet	Yellow	WR63T	WR76H
1M	Brown	Black	Green	WR64U	WR77J

(Hor or Vert S-Min Preset plus Value)



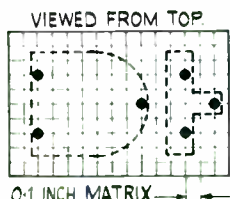
## EDGE PRESET

A fully enclosed, vertical mounting carbon film preset with thumb-wheel operation. 0.25W at 40°C. Tolerance  $\pm 20\%$ . Max. voltage 250V DC. Temperature coefficient 400ppm/°C. Available only: 100  $\Omega$ .



Order As **WR28F** (Edge Preset)

## SKELETON PRESETS



Open-type presets with linear carbon tracks rated 0.25W at 40°C. Tolerance  $\pm 20\%$  up to 220k;  $\pm 30\%$  over 220k. Max. voltage 300V DC. Non-insulated slider operated by screwdriver from either side. Available in the following values

	For horizontal types	For vertical types
100 $\Omega$	Order As <b>WR78K</b>	Order As <b>WW00A</b>
220 $\Omega$	Order As <b>WR79L</b>	Order As <b>WW01B</b>
470 $\Omega$	Order As <b>WR80B</b>	Order As <b>WW02C</b>
1k	Order As <b>WR81C</b>	Order As <b>WW03D</b>
2k2	Order As <b>WR82D</b>	Order As <b>WW04E</b>
4k7	Order As <b>WR83E</b>	Order As <b>WW05F</b>
10k	Order As <b>WR84F</b>	Order As <b>WW06G</b>
22k	Order As <b>WR85G</b>	Order As <b>WW07H</b>
47k	Order As <b>WR86T</b>	Order As <b>WW08J</b>
100k	Order As <b>WR87U</b>	Order As <b>WW09K</b>
220k	Order As <b>WR88V</b>	Order As <b>WW10L</b>
470k	Order As <b>WR89W</b>	Order As <b>WW11M</b>
1M	Order As <b>WR90X</b>	Order As <b>WW12N</b>
2M2	Order As <b>WR91Y</b>	Order As <b>WW13P</b>
4M7	Order As <b>WR92A</b>	Order As <b>WW14Q</b>

(Vert or Horiz Skeleton plus Value)

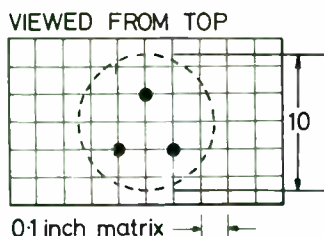
## JAPANESE VOLUME CONTROL

A miniature 5k only volume control with switch, spindle nut and washer as used in Japanese radios. Dia. 17mm.



Order As **FX41U** (Japanese V/C)

## CERMET PRESET



A miniature horizontal mounting cermet preset featuring high stability and excellent resolution. It has an integral dust cover, fits 0.1in matrix directly, and may be adjusted by a screwdriver from either side.

Linear track only

Tolerance:  $\pm 20\%$

Power rating: 0.5W at 50°C

The following values are available:

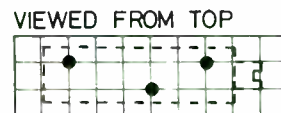
100  $\Omega$ , 500  $\Omega$ , 1k, 5k, 10k, 50k, 100k, 1M

100 $\Omega$	Order As <b>WR38R</b>	10k	Order As <b>WR42V</b>
500 $\Omega$	Order As <b>WR39N</b>	50k	Order As <b>WR43W</b>
1k	Order As <b>WR40T</b>	100k	Order As <b>WR44X</b>
5k	Order As <b>WR41U</b>	1M	Order As <b>WR45Y</b>

(Cermet plus Value)

## 15-TURN CERMET PRESET

A 15-turn Cermet preset with slipping clutch, end stops and infinite electrical resolution. 0.75W at 25°C (0.33W at 70°C). Max. working voltage 200V.



Values available:

500  $\Omega$ , 1k, 5k, 10k, 50k, 100k

The dust-proof and immersion-proof case measures 19mm  $\times$  4.8mm  $\times$  6.4mm high and the terminal pins are at 7.62mm (0.3in) and 5.08mm (0.2in) spacing, the centre pin being offset by 2.54mm (0.1in).

500 $\Omega$	Order As <b>WR46A</b>	10k	Order As <b>WR49D</b>
1k	Order As <b>WR47B</b>	50k	Order As <b>WR50E</b>
5k	Order As <b>WR48C</b>	100k	Order As <b>WR51F</b>

(15-Turn Cermet plus Value)

## EDGE CONTROLS

### Potentiometer

A 5k log pot suitable for use with most transistor radios. Dimensions: 20 x 16.5mm. Depth (including knob): 11mm excl. pins, 15mm incl. pins. Has integral single pole on/off switch.

Order As **BW06G** (Edge Control Pot)

### Knobs for Edge Control

Two different style knobs are available to suit edge control pot.

Style 1 (small):

24mm dia. x 2mm thick.

Style 2 (large):

31mm dia x 5.5mm thick.

Both styles are available in grey and black.



Order As <b>BW07H</b>	(Edge Knob Small Black)
Order As <b>BW08J</b>	(Edge Knob Small Grey)
Order As <b>BW09K</b>	(Edge Knob Large Black)
Order As <b>BW10L</b>	(Edge Knob Large Grey)

## LOUDSPEAKER VOLUME CONTROL

Unenclosed wirewound controls with 9.5mm ( $\frac{3}{8}$  in.) bush and standard 6.3mm ( $\frac{1}{4}$  in) shaft 6.3mm long, ideal for use as loudspeaker volume control.

Available in four values:

20 $\Omega$ , 50 $\Omega$ , 100 $\Omega$ , 200 $\Omega$ .

Order As <b>FX40T</b>	(L/S Control 20 $\Omega$ )
Order As <b>FX97F</b>	(L/S Control 50 $\Omega$ )
Order As <b>FX98G</b>	(L/S Control 100 $\Omega$ )
Order As <b>FX99H</b>	(L/S Control 200 $\Omega$ )



## ROTARY POTENTIOMETERS



### SINGLE GANG TYPES

Rotary miniature carbon track. Tolerance  $\pm 20\%$  Power rating: Lin  $\frac{1}{2}$ W; Log  $\frac{1}{4}$ W;  $\frac{1}{4}$ in spindle. Linear without switch available in the following values:

	For lin types	For log types		For lin types	For log types
	Order As	Order As		Order As	Order As
1k	<b>FW00A</b>		100k	<b>FW05F</b>	<b>FW25C</b>
4k7	<b>FW01B</b>	<b>FW21X</b>	220k	<b>FW06G</b>	<b>FW26D</b>
10k	<b>FW02C</b>	<b>FW22Y</b>	470k	<b>FW07H</b>	<b>FW27E</b>
22k	<b>FW03D</b>	<b>FW23A</b>	1M	<b>FW08J</b>	<b>FW28F</b>
47k	<b>FW04E</b>	<b>FW24B</b>	2M2	<b>FW09K</b>	<b>FW29G</b>

(Pot Lin or Pot Log plus Value)

## SWITCHED TYPES

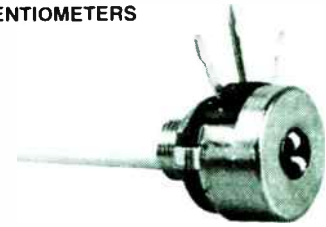
Any single gang type except 1k lin, available with double pole switch 250V 2A.



	For lin types	For log types		For lin types	For log types
	Order As	Order As		Order As	Order As
4k7	FW41U	FW62S	220k	FW46A	FW67X
10k	FW42V	FW63T	470k	FW47B	FW68Y
22k	FW43W	FW64U	1M	FW48C	FW69A
47k	FW44X	FW65V	2M2	FW49D	FW70M
100k	FW45Y	FW66W			

(Sw Pot Lin or Sw Pot Log plus Value)

## WIREWOUND POTENTIOMETERS

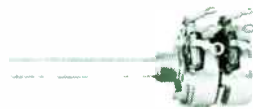


Power rating:	10Ω to 10k	25k and 50k
Tolerance:	3W at 40°C	1W at 20°C
Dimensions of body (dia x depth)	±10%	±10%
	20 x 12mm	23 x 18mm

Standard 1/8in. spindle. Linear track.

## DUAL-GANG TYPES

Dual Gang (Stereo) without switch available in the following values.



	For lin types	For log types		For lin types	For log types
	Order As	Order As		Order As	Order As
4k7	FW84F	FX08J	220k	FW89W	FX13P
10k	FW85G	FX09K	470k	FW90X	FX14Q
22k	FW86T	FX10L	1M	FW91Y	FX15R
47k	FW87U	FX11M	2M2	FW92A	FX16S
100k	FW88V	FX12N			

(Dual Pot Lin or Dual Pot Log plus Value)

10Ω	Order As FW50E	1k	Order As FW93B
20Ω	Order As FW51F	2k	Order As FW96E
50Ω	Order As FW52G	5k	Order As FW94C
100Ω	Order As FW71N	10k	Order As FW95D
200Ω	Order As FW72P	25k	Order As FX17T
500Ω	Order As FW73Q	50k	Order As FX18U

(W/W Pot plus Value)

## SLIDE CONTROL BEZEL

A self-adhesive aluminium bezel to suit our SLIDE POTS and DUAL SLIDES. Semi-matt anodized finish, with black scale on each side of the cutout.



Bezel W 30 H 110  
Cutout W 3 H 65

Order As FX07H (Slide Bezel)

## SLIDE POTENTIOMETERS

A range of carbon track slide potentiometers in metal case which may be used as a screen. Single and double track versions available in lin and log, in the following values: 1k, 5k, 10k, 25k, 50k, 100k, 250k, 500k.

These potentiometers are supplied without knobs. A range of suitable knobs is shown on page 79

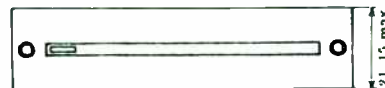
These potentiometers are tapped to accept M3 screws (see page 49 max. depth in potentiometer 3mm. For example if fitting to an 18swg panel a 6mm M3 countersunk screw and 1/8in 6BA spacer would give the correct distances so that the knob fits close to the panel. The use of a countersunk screw enables the screwhead to be covered by our SLIDE BEZEL shown below.

Mechanical travel	: 60mm nominal.	Power rating at 40°C lin	: 0.5W
Electrical travel	: 55mm.	log	: 0.25W
Terminals	: Solder lugs.	(Derate by 50% at 70°C) Voltage rating	(providing power rating is not exceeded)
Operating force	: 2 to 6oz.	lin	: 500V DC max.
Tolerance	: ±20%	log	: 350V DC max.

Linear types are marked: "A"

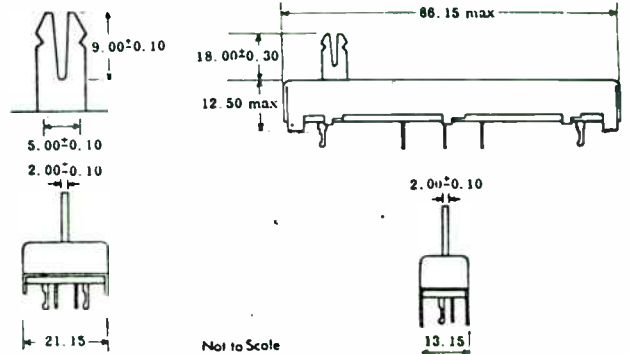
Log types are marked: "B"

Track matching (on dual-gang types): 2dB

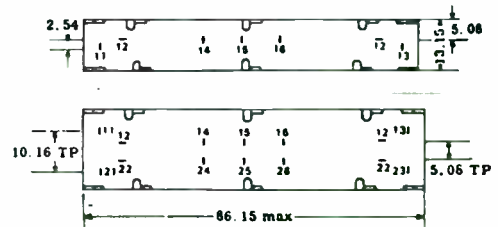
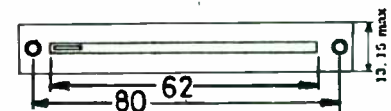


For single-gang		For dual-gang	
Lin types	Log types	Lin types	Log types
Order As	Order As	Order As	Order As
1k	FX31J	FX52G	FX52G
5k	FX32K	FX53H	FX53H
10k	FX33L	FX54J	FX54J
25k	FX34M	FX55K	FX55K
50k	FX35Q	FX56L	FX56L
100k	FX36P	FX57M	FX57M
250k	FX37S	FX58N	FX58N
500k	FX38R	FX59P	FX59P
		FX75S	HB00A
		FX76H	HB01B
		FX77J	HB02C
		FX78K	HB03D
		FX79L	HB04E
		FX80B	HB05F
		FX81C	HB06G
		FX82D	HB07H

(Slide Pot Lin or Log plus Value or Dual Slide Lin or Log plus Value)



Not to Scale



## Dual-Gang 10k Log Slider

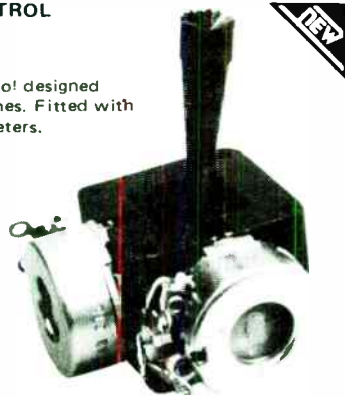
A slide pot in the same size as the standard types, but is guaranteed to go to zero ohms at the end of the track. Stocked primarily for use in our Audio Mixer where this is important.

Order As HQ37S (Mixer Slide Log 10k)



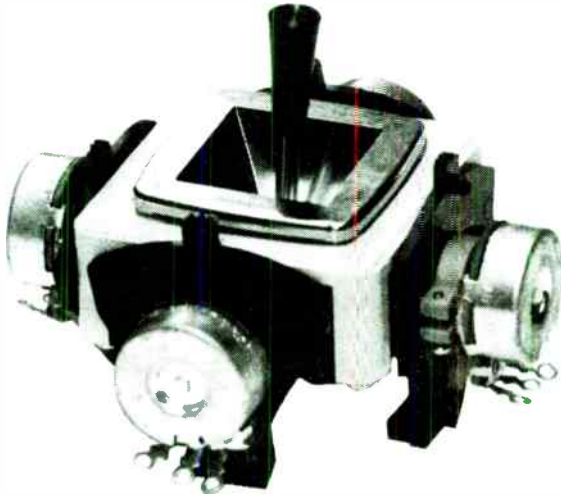
## TWO-AXIS JOYSTICK CONTROL

A good quality joystick control designed specially for use with TV games. Fitted with two 100kΩ linear potentiometers.



Order As HQ50E (2-Axis Joystick)

## FOUR-AXIS JOYSTICK CONTROL



A four axis joystick potentiometer with four 100k linear carbon potentiometers fitted. Lightweight action. Stick will only move potentiometers through 60° (around 20% of total track), but this can be any part of the track. Final adjustments can be carried out after mounting, with the fine trim controls which protrude through the fascia.

The joystick is finished with a smart chrome bezel and chrome stick with black knob. Overall size (excl. stick) 93 x 93 x 50mm high.

Order As XB09K (Joystick Pot)

## FOUR-AXIS JOYSTICK MOUNTING PLATE

A fully punched aluminium plate for mounting our joystick pot. Finished in semi-matt black. Plate was originally designed for use with our 4600 synthesiser and for that reason has two additional holes; these, however, could be blanked off.

Overall size: 124 x 110mm. Fixing holes: 111 x 97.5mm x 6BA clear.

Order As XB06G (Joystick Mtg Plate)

## THERMISTORS

A range of negative temperature coefficient thermistors. The resistance  $R_{T_1}$  (Ω) of a thermistor at a temperature  $T_1$  (°K) can be found by inserting the resistance  $R_{T_2}$  (Ω) at a given temperature  $T_2$  (°K) in the following equation:

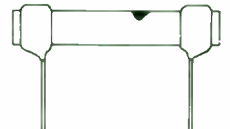
$$R_{T_1} = R_{T_2} e^{\left(\frac{B}{T_1} - \frac{B}{T_2}\right)} \text{ or } \log_{10} R_{T_1} = \log_{10} R_{T_2} + B \left(\frac{T_2 - T_1}{T_1 \cdot T_2}\right) \log_{10} e$$

where B is the characteristic temperature for any given thermistor in °K and e is the exponential factor (=2.7183). (°K = °C + 273).

## ROD THERMISTORS

Rod type thermistors for general purpose applications, including temperature measurement and circuit compensation.

Length: 12mm (max.)  
 Diameter: 3.7mm (max.)  
 Power (max.): 0.6W  
 Dissipation Factor: 5.5mW/°C  
 Max operating temperature: 150°C



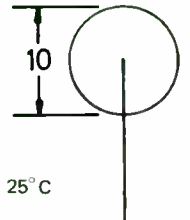
Type	R at 25°C (±20%)	B(°K)	R at 150°C (approx)	Colour Code
VA1066S	4,700Ω	3250	200Ω	Orange
VA1055S	15,000Ω	3550	440Ω	Green
VA1056S	47,000Ω	3925	940Ω	Blue
VA1067S	150,000Ω	4075	2500Ω	White

Order As FX21X (Thermistor VA 1055S)  
 FX22Y (Thermistor VA 1056S)  
 FX42V (Thermistor VA 1066S)  
 FX43W (Thermistor VA 1067S)

## DISC THERMISTORS

Disc type lacquer coated thermistors suitable for use in temperature measurement, control and compensation applications.

Diameter: 10mm (max)  
 Thickness: 4mm (max)  
 Power (max): 1W at Tamb = 25°C  
 Dissipation factor: 10mW/°C  
 Max operating temperature: 125°C



Type	R at 25°C (±20%)	B(°K)	R at 125°C (approx)	Equivalent
KR047CW	4.7	2700	0.5	VA1033
KR068CW	6.8	2800	0.7	VA1074
KR100CW	10	2900	1.1	VA1110
KR150CW	15	3000	1.3	VA1100
KR330CW	33	3200	2.3	VA1077
KR470CW	47	3300	3.5	VA1034
KR151CW	150	3550	7.5	VA1040
KR471CW	470	3850	20	VA1039
KR152CW	1500	4100	48	VA1038

Order As FX63T (Thermistor KR047CW) FX84F (Thermistor KR470CW)  
 FX64U (Thermistor KR068CW) FX85G (Thermistor KR151CW)  
 FX65V (Thermistor KR100CW) FX86T (Thermistor KR471CW)  
 FX66W (Thermistor KR150CW) FX87U (Thermistor KR152CW)

## BEAD THERMISTORS

Type F23



Directly heated bead type thermistor, embedded in the tip of a glass probe, suitable for temperature measurement, control and compensation. Care should be taken to ensure that the indicating circuit current is kept low in order that it does not itself cause heating of the thermistor and thus cause a false result.

Length: 76.2 ± 3.2mm  
 Diameter: 4mm (approx)  
 Power (max.): 100mW to 200mW (depending on external medium)  
 Power sensitivity: 1.2°C/mW (air), 0.3°C/mW (water)  
 Dissipation factor: 0.85mW/°C (air), 3.5mW/°C (water)  
 Max. dissipation for thermal measurements: 10mW

Max. operating temperature: 300°C  
 R at 20°C (±20%): 2000  
 R at 25°C (±20%): 1700  
 B (°K): 3050  
 Min. operating resistance: 13

Order As FX61R (Thermistor F23)

## Type R53



Directly heated bead type thermistor housed in evacuated glass bulb, designed for operation at very low power levels owing to its exceptionally high sensitivity and is thus particularly suitable for use in transistor circuits.

Length:	25.4mm (max.)
Diameter:	4mm (approx)
Power at 20°C max.:	3mW
Power sensitivity:	62.5°C/mW
Dissipation factor:	0.016mW/°C
Max. operating temperature:	175°C (ambient), 220°C (bead)
R at 20°C (±20%):	5000 Ω
R at 25°C (±20%):	4200 Ω
B (°K):	3100
Typical resistance at 3mW dissipation in free air at 20°C:	63

Order As **FX62S** (Thermistor R53)

## Types G16 and G23

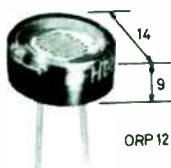
Directly heated bead type thermistor embedded in a solid glass pellet, suitable for temperature measurement, control and compensation.



Type:	G16	G23
Size:	3mm dia	3mm dia
Power at 20°C max.:	370mW	140mW
Power sensitivity:	0.5°C/mW	0.5°C/mW
Dissipation factor:	1.3mW/°C	1.3mW/°C
Max operating temperature:	300°C	125°C
R at 20°C (±20%):	1MΩ	2kΩ
R at temp. shown (±20%):	30kΩ at 100°C	1.65kΩ at 25°C
B (°K):	4850	3125
Min operating resistance	170Ω	115Ω
Similar types G16:	GL16, TH-B11	
G23:	GL23, TH-B12	

Order As **WH23A** (Thermistor G16)  
**WH24B** (Thermistor G23)

## LIGHT-DEPENDENT RESISTORS



A range of cadmium sulphide photoconductive cells sensitive to visible light. They have maximum sensitivity in the green, yellow, orange and red parts of the spectrum (wavelengths: 480-690nm). Resistances quoted below are those measured when the cell is illuminated by a lamp of colour temperature 2700°K. For other light sources the cell resistance should be multiplied by the following approximate factors.

Source of illumination	Multiplication factor
Incandescent radiation at colour temperature of: 1500°K	× 0.5
2000°K (oil-fired burner-yellow flame)	× 0.66
2854°K (international standard)	× 1.05
Sunlight	× 1.33
White fluorescent light	× 2

Where cell is operated from a 50Hz AC source the resistance values are between 1 and 1.3 times those for DC.

Type	Incidence of illumination	Cell resistance at 50 lux	Min dark resistance	Min. bright resistance	Max. power dissipation	Max. cell voltage
ORP12	End-on	2400	10M	20	200mW	110V
ORP60	End-on	60,000	200M	2k†	70mW	350V
ORP61	Side-on	60,000	200M	2k†	70mW	350V
RPY58A	Side-on	600	200k	70 †	—	—

\*At 10,000 lux. †At 1,000 lux.

Order As **HB10L** (LDR ORP12)  
**HB11M** (LDR ORP60)  
**HB12N** (LDR ORP61)  
**HB09K** (LDR RPY58A)

## KNOBS

### Modern attractive knobs

All grub-screw fixing, suitable for 1/4in spindle.

#### BK12

Standard Black Pointer Knob with white line 32mm long. Height 16mm

Order As **RW75S** (Knob BK12)



#### PN20

Heavy duty function knob with white spot and spun aluminium insert. With recess for control fixing nut. Dia. 22mm. Height 17mm.

Order As **RW77J** (Knob PN20)



#### RN92

Small plastic knob with spun aluminium insert. Side is serrated. Diameter: 21mm. Height: 13mm.

Order As **RX99H** (Knob RN92)



#### KB4

Plastic Instrument knob with pointer line marked on skirt (dia. 20mm). Height 17mm

Order As **RW87U** (Knob KB4)



#### KB3

Plastic Instrument Knob with pointer line marked on skirt (dia. 25mm) Height 19mm

Order As **RW86T** (Knob KB3)



#### R78

A silk black knurled finish knob with machined aluminium finish cap. With indicator line. Size: 22mm dia. skirt × 17mm high.

Order As **RX09K** (Knob R78)





**RK401**

A small version of Knob RK403.  
 Diameter: 43.5mm  
 Height: 20mm



Order As HB19V (Knob RK401)

**RK403**

A very large plastic knob in black.  
 Knob has fluted finger grips and skirt with a white indicator line.  
 Diameter: 76mm Height: 28mm

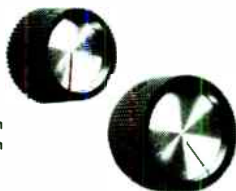


Order As HB57M (Knob RK403)

**K1 & K2**

Plastic knob available in two sizes with deeply recessed spun aluminium insert with black marker line. With recess for control fixing nut. Side is serrated.

K1: Diameter: 26mm Height: 18mm  
 K2: Diameter: 33mm Height: 19mm



Order As HB23A (Knob K1)  
 HB24B (Knob K2)

**M1**

A 19.1mm diameter control knob fitted with a diamond tooled metal cap, and knurled black nylon grip. Height 15.5mm



Order As RW88V (Knob M1)

**M2**

A 25mm diameter control knob identical to **KNOB M1** but fitted with a skirt with a white dot. Height 15.5mm



Order As RW89W (Knob M2)

**R81**

A silk black knurled finish knob with a machined aluminium



Size: 25mm dia. skirt x 14mm high.  
 Skirt has a white indicator line.

Order As RX10L (Knob R81)

**R82**

As type R81 but with an aluminium skirt numbered 1 to 10.



Order As RX11M (Knob R82)

**KCR 2**

Plastic knob with chromed top and narrow skirt. Serrated side. As used on many car radios. Diameter: 24mm. Height: 30mm.



Order As HB25C (Knob KCR2)

**M3 & M4**

A smart black nylon knob with recess for control fixing nut. Top has a chrome finished insert (mirror finish). Available in two sizes.

M3 Dia. 25.4mm Height 15mm  
 M4 Dia. 35.3mm Height 17mm

Order As RW90X (Knob M3)  
 RX00A (Knob M4)



**F18**

Black knob with spun aluminium insert and calibrated aluminium skirt.  
 (Dia. 26mm). Height 15mm



Order As RW82D (Knob F18)

**F10**

Black Calibrated Knob with wide skirt (Dia. 30mm)  
 Height 18mm



Order As RW78K (Knob F10)

**F11**

As F10, but skirt has black indicator line. Spun aluminium skirt and insert.  
 Diameter: 30mm. Height: 18mm.



Order As HB26D (Knob F11)

**PK2 & NK2**

A black knob with spun aluminium insert in top and aluminium skirt.  
 Type PK2 has black arrow head on skirt, type NK2 has numbered skirt: 0-10.  
 Size (both types) Dia. 37mm Height 15mm



Order As RX01B (Knob NK2)  
 RX02C (Knob PK2)

**KTH**

All metal knob with cone-shaped recessed top and sloping skirt.  
 Diameter 22mm. Height: 20mm.



Order As HB27E (Knob KTH)

**R64**

Aluminium knurled body and glossy black skirt numbered in white 1 to 10. Size 30mm dia. skirt x 13mm high.



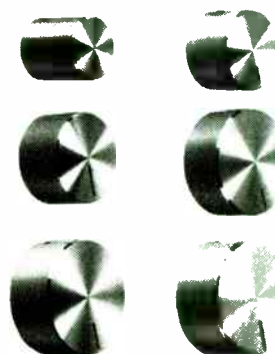
Order As RX04E (Knob R64)

**Spun Aluminium Knobs**

A range of spun aluminium finish knobs with a black marker line. All knobs are grub-screw fixing and fit a standard 6.3mm (1/4in.) shaft.

The following sizes are available.

Type	Diameter	Height
R51	14mm	16mm
R52	18mm	12mm
R76	22mm	13mm
R77	28mm	13mm
R53	32mm	14mm
R54	38mm	16mm



Order As

HB28F (Knob R51)  
 HB29G (Knob R52)  
 RX07H (Knob R76)  
 RX08J (Knob R77)  
 HB30H (Knob R53)  
 HB31J (Knob R54)

### K105.

Solid aluminium knob with serrated top edge. Top is a matt black textured inlay. With recess for control fixing nut. Available in two sizes with an indicator line and two sizes without indicator line.

With indicator line:

K105L: Diameter: 28mm Height: 16mm

K106L: Diameter: 40mm Height: 16mm

Without indicator line:

K105: Diameter: 24mm Height: 16mm

K106: Diameter: 40mm Height: 16mm

Order As **HB32K (Knob K105)**  
**HB33L (Knob K106)**

**HB34M (Knob K105L)**  
**HB35Q (Knob K106L)**



### Pointer Skirt

This plugs into the base of the knob and has a white triangle embossed on a black opaque skirt.

Order As **RX19V (15mm Collet Indicator)**



### Numbered Skirt

This also plugs into the base of the knob and has the numbers 0 to 11 embossed in black on a transparent dial.

Order As **RX20W (15mm Collet Skirt)**



### K15, K24 & K30

Solid aluminium knobs with serrated top edge and spun top for control fixing nut on K24 and K30 Recess.

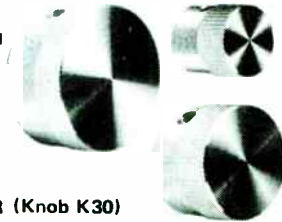
K15: Diameter: 15mm Height: 16mm

K24: Diameter: 24mm Height: 16mm

K30: Diameter: 30mm Height: 16mm

Order As **HB36P (Knob K15)**

**HB37S (Knob K24)**      **HB38R (Knob K30)**



### K44, K45 & K46

Very high quality solid aluminium knobs, black anodised and spun. There is a very bright finish narrow chrome line around top edge. Fluted finger-grip around knob. Recess for control fixing nut on K45 and K46.

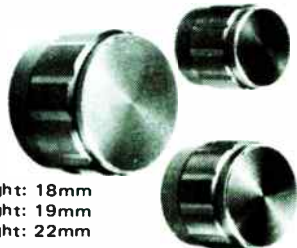
K44: Diameter: 18mm Height: 18mm

K45: Diameter: 22mm Height: 19mm

K46: Diameter: 29mm Height: 22mm

Order As **HB39N (Knob K44)**

**HB40T (Knob K45)**  
**HB41U (Knob K46)**



### COLLET KNOBS

#### Knob

High quality polycarbonate knobs having a most attractive modern appearance. Suitable for 1/8in spindles, the collets are tightened or loosened by means of a screw in the top of the knob which is normally hidden by a push fit cap.

Knob grey or black (Dia.15mm).

Order As **RX16S (Collet Knob Black)**  
**RX17T (Collet Knob Grey)**



#### Cap

These plug into the top of the knob and hide the collet assembly. They can also be used for colour coding.

Available in black, grey, red, blue, green and yellow.

Order As **WL45Y (15mm Collet Cap Black)**  
**WL46A (15mm Collet Cap Blue)**  
**WL47B (15mm Collet Cap Green)**  
**WL48C (15mm Collet Cap Grey)**  
**WL49D (15mm Collet Cap Red)**  
**WL50E (15mm Collet Cap Yellow)**



#### Pointer

These are available in the same colours as the caps, and plug into the base of the knob.

Order As **WL51F (15mm Collet Pointer Black)**  
**WL52G (15mm Collet Pointer Blue)**  
**WL53H (15mm Collet Pointer Green)**  
**WL54J (15mm Collet Pointer Grey)**  
**WL55K (15mm Collet Pointer Red)**  
**WL56L (15mm Collet Pointer Yellow)**



#### Nut Cover

This plugs into the base of the knob and hides the potentiometer fixing nut. Available only in black with a white line.

Order As **RX18U (15mm Collet Nut Cover)**



### Stator

For use with COLLET SKIRT.

Black disk has one white segment. The stator is fitted to the panel with a slotted nut allowing the figure dial to rotate over it. Thus only one number stands out clearly against the white segment of the stator whilst the remaining numbers "disappear" against the black background.

Order As **RX21X (15mm Collet Stator)**



### Slotted Nut

This nut is required for fixing the stator described above. 10mm metric threaded controls will need the metric nut whilst the standard 3/8 in. threaded controls will need the imperial type.

All our controls are 3/8 in. except single-gang pots in lin and log which are metric.

Order As **WL43W (Collet Rd Nut 3/8 in.)**  
**WL44X (Collet Rd Nut 10mm)**



### LGW-COST "COLLET" STYLE

#### Knob

A range of knobs and accessories having a similar external appearance to our 15mm Collet Knobs, but which are grub screw not collet fixing. The accessories are similar to our collet knobs and plug into the knob body in the same way (but they are not interchangeable with any of the 15mm Collet Knob parts), but unlike our 15mm Collet Knobs, once plugged together they are not easily separated again and will probably be damaged if separation is attempted.

Order As **RX12N (Knob R621 Black)**



#### Cap

The cap which plugs into the top of the knob body is available in the following colours: Black, Blue, Brown, Green, Grey, Red and Yellow

#### Order As

**WL61R (Cap R622 Black)**      **WL65V (Cap R622 Grey)**  
**WL62S (Cap R622 Blue)**      **WL66W (Cap R622 Red)**  
**WL63T (Cap R622 Brown)**      **WL67X (Cap R622 Yellow)**  
**WL64U (Cap R622 Green)**



#### Nut Cover

Three different types of base are available if required and these simply plug into the base of the knob body.

A nut cover with a white indicator line. Available only in black. Dia. 19mm, height 4mm. Designed to cover the potentiometer fixing nut.

Order As **RX13P (Nut Cover R624)**



#### Pointer Skirt

A black skirt with a white indicator arrow.

Order As **RX14Q (Indicator R623A)**



#### Numbered Skirt

A clear transparent skirt with black numbers embossed on it 0-10. (30° between each number and the next, 60° between 10 and 0)

Order As **RX15R (Skirt R623N)**





## KNOBBS FOR SLIDE POTS

### TYPE A

Black plastic knob with white line

Order As **RX22Y** (Slide Knob A)



### TYPE D

Brushed aluminium knob with black plastic sides

Order As **RX23A** (Slide Knob D)



### TYPE F

A plastic knob with a white line across the centre. Fits vertically or horizontally. Size 11 x 18 x 13mm high. Available in the following colours: Black, Blue, Green, Grey and Red.



Order As  
**RX24B** (Slide Knob F Black)    **RX27E** (Slide Knob F Grey)  
**RX25C** (Slide Knob F Blue)    **RX28F** (Slide Knob F Red)  
**RX26D** (Slide Knob F Green)

Please note that the knobs listed here fit the Slide Pots that are shown in this catalogue. They also fit the AB and RS types, but probably will not fit any Japanese or German types.

## SPINDLE COUPLER

Brass spindle coupling. Precision turned from brass rod for extending all types of 1/4in spindles. Four flush-fitting grub screws ensure non-slip, trouble-free operation.

Order As **RX29G** (Spindle Coupler)



## EXTENSION SPINDLE

Brass spindle extension. Fits all types of 1/4in spindles. Spindle retainer fitted with two 6BA screws, continued by extension spindle 1/4in x 66mm long.

Order As **RX30H** (Ext. Spindle)



## BRASS BUSH

A brass bush (panel cut-out 7/8 in) to support long spindle in front panel or guide spindle fixed in sub-chassis through front panel. Suits standard 1/4 in. spindles. Overall length: 15mm.

Order As **RX31J** (Brass Bush)



## EBONITE ROD

1/4in. (6.35mm) dia rod for extending spindles. Strong and slightly flexible, it is supplied in 6in. (152mm) lengths (nominal)

Order As **RX38R** (Ebonite Rod)



## CORD DRIVES

### Brass Type



A brass bush (panel cut-out 7/8 in) through which a standard 1/4 in shaft revolves. Total length: 49mm. Length from front of bush: 35mm.

Order As **RX45Y** (Cord Drive Brass)

### Steel Type



A brass bush (panel cut-out 7/8 in) through which a standard 1/4 shaft revolves in a ball race. Spindle extends at rear of bush to allow flywheel to be fitted. Total length: 68mm. Length from front of bush: 42mm.

Order As **RX46A** (Cord Drive Steel)

## DRIVE CORD

A nylon covered spun-glass cored drive cord. Non-stretch and non-slip. Diameter 0.56mm. Breaking strain 10lb. Sold per metre.

Order As **BL73Q** (Drive Cord)

## CORD FIXING DRUM

A steel drum with brass bush which clamps on standard 1/4 in spindles by two 4BA screws.

Available in two sizes. 54.5mm dia. (small) and 95.5mm dia. (large).

Order As **RX43W** (Cord Drum Small)  
**RX94C** (Cord Drum Large)



## FLYWHEEL

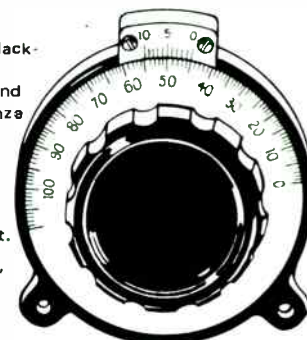
A heavy lead flywheel with a brass bush for fixing (by two grub screws) to standard 1/4 in spindles, for use with tuning dials. Overall size 10mm x 51mm dia (bush protrudes by 6.3mm). Weight: 6oz (170gm).

Order As **RX44X** (Flywheel)



## VERNIER DIALS

Heavy black bakelite base and black-printed aluminium scale. Moulded knob has fluted grips and internal parts are phosphor bronze and brass for long life. No backlash, positive logging, "large" dial can be read to a tenth of each scale division. Planetary slow motion drive. Fits standard 6.3mm (1/4 in.) shaft. Scale marked 0 to 100 in 180°. Please note that only the "large" dial has a vernier scale.



Type	Order As	Dial diameter	Reduction ratio (approx)
Vernier Dial Small	<b>RX39N</b>	36mm	8:1
Vernier Dial Medium	<b>RX40T</b>	50mm	6:1
Vernier Dial Large	<b>RX41U</b>	70mm	10:1

## EPICYCLIC BALL DRIVES

Type 4511F



A powerful friction drive with a reduction ratio of approx. 6:1. Fits standard 6.3mm (¼in.) shafts and knobs. Two grub screws for fixing shaft. Base of shaft tapped with two 8BA threaded holes for direct fixing of Rotary Pointer.

Shaft length: 26.7mm  
 Overall length: 47mm  
 Output torque: 1.8kgm.cm.(26oz.in.) to 2.7kgm.cm. (38oz.in.)  
 Input torque: <216 gm.cm. (3 oz.in.)

Order As RX42V (Ball Drive)

## Miniature Type



A small friction drive with a reduction ratio of approx. 10:1. Fits standard 6.3mm (¼in.) shafts and knobs. Two grub screws for fixing shaft. Mounting bracket has two 8BA clearance holes on 20mm. centres.

Shaft length: 17mm  
 Overall length: 32.5mm  
 Output torque: 570gm.cm.(8oz.in) minimum.

Order As HB42V (Mini Ball Drive)

## Dual Ratio Drive Scale



Dial incorporates a dual ratio drive giving fast drive of 6:1 with a reverse slow drive of 36:1 for very accurate tuning. Output shaft fits standard 6.3mm. (¼in.) shaft. Unit has an aluminium back plate, scale, spare scale, transparent cover, hair-line pointer, black bakelite escutcheon and black plastic knurled knob. Scale printed 0 to 100 with space for other ranges. Fits into front of panel which may be any thickness up to 9.5mm. (3/8in.) (or more by providing longer screws). Fixing centres: 111 x 83mm x 6BA. Overall size: 124 x 96 x 27mm behind front plate.

Output torque: (slow) 1.08kgm.cm. (15oz.in.) min.  
 (fast) 1.7kgm.cm. (24oz.in.) min.  
 Input torque: (slow) 216gm.cm. (3oz.in.) max.  
 (fast) 500gm.cm. (7oz.in.) min.  
 (fast) 1.08kgm.cm. (15oz.in.) max.

Order As HB43W(DR Drive Scale)

## Round Drive Scale



Dial incorporates a ball drive type 4511F. Output shaft fits standard 6.3mm. (¼in.) shaft. Unit has an aluminium scale printed 0 to 100 in 180°, black plastic knob, and hair-line pointer which is fixed separately. All necessary fixing nuts and bolts supplied. Scale may be reversed and is plain for engraving etc.  
 Dial diameter: 102mm (4in.)

Order As HB44X (Round Drive Scale)

## Aluminium Dial



Dial incorporates a ball drive type 4511F. Output shaft fits standard 6.3mm. (¼in.) shaft. Unit has an aluminium scale printed 0 to 100 in 180° and a 25.4mm (1in.) solid aluminium diamond knurled knob.

Dial diameter: 44mm (1¾in.)

Order As HB45Y (Aluminium Dial)

## Pointer

A brass pointer sprayed gloss white. The carriage is designed to slide over scale or back plate 18swg thick. Length of pointer: 110mm.

Order As HB46A (White Pointer)

## Ball Drive Pointer



A perspex pointer, transparent with a crimson hair line. Fits the ball drive type 4511F.

Length of pointer: 86mm.

Order As HB47B (Ball Drive Pointer)

## Cord Tension Springs

Springs have 3.2mm (1/8in.) inside diameter loops at each end. Three sizes are available.

Length (between loop centres)	Number of coils
8mm (5/16in.)	6
12.7mm (½in.)	14
21.4mm (27/32in.)	26

Order As HB48C (Spring Short)  
 HB49D (Spring Medium)  
 HB50E (Spring Long)

## Pulley

A plastic idler pulley manufactured in Celcon. They are strong and lightweight with a non-slip non-abrasive grip. To fit an 3.2mm (1/8 in.) shaft. Outside diameter 12.7mm (½ in.). Cord diameter when wrapped round pulley would be 9.5mm (7/8 in.). Outside width 3.2mm (1/8 in.) Width at top of groove 1.6mm (.062 in.). Width at base of groove 0.4mm (1/4 in.)

Order As RX95D (Pulley ½ in)

## FUSE HOLDERS

These fuseholders are not suitable for use on domestic equipment at voltages over 50V unless they are inaccessible without the use of a tool as defined in the Electrical Equipment (Safety) Regulations 1975.

### 20mm Type

Panel mounting suitable for 20mm fuses, 7A max., body length 40mm. Panel cut-out 12.5mm.

Order As RX47B (F Holder 20)



### 1½ in. Type

Panel mounting suitable for 1½in fuses 7A max., body length 54mm. Panel cut-out 16mm.

Order As RX48C (1½ in. F Holder)





**SAFETY TYPES**



**20mm Types**

A panel mounting 20mm fuseholder with screwdriver release to meet the latest safety regulations. 6.3A max. Overall length: 32mm. Bezel dia. 15mm. Panel cut-out 12.7mm.  
**Order As RX96E (Safuseholder 20)**



**1 1/4 in Types**

A panel mounting 1 1/4in fuseholder with screwdriver release to meet the latest safety regulations. 16A max. Overall length: 44mm. Bezel dia. 15mm. Panel cut-out 12.7mm.  
**Order As RX97F (Safuseholder 1 1/4in.)**

**FUSE CLIPS**

Tinned brass fuse clips for 20mm fuses. The lugs on the clip are on a 2.54 x 2.54mm (0.1 in x 0.1 in) matrix and will fit into 1.5mm dia. holes. Two clips are required per fuse.



**Order As WH49D (Fuse Clip)**

**CHASSIS TYPES**

Chassis mounting nylon moulded fuse holder with tinned phosphor-bronze clips.

Single hole 6BA clear fixing.

For 20mm fuses  
 L 22 H 16 D 8

For 1 1/4in fuses  
 L41 H16 D12

**Order As RX49D (Chassis F/H 20mm)**  
**RX50E (Chassis F/H 1 1/4in)**

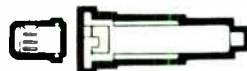


**IN-LINE TYPE**

L52 Dia. 14

Bayonet-action in line car-type fuse holder, nylon moulded body suitable for 1 1/4in fuses

**Order As RX51F (F/H Car)**



**FUSES**

**20mm Type**

Quickblow glass cartridge fuses. Size: 20mm long x 5mm dia. Available in the following ratings:

50mA, 100mA, 150mA, 250mA, 500mA, 1A, 1.5A, 2A, 3A, 5A.

- Order As**
- WR93R (Fuse 20mm 50mA)
  - WR00A (Fuse 20mm 100mA)
  - WR94C (Fuse 20mm 150mA)
  - WR01B (Fuse 20mm 250mA)
  - WR02C (Fuse 20mm 500mA)
  - WR03D (Fuse 20mm 1A)
  - WR04E (Fuse 20mm 1.5A)
  - WR05F (Fuse 20mm 2A)
  - WR06G (Fuse 20mm 3A)
  - WR07H (Fuse 20mm 5A)



**20mm Antisurge Type**

Antisurge glass cartridge fuses. Size: 20mm long x 5mm dia. Available in the following ratings.

500mA, 1A, 2A.

- Order As**
- WR18U (Fuse A/S 500mA)
  - WR19V (Fuse A/S 1A)
  - WR20W (Fuse A/S 2A)



**1 1/4 in. Type**

Quickblow glass cartridge fuses. Size: 1 1/4. (32mm) long x 1/4 (6.4mm) dia. Available in the following ratings.

50mA, 100mA, 150mA, 250mA, 500mA, 1A, 1.5A, 2A, 3A, 5A, 10A, 15A.

- Order As**
- WR95D (Fuse 1 1/4 50mA)
  - WR08J (Fuse 1 1/4 100mA)
  - WR96E (Fuse 1 1/4 150mA)
  - WR09K (Fuse 1 1/4 250mA)
  - WR10L (Fuse 1 1/4 500mA)
  - WR11M (Fuse 1 1/4 1A)
  - WR12N (Fuse 1 1/4 1.5A)
  - WR13P (Fuse 1 1/4 2A)
  - WR14Q (Fuse 1 1/4 3A)
  - WR15R (Fuse 1 1/4 5A)
  - WR16S (Fuse 1 1/4 10A)
  - WR17T (Fuse 1 1/4 15A)



**1in. Type Domestic Mains Fuses**

Standard electrical plug fuses to BS1362. Size 1in. (25.4mm) long x 1/4in. (6.4mm) dia. Available in the following ratings.

2A, 3A, 5A, 13A.

- Order As**
- HQ31J (Plug Fuse 2A)
  - HQ32K (Plug Fuse 3A)
  - HQ33L (Plug Fuse 5A)
  - HQ34M (Plug Fuse 13A)



**FUSE WIRE**

A card on which is wound three pieces of fuse wire. 5A, 15A and 30A.

**Order As HB51F (Fuse Wire)**



**MES LAMP HOLDERS**

**CHASSIS TYPE**

An MES bulb holder fitted to a long bracket which makes it ideal for backlighting scales etc. where an anchor point is not suitably situated.

**Order As RX85G (MES L/Hldr MST 107)**



**BATTEN HOLDER**

An MES bulb holder in a white bakelite base, with screw terminals.

Dimensions: Dia. of base 31mm.  
 Fixing centres: 23mm.  
 Total height 18mm.

**Order As RX86T (MES Batten Hldr)**



**PANEL TYPE**

MES lampholder. Available with red, amber, green, blue or clear transparent lens. The front bush has a polished chrome finish. Requires a 19mm panel cut-out.

- Order As**
- RX57M (Holder MES Amber)
  - RX58N (Holder MES Blue)
  - RX59P (Holder MES Clear)
  - RX60Q (Holder MES Green)
  - RX61R (Holder MES Red)



## LES LAMPHOLDERS

Available with red, green, amber, blue or clear transparent heat-proof polycarbonate lenses. The lens body is a snap fit to the panel. Requires a 9.52mm panel cut-out and is suitable for panels from 0.89mm to 1.14mm thick.



**Order As**  
**RX62S (LES Clip Holder Amber) RX65V (LES Clip Holder Green)**  
**RX63T (LES Clip Holder Blue) RX66W (LES Clip Holder Red)**  
**RX64U (LES Clip Holder Clear)**

A panel lampholder with smart chromed bezel and domed translucent polycarbonate cap available in five colours. Panel fixing requires 10mm dia. cut-out and, when fixed, lamp can be removed from either side of panel. Dia. of bezel: 12mm.



Colours available:  
 Blue, Green, Red, White, Yellow.  
**Order As**  
**RX76H (Domed LES Lhldr Blue) RX79L (Domed LES Lhldr White)**  
**RX77J (Domed LES Lhldr Green) RX80B (Domed LES Lhldr Yellow)**  
**RX78K (Domed LES Lhldr Red)**

A panel lampholder with smart chromed bezel and flat-topped transparent polycarbonate cap available in three colours. Panel fixing requires 11mm dia. cut-out and, when fixed, lamp can be removed from either side of panel. Dia. of bezel: 14mm.



Colours available: Blue, Green, Red.  
**Order As** **RX67X (Flat-Top LES Lhldr Blue)**  
**RX68Y (Flat-Top LES Lhldr Green)**  
**RX69A (Flat-Top LES Lhldr Red)**

A panel lampholder with fluted translucent polycarbonate cap available in four colours. Panel fixing, requires 9.5mm (3/8 in.) cut-out. Diameter of bezel: 13.5mm. Colours available: Amber, Clear, Green and Red.



**Order As**  
**FF66W (Fluted Lamphldr Amber) FF68Y (Fluted Lamphldr Green)**  
**FF67X (Fluted Lamphldr Clear) FF69A (Fluted Lamphldr Red)**

## NEON INDICATORS

### ROUND PANEL TYPE



Moulded body with built-in resistance for 250V use. Red or Amber lens with bright chrome bezel. Requires a 13.46mm panel cut-out and it is a snap-in fixing type suitable for panels from 0.89mm to 1.14mm thick.

**Order As** **RX82D (Pan Neon Amber)**  
**RX83E (Pan Neon Red)**

### SQUARE PANEL TYPE

Polycarbonate body with built-in resistance for 250V use. Red lens. Requires a panel cut-out 23.8mm x 11.1mm. The body has integral spring clips for snap-in fixing. Suitable for panels from 0.89mm to 1.14mm thick.

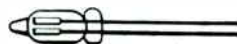


**Order As** **RX81C (Square Neon)**

## BULBS

### WIRE-ENDED NEON TYPE

Wire-ended neon indicator lamp. For 250V operation use a series 270k 1/4W resistor. Bulb diameter 5.95mm. Bulb length 21.5mm (max).



**Order As** **RX70M (Wire Neon)**

## WIRE-ENDED FILAMENT TYPES

A wire-ended filament type bulb dia 5mm 12V, 0.08A, 0.96W, 2 Lumens (nom). Nominal life: 5000 hours.



**Order As** **WQ13P (Wire Bulb 12V)**

## LES BULB TUBULAR



Two types are available 6V and 12V. 6V, 0.06A, 0.36W, 1.0 Lumens (nom). Nominal life: 5000 hours. Post Office type 41C. 12V, 0.08A, 1W, 2 Lumens (nom). Nominal life 5000 hours.

**Order As** **WL74R (LES Bulb 6V)**  
**WL75S (LES Bulb 12V)**

## TUBULAR NEON BULB WITH MES BASE

Use with a 270k 1/2W resistor for 250V operation.



**Order As** **RX84F (Neon Bulb)**

## ROUND MES TYPE

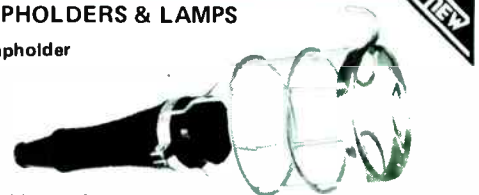
Volts	Watts	Amps	Nominal lumens	Nom. life (hours)
3.5	0.5	0.15	1.5	5000
6	0.24	0.04	0.45	5000
6	0.6	0.1	3	1000
6.5	1.95	0.3	12	3000
12	1.2	0.1	5	5000
12	2.2	0.18	11	3000
24	2.8	0.12	11	3000



**Order As**  
**WL76H (Bulb MES 3.5V) WL80B (Bulb MES 12V 1.2W)**  
**WL77J (Bulb MES 6V 0.24W) WL81C (Bulb MES 12V 2.2W)**  
**WL78K (Bulb MES 6V 0.6W) WL82D (Bulb MES 24V)**  
**WL79L (Bulb MES 6.5V)**

## MAINS LAMPHOLDERS & LAMPS

### Inspection Lampholder



A heavy duty rubber mains inspection lampholder with wire guard. Suits standard domestic light bulb. Overall length: 300mm.  
**Order As** **LL15R (240V Inspection Lamp)**

### Hand-Held Fluorescent Tube



A smart orange-plastic cased 12V fluorescent tube. Bright white light, but only 8W consumption. With swivel hook and leads with clips for direct connection to car battery. No motorist should be without one. Also invaluable during power cuts, e.g. three of these could be run from one fully charged car battery for up to 15 hours before recharging.

**Order As** **LQ10L (Portable Lamp)**

### Replacement Tube

A 12V 8W fluorescent tube for use as replacement in our Portable Lamp. It also suits many other caravan and boat lamps.

**Order As** **LQ11M (12V Tube)**

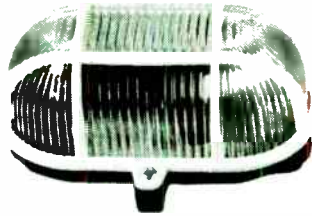




**BULKHEAD LAMPHOLDER**

An outdoor lampholder, oval in shape with prismatic glass, brown bakelite body and a white ABS plastic guard. Watertight fitting. Suitable for standard domestic light bulbs up to 60W. Fixing centres: 104mm. Overall size: 175 x 115 x 95mm.

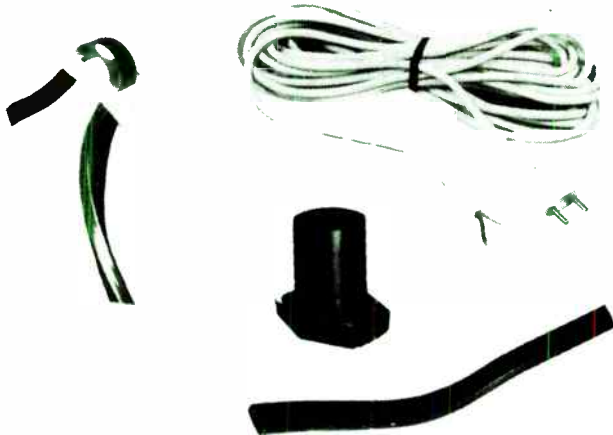
Order As XQ15R (Bulkhead)



**ILLUMINATION FESTOON HARNESSES**

Outdoor lighting harnesses with ten or twenty lampholders. Illuminate one of your trees or light up a patio, lawn, barbecue corner or terrace with one of our lighting harnesses. Five different colour bulbs available.

**Ten Lamp Kit**



Kit contains: 10m of two-core mains connecting cable terminated at one end in a shaver-type two-pin plug which should be cut off and a standard 13A plug fitted. A two-way terminal block; 10 self-assemble BC lampholders (requiring no cable-stripping); 5 metres of flat green moulded cable (fire and weather-resistant) which lampholders fix to; and 2 nylon fixing rings to hang up the festoon. Supplied with easy-to-follow assembly instructions. Rated up to 60W bulbs. Bulbs not included. We recommend the use of our Round Bulbs detailed below.

Order As XQ16S (Festoon Harness Kit)

**Twenty Lamp Harness**



A ready-made festoon harness, 9 metres long with twenty BC lampholders fixed to it. The cable is flat green PVC, self-extinguishing and weather resistant. Rated up to 25W bulbs. We recommend the use of our Round Bulbs detailed below. Complete with 2 nylon fixing rings to hang up the festoon. Bulbs not included.

Order As XQ17T (20-Way Festoon Harness)

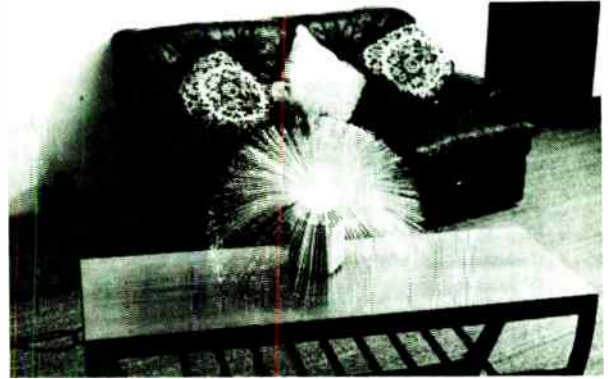
**Round Bulbs**

Round bulbs 44mm diameter with standard BC connector. Rated 240V, 25W. Available in Blue, Green, Red, White and Yellow.

- Order As HB52G (Rd Bulb Blue)
- HB53H (Rd Bulb Green)
- HB54J (Rd Bulb Red)
- HB55K (Rd Bulb White)
- HB56L (Rd Bulb Yellow)



**FIBRE OPTIC LAMP**



A beautiful fibre optic lamp (mains operated) with a smart anodised brushed aluminium base measuring 117 x 117mm. Overall height of base 128mm. Fibre tails spread out to form a hemisphere around the base. Approx. diameter 500mm. A replacement bulb is supplied inside the lamp.

The effect is seen as thousands of pin-points of light spread over an imaginary hemisphere with the colours constantly changing in patterns across the surface. A beautiful centrepiece for your living room.

Order As XQ18U (Fibre Optic Lamp)

**FIBRE OPTIC TABLES**



A really unusual yet attractive piece of furniture for your living room. A glass coffee table with bright chromed surround and four heavily chromed 400mm high legs. Under the glass are dozens of whorls each containing hundreds of glass fibres. These are illuminated from below and different colours swirl slowly across the table. Alternatively the legs may be removed and the unit hung (vertically in the case of the large table) on the wall to produce a constantly changing "painting in light". The table is sealed so that spilled liquids cannot reach the fibres. The tungsten halogen lamp is a long life type rated at 20W. Mains operated. Two sizes are available:

- Small: 600 x 600mm
- Large: 1000 x 500mm

Order As XQ19V (Fibre Optic Table Small) (Delivery by carrier)  
XQ20W (Fibre Optic Table Large)

Replacement Bulb for Fibre Optic Table  
6V 20W Tungsten Halogen

Order As XQ21X (M39 6V TH Lamp)

## SWITCHES

### ULTRA MINIATURE TOGGLE SWITCHES

A range of ultra miniature toggle switches. Rated 250V, 1.5A AC. Chrome plated brass dolly. Mounting hole: 5.2mm (0.2in). Available in three actions.

Dimensions:	Single-pole types	Double-pole types
Body	8 x 5 x 7mm	8 x 9 x 7mm
Bush length	5.6mm	5.6mm
Dolly length	9.5mm	9.5mm
Tag length	5mm	5mm

Single-pole single throw (SPST)

Order As **FH97F** (SPST Ultra Min Toggle)

Single-pole double throw (SPDT)

Order As **FH98G** (SPDT Ultra Min Toggle)

Double-pole double throw (DPDT)

Order As **FH99H** (DPDT Ultra Min Toggle)



### SUB-MINIATURE TOGGLE SWITCHES

Sub-miniature toggle switches. Rated 250V AC 2A, 30V DC 5A. Moving contact: silver. Fixed contacts: silver alloy. Chrome plated brass dolly. Mounting hole 6.4mm.

#### Single pole types

Dimensions:	
Body:	12.7 x 6.9 x 8.9mm
Bush length:	8.9mm
Dolly length:	10.4mm
Tag length:	3.9mm

Single-pole changeover.

Order As **FH00A** (Sub-Min Toggle A)

Single-pole changeover biased one way.

Order As **FF70M** (Sub-Min Toggle J)

Single-pole changeover, centre off.

Order As **FH01B** (Sub-Min Toggle B)

Single-pole changeover, centre off biased one way.

Order As **FH02C** (Sub-Min Toggle C)

Single-pole changeover, centre off, biased both ways.

Order As **FH03D** (Sub-Min Toggle D)



Types A,B,C,D,J

#### Double pole types

Dimensions:	
Body:	12.7 x 11.4 x 8.9mm
Bush length:	8.9mm
Dolly length:	10.4mm
Tag length:	3.9mm

Double-pole changeover

Order As **FH04E** (Sub-Min Toggle E)

Double-pole changeover biased one way.

Order As **FF71N** (Sub-Min Toggle K)

Double-pole changeover, centre off.

Order As **FH05F** (Sub-Min Toggle F)

Double-pole changeover, centre off, biased one way.

Order As **FH06G** (Sub-Min Toggle G)

Double-pole changeover, centre off, biased both ways.

Order As **FH07H** (Sub-Min Toggle H)

#### Single pole three way

Three position switch with an unusual switching action to enable single pole three way action to be achieved. With toggle in position one, contacts 2, 3 and 5, 6 are made; in position two, contacts 2, 3 and 4, 5 are made; and in position three, contacts 1, 2 and 4, 5 are made. Thus to achieve three way action, link together pins 2 and 4 then pole or input is pin 5, output 1 is pin 6 output 2 is pin 3 and output 3 is pin 1.

Order As **FF72P** (Sub-Min Toggle L)

#### 4-Pole Type

4-pole changeover

Dimensions:

Body:	12.7 x 21.6 x 10.5mm
Bush length:	8.9mm
Dolly length:	10.4mm
Tag length:	3.9mm

Order As **FH08J** (4-pole SM Toggle)

### MINIATURE SPDT TOGGLE



A miniature toggle switch with 14mm long red plastic dolly. Diameter 9.2mm Length (excl. dolly) 31.6mm. Bush length: 6mm. Panel cut-out: 7.4mm. Rated: 1.5A at 250V AC, 2A at 12V DC.

Order As **FH29G** (Min SP Toggle)

### DPDT TOGGLE

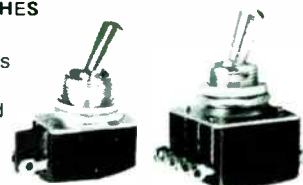


Standard DPDT. Rated 250V AC, 1.5A, with ON/OFF plate. Overall size (excluding dolly): 32mm x 19mm x 29mm. Mounting hole: 11mm

Order As **FH39N** (Toggle Sw)

### STANDARD TOGGLE SWITCHES

A range of toggle switches rated 2A at 250V AC with chrome plated brass dolly and bush. Switches require a 12.7mm panel cut-out. Bush is 10mm long.



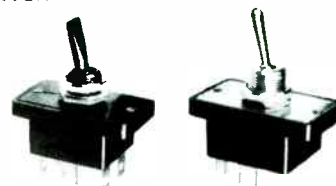
Type	Contact arrangement	Height	Width	Depth
SPST		31	12.5	14
SPDT		36	12.5	14
DPDT		23*	26	19

\*Tags protrude a further 6mm from both sides.

Order As **FH10L** (Std Toggle SPST)  
**FH11M** (Std Toggle SPDT)  
**FH12N** (Std Toggle DPDT)

### HEAVY DUTY TOGGLE SWITCH

A range of heavy duty toggle switches rated 13A at 250V AC or 17A at 6 to 24V DC. Mounting hole 12.7mm.



TYPE 1 SPST with chrome plated brass lever.

TYPE 4 DPST with chrome plated brass lever.

TYPE 7 SPST with black nylon lever.

TYPE 8 DPST with black nylon lever.

TYPE 9 DPDT with black nylon lever.

Order As

**FH16S** (H/D Toggle Type 1) **FH19V** (H/D Toggle Type 8)

**FH17T** (H/D Toggle Type 4) **FH20W** (H/D Toggle Type 9)

**FH18U** (H/D Toggle Type 7)

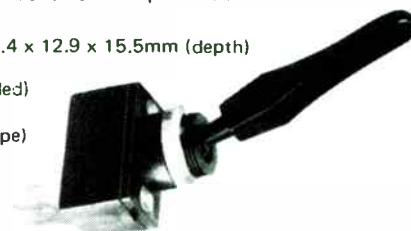
### DUCK-BILL TOGGLE

A 10A 12V DC or 240V AC toggle switch with single pole make or break contact. Panel cutout: 12mm dia. Switch is supplied with a smart chromed lock-nut and has 1/4in quick-fit terminals.

Switch body size: 25.4 x 12.9 x 15.5mm (depth)

Bush length: 11mm  
(5.2mm sleeve provided)

Dolly length:  
44mm (duck-bill shape)



Order As **FH13P** (Duck Bill Toggle)



## VERY LONG ARM TOGGLE SWITCH

A 10A 12V DC or 240V AC toggle switch with single pole make or break contact locking. A single-pole make biased flash switch in the same style is also available. Panel cut-out: 12mm dia. Switch is supplied with a smart chromed lock-nut and has 1/4in quick-fit terminals.

Switch body size: 24.4 x 13 x 14.4mm (depth)



Bush length:  
11.6mm (9mm threaded and  
4.6mm sleeve provided)  
Dolly length: 74mm

Order As **FH14Q** (Long-Arm Toggle Locking)  
**FH15R** (Long-Arm Toggle Flasher)

## HEKLA ROCKER SWITCH

A single pole make/break rocker switch. Black body 29 x 18mm with a choice of colours for rocker bar. Switch requires a 16mm dia. panel hole. Bush is 10mm long.

Rated: 2A at 250V AC

The following colour rocker bars are available: Black, Blue, Green, Luminous, Red, White and Yellow.



Order As  
**FH21X** (Hekla Switch Black) **FH25C** (Hekla Switch Red)  
**FH22Y** (Hekla Switch Blue) **FH26D** (Hekla Switch White)  
**FH23A** (Hekla Switch Green) **FH27E** (Hekla Switch Yellow)  
**FH24B** (Hekla Switch Luminous)

## ROCKER SWITCH

A range of 10A 250V AC rocker switches having a white polycarbonate body. The switches are snap-mounting and require a panel cut out 28.2mm x 11.5mm for single pole types and 28.2mm x 22.3mm for double pole types.

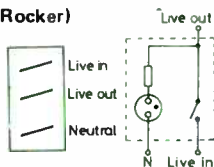


The following types are available:

Single pole, single throw **Order As FH30H** (SPST Rocker)  
Single pole, double throw **FH31J** (SPDT Rocker)

Single pole, single throw with integral neon indicator with red lens

**FH32K** (Rocker Neon)



Double pole, single throw **FH33L** (Rocker Sw DP)  
Double pole, double throw **FH34M** (DPDT Rocker)

## ROTARY SWITCH



A high quality rotary switch moulded in glass-filled nylon. Indexing 30°. 6.3mm (1/4in.) spindle, 9.5mm (3/8in.) bush. With adjustable rotation limit stop. Silver-plated contacts.

Bush length: 8mm  
Spindle length: 30mm (with flat)  
Overall length: 58mm  
Max voltage: 300V AC or DC

## SLIDE SWITCHES

### Single Pole Sub-Miniature

Sub-miniature SPDT slide switch suitable for use as replacements in calculators, clocks etc.

Dimensions: Body: 11 x 5 x 6mm  
Front plate: 19 x 5mm  
Tang: 3.8mm long (throw 3.4mm)  
Tags: 2.7mm long x 1.8mm wide  
Fixing centres: 15mm x 8BA clear

Rating: 100V AC 0.5A, 18V DC 0.8A.

Order As **FF77J** (SP Slide)



### Double Pole Sub-Miniature

A sub-miniature DPDT slide switch with wiring tags.

Dimensions: Body: 15 x 8 x 8mm  
Front plate: 23 x 8mm  
Tang: 5.5mm long (throw 3.4mm)  
Tags: 2mm long x 1.8mm wide  
Fixing centres: 19mm x M2 tapped

Ratings: 125V AC 0.5A, 18V DC 0.8A

Order As **FH35Q** (Sub-Min Slide)



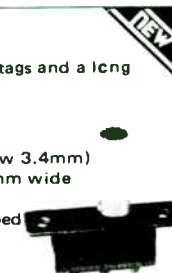
### Double Pole Sub-Miniature Chrome Tang

A sub-miniature DPDT slide switch with wiring tags and a long tubular chromed tang.

Dimensions: Body: 15 x 8 x 8 mm  
Front plate: 23 x 8mm  
Tang: 14mm long (throw 3.4mm)  
Tags: 2mm long x 1.8mm wide  
Fixing centres: 18mm x M2 tapped

Ratings: 125V AC 0.5A, 18V DC 0.8A

Order As **FF79L** (Long Chrome Slide)



### Double Pole Miniature

A miniature DPDT slide switch with wiring tags.

Dimensions: Body: 22 x 13 x 8mm  
Front plate: 35 x 13mm  
Tang: 9.5mm long (throw 5.3mm)  
Tags: 4.2mm long x 2.8mm wide  
Fixing centres: 28mm x M3 tapped

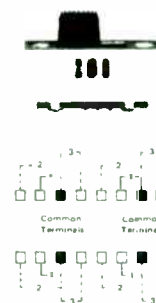
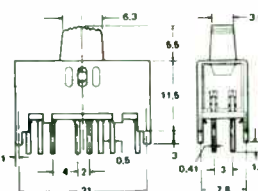
Ratings: 125V AC 1A, 18V DC 1.5A

Order As **FH36P** (STD Slide Sw)



### 4-Pole 3-Position

Miniature 4-pole 3-position.  
Rated 125V AC 0.3A.



Order As **FH38R** (4-Pole Slide)

Max current: 5A continuous  
Contact resistance: 10mΩ  
Contact rating: 150mA at 250V AC or DC  
350mA at 110V AC or DC

The following types are available:

Break before Make action **Order As**  
1 pole 12 way **FF73Q** (Rotary Sw12B)  
2 pole 6 way **FF74R** (Rotary Sw6B)  
3 pole 4 way **FF75S** (Rotary Sw4B)  
4 pole 3 way **FF76H** (Rotary Sw3B)

Make before Break action  
1 pole 12 way **FH42V** (Rotary Sw12)  
2 pole 6 way **FH43W** (Rotary Sw6)  
3 pole 4 way **FH44X** (Rotary Sw4)  
4 pole 3 way **FH45Y** (Rotary Sw3)

## MAKA-SWITCH

Switches may be made up using the various accessories to suit individual requirements. Available only in 'miniature' size.  $\frac{1}{4}$  in spindle,  $\frac{3}{8}$  in bush.

### Shaft Assembly

Switch mechanism (shafting assembly) accommodates up to 4 wafers.



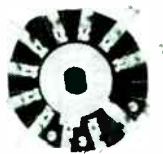
Indexing:  $30^\circ$  6.3mm ( $\frac{1}{4}$ in.) spindle. 9.5mm (3/8in.) bush  
 Spindle length: 41mm (with flat). Bush length: 8mm  
 Overall length: 90mm  
 With adjustable rotation limit stop

Order As FH46A (Maka Shaft)

### Wafers

Glass filled diallyl phthalate stators, acetal rotors and silver-plated contacts.

Max working voltage: 300V AC or DC  
 Max current: 5A continuous  
 Contact resistance:  $10m\Omega$   
 Contact rating: 150mA at 250V AC or DC  
 350mA at 110V AC or DC



The following types are available:

Break before Make action

1 pole 12 way  
 2 pole 6 way  
 2 pole 9 way  
 3 pole 5 way  
 4 pole 3 way  
 6 pole 2 way

Order As  
 FH47B (Maka Wafer 1p 12w)  
 FH48C (Maka Wafer 2p 6w)  
 FF81C (Maka Wafer 2p 9w)  
 FH49D (Maka Wafer 3p 5w)  
 FH50E (Maka Wafer 4p 3w)  
 FH51F (Maka Wafer 6p 2w)

Make before Break action

1 pole 12 way  
 2 pole 6 way  
 2 pole 9 way

FH52G (Make Wafer 1p 12w MB)  
 FH53H (Maka Wafer 2p 6w MB)  
 FF82D (Maka Wafer 2p 9w MB)

### Mains Switch

A DPST switch that mounts on the shaft assembly. Rated 4A at 250V AC

Order As FH54J (Maka Mains)



### Screen

To mount between wafers for screening.

Order As FH55K (Maka Screen)

Note: Where wide separation of wafers or screens is required use 8BA Spacer  $\frac{1}{8}$  in shown on page 50.

## KEY OPERATED SWITCH

A DPDT rotary switch operated with a Yale key. Ideal for burglar alarms and all security applications. The key may be withdrawn in either position. 2 Keys provided with each lock. Random supply of 200 different lock numbers. Panel cut-out 19.1mm ( $\frac{3}{4}$ in.)

Bezel diameter: 22.2mm  
 Bush length: 12.7mm Bezel is chrome plated.  
 Indexing:  $60^\circ$   
 Contact rating: 4A 250V AC  
 10A 12V DC

Order As FH40T (Key Switch)



## ROTARY MAINS SWITCH

A double-pole single-throw (DPST) rotary mains switch moulded in flame retardant plastic. Recommended for use in circuits where heavy switching current surges occur.

Indexing  $45^\circ$  6.3mm ( $\frac{1}{4}$ in) spindle. 9.5mm (3/8in.) bush.

Bush length: 8mm  
 Spindle length: 25mm (with flat)  
 Overall length: 47mm  
 Contact rating: 4A at 250V AC  
 Current surge: 80A for 10msec  
 Contact resistance:  $20m\Omega$

Order As FH57M (Rotary Mains)



## THUMBWHEEL SWITCH



A thumbwheel edge switch in a black satin plastic finish. This high quality switch has gold-plated contacts on the fibre-glass pcb and precious metal wiper contacts to ensure reliable operation. The numbers 0 to 9 appear in white in the aperture in the front as the wheel is revolved, and operation is positive and smooth. The switches are front panel mounting and both types may be stacked together if required, to form a bank of switches. Switches are available with decimal or BCD outputs. Connections are made as follows:

Number shown	Pin Numbers	Decimal	BCD
0	A and 0	A and 0	None
1	A and 1	A and 1	5 and 1
2	A and 2	A and 2	5 and 2
3	A and 3	A and 3	5, 1 and 2
4	A and 4	A and 4	5 and 7
5	A and 5	A and 5	5, 1 and 7
6	A and 6	A and 6	5, 2 and 7
7	A and 7	A and 7	5, 1, 2 and 7
8	A and 8	A and 8	5 and 6
9	A and 9	A and 9	5, 1 and 6

Switch resistance:  $<100m\Omega$

Current carrying

capacity:

Contact rating:

Character height:

Width of switch:

Overall height:

Panel cut-out:

Mounting by means of special end-cheeks described below.

Order As FF83E (Thumbwheel Decimal)  
 FF84F (Thumbwheel BCD)

### Spacer

A blank section which may be stacked with switches to give a gap between groups. Width: 8mm.

Order As FF85G (Thumbwheel Spacer)

### Mounting Kit

A kit of parts to mount one block of up to 10 switches and spacers. Kit contains: 1 left-hand mounting cheek, 1 right-hand mounting cheek, four panel mounting springs, so that bank of switches clip into panel cut-out and 2 lengths of threaded rod with four nuts and four washers. To calculate the size of cut-out required use the formula: (Number of switches plus spacers multiplied by 8) then add 9 to give the width in mm and the height will be 31mm.

Order As FF86T (Thumbwheel Mounting Kit)

## CLICK-EFFECT PUSH SWITCH

A neat, small and very low cost push switch in a matt grey finish for direct pcb mounting. Smooth, gentle and positive action with a click-effect so that you know switch has operated. Action is single-pole push-to-make non-locking. Switch has a small square button fitted to a circular base. Each contact is connected to two pins for ease of track layout on pcb. Contact is self-cleaning laminated silver.

Contact rating: 10mA at 35V DC  
 Contact resistance:  $\leq 50m\Omega$   
 Bounce: 1ms  
 Insulation resistance:  $>10^5 M\Omega$   
 Life:  $10^6$  operations  
 Inter-contact capacity at 1MHz:  $<1pF$   
 Key travel: 0.8mm  
 Size of button: 7.7 x 7.7mm  
 Height of button: 4mm  
 Overall diameter: 11.5mm  
 Overall height from pcb: 10.8mm  
 Pin length: 2.8mm  
 Pin diameter: 0.6mm  
 Pin spacing:  $5 \times 5mm$



Order As FF87U (Click Switch)

Continued on next page



**CAPS FOR CLICK SWITCH**

A range of different colour caps which may be snapped on to our click switches if a larger button is required.

Size of cap: 12.4 x 12.4mm  
 Height of cap: 5.5mm  
 Overall height from pcb: 12.3mm

Available in the following colours: Black, Blue, Green Grey, Ivory, Red, White and Yellow.

Order As

- FF88V (Click Cap Black)    FF92A (Click Cap Ivory)
- FF89W (Click Cap Blue)    FF93B (Click Cap Red)
- FF90X (Click Cap Green)    FF94C (Click Cap White)
- FF91Y (Click Cap Grey)    FF95D (Click Cap Yellow)



**KEYBOARD SWITCH**

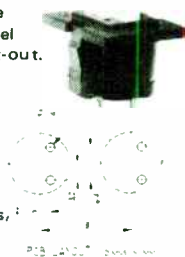
A low-cost non-locking push switch designed for making up keyboards and key pads etc. The keytops must be ordered separately.

Designed to be mounted directly on the pcb the centre of each switch should be 19mm distant from its neighbour. The keytops will then butt up to one another to avoid having a complicated front panel

Specification: cut-out.

Rating: 1mA at 24V DC  
 Bounce: 10ms max. (4ms typical)  
 Contact resistance: 200mΩ  
 Stroke: 2.5mm  
 Life: 10<sup>6</sup> operations  
 Switches are non-locking push-to-make.  
 Overall size: 15 x 15mm  
 Height: 17mm (excluding 3mm pins)  
 Height with key-top: 19mm (excluding pins)

Order As FF61R (Keyboard Switch)



**KEYBOARD SWITCH KEYPAD**



A two-part key-top which snaps on to the switch. The top is in two parts the upper part being transparent. Thus the lower part may be engraved, marked with Letraset, or a piece of printed card may be placed on it, then the top part snapped on and the key-top appears to have a legend printed on it.

Available in: 1 x 1: size 18 x 18 x 9mm high  
 2 x 1: size 36 x 18 x 9mm high  
 3 x 1: size 54 x 18 x 9mm high

(The 3x1 key-top comes complete with a bar so that the top does not slip sideways around the switch plunger).

- Order As FF62S (Keytop 1 Position)
- FF63T (Keytop 2 Position)
- FF64U (Keytop 3 Position)

**ASCII CHARACTER SET TRANSPARENCY**



An ASCII character set on transparent film with cut-out lines to fit

our Keyboard Switch Key-tops. Characters may be placed directly in the key-top or with a piece of thin coloured card to give the effect of having coloured keys.

Order As FF65V (ASCII Transparency)

**PUSH SWITCHES**

**Push to Make**

Miniature non-locking push to make switch with red button.



Overall size: 28mm long, 10.5mm dia. Rated 250mA 125V AC.

Order As FH59P (Push Sw)

**Square Push to Make**

Push to make non-locking switch with a large square button available in four colours: Black, Green, Red and Yellow.



Panel cut-out: 12.7mm (1/2in) diameter (round).  
 Overall length: 39mm (1 1/2in)  
 Length behind bezel: 29mm  
 Button: 10mm square  
 Bezel (elephant grey): 14mm square

- Order As FF96E (Square Push Black)
- FF97F (Square Push Green)
- FF98G (Square Push Red)
- FF99H (Square Push Yellow)

**Push to Break**

Miniature non-locking push to break switch with black button.



Rated 1A 250V AC.

Order As FH60Q (Break Push)

**MINIATURE LOCKING PUSH BUTTON SWITCH**

Miniature push button switches with 3A 250V AC contacts. Single pole changeover (SPCO) and double pole changeover (DPCO) types are available. Both are locking (i.e. press-press). Fitted with red plastic button with dimpled top.

Panel cut-out: 6mm  
 Bush length: 7.5mm  
 Body dimensions (excl. tags): 11.6 x 6.5 (SPCO);  
 11.7 (DPCO) x 17mm deep  
 Button dimensions: 8 x 10mm dia.



- Order As FH41U (Pushlock SPCO)
- FH66W (Pushlock DPCO)

**TABLE LIGHT SWITCH**

A push-on, push-off single pole make/break switch with a white push button. Panel cut-out: 10mm.

Max panel thickness: 4mm  
 Switch body dimensions: 24 x 13 x 8.5mm.  
 Connections by screw terminals.  
 Rated: 2A at 250V AC.



Order As FH94C (Pressil Sw)

**PUSH SWITCH**

A push button switch with a large red dimpled button and smart chromed bezel. Action is non-locking push to make single pole. Panel fixing requires 16mm dia. cut-out. Rated 2A at 240V AC.



Order As FH91Y (Motor-Start Press)

**FOOT SWITCH**

A hard-wearing push-on push-off switch rated 2A at 250V AC, suitable for use as foot-operated switches. A 1 1/2in dia. fixing hole is required and the bush is 18mm long.



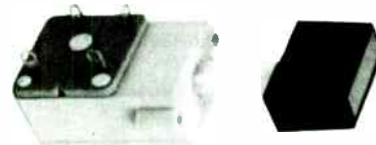
Type	Contact arrangement	Body dimensions (mm)		
		Length	Width	Depth
1	SPDT	24	13	24
2	DPDT	40	15	20

- Order As FH92A (Press Toe Sw Type 1)
- FH93B (Press Toe Sw Type 2)

**PUSH-ON PUSH-OFF SWITCH**

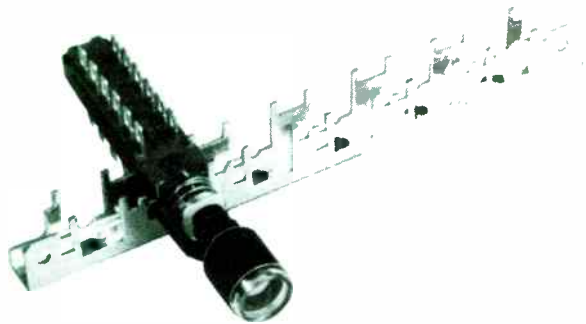
DPST push-button switch with knob. Rated 4A at 240V AC. Size of body 27 x 18 x 14mm. Operating rod 20mm long unoperated; 16mm long when operated. Knob size 18 x 13 x 8.5mm, black plastic.

Fixing centres 18mm. Holes are blind untapped suitable for a No. 4 self-tapping screw. Maximum depth of screw 1/4in.



Order As FH37S (Mains Push)

## INTERLOCKING PUSH-BUTTON SWITCH SYSTEM



A very high quality low cost range of push-button switches each of which is capable of being adjusted for push-on/push-off (locking) operation or momentary push (non-locking) operation singly or in interlocking groups. Almost infinite variations of configurations of switches are possible so that these switches fulfill practically all the requirements of a quality push-button switch installation.

### Signal Switches



Contacts are silver-plated brass with moving contacts spring-loaded and contoured to achieve constant pressure and positive self-cleaning action and long-term low contact resistance. The polycarbonate housing has printed circuit pins fixed on top face and solder terminals on bottom face. The plunger with moving contacts can be removed from the front for maintenance without removing wires, but these switches are protected against ingress of dust or flux.

Rated: 0.5A, 100V AC  
0.2A, 250V AC  
1A, 25V DC

Max. contact resistance: 6mΩ; after 25,000 cycles: 20mΩ max.  
Insulation resistance between adjacent contact or frame and any contact:  $>1 \times 10^{12} \Omega$ .  
Life: 100,000 cycles (50,000 interlocked).  
Action: Break before make.

Length (L) of signal and dummy switch:

2-pole changeover: 42.4mm  
4-pole changeover: 54.4mm  
6-pole changeover: 66.4mm  
8-pole changeover: 78.4mm  
10-pole changeover: 90.4mm  
Dummy: 31.7mm

The 2- and 4-pole switches are available with a light touch in addition to the standard versions. Four different button styles are available giving a wide choice of possibilities.

### Standard Touch

These switches are operated by a normal pressure and are available in the following types:

2-pole changeover; 4-pole changeover; 6-pole changeover; 8-pole changeover; 10-pole changeover.

Order As FH67X (Latchswitch 2-pole)  
FH68Y (Latchswitch 4-pole)  
FH69A (Latchswitch 6-pole)  
FH70M (Latchswitch 8-pole)  
FH71N (Latchswitch 10-pole)

### Light Touch

These switches are operated by a very light touch and are available in two types:

2-pole changeover; 4-pole changeover.

Order As BW11M (Latchsoft 2-pole)  
BW12N (Latchsoft 4-pole)



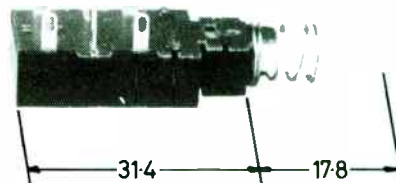
### Dummy Switch



A dummy switch suitable for use as a release button on interlocking groups.

Order As FH72P (Latchdummy)

### Mains Switch



A mains switch which is capable of all the types of operation that the signal switches are capable of, and is fully compatible in interlocking groups.

Rated: 4A at 250V AC (non-inductive load).  
Contact arrangement: DPDT.

Order As FH74R (Mains Latchswitch)

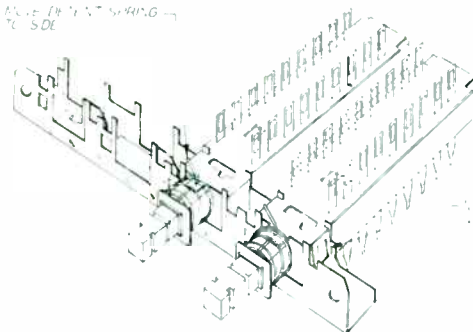
### Mounting Brackets



A range of brackets for mounting (and providing interlocking action) the latchswitches which have no other method of fixing except the p.c. pins. The brackets are suitable for mounting up to 1, 2, 4, 6, 8 or 10 switches any group of which are capable of being interlocked, and any switch may be locking or non-locking whether interlocked or not.

The single bracket is only a mounting frame whilst the other brackets comprise the mounting frame, a latching bar and a latch return spring.

PLEASE REFER TO DRAWING FOR SIZE



The leaf spring is pressed in between the paxolin top and the body of the switch.

Order As FH75S (Latchbracket Single)  
FH76H (Latchbracket 2-Way)  
FH78K (Latchbracket 4-Way)  
FH80B (Latchbracket 6-Way)  
FH82D (Latchbracket 8-Way)  
FH84F (Latchbracket 10-Way)



### Round Button

Diameter: 12.3mm; Length: 12.5mm.  
Available in the following colours:

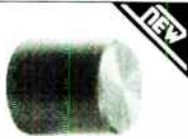
Black, Green, Grey, Red,  
White and Chrome.



Order As  
**FL31J (Rd Latchbutton Black)**    **FL34M (Rd Latchbutton Red)**  
**FL32K (Rd Latchbutton Green)**   **FL35Q (Rd Latchbutton White)**  
**FL33L (Rd Latchbutton Grey)**    **FL36P (Rd Latchbutton Chrome)**

### Small Round Button

Diameter: 8.8mm Length: 10.5mm.  
Available in the following colours:  
Black and Chrome.



Order As **BW13P (Small Latchbutton Black)**  
**BW14Q (Small Latchbutton Chrome)**

### Rectangular Buttons

Width: 14.7mm; Height: 7.4mm; Length: 11m.  
Button can be mounted horizontally or vertically.  
Available in the following colours:

Black, Grey, Red, White and Chrome.

Order As  
**FH61R (Rct Latchbutton Black)**  
**FH62S (Rct Latchbutton Grey)**  
**FH63T (Rct Latchbutton Red)**  
**FH64U (Rct Latchbutton White)**  
**FH65V (Rct Latchbutton Chrome)**



### "Magic Light" Buttons

A range of "magic light" buttons which may be used where illuminated buttons would normally be needed. They use no energy, need no lamp, lampholder, power supply, switch contact or wiring, generate no heat and eliminate lamp replacement, yet are very bright in all but the very darkest locations.



When unoperated a clear plastic lens is visible with black interior. When button is pressed a highly reflective coloured disc "magically" appears behind the transparent lens.

Button shell is black and the following "magic light" colours are available:  
Blue, Green, Orange, and Yellow.

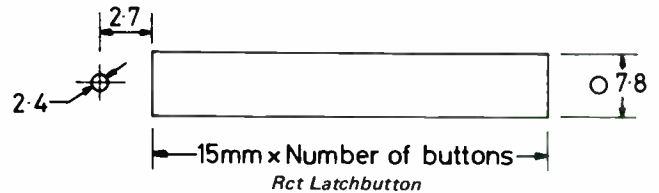
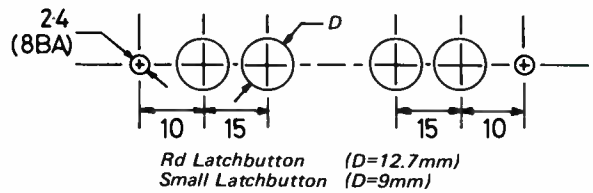
Order As  
**FH87U (Magiclight Button Blue)**  
**FH88V (Magiclight Button Green)**  
**FH89W (Magiclight Button Orange)**  
**FH90X (Magiclight Button Yellow)**

### Single Switch Mounting Bush

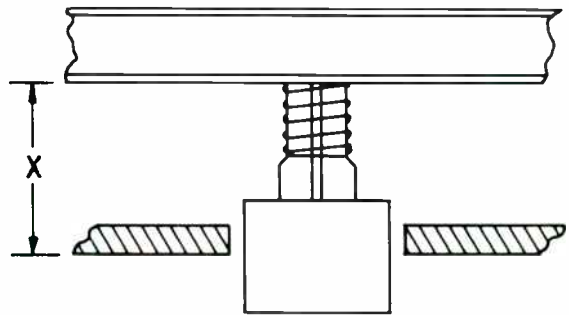
A bush and button that will fit on to any Latchswitch. The bush allows the latchswitches to be fixed to a panel with a single round hole. The bush can only be used with the magiclight-type button supplied with it. (This button is not the same mechanically as our standard Magiclight Buttons, although the coloured effect is the same.) Shell colour: black.

Overall diameter: 19mm  
Panel cut-out: 14mm  
Available with four different colour buttons:  
Blue, Green, Orange and Yellow.

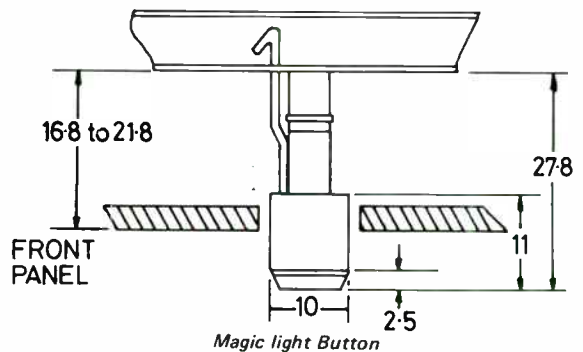
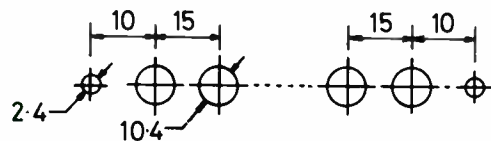
Order As **BW15R (Latchbush Blue)**  
**BW16S (Latchbush Green)**  
**BW17T (Latchbush Orange)**  
**BW18U (Latchbush Yellow)**



Front Panel Cut-outs showing relative position of 8BA fixing holes on sub-chassis.



X for Rct Latchbutton = 10 to 14mm  
X for Rd Latchbutton = 10 to 15.5mm  
X for Small Latchbutton = 10 to 13.5mm



### MICROSWITCH

A 5Amp 240V AC microswitch with single pole changeover contact. Fitted with roller ended operating lever. Body size: 27.5 x 16 x 10mm.



### MICROSWITCH

Changeover contacts rated at 250V AC, 5A. Overall size: 20mm x 6.5mm. Three solder lugs and two 8BA clearance holes in body for fixing.



Order As **FH95D (Roller Microswitch)**  
**FH96E (Microswitch)**





## PLUG-IN RELAY

Plug-in type relay fitted with dust cover. Two-pole changeover, silver contacts. Octal base plugs into our OCTAL CH SKT.

### Contact details:

Max. ratings: 7.5A at 250V AC  
 3A at 440V AC  
 7.5A at 6V DC  
 7A at 12V DC  
 4.5A at 24V DC  
 1.5A at 48V DC  
 0.3A at 100V DC  
 0.15A at 200V DC

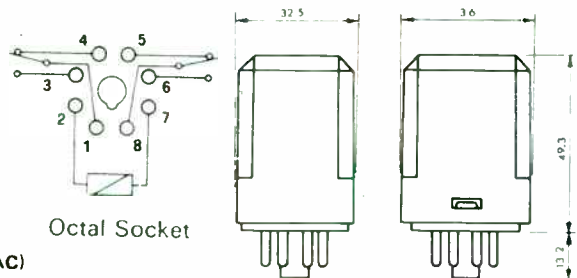
Life: > 20 million operations  
 Operate and Release time: 10 to 20ms



Order As  
**FX44X** (Plug-In Relay 6V)  
**FX45Y** (Plug-In Relay 12V)  
**FX46A** (Plug-In Relay 24V)  
**FX47B** (Plug-In Relay 230V AC)

### Coil details:

Nominal coil voltage	Operate voltage range	Coil resistance
6V DC	4.8 to 6.6V	30 Ω
12V DC	9.6 to 13.2V	120 Ω
24V DC	19.2 to 26.4V	480 Ω
230V AC	184 to 253V	7300 Ω



## POWER RELAY

Open construction relay with two-pole changeover pure silver contacts. Mounting by single screw.

### Contact details:

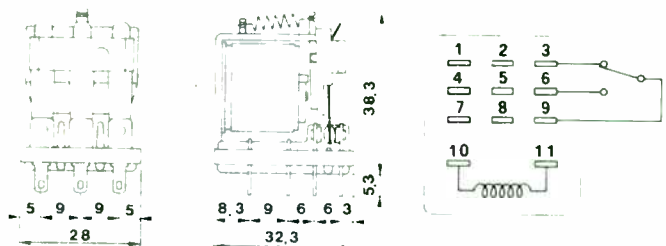
Max. ratings: 7.5A at 250V AC  
 3A at 440V AC  
 7.5A at 6V DC  
 7A at 12V DC  
 4.5A at 24V DC  
 1.5A at 48V DC  
 0.3A at 100V DC  
 0.15A at 200V DC

Life: > 20 million operations  
 Operate and release time: 10 to 20ms



### Coil details:

Nominal coil voltage	Operate voltage range	Coil resistance
12V DC	9.6 to 13.2V	120 Ω
230V AC	184 to 253V	7300 Ω



Order As **FX48C** (Power Relay 12V)  
**FX49D** (Power Relay 230V AC)

## HEAVY DUTY RELAYS

Two fully enclosed heavy duty relays designed primarily for use in cars, but could be used for other low voltage use. All coils are 12V.

### Single

A single 12V coil with single-pole changeover contact rated 15A at 12V. Coil resistance: 45Ω.

Dimensions: 96 x 60 x 64mm high.  
 Fixing centres: 80 x 7mm dia.



Order As **YB89W** (Car Relay Single)

### Dual

Two separate single pole make (SPST) relays in one can. Designed primarily for use as car headlight (dip/main beam) switch. Unit has internal 20A fuse fitted. Contacts rated 15A at 12V. Coil resistance (each coil): 55Ω.

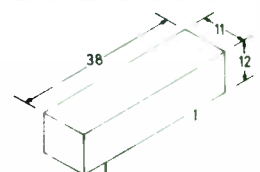
Dimensions: 107 x 88 x 47mm  
 Fixing centres: 92.5 x 28mm x 7mm dia.

Note: One side of both coils is internally commoned and one side of both pairs of make contacts is internally commoned.



Order As **YB90X** (Car Relay Dual)

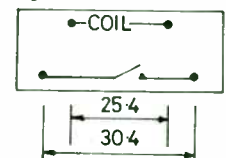
## REED RELAYS



A reed relay with one make contact encapsulated in a moulded outer case. Pins fit directly onto a 0.1 inch grid

### Contact details:

Max. power: 5W  
 Max. current: 200mA  
 Max. voltage: 50V  
 Contact capacitance: - 2pF  
 Max. contact resistance: 150mΩ



Life: 5 million operations  
 Operate and release time: 1ms (approx) Insulation resistance (between coil and either contact and between contacts): 10<sup>10</sup> Ω

Coil details:	Operate voltage range	Coil resistance	Body colour
	6 to 9V	700	Green
	9 to 12V	1k	Blue
	12 to 18V	1k7	White
	18 to 30V	3k	Red

Order As **FX50E** (Reed Relay 6 to 9V)  
**FX51F** (Reed Relay 9 to 12V)  
**FX73Q** (Reed Relay 12 to 18V)  
**FX74R** (Reed Relay 18 to 30V)

## DIL REED RELAYS

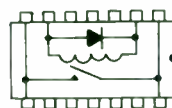
A reed relay with single pole or double pole make or single pole changeover contacts moulded in a standard 14-pin dual-in-line package.



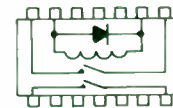
Contact details	1 pole make	2 pole make	1 pole change-over
Max power	10W	3W	4W
Max current	0.5A	0.11A	0.2A
Max voltage	100V	28V	100V
Contact capacitance	2pF	2pF	2.5pF
Max contact resistance	100mΩ	200mΩ	150mΩ
Life (millions of operations)	100	100	100
Operate time	0.25ms	0.25ms	0.5ms
Release time	0.15ms	0.15ms	1.3ms
Insulation resistance	10 <sup>9</sup> Ω	10 <sup>9</sup> Ω	10 <sup>9</sup> Ω

Coil details: Type	Nominal coil voltage	Operate voltage range	Must release voltage	Coil resistance
1 pole make	5V	3.7-7.5V	0.5V	500Ω
1 pole make	12V	9-36V	1V	2900Ω
2 pole make	5V	3.7-7.5V	0.5V	200Ω
2 pole make	12V	9-18V	1V	500Ω
1 pole c/over	5V	3.7-7.5V	0.5V	150Ω
1 pole c/over	12V	9-18V	1V	500Ω

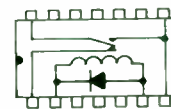
All types have an internal diode connected across the coil to protect the driver. The 5V types may be driven directly from TTL and the 1 pole make 12V version may be driven directly from some CMOS devices operating at 15V.



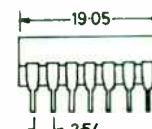
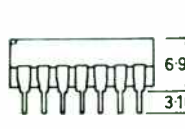
TYPE A



TYPE B

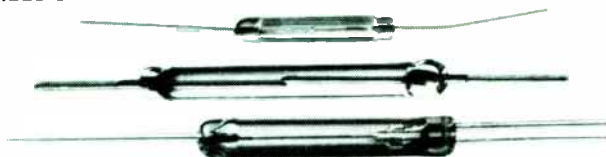


TYPE C



Order As **FX88V** (DIL Reed Relay 1-Pole 5V)  
**FX89W** (DIL Reed Relay 1-Pole 12V)  
**FX90X** (DIL Reed Relay 2-Pole 5V)  
**FX91Y** (DIL Reed Relay 2-Pole 12V)  
**FX92A** (DIL Reed Relay 1-Pole C/O 5V)  
**FX93B** (DIL Reed Relay 1-Pole C/O 12V)

## REED SWITCHES



A dry-reed switch with rhodium plated contacts for long life. When a magnet or electromagnet is brought near the reed magnetism is induced into both halves of the reed in the same direction. Thus of the overlapping ends, one becomes a north pole

Order As **FX68Y** (Reed Sw Std) **FX69A** (Reed Sw Compact)

Type	Glass length	Glass dia	Overall length	Contact arrangement	Max power	Max current AC / DC	Switching voltage DC	Switching voltage AC (rms)	Operating current (mA)
STANDARD	50.8mm	5.5mm	84mm	single pole make	25W	2A	400V	300V	40.80
COMPACT	38.8mm	5.5mm	88mm	single pole changeover	10W	0.5A	100V	125V	50.90
MINIATURE	20.3mm	3.2mm	57.2mm	single pole make	15W	0.5A	200V	125V	20.53

Type	Contact capacitance	Max contact resistance	Life (millions of operations)	Operate time	Release time	Insulation resistance	Endurance
STANDARD	0.8pF	70mΩ	100	2ms	0.2ms	10 <sup>11</sup>	7.85H A
COMPACT	3pF	100mΩ	100	2ms	4ms	10 <sup>11</sup>	13.85H A
MINIATURE	0.2pF	150mΩ	100	1ms	0.2ms	10 <sup>11</sup>	6.85H A

and one a south pole and the attraction of the poles causes the switch to close. When the operating magnet is removed, the springiness of the reed enables the switch to break.

**FX70M** (Reed Sw Miniature)

## MAGNETS

Magnets for use with our REED SWITCHES



Small: 18.5×3.2×3.2mm

Large: 25.2×6.3×6.3mm

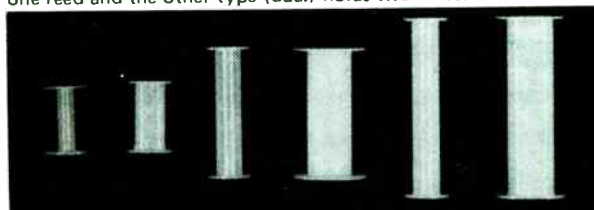
In the table below the distance in mm is that when the reed just operates and just releases when the wide face of the reed is parallel to a long face of the magnet and is measured from the centre of the reed to the nearest face of the magnet. In practice reduce the operate distance and increase the release distance by 25% to ensure reliable operation.

Magnet Large	Standard	Compact	Miniature
Operate distance	22mm	19mm	26mm
Releasedistance	36mm	29mm	36mm
Magnet Small	Standard	Compact	Miniature
Operate distance	6mm	5mm	10mm
Releasedistance	12mm	9mm	15mm

Order As **FX71N** (Magnet Small)  
**FX72P** (Magnet Large)

## COIL FORMERS

Coil formers for use with our REED SWITCHES. Two types of former are available for each type of reed. One type (single) holds one reed and the other type (dual) holds two reeds.



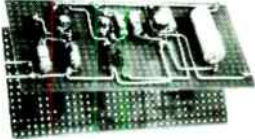
Former Type	Holds one switch type	Holds two switches type
Stan One	Reed Switch Standard	
Stan Two		Reed Switch Standard
Comp One	Reed Switch Compact	
Comp Two		Reed Switch Compact
Min One	Reed Switch Miniature	
Min Two		Reed Switch Miniature

Overall lengths of formers: Stan: 50mm; Comp: 37mm; Min: 20mm.

Order As **HB13P** (Sw Former Stan One) **HB16S** (Sw Former Comp Two)  
**HB14Q** (Sw Former Stan Two) **HB17T** (Sw Former Min One)  
**HB15R** (Sw Former Comp One) **HB18U** (Sw Former Min Two)



## SRBP MATRIX BOARDS AND VEROBOARDS



	Overall size (mm)	Overall size (ins)	Number of copper strips	Number of holes in each strip	Hole matrix
SRBP 0.1in TYPE 1	149x114	6x4.5	None	58x42	0.1in
SRBP 0.1in TYPE 2	95x63	3.75x2.5	None	37x24	0.1in
SRBP 0.1in TYPE 3	127x95	5x3.75	None	50x36	0.1in
SRBP 0.15in TYPE 1	127x95	5x3.75	None	33x24	0.15in
SRBP 0.15in TYPE 2	95x62	3.75x2.5	None	25x16	0.15in
SRBP 0.15in TYPE 3	127x63	5x2.5	None	33x16	0.15in
VERO 14354	63x25	2.5x1	10	24	0.1in
VERO 10345	127x63	5x2.5	24	50	0.1in
VERO 10346	95x63	3.75x2.5	24	37	0.1in
VERO 10347	127x95	5x3.75	36	50	0.1in
VERO 10348	95x95	3.75x3.75	36	37	0.1in
VERO 10401	292x95	11.5x3.75	34	115	0.1in
VERO 53P16	63x25	2.5x1	6	16	0.15in
VERO 42P16	127x63	5x2.5	16	33	0.15in
VERO 43P16	95x63	3.75x2.5	16	25	0.15in
VERO 45P16	127x95	5x3.75	23	33	0.15in
VERO 46P16	95x95	3.75x3.75	24	25	0.15in

All 0.1in. matrix boards and Veroboards except SRBP 0.1in. TYPE 1 have holes of 1mm (0.04in.) diameter. SRBP 0.1in. TYPE 1 and all 0.15in. matrix boards and Veroboards have holes of 1.3mm (0.052in.) diameter. Boards are all 1.6mm thick.

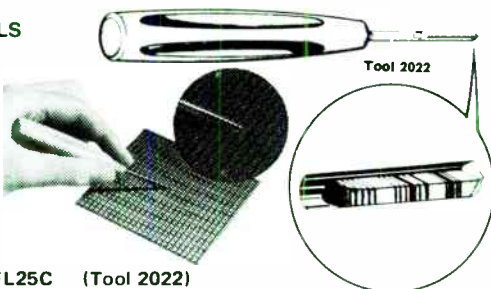
### Order As

FL00A (SRBP 0.1in Type 1)	FL09K (Vero 10347)
FL01B (SRBP 0.1in Type 2)	FL10L (Vero 10348)
FL02C (SRBP 0.1in Type 3)	FL53H (Vero 10401)
FL03O (SRBP 0.15in Type 1)	FL12N (Vero 53P16)
FL04E (SRBP 0.15in Type 2)	FL13P (Vero 42P16)
FL05F (SRBP 0.15in Type 3)	FL14Q (Vero 43P16)
FL06G (Vero 14354)	FL15R (Vero 45P16)
FL07H (Vero 10345)	FL16S (Vero 46P16)
FL08J (Vero 10346)	

## VEROTOOLS

### Type 2022

Tool 2022 Spot face cutting tool.



Order As FL25C (Tool 2022)

### Type 2150

Tool 2150 Veropin insertion tool, for use with PIN 2140 and PIN 2141 (green handle).

Order As FL260 (Tool 2150)

### Type 2151

Tool 2151 Veropin insertion tool, for use with PIN 2144 and PIN 2145 (orange handle).

Order As FL27E (Tool 2151)

## VEROSTRIP

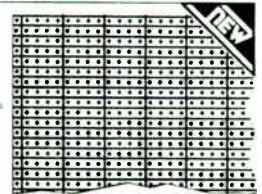
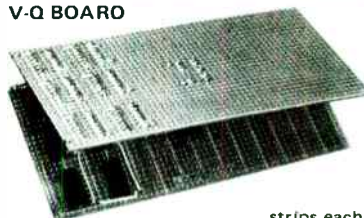
These boards are suitable for all applications where a conventional tag strip or group board might be used, with the advantage that small or large components are neatly accommodated. Components can be mounted across or along the strips.

Coppered strips run across the board with a break in the centre 1 hole (0.1 in.) or 2 holes (0.15 in.) wide running the length of the board.

	VEROSTRIP 0.1in	VEROSTRIP 0.15in
Overall size (mm)	213 x 38	213 x 38
(ins)	8.4 x 1.5	8.4 x 1.5
Number of strips	79	53
Number of holes in coppered part of each strip	14	8
Total number of holes in each strip	15	10
Hole matrix	0.1in	0.15in
Hole diameter	1mm (0.04in)	1.3mm (0.052in)

Order As FL17T (VeroStrip 0.1in)  
FL18U (VeroStrip 0.15in)

## V-Q BOARD

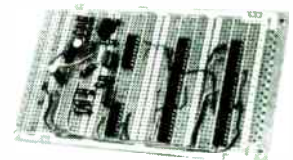


This board has 28 coppered strips each with 58 holes. Each strip is divided into 14 4-hole segments so that track cutting is virtually eliminated. The board is specifically designed to mount dual-in-line integrated circuits and is punched to suit our 0.04in. dia. pins on a 0.1 x 0.1 in. matrix. Overall size 150 x 75mm. Supplied with layout sheet.

Order As HQ48C (Vero V-Q Board)

## DIP BOARD

0.1in matrix, overall size 157x114mm. Suitable for mounting up to 20 14-pin or 28 8-pin DIL packages.



Order As FL19V (DIP Board)

## PCB CONNECTORS

Connectors to enable pcbs to be plugged together horizontally or at right angles to one another. Contacts are gold-flashed nickel-plated phosphor-bronze. Rated: 5A. Contact resistance: 6mΩ. Hole in pcb: 1.2mm dia. (5mm centres for twin tag types). Board thickness (max): 1.6mm. Three types are available.  
45 degree type: 14.9 x 3.2mm (excl. pins)  
Vertical type: 8.8mm (excl. pins)  
Horizontal type: 15.2 x 4.3mm (excl. pins)

Order As WQ14Q (PCB Conns 45°)  
WQ15R (PCB Conns Vertical)  
WQ16S (PCB Conns Horizontal)

## VEROPINS

### Type 2140

Pin 2140. Double-ended pin 1.3mm (0.052in.) dia. Supplied in packs of 100.

Order As FL20W (Pin 2140)

### Type 2141

Pin 2141. Single-ended pin 1.3mm (0.052in) dia. Supplied in packs of 100.

Order As FL21X (Pin 2141)

### Type 2144

Pin 2144. Double-ended pin 1mm (0.04in) dia. Supplied in packs of 100.

Order As FL23A (Pin 2144)

### Type 2145

Pin 2145. Single-ended pin 1mm (0.04in) dia. Supplied in packs of 100.

Order As FL24B (Pin 2145)

## WIREWRAPPING PINS

These pins suitable for wire wrapping fit holes with a 1mm (0.04in) dia. Two types are available.

Single-sided Order As **FL80B** (Pin 0266)

Double-sided Order As **FL81C** (Pin 1657)



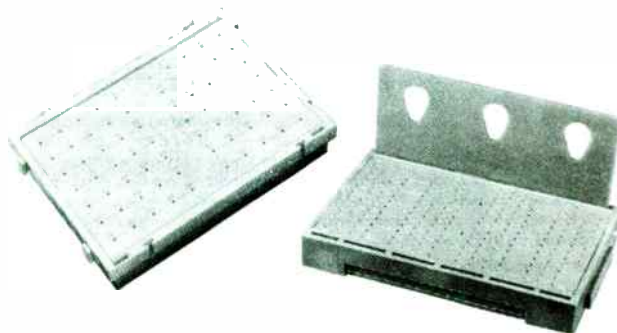
## THROUGH-PCB PINS



Pins to provide a connection between tracks on opposite side of printed circuit boards without the need for through-hole plating. Pins are inserted by hand then soldered on both sides. Pins fit 0.04in. (1mm) dia holes and are suitable for 1/16 in. (1.6mm) thick board. Pins are brass, tin/lead plated. Overall pin length: 0.137in (3.5mm). Supplied in packs of 50 approx.

Order As **FL82D** (Track Pin)

## SOLDERLESS BREADBOARDING DECS



A system for constructing circuits in such a way that the components can be used over and over again. Component wires are simply pushed into the boards where they are firmly held by phosphor bronze double leaf spring contacts. To modify the circuit simply pull the components out and plug in again in the correct position. The contacts are laid out in parallel rows and the pre-arranged bus-bar pattern is indicated by raised lines on the surface of the board. Wires up to a maximum diameter of 1mm can be used and the wiping action on insertion and withdrawal of components ensures reliable contact surfaces.

### Technical Data:

Capacitance:	0.6pF/contact
Resistance between adjacent contacts:	<10mΩ
Insulation resistance:	>100MΩ
Contacts:	Phosphor bronze
Max. current:	5A
Max. voltage:	1kV

### S-Dec

This Dec is designed for discrete components only. Formed in high impact polystyrene it has 70 contact points arranged in two panels each of which has 7 parallel rows of 5 connected contact points.

Board is supplied with a booklet of circuits with full instructions for assembly on the Dec and a control panel which fits into slots in the Dec and is used for mounting potentiometers, switches, lamps etc.

Max temperature: 70°C. Size: 114 x 83 x 22mm.

Order As **WF15R** (S-Dec)

## TAG STRIPS

### 4-Way

4 tags, 2 earthed.

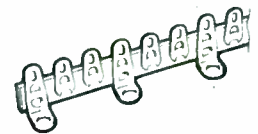
Order As **FL28F** (4-Way Tag)



### 13-Way

13 tags, 5 earthed.

Order As **FL29G** (Mtg Strip)



## TAG BOARD

Miniature SRBP base with 36 solder tags in two rows, size W38.1, L117, H7.5, ideal for mounting capacitors, resistors and grouping wires.



Order As **FL11M** (Tag Board)

## T-Dec

This Dec is designed primarily for discrete components, but it has a position in the centre where a DIL carrier may be inserted so that one I.C. may be used. Formed in glass filled nylon the Dec has 208 contacts per board arranged in 38 rows. There is 5mm separation between rows which enables modern short lead devices to be inserted directly into the contacts.

Typically six to ten stages of discrete circuitry or one DIL I.C. (up to 16 leads) can be accommodated on one board, but boards may be linked together using the dovetailed sections of the board walls (μ-Decs can also be interlocked with T-Decs).

Board is supplied with a booklet of circuits with full instructions for assembly on the Dec and a control panel which fits into slots in the Dec and is used for mounting potentiometers, switches, lamps, etc.

Max. temperature: 130°C. Size: 122 x 80 x 16mm.

Order As **WF16S** (T-Dec)

## μ-Dec 'A'

This Dec will accommodate one or two I.C.'s (up to 16 pins) on holders along with discrete components. The Dec is formed in glass filled nylon and has three bus bar rows each with 16 contacts across the Dec and two independent panels of 20 rows of contacts arranged in 10 pairs with 4 contacts per row.

Board is supplied with a booklet of circuits with full instructions for assembly on the Dec and a control panel which fits into slots in the Dec and is used for mounting potentiometers, switches, lamps, etc.

Max temperature: 130°C. Size 122 x 80 x 16mm.

Order As **WF21X** (μ-Dec A)

## μ-Dec 'B'

This Dec will accommodate one or two IC's (up to 16 pins) along with discrete components. Two 16-pin DIL holders are fixed to the board. The Dec is formed in glass-filled nylon and has three bus bar rows each with 16 contacts across the Dec and two independent panels of 20 rows of contacts arranged in 10 pairs with 4 contacts per row.

Board is supplied with a booklet of circuits with full instructions for assembly on the Dec and a control panel which fits into slots in the Dec and is used for mounting potentiometers, switches, lamps etc.

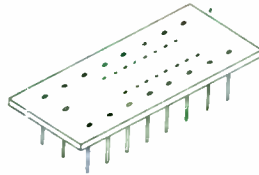
Max. temperature: 130°. Size 122 x 80 x 16mm.

Order As **LY00A** (μ-Dec 'B')

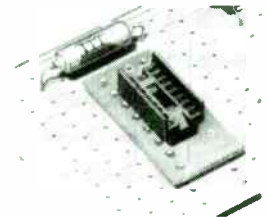


## DIL Holders

Dual-in-line holders which may be plugged directly into the T-Dec or  $\mu$ Dec and which will accommodate a standard 16-pin DIL socket into which a DIL IC (up to 16-pins) may be plugged. Without socket.



With socket ready fitted.



Order As **HX85G** (DIL Holder)

Order As **HX86T** (DIL Holder With Socket)

## EDGE CONNECTORS



A moulded edge connector designed for applications where the pcb is only occasionally disturbed, but a reliable trouble-free performance is essential. The body moulding is black polypropylene and the contact springs are electro-tinned brass. The connectors are open-ended so that wide pcb's may be inserted or the ends may be closed by adding mounting feet type G or L (except 0.1in. 40-way). Contacts have tags suitable for wiring or direct insertion in pcb's when a 1.4mm dia. hole is required. All types are single-sided with backing contacts to hold the board tightly.

### Specification

Current rating: 5A per contact  
 Working voltage: 0.1in: 350V AC peak or DC  
 0.15: 500V AC peak or DC  
 Pcb thickness nominal: 1.6mm

Eight different types are available. (Please note 40-way type cannot be fitted with mounting feet).

Type	Pitch	No. of contacts	Dimensions (mm)		Fix centres with mounting feet fitted	Max board width with mounting feet type G or L fitted
			Length	Width		
108	0.1in	8	27.2	8.7	37.3	22.1
116	0.1in	16	47.5	8.7	57.7	42.4
124	0.1in	24	67.8	8.7	78.0	62.7
132	0.1in	32	88.1	8.7	98.3	83.1
140	0.1in	40	103.4	8.7	-	-
158	0.15in	8	41.2	8.7	48.8	33.5
1512	0.15in	12	56.4	8.7	64.0	48.8
1516	0.15in	16	71.6	8.7	79.3	64.0

Moulding height: 13.9mm  
 Board insertion depth: 8.7mm  
 Tag length: 3.2mm

### Order As

- |                       |                        |
|-----------------------|------------------------|
| FL83E (Edge Conn 108) | FL87U (Edge Conn 140)  |
| FL84F (Edge Conn 116) | FL88V (Edge Conn 158)  |
| FL85G (Edge Conn 124) | FL89W (Edge Conn 1512) |
| FL86T (Edge Conn 132) | FL90X (Edge Conn 1516) |

## Mounting Feet for Edge Connectors



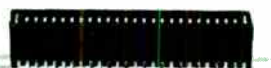
Nickel-plated brass mounting feet available in three styles, to suit our Edge Conns (except Edge Conn 140). All feet have 6BA (M3) clear fixing holes.

Three styles are available and may be easily fitted to suit your application. Supplied in pairs.

Order As **FL91Y** (Edge Conn Feet G)  
**FL92A** (Edge Conn Feet H)  
**FL93B** (Edge Conn Feet L)

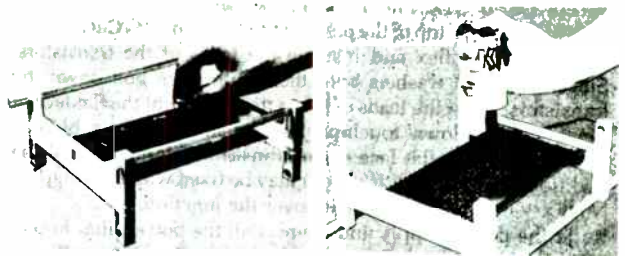
## Silver-Plated Type

24-way 0.1in pitch silver-plated contacts. Intended for use with DM02. Includes a polarising key fitted in position 5.



Order As **FL30H** (Edge Conn Silver)

## PCB HOLDER



This extremely useful holder makes pcb assembly much easier. It holds the pcb steady for drilling and inserting components. A special pad holds the components in position so that the board can be turned over for soldering. Adjustable for any pcb up to 300 x 350mm (12 x 14in).

Order As **XB90X** (Fixircuit)

## "SENO GS" ETCHING SYSTEM



The "Seno GS" etching system is a completely safe, clean and extremely simple system for laboratory, school or home use. System comprises a two section heavy duty polythene sleeve with the etching chemicals sealed in the lower section. A prepared board is placed in the upper compartment and the top of the bag is sealed. The seal between compartments is removed and the etchant flows over the board. A constant visual check on the board is possible while etching is taking place. When etching is completed the liquid is drained into the lower compartment which is then sealed off again. The top seal is now removed some water poured in to rinse the board. Now simply remove the perfectly etched board — all without personal contact with the acid!

A special neutraliser is provided so that when etchant is exhausted the neutraliser can be added. These are mixed together in sealed bag. Two hours later, the pack is a semi-hard neutral mass for disposal straight into the dustbin. Etchant is sufficient for approximately 1600cm<sup>2</sup> of copper. The complete kit is supplied in an expanded polystyrene storage box which facilitates totally safe storage between applications.

Order As **XB43W** (Seno Etch System)

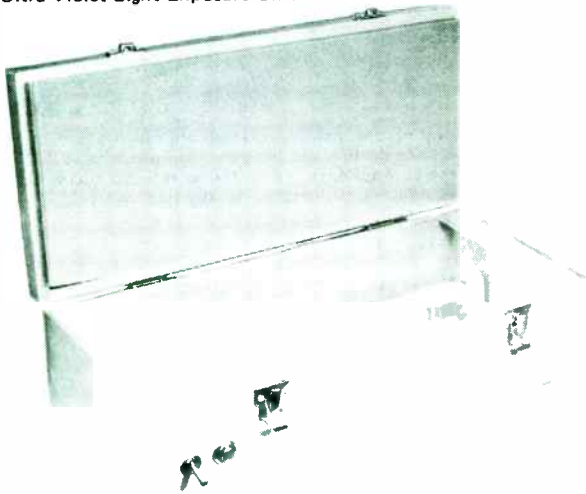
## UV PHOTO-ETCH SYSTEM



The UV photo-etch system of making pcbs has many advantages over any other system for prototypes or production in very small quantities.

1. The original artwork can be produced using a professional method, because it does not have to be made on the pcb.
2. The production run can be made from the same artwork as the prototype is not destroyed during the etching process.
3. Alterations can be made without having to re-make the whole artwork.
4. The artwork may be filed and additional copies of the original pcb made at any time.
5. Magazine artworks could be turned into a positive transparency by a professional photographer at very little cost, saving hours of time making a new artwork.
6. The system is very simple to use and does not require a darkroom. Full instructions are supplied with the ultra-violet light exposure unit.

### Ultra-Violet Light Exposure Unit



A solid beechwood case with hardboard base containing two 8W ultra-violet tubes. Case size 406 x 177 x 102mm. The lamps are covered by a 4mm glass sheet masked to give a maximum exposure area of 254 x 157mm. The beechwood lid is hinged and clips down at the front. A pressure pad fixed to the lid ensures an even and firm pressure on the pcb to keep it in good contact with the glass over the whole exposure area. The box incorporates a mains switch and indicator and is connected to the mains (240V AC) via mains lead supplied. The unit must be used with our Photo-etch Board and after exposure the board must be developed using sodium hydroxide solution (caustic soda) available from most chemists (e.g. Boots) before etching in ferric chloride in the normal way. Full instructions for use are supplied with the exposure unit.  
**Order As XY10L (UV Exposure Box)**

### Presensitised Copper-clad Boards

A single-sided copper-clad fibre-glass board coated with a positive photo-resist suitable for use with our UV exposure box. The board is supplied in a light-safe polythene bag and should be kept in the bag until it is required for use. Size 203 x 114mm.  
**Order As BW19V (Photo-Etch PCB)**

### Drafting Film Pack

A pack containing 5 sheets of polyester drafting film and one sheet of 0.1 x 0.1 in. (2.54mm) grid. Lay one sheet of film on the grid which then assists in exact placing of the tracks and pads that make up the artwork. The piece of film with artwork on it is then placed on the UV exposure unit with the coppered photo-resist board on top of it and the lid closed. The artwork may be altered or re-used whenever required.

**Order As BW20W (Photo-Etch Drafting Pack)**

## FERRIC CHLORIDE CRYSTALS

A packet of anhydrous Ferric Chloride ( $FeCl_3$ ) crystals for etching copper clad boards. Packet contains sufficient crystals to make one pint of solution. Dissolve in cold water. Store and etch in plastic or glass vessels. With regular stirring, etching will take about 20 minutes or longer depending on how many times solution has been used before. One pint will etch about 350 square inches (0.226 square metres).

**Order As XX12N (Etch Crystals)**

## PRINTED CIRCUIT ETCHING FLUID

A plastic bottle containing etching fluid. 250cc.

**Order As WF10L (Etcher Fluid)**



## PRINTED CIRCUIT BOARD ETCH RESIST MARKER PEN



Nylon tipped pen for fast fabrication of perfect printed circuit boards. The ink adheres perfectly to copper and is completely resistant to ferric chloride and other usual etchant solutions. The pen is completely filled with ink and a spare tip is located in the rear of the pen. Draw the planned circuit onto a thoroughly cleaned copper laminated board and allow to dry. Then immerse the board in etching fluid until all the copper is dissolved. The ink can then be removed with Aero-Klene and the circuit board is then ready for use. This pen incorporates a unique valve-controlled ink dispenser to avoid evaporation of ink when pen is not in use.  
**Order As HX02C (PCB Pen)**

## ETCH RESIST REMOVER

Cloth made damp with remover will dissolve Etch Pen ink after etching and leave copper tracks clean. In bottle containing 30cc.

**Order As HX03D (Resist Remover)**



## COPPER-CLAD BOARDS

A range of copper-clad boards suitable for making your own printed circuit boards.

The following types and sizes are available:

Single-sided SRBP:	203 x 102mm (8 x 4in) (Small Single)
	254 x 152mm (10 x 6in) (Medium Single)
	305 x 203mm (12 x 8in) (Large Single)
Single-sided Fibre Glass:	203 x 102mm (8 x 4in) (Small Single)
	254 x 152mm (10 x 6in) (Medium Single)
	305 x 203mm (12 x 8in) (Large Single)
Double-sided Fibre Glass:	254 x 152mm (10 x 6in) (Medium Double)
<b>Order As</b>	<b>HX00A (PCB SRBP Small Single)</b>
	<b>WF38R (PCB SRBP Medium Single)</b>
	<b>WF39N (PCB SRBP Large Single)</b>
	<b>HX01B (PCB Fibre Glass Small Single)</b>
	<b>WF40T (PCB Fibre Glass Medium Single)</b>
	<b>WF41U (PCB Fibre Glass Large Single)</b>
	<b>WF42V (PCB Fibre Glass Medium Double)</b>



## ETCH RESIST DRAFTING AIDS

A range of professional etch resist drafting aids for use directly on the pcb or in making 1:1 artwork for use with photo resist pcb's, or 2:1 artwork for masters for professional pcb manufacturers.

### BLACK TAPES

A black crepe tape with a matt finish for high quality photographic reproduction. The crepe tape can be made into tight curves without distortion at the edges. A good adhesion is obtained even on irregular surfaces.

Tapes are on 16.46m rolls.

The following widths are available.

0.031in.  Order As BW21X (Track Tape 31)

0.040 in.  Order As BW22Y (Track Tape 40)

0.050 in.  Order As BW23A (Track Tape 50)

0.062 in.  Order As BW24B (Track Tape 62)

0.080 in.  Order As BW25C (Track Tape 80)

0.100 in.  Order As BW26D (Track Tape 100)

0.125 in.  Order As BW27E (Track Tape 125)

0.150 in.  Order As BW28F (Track Tape 150)

0.200 in.  Order As BW29G (Track Tape 200)

### BLACK CIRCLES

Die cut circles manufactured in black crepe and supplied in the form of a roll with half of each symbol stuck to a clear carrier tape. To apply, separate the circles from the carrier, release the film from its protective backing paper and position carrier with circle on the artwork or pcb. Then having applied pressure to the circle, gently pull away the carrier film at an angle leaving the circle securely in position. This method is undoubtedly the most simple, accurate and speedy way to make pcb artwork.

Circles are supplied in rolls of 250 circles.

The following sizes are available:

Outside diameter (in.)	Inside diameter (in.)	
0.075	0.02	Order As BW30H (Pad 075)
0.100	0.03	Order As BW31J (Pad 100)
0.125	0.03	Order As BW32K (Pad 125)
0.15	0.04	Order As BW33L (Pad 150)
0.2	0.04	Order As BW34M (Pad 200)
0.3	0.05	Order As BW35Q (Pad 300)
0.4	0.08	Order As BW36P (Pad 400)
0.5	0.10	Order As BW37S (Pad 500)
0.6	0.10	Order As BW38R (Pad 600)

### DUAL-IN-LINE IC CLUSTERS

Sixteen circles arranged in a 0.1 by 0.3in pitch to suit IC's up to 16-pin DIL. Symbols could be laid end to end and/or split to make them wider (0.6in.) to suit any size IC package. These pads offer a considerable time saving over using individual pads. Available in 1:1 or 2:1 sizes.

Supplied in rolls of 100 16-pin DIL symbols.

1:1 Order As BW39N (IC Pads 100)

2:1 Order As BW40T (IC Pads 200)



### DRAFTING TEMPLATE

A clear plastic template to speed the job of placing pads for pcb artworks. Holes are laid out over the template in various patterns and pitches; simply lay the template over the artwork or pcb, put a pin through the appropriate holes to lightly mark the position, remove the template and put the pads down centred on the marks. The following patterns are marked on the template. DIL packages up to 40 pin at 0.3in and 0.6in. pitch as applicable, T05, T018 and T03 transistor packages including fixing holes for T03, 8-pin, 10-pin and 12-pin round IC packages. In addition there are a series of precision holes to check drill sizes between 0.6mm and 2mm where drills are often too small to be marked on the shank.

Manufactured in clear plastic, overall size: 64 x 51mm.

Order As BW41U (Drafting Template)

## CHOOSING AN AERIAL

If you want to get the best out of your FM receiver or TV set invest in a good aerial. So many people spend hundreds of pounds on a TV set or FM receiver and then never allow it to work as well as it could, because they won't spend a few more pounds on a good aerial.

If at all possible always fit an aerial outside and as high as possible and for best results it should have a clear view to the horizon. Aerials in the loft can be satisfactory but they will need to be carefully positioned as they are affected by water tanks and pipes and cables. Remember the signal level inside a roof can be as little as one tenth of the level outside, so you will need a bigger aerial to achieve the same result that an outside aerial would give. Set-top aerials are rarely completely satisfactory as they are affected by people moving in the room, cars passing by, trees moving outside and other effects of this kind. In flats indoor aerials only work if your outside wall is on the side of the block nearest the transmitter.

The farther you live from the transmitter the bigger the aerial you will need. For colour on uhf TV or stereo on vhf radio you will need a bigger aerial than for mono, and for the new generation of teletext receivers you will need an ever better aerial.

For TV it is very important to ensure that you choose the right group aerial for your local transmitter. There are six groups generally in use in Europe and they are:

Group A	: Channels 21-34
Group B	: Channels 39-53
Group CD	: Channels 48-68
Group K	: Channels 21-48
Group E	: Channels 39-68
Group W	: Channels 21-68

Our table of transmitting stations shows which group aerial will be needed to receive the station you require. If you choose a wideband aerial in order to receive from several different transmitters it will need to be larger than its equivalent single group aerial to give the same gain over the whole band.

The aerial should point directly towards the transmitter with the cross-pieces (elements) at right angles to the transmitter. If the polarisation is horizontal (H), circular (C) or slant (S) mount the aerial so that the elements are horizontal whilst if the polarisation is vertical the elements of the aerial should be vertical. If there is a major obstruction, hill, large building, gasometer etc. directly in line with the transmitter it can sometimes improve reception if the aerial is pointed slightly to one side of the direction of the transmitter. Raising the height of the aerial can also improve reception. Often raising an aerial by as little as one metre can be equivalent to doubling the size of the aerial. With VHF radio aerials the smallest element should be closest to the transmitter and mounted at least 600mm (2ft) from the nearest TV aerial. If you get a hiss on stereo, but not on mono you need a bigger aerial. If you get a whispering hiss or 'birdie' on mono and stereo (especially on Radio 3) the signal level is too high and it will be necessary to fit an attenuator in the lead. If you get this kind of hiss in stereo only use a bigger aerial to make it more directional. (In general the bigger the aerial the more selective it will be in picking up signals only from the front and not from the sides or rear). If high pitched sounds are distorted turn the aerial for least distortion rather than maximum signal strength and use a more directional aerial. (In this respect use of a cranked mast can help as this gives some lateral as well as rotational adjustment which can be a help.) If crackles from passing vehicles are a problem mount the aerial such that the roof shields it from the road. To reduce the effects of passing aircraft causing volume changes use two aerials stacked one above the other.

Continued on page 99







## VHF FM AERIALS

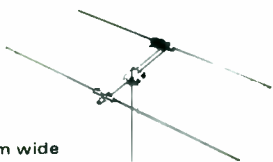
A range of high quality aerials for use with Band II Vhf Fm mono or stereo receivers. The aerials offer VSWR's as low as 1.05:1 have an even response to within ½dB over the band, display high directivity for stereo reception free from multipath distortion, and give up to 1½dB extra gain with patented 'Trumatch' dipole (except FM224).

### 2-Element

Suitable for reception areas close to the transmitter, it is a single dipole and reflector 'H' array. Supplied complete with Universal Clamp Type 1.

Forward Gain: 3dB  
Overall Size: 0.68m long x 1.73m wide

Order As XQ22Y (Mushkiller FM224)



### 3-Element

Suitable for good reception areas. It features the 'Trumatch' dipole, one director and one reflector. Supplied complete with Universal Clamp Type 1.

Forward Gain: 6dB  
Overall Size: 1.08m long x 1.73m wide

Order As XQ23A (Mushkiller FM234T)  
(Delivery by carrier)



### 3-Element Lightweight

Suitable for good reception areas. This aerial is the same as the FM234T except that it uses smaller diameter aluminium tubes throughout. It is therefore ideal for loft mounting as well as outdoor use, though it will not be as hardwearing outdoors as the FM234T. Supplied complete with Universal Clamp Type 1 and Loft Bracket EM4 and fitting instructions.

Forward Gain: 6dB  
Overall Size: 1.05m long x 1.73m wide.

Order As XQ24B (Mushkiller FM235T)

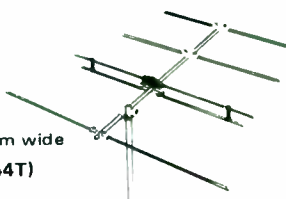


### 4-Element

Suitable for outer reception areas. Supplied with Universal Clamp Type 1.

Forward Gain: 7dB  
Overall Size: 1.66m long x 1.73m wide

Order As XQ25C (Mushkiller FM244T)  
(Delivery by carrier)

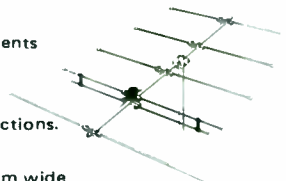


### 5-Element Lightweight

Similar to FM235T but with 5 elements and suitable for outer and distant reception areas. Supplied complete with Universal Clamp Type 1, Loft Bracket EM4 and fitting instructions.

Forward Gain: 8dB  
Overall Size: 1.87m long x 1.73m wide

Order As XQ26D (Mushkiller FM255T)  
(Delivery by carrier)

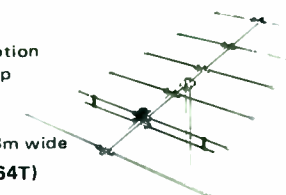


### 6-Element

Suitable for distant and fringe reception areas. Supplied with Universal Clamp Type 1.

Forward Gain: 9dB  
Overall Size: 2.65m long x 1.73m wide

Order As XQ27E (Mushkiller FM264T)  
(Delivery by carrier)

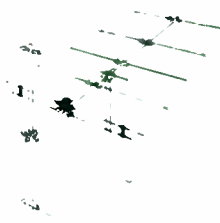


### 8-Element

Suitable for extreme fringe area reception. Supplied with Universal Clamp Type 1.

Forward Gain: 11dB  
Overall Size: 2.65m long x 1.73m wide x 0.87m high

Order As XQ28F (Mushkiller FM284T)  
(Delivery by carrier)

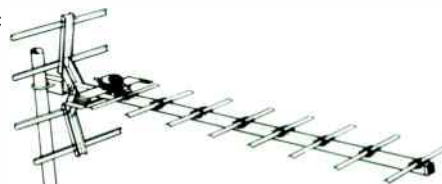


## UHF TV AERIALS

### Trucolour

A range of high quality aerials for use with Band IV and V UHF monochrome and colour TV sets. Each type is available in three channel groups.

### 10-Element

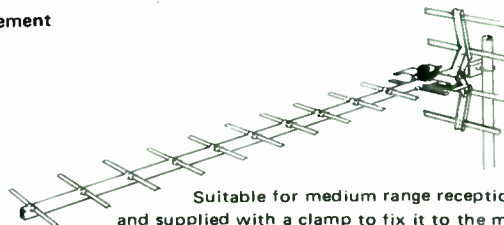


Suitable for use in the primary service area and supplied with a clamp to fix it to the mast.

	Group A	Group B	Group C/D
Forward Gain (±0.5dB)	11.7dB	11.7dB	11.5dB
Front/Back Ratio (±2dB)	28.3dB	28.3dB	29.2dB
Acceptance Angle (±3°)	±21°	±21°	±23°
Overall Size:	1.1m	0.9m	0.82m

Order As XQ29G (Trucolour TC10 Group A)  
XQ30H (Trucolour TC10 Group B)  
XQ31J (Trucolour TC10 Group C/D)

### 13-Element

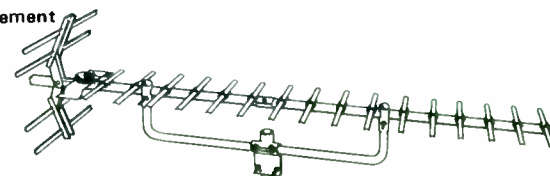


Suitable for medium range reception and supplied with a clamp to fix it to the mast.

	Group A	Group B	Group C/D
Forward Gain (±0.5dB)	13.0dB	13.0dB	13.4dB
Front/Back Ratio (±2dB)	27.2dB	27.2dB	28.2dB
Acceptance Angle (±3°)	±19°	±19°	±21°
Overall Size:	1.4m	1.18m	1.07m

Order As XQ32K (Trucolour TC13 Group A)  
XQ33L (Trucolour TC13 Group B)  
XQ34M (Trucolour TC13 Group C/D)

### 18-Element



Suitable for medium to long range reception and supplied with a Universal Clamp Type 1 and U support arm.

	Group A	Group B	Group C/D
Forward Gain (±0.5dB)	14.7dB	14.7dB	14.5dB
Front/Back Ratio (±2dB)	30.7dB	30.7dB	29.7dB
Acceptance Angle (±3°)	±16°	±16°	±17°
Overall Size:	1.82m	1.54m	1.41m

Order As XQ35Q (Trucolour TC18 Group A)  
XQ36P (Trucolour TC18 Group B)  
XQ37S (Trucolour TC18 Group C/D)

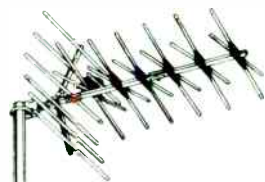


**Extragain**

A range of high quality, high gain aerials for use with Band IV and V UHF monochrome and colour TV sets. Especially suitable for use with teletext receivers. They are ideal for problem areas, ghosting and long-range reception.

Features are the high forward gain Quad-X dipole and Quad-X director chain; the high front to back ratio and improved directivity resulting from a massive six element full-wave reflector and the extra accurate matching given by a specially designed integral balun and resonator.

**5-Bay Director Aerial**

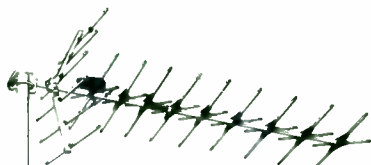


Suitable for local areas, this aerial has five powerful Quad-X director bays giving equivalent gain to that provided by a standard 18-element aerial. Available only as a wideband (W) giving coverage of all UHF channels. A very compact and economical aerial; supplied complete with clamp.

Forward Gain: 11dB  
 Front/Back Ratio: 26-27dB  
 Acceptance Angle: ±17-20°  
 Overall size: 0.76m long approx.

Order As XQ38R (Extragain XG5)

**8-Bay Director Aerial**

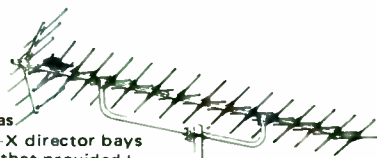


Suitable for fringe areas, this aerial has eight powerful Quad-X director bays giving equivalent gain to that provided by 2 standard 18-element aerials. Supplied with a three-way clamp for tail mounting, the aerial is available in three channel groups and a wideband version is also available.

	Group A	Group B	Group C/D	Wideband
Forward Gain (dB)	15	15	16	13
Front/Back Ratio (dB)	26-32	29-31	29-31	26-31
Acceptance Angle (degrees)	±15-17	±15-16	±14-16	±14-17
Overall size: 1.38m long approx.				

Order As XQ39N (Extragain XG8 Group A)  
 XQ40T (Extragain XG8 Group B)  
 XQ41U (Extragain XG8 Group C/D)  
 XQ42V (Extragain XG8 Wideband)

**14-Bay Director Aerial**



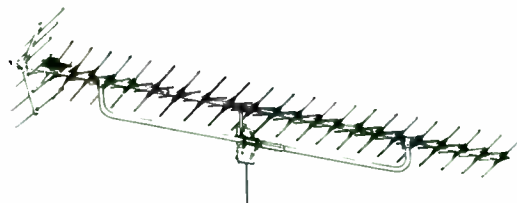
Suitable for outer fringe areas, this aerial has fourteen powerful Quad-X director bays giving equivalent gain to that provided by 4 standard 18-element aerials. Supplied with a U support arm and three-way clamp, the aerial is available in three channel groups and a wideband version is also available.

	Group A	Group B	Group C/D	Wideband
Forward Gain (dB)	17	17	18	14
Front/Back Ratio (dB)	27-31	30-35	30-34	27-34
Acceptance Angle (degrees)	±13-15	±14-15	±13-16	±13-15
Overall size: 2.11m long approx.				

Order As XQ43W (Extragain XG14 Group A)  
 XQ44X (Extragain XG14 Group B)  
 XQ45Y (Extragain XG14 Group C/D)  
 XQ46A (Extragain XG14 Wideband)

(Delivery by carrier)

**21-Bay Director Aerial**



Suitable for extreme fringe areas, this extremely powerful aerial is the ultimate in UHF reception. The aerial has 21 powerful Quad-X director bays giving gains of up to 21dB. Supplied with a U support arm and special double clamp, the aerial is available in three channel groups and a wideband version is also available.

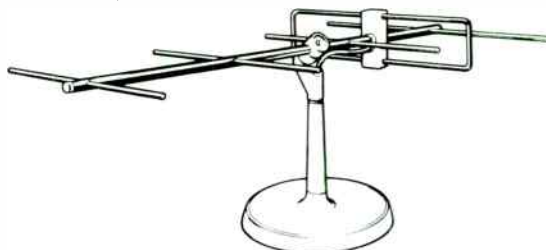
	Group A	Group B	Group C/D	Wideband
Forward Gain (dB)	19	20	19	16
Front/Back Ratio (dB)	30-33	31-37	31-33	30-37
Acceptance Angle (degrees)	±11-14	±10-12	±10-12	±10-14
Overall Size: 3.38m long approx.				

(It is recommended that this aerial be mounted on a 51mm (2in.) mast with a lashing kit No. 7).

Order As XQ47B (Extragain XG21 Group A)  
 XQ48C (Extragain XG21 Group B)  
 XQ49D (Extragain XG21 Group C/D)  
 XQ50E (Extragain XG21 Wideband)

(Delivery by carrier)

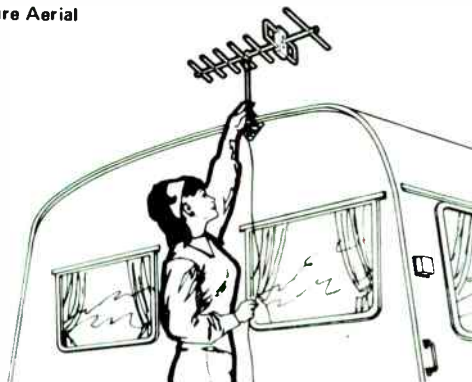
**Indoor Set-Top Aerial**



A UHF set-top aerial available only in wideband version. This high quality aerial allows for easy adjustment to give horizontal or vertical polarisation, and is electrically isolated for safety. Assembly instructions on box.

Order As XQ51F (Super Set-Top)

**Leisure Aerial**



A specially designed aerial for caravanning, camping, boating etc. suitable for reception of all UHF TV stations at home and abroad. The aerial can be fitted in seconds and the pack comprises a 7-element wideband aerial adjustable for horizontal or vertical polarisation with gold anodised elements and weatherproof cable junction unit and a unique mounting bracket that gives a choice of permanent or 'no hole' fixing. Full instructions and UK stations guide are provided on the carton.

Order As XQ52G (Caratenna CA7)

**NEW**

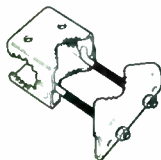
# AERIAL MOUNTS



## MOUNTING BRACKETS AND MASTS

### Bracket No. 1

A universal clamp for masts up to 51mm (2in.) diameter.



Order As **BW42V** (Universal Clamp Type 1)

### Bracket No. 2

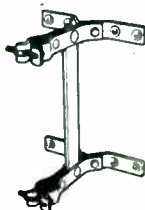
A surface mounting bracket for masts up to 25.4mm (1in.) diameter.



Order As **BW43W** (Mast Bracket Type 2)

### Bracket No. 3

A wall-mounting bracket for 25.4 to 32mm diameter mast (1 to 1¼in.) and providing a 102mm (4in.) stand-off.



Order As **XQ53H** (Mast Bracket Type 3)

### Bracket No. 8

A heavy-duty double wall-mounting bracket for masts up to 51mm (2in.) diameter and providing a 203mm (8in.) stand-off.



Order As **XQ54J** (Mast Bracket Type 8)

### Bracket No. 14

A handy wall-mounting bracket for 25.4 to 32mm diameter masts (1 to 1¼in.).



Order As **BW44X** (Mast Bracket Type 14)

### Loft Bracket EM4

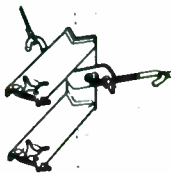
A stand-off arm or sturdy loft bracket size 305 x 19mm (12 x ¾in.).



Order As **BW45Y** (Loft Bkt EM4)

### Lashing Kit No. 4

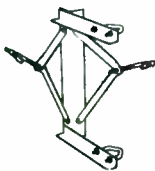
A single lashing with bracket to give 152mm (6in.) stand-off for masts up to 25.4mm (1in.) diameter.



Order As **XQ55K** (Lashing Kit Type 4)

### Lashing Kit No. 6

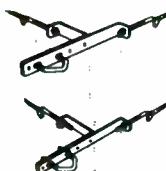
A heavy duty single lashing with bracket to give 178mm (7in.) stand-off for masts up to 51mm (2in.) diameter.



Order As **XQ56L** (Lashing Kit Type 6)

### Lashing Kit No. 7

A heavy duty double lashing with bracket to give 140mm (5½in.) stand-off for masts up to 51mm (2in.) diameter.



Order As **XQ57M** (Lashing Kit Type 7)

### Lashing Kit No. 9

A single lashing with bracket to give 102mm (4in.) stand-off for 25.4 to 32mm diameter masts (1 to 1¼in.).



Order As **XQ58N** (Lashing Kit Type 9)

### Mast Type C

A 914.4 x 25.4mm (3ft x 1in.) swan-neck mast giving a 762mm (30in.) or 305mm (12in.) stand-off. Manufactured in tubular aluminium, wall thickness 1.6mm.

Order As **XQ59P** (Mast C)



### Mast Type D

A 914.4 x 25.4mm (3ft x 1in.) cranked mast giving a 229mm (9in.) stand-off. Manufactured in tubular aluminium, wall thickness 1.6mm.

Order As **XQ60Q** (Mast D)



### Mast Type E

A 1829 x 25.4mm (6ft x 1in.) straight mast. Manufactured in tubular aluminium, wall thickness 1.6mm.

Order As **XQ61R** (Mast E)

(Delivery by carrier)



### Mast Type G

A 3048 x 38mm (10ft x 1½in.) straight mast. Manufactured in tubular aluminium, wall thickness 1.6mm.

Order As **XQ62S** (Mast G)

(Delivery by carrier)



### Mast Type M

A 1524 x 25.4mm (5ft x 1in.) cranked mast giving a 356mm (14in.) stand-off. Manufactured in tubular aluminium, wall thickness 1.6mm.

Order As **XQ63T** (Mast M)

(Delivery by carrier)



### Mast Type R

A 1829 x 32mm (6ft x 1¼in.) cranked mast giving a 127mm (5in.) stand-off. Manufactured in tubular aluminium, wall thickness 1.6mm.

Order As **XQ64U** (Mast R)

(Delivery by carrier)

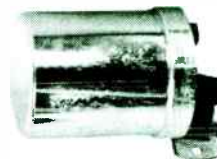


## TV AND FM RADIO AERIAL AMPLIFIERS

### Masthead Amplifier

A masthead amplifier for UHF TV and FM stereo radio in a fully weatherproof housing with a perforated strip and bracket for mast or surface mounting.

The power to drive the amplifier is fed up the co-axial feeder cable by a special power unit which must be bought separately (see below). It is essential that the right amplifier is selected from the four types available as the gain falls off rapidly outside its band.



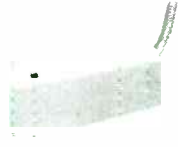
Group	Channels	Typical Gain
A	21-34	15dB
B	39-53	14dB
CD	48-68	11dB
VHF FM	88-100MHz	15dB

Order As **BW46A** (Masthead Amp MA102 Group A)  
**BW47B** (Masthead Amp MA102 Group B)  
**BW48C** (Masthead Amp MA102 Group C/D)  
**BW49D** (Masthead Amp MA102 VHF)



## Masthead Amp Power Unit

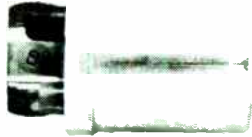
A power unit for use with our Masthead Amp MA102. The power unit plugs into the mains (240V) and supplies a low voltage (41V DC off load, 18V DC at 10mA) up the co-axial feeder to the amplifier. Supplied with instructions and screws to fix to skirting board if desired. White moulded housing. Overall Size: 107 x 92 x 51mm.



Order As BW50E (Power Unit PU102)

## DIPLEXER AND SPLITTERS

### VHF/UHF Diplexer



A masthead mounting diplexer for combining or dividing VHF and UHF antenna downloads. Supplied with mounting bracket.

Insertion loss: VHF input Band II <1dB  
UHF inputs Bands IV/V <2dB  
Isolation: Band II/UHF 20dB (typical)

Order As BW51F (Diplexer UF2)

### Combiner/Splitter



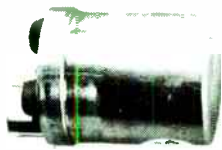
A wideband low loss non resistive unit for combining antenna downloads or dividing equally the signals on one download.

Frequency Range: 40–860MHz  
Insertion Loss VHF: <3.5dB  
UHF: <4.0dB

Isolation between spurs: 20dB  
Supplied in a weatherproof housing for mast or surface mounting. Line power block on one spur. Supplied with mounting bracket.

Order As BW52G (Splitter CS100)

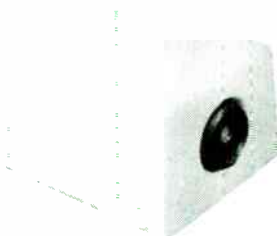
### Masthead Splitter Unit



A resistive splitter which divides equally the signals on an antenna download between two receivers. Suitable for UHF or VHF. Insertion Loss: 6dB (nominal)

Order As BW53H (Splitter SB2)

### Surface-mounting Splitter Unit



A unit similar to the SB2 but for surface mounting. White moulded housing and fixing screws provided. No soldering required. Overall size: 55 x 40 x 29mm.

Order As HX88V (Aerial Splitter SB11)

## TV AND FM OUTLETS

### Single Co-axial Outlet Surface



A surface mounting co-ax outlet in a moulded white housing. Co-ax cable enters from rear and is screw terminated. For use with VHF or UHF signals. Screws supplied. Overall size: 44 x 35 x 24mm

Order As HX87U (Surface Co-Ax Outlet)

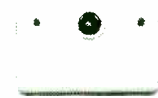
### Double Co-axial Outlet Surface



As above, but with two completely separate co-ax sockets and screw terminals in rear for two separate cables. Overall size: 63 x 44 x 29mm

Order As BW54J (Surface Double Co-Ax Outlet)

### Single Co-axial Outlet Flush



A flush mounting co-ax outlet with a white thermoset front plate. Fits standard conduit and surface boxes (see electrical accessories) to BS1363. Screws supplied. No soldering required. For use with VHF or UHF signals. Front 65mm square. Depth (from rear of plastic moulding) 10mm.

Order As BW55K (Flush Co-Ax Outlet)

### Double Co-axial Outlet Flush



As above, but with two completely separate co-ax sockets and screw terminals inside for two separate cables. Overall size: 65mm square. Depth (from rear of plastic moulding) 10mm.

Order As BW56L (Flush Dble Co-Ax Outlet)

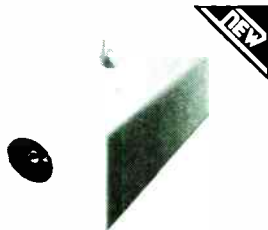
### TV/FM Diplexer



A surface mounting integral diplexer which separates the UHF TV signals from the FM radio signals which have been combined on one download. Screw fixing for co-ax cable at rear, two co-ax sockets at the front, one marked TV and one marked FM. In a white moulded housing with fixing screws supplied. Overall size: 63 x 44 x 29mm.

Order As BW57M (TV/FM Outlet)

## AERIAL SWITCH



A surface mounting aerial switch in a white moulded housing. For switching a TV or FM receiver from one aerial to another. Or it can be used to switch one downlead from one receiver to another. Screw fixing at rear for two separate co-axial downleads and one standard co-ax socket at the front. Supplied with fixing screws. Overall size: 63 x 44 x 29mm.

**Order As BW58N (Aerial Switch)**

## BALUN



A high quality receiver transformer to enable 75Ω co-ax downleads to be used when FM receiver has 240 to 300Ω balanced aerial input. Instructions on packet. (No soldering required).

**Order As LB09K (75/300 Balun)**

## ATTENUATORS

For in line connection. Standard co-ax socket at one end, standard co-ax plug at other end. In bright aluminium alloy bodies and suitable for VHF and UHF. They have a low VSWR and are clearly marked and colour coded. Three types available.

6dB Red    12dB Blue    18dB Green  
Length 45mm (approx.)

**Order As BW59P (Attenuator 6dB)**  
**BW60Q (Attenuator 12dB)**  
**BW61R (Attenuator 18dB)**



## FM AERIAL



A folded dipole aerial for indoor use. Suitable for use at frequencies 88 to 108MHz (each side is exactly a 1/4 wavelength at 98MHz). Supplied with 1.75m of down lead terminated with spade connectors. Impedance: 300Ω balanced.

**Order As LB11M (FM Tape Aerial)**

## FERRITE RODS



Round ferrite rods for medium wave/long wave radios. Available in the following sizes which may be cut into shorter lengths if required with a hacksaw.

Type	Length	Diameter	Material Grade	Specific inductance
538	127mm(5in)	9.5mm(3/8 in)	F14	58nH
638	152.4mm(6in)	9.5mm(3/8 in)	F14	58nH
612	152.4mm(6in)	12.7mm(1/2 in)	F14	
816	203.2mm(8in)	8mm(5/16 in)	F14	

**Order As LB07H (Ferrite Rod 538)**  
**LB08J (Ferrite Rod 638)**  
**LB15R (Ferrite Rod 612)**  
**LB16S (Ferrite Rod 816)**

## FERRITE ROD AERIAL



A 5in long x 3/8 in diameter ferrite rod onto which a medium wave and long wave coil are wound. Coils may be moved on rod for best performance (then fixed with Denfix). Designed to be used with our Twin 00 tuning capacitor. Inductance of medium wave coil: 370μH; long wave coil: 4.1mH. Typical coverage: medium wave – 550 to 1550kHz (193m to 545m); long wave – 150 to 280kHz (1070 to 2000m). Aerial is supplied with complete circuit of a good quality medium/long wave radio using components available from Maplin which will run on a 9V battery (e.g. PP9).

**Order As LB12N (MW/LW Aerial)**

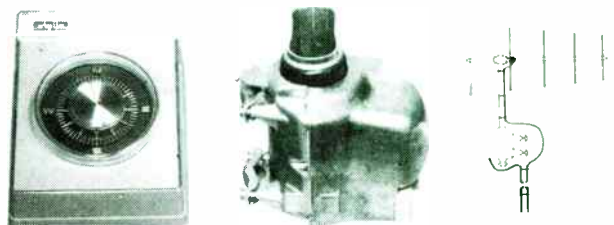
## TELESCOPIC AERIAL



An eight section telescopic aerial which is hinged for operation at different angles. Dimensions of base section 10mm dia with a tapped 4BA hole in the centre at the bottom. Length: 176mm unextended; 1.1 metres extended.

**Order As LB10L (Telescopic Aerial 4ft)**

## AERIAL ROTATOR



The aerial rotator is designed to turn and accurately position even the largest TV or FM antennae, assuring the best possible signal or picture for black and white or colour TV sets.

Rotation of drive unit on the roof is synchronised with the position of the lighted indicator on the control unit. This positive control is accomplished by a highly reliable electromechanical system. It is similar to a radar system which allows you to position the antenna in exactly the desired direction.

The connecting cable between the control unit and the drive unit carries only safe, low voltage power. The operating cycle is started by turning the control knob to the desired direction. When the antenna reaches the selected position, the unit shuts off automatically and draws no current until it is again activated by turning the control knob.

The control box is finished in beige textured plastic, overall size 205 x 150 x 110mm. A length of 4-core cable has to be connected between control box and drive unit. (our multi-core 4-way is ideal). The control box is connected directly to the mains (240V).

The drive unit can be fixed to masts having diameters 1 1/2 in to 2 1/2 in. The use of a mast of diameter over 1 1/2 in is recommended for unguyed masts over 6 feet long or for large antenna arrays. The antenna support mast should be less than 1.6in dia.

Detailed but easy to follow instructions for fitting and use are supplied.

**Order As XB54J (Aerial Rotator)**





## MOBILE RADIO ANTENNAE



### ANTENNAE

A very high quality range of antennae and mountings covering 68 to 470MHz. manufactured by the world famous firm 'Larsen Electronics Inc.' The antennae feature the special 'Küirod' coating with four separate platings on highest grade 17-7PH stainless steel to get the power out of the aerial for maximum radiation efficiency and give you a 'Küirod' even at 150W. VSWR 1-3:1 (with all fixed mounts).

### Whip Aerial W490



Q Cone supplied with all antennae.



The antenna is manufactured from 17-7PH stainless steel and precisely tapered to give rigidity at high vehicle speeds, yet have maximum spring and give should it hit overhead objects. The whip is quadruple plated with a special 'Larsen' developed combination of nickel, copper and chrome to provide all weather protection and give maximum radiation efficiency in view of skin effect resistance. Band: 66 to 88MHz (supplied with cutting chart)  $\frac{1}{4}$  wavelength. Max power 200W.

Supplied with Q-cone and allen key. The antenna fits all the mounts listed below.

Order As XQ65V (Küirod W490)

### Parallel Rod



The antenna is manufactured from the same materials as the Küirod W490 and thus offers the same superb quality and efficiency. The antenna has parallel sides.

Band: 140 to 470 MHz (supplied with cutting chart).  $\frac{1}{4}$  wavelength.

Max. power: 200W VHF, 150W UHF.

Supplied with Q-cone and allen key. The antenna fits all the mounts listed below.

Order As XQ66W (Q Rod)

### Collinear Antennae

These antennae are manufactured from the same materials as the Küirod W490 and thus offer the same superb quality and efficiency. The phasing coil is streamlined and blends in with the rod for minimum wind drag.

Band: LMC4200: 420 to 440 MHz  
LMC4500: 450 to 470 MHz  
(Both types supplied with cutting charts).

Gain: 5dB  
Max. power: 150W

Supplied with Q-cone and allen key. These antennae fit all the mounts listed below.

Order As XQ67X (Collinear LMC4200)  
XQ68Y (Collinear LMC4500)



## MOUNTS

### Magnetic Mount



A very high quality magnetic mount which will hold very strongly on any ferrous surface. With all antennae, speeds in excess of 100 mph will not dislodge this mount. Heavily enamelled, weather proof unit, it is supplied complete with 5m of RG58 cable. Plug is not supplied. The unit incorporates a threaded mount on to which the Q-cone may be screwed.

Order As BW62S (Mag Mount)

### Gutter Clip

A high quality gutter clip which takes just seconds to clip on to car. The clip is heavily chromed for long life in all weather conditions. The clip incorporates a threaded mount on to which the Q-cone may be screwed. Designed for use with RG58 cable (not supplied).



Order As BW63T (Gutter Clamp)

### Boot Clip

This clip fixes on to the boot lid of the car and is heavily chromed for long life. The clip incorporates a threaded mount on to which the Q-cone may be screwed. Designed for use with RG58 cable (not supplied).



Order As BW64U (Boot-Lid Clip)

### 'L' Bracket

A heavily chromed 'L' bracket for fixing to boot guttering etc. Incorporates a threaded mount on to which Q-cone may be screwed. Designed for use with RG58 cable (not supplied).

Order As BW65V (Larsen L Bracket)

### NLA Mount

This is a permanent mount requiring a  $\frac{3}{8}$  in. dia. hole in the car body. A fully weatherproof high impact plastic cover covers the mount and the Q-cone screws directly on to this. Designed for use with RG58 cable (not supplied).



Order As BW66W (NLA Mount)

### 3dB GAIN COILS



Two kits of parts both of which include the Küirod W490 and give 3dB gain over the band 144 to 174 MHz. The LM150 Kit fits the Mag Mount, Gutter Clamp, Boot-Lid Clip and L Bracket. The NLA150 Kit is suitable for direct mounting and requires a  $\frac{3}{8}$  in. cut-out in the car body. The coils are housed in a tough high impact epoxy base. LM150 Kit contains Küirod W490 (without Q-cone) and LM150 coil.

NLA150 Kit contains Küirod W490 (without Q-cone) a  $\frac{3}{8}$  in. base and NLA coil. Designed for use with RG58 cable (not supplied).

Order As XQ69A (LM150 Kit)  
XQ70M (NLA150 Kit)

For RG58 cable see page 45

### ALLEN KEY

A replacement Allen key to fit the Q-cones supplied with our Larsen antennae.

Order As BW67X (Larsen Allen Key)

### GRUB SCREW

A replacement grub screw with allen head for use with the Q-cones supplied with our Larsen antennae. In packs of ten

Order As BW68Y (Larsen Grub Screw)

## LOW PASS FILTER

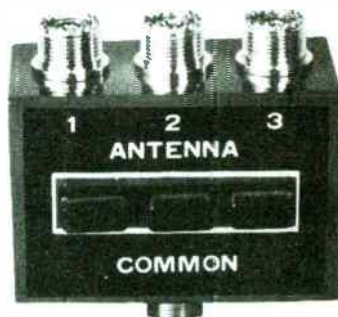


A low pass filter designed to cut interference to TV and Band II transmissions. When inserted in the antenna lead of a transmitter it provides a fast cut-off of harmonic energy over 30MHz. Fitted with a standard 'uhf'-type socket at each end for connection to the transmitter and antenna.

**Specification:**  
 Cut-off frequency: 30MHz  
 VSWR (max. at 27MHz): <1.2:1  
 Impedance: 50Ω  
 Dimensions: 80 x 55 x 40mm

Order As YB00A (Low-Pass RF Filter)

## ANTENNA SWITCH



A switch to permit one transmitter or receiver to be connected to any one of three antennae, or vice versa. The unit has three push-button switches and four 'uhf'-type sockets.

**Specification:**  
 Power handling: 150W  
 SWR: <1.2:1  
 Frequency: up to 30MHz  
 Dimensions: 80 x 55 x 40mm

Order As YB01B (RF Antenna Switch)

## SWR & RELATIVE FIELD STRENGTH METER

This small unit has a single meter calibrated to show SWR and relative field strength. The unit is fitted with a standard 'uhf'-type socket at each end for connection to the transmitter and antenna. A small pickup antenna is provided which screws into the top of the meter so that relative field strength can be determined.

**Specification:**  
 SWR range: 1:1 to 1:3  
 Impedance: 50Ω  
 Accuracy: ±5%  
 Dimensions: 55 x 60 x 120mm



Order As YB03D (SWR FS Meter)

## GRID DIP METER

A transistorised 'Grid' Dip Meter giving a high degree of accuracy. Applications include measuring the resonant frequency of tuned circuits, use as a relative field strength meter etc. Operates over the range 440kHz to 280MHz. Supplied with six coils to cover the band in six ranges: 440kHz to 1.3MHz, 1.3MHz to 4.3MHz, 4MHz to 14MHz, 14MHz to 40MHz, 40MHz to 120MHz, and 120MHz to 280MHz.

Also supplied with crystal earpiece and battery (replacement type PP3).

Complete with 6 page operating instructions detailing several other applications.



Order As YB04E (Grid Dip Meter)

## SWR & TRANSMITTED POWER METER



This small unit has two meters, one to indicate standing wave ratio and one to indicate transmitted power. The unit is fitted with a standard 'uhf' — type socket at each end for connection to the transmitter and antenna.

**Specification:**  
 Measuring method: Direct coupling  
 Max handling power: 1kW  
 Frequency range: 3.5MHz to 150MHz  
 SWR range: 1:1 to 1:3  
 Impedance: 50Ω  
 Accuracy: Power ±20%, SWR ±5%  
 Dimensions: 120 x 60 x 50mm

Order As YB02C (SWR Power Meter)



## COIL FORMERS

### Polystyrene Type

A high insulation, low loss polystyrene coil former for chassis mounting. Supplied fitted with nine pins (1mm dia each) and an iron dust core moulded onto a brass carrier.

Order As **LB40T (9.5 Coil Former)**



### Bakelite with Moulded Base

Two bakelite coil formers each having an integral mounting base. Smaller type has 8BA clear fixing holes, larger type has 6BA clear fixing holes.

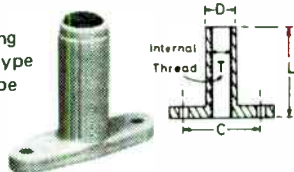
Iron dust core must be purchased separately if required.

Dimensions:

Type	L	D	C	T	Suitable Core
351/8BA	21mm	7mm	20mm	6mm	Type 6
450	29mm	10mm	28mm	8mm	Type 8

Previously sold as Former  $\frac{1}{8}$  in and  $\frac{1}{4}$  in (450).

Order As **LB17T (Former 351)**  
**LB18U (Former 450)**



### Bakelite



Four different length coil formers 4.8mm diameter may be fitted into our Former Base and screened with the appropriate screening can (see table). Iron dust core Type 4 fits all types.

Type	Length	Suitable Screening Can
722/1	14mm	No. 10
722/2	20.5mm	No. 13
722/8	27mm	No. 15
722/4	33mm	No. 14

Order As **LB19V (Former 722/1)**      **LB21X (Former 722/8)**  
**LB20W (Former 722/2)**      **LB22Y (Former 722/4)**

### IRON DUST CORES

Iron dust cores which are threaded and may be adjusted by our Trim TT5. (Iron grade 500).

Type	Diameter	Length	Suits former
4	4mm	10mm	722
6	6mm	12.7mm	351/8BA
8	8mm	17mm	450

Order As **LB41U (Dust Core Type 4)**  
**LB42V (Dust Core Type 6)**  
**LB43W (Dust Core Type 8)**

### BASE PLATE

An SRBP base plate for use with our type 722 coil formers. Fitted with six pins

Overall size: 12.7mm square x 7mm high.

Order As **LB44X (Former Base)**



### SCREENING CANS



A range of screening cans for use with our type 722 formers and Former Base.

Type	Width (square)	Length	Suits former
No. 10	12.7mm	17.5mm	722/1
No. 13	12.7mm	24mm	722/2
No. 15	12.7mm	31mm	722/8
No. 14	12.7mm	36.5mm	722/4

Order As **LB36P (Screening Can 10)**  
**LB37S (Screening Can 13)**  
**LB39N (Screening Can 15)**  
**LB38R (Screening Can 14)**

### POLYSTYRENE IMPREGNANT

A clear polystyrene thermoplastic material dissolved in a quick drying solvent, which when dry contains all the properties of pure polystyrene. It is very low loss at rf and can be used for cementing or impregnating coils etc.

Supplied in bottles containing 100cc (nominal).

Order As **LB61R (Denfix)**

### ANTI-PARASITIC BEADS

Small ferrite beads which may be threaded on to wires to add impedance for the suppression of unwanted parasitic oscillations or to provide screening.

Max. dia. 4.2mm Max length 5.5mm.

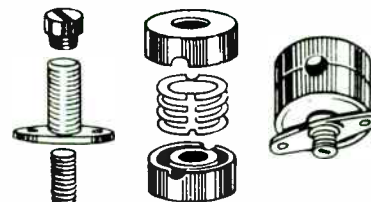
Min. hole dia 1.8mm.

Packed in 10's.



Order As **LB62S (A/P Beads)**

### SMALL POT CORE (TYPE 1)



Small pot core dia. 22mm, height 26mm, complete with an adjustable iron dust core, polycarbonate former and a two-section polystyrene bobbin. Former has two 8BA clearance mounting holes (8BA nuts and bolts supplied). Alternatively if dust core is not required, pot core may be fixed with a 2BA 1 inch nylon bolt through the centre. Specific inductance: 40nH.

Order As **HX05F (Small Pot Core)**

### POT CORE (TYPE 2)



Core (Type 2) (LA 4345)

Pot core dia. 23mm, height 17mm. Printed circuit board mounting former (with pins on 0.1in. grid) and clips supplied separately (See below). Specific inductance: 400nH.

Order As **HX06G (Core Type 2)**

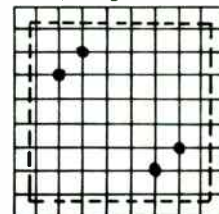
### Bobbin (Type 2) (DT 2470)



Single section with four pins for use with CORE TYPE 2.

Order As **HX07H (Bobbin Type 2)**

Pin spacing from above



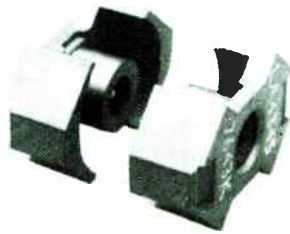
0.1 inch matrix

### Clips (Type 2) (DT 2396)

Tinned sprung steel clips for use with CORE TYPE 2 (2 clips required).

Order As **HX08J (Clips Type 2)**

## POT CORE (TYPE 3)

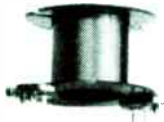


### Core (Type 3) (LA4543)

Pot core dia. 28mm, height 19mm, printed circuit board mounting former (with pins on 0.1in. grid) and clips supplied separately (see below). Specific inductance: 1000nH.

Order As **HX09K** (Type 3 Core)

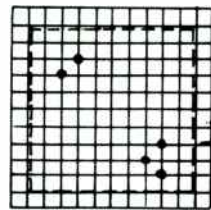
### Bobbin (Type 3) (DT 2534)



Single section with 5 pins for use with TYPE 3 CORE.

Order As **HX10L** (Type 3 Bobbin)

Pin spacing from above



0.1Inch matrix

### Clips (Type 3) (DT2406)

Tinned sprung steel clips for use with TYPE 3 CORE (2 clips required).

Order As **HX11M** (Type 3 Clips)

## Notes on Winding Inductors

The following range of pot cores allow inductances from about 10mH to 10H to be wound with a high degree of accuracy. In general it is best to use as thick enamelled copper wire as possible bearing in mind that the thicker the wire the fewer the number of turns that can be contained on the former within the core. Using thicker wire will have negligible effect on the value of inductance, but it will lower the DC resistance which makes the Q higher:

To calculate the number of turns required to make a particular inductance use the formula.

$$n = \sqrt{\frac{L}{A_L}} \quad \text{or} \quad L = n^2 A_L$$

Where n is the number of turns. L is the inductance in Henry's and  $A_L$  is the specific inductance.

## LARGE POT CORE (Type 4)



### Core (Type 4) (FX2240)

Pot core dia: 26mm, height 16mm, Printed circuit board mounting (with pins on 0.1in. grid). Bobbin and mounting system supplied separately (see below).

Specific inductance: 4300nH.

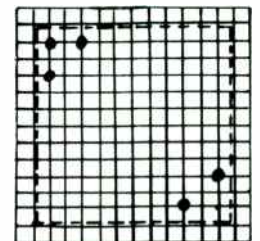
Order As **HX12N** (Large Pot Core)

### Bobbin (Type 4)

Single section bobbin for use with large pot core.

Order As **HX13P** (Bobbin Type 4)

Pin spacing from above



### Mounting system

Comprises four sprung steel clips, one chromed strain ring and one PCB mounting board with eight pins.

Order As **HX14Q** (Mounting System Type 4)

The specific inductance of our cores is given in nanoHenry's and it is necessary to convert this to Henry's (i.e.  $\times 10^{-9}$ ) to obtain the inductance in Henry's.

Example:

Using CORE TYPE 2 find the number of turns required to give 0.1 Henry's (100mH).

For core LA4345,  $A_L = 400\text{nH}$ .

$$\begin{aligned} n &= \sqrt{\frac{L}{A_L}} = \sqrt{\frac{0.1}{400 \times 10^{-9}}} \text{ turns} \\ &= \sqrt{0.00025 \times 10^9} \text{ turns} \\ &= \sqrt{250,000} \text{ turns} \\ &= 500 \text{ turns} \end{aligned}$$

## READY WOUND POT CORES

A range of ready wound inductors for use in equalisers etc. For details of core sizes see the individual pot core assembly types. The following types are available.



Type	Inductance	Wound in	DC Resistance
L15	10mH	Core Type 2	3Ω
L9	13mH	Core Type 2	5Ω
L8	23mH	Core Type 2	7Ω
L14	40mH	Core Type 2	9Ω
L7	53mH	Core Type 2	11Ω
L6	100mH	Core Type 2	15Ω
L5	180mH	Type 3 Core	13Ω
L12	350mH	Type 3 Core	15Ω
L11	1H	Type 3 Core	40Ω

Order As **HW23A** (GE Coil L15)  
**HX58N** (GE Coil L9)  
**HX57M** (GE Coil L8)  
**HW24B** (GE Coil L14)  
**HX56L** (GE Coil L7)  
**HX55K** (GE Coil L6)  
**HX54J** (GE Coil L5)  
**HW25C** (GE Coil L12)  
**HW26D** (GE Coil L11)

## SMALL HIGH INDUCTANCE WOUND CORES

Four cores offering very high inductances in an extremely small core. Supplied with 1in 4BA fixing bolt through the approx 100mm centre and of wire ready for connection to circuit.



Size: 18mm diameter; 11m high.

Values available	Colour of leads	D. C. resistance
0.5H	Red/Brown	40Ω
1H	Orange/Yellow	55Ω
2H	Green/Black	95Ω
4H	Violet/White	110Ω

Order As **HX24B** (Choke 0.5H)  
**HX25C** (Choke 1H)  
**HX26D** (Choke 2H)  
**HX27E** (Choke 4H)

## EQUALISER POT CORE

A multi-tapped ready-wound pot core for use in our mixer, built in our large pot core. When used in that project the wires are connected to pins 1 to 5 on the pcb as follows: 1-White, 2-Brown, 3-Red, 4-Green, 5-Violet.

Order As **LR07H** (Mixer Pot Core).



## CHOKES

### VERY HIGH INDUCTANCE CHOKE

A small audio choke inductance 10H (with no DC current present or 3H with 12mA DC). DC resistance: 750Ω. Size: 20 x 16 x 16mm.



Order As HW27E (Choke 10H)

### A.F. CHOKES



High power choke designed primarily for use in loudspeaker crossover networks where the system rating is not more than 25W. Overall size 51 x 16mm. Available in two values: 0.5mH and 1mH.

Order As HX20W (Audio Choke 0.5mH)  
HX21X (Audio Choke 1mH)

### R. F. CHOKES



A range of r.f. chokes having a triple barrier against moisture, and high termination strength and reliability.

Rating: 1/3 W at 70°C.  
Insulation resistance: >10<sup>9</sup> Ω.

Value (μH)	Test freq. (MHz)	Self-Resonant Frequency (MHz)	Q (min)	D.C. resistance (max) at 20°C	D.C. current (max) at 70°C	Order As
0.22	25	500	45	0.04Ω	2.4A	WH25C
0.33	25	420	45	0.05Ω	2.16A	WH26D
0.47	25	350	45	0.08Ω	1.7A	WH27E
0.68	25	300	45	0.16Ω	1.2A	WH28F
1.0	25	230	45	0.3Ω	880mA	WH29G
1.5	7.9	190	30	0.6Ω	620mA	WH30H
2.2	7.9	150	30	1Ω	480mA	WH31J
3.3	7.9	120	30	1.7Ω	370mA	WH32K
4.7	7.9	67	45	0.3Ω	880mA	WH33L
6.8	7.9	57	45	0.6Ω	620mA	WH34M
10.0	7.9	45	45	0.9Ω	520mA	WH35Q
15.0	2.5	38	55	1.6Ω	380mA	WH36P
22.0	2.5	30	55	3Ω	280mA	WH37S
33.0	2.5	25	55	5Ω	220mA	WH38R
47.0	2.5	18	55	8Ω	170mA	WH39N
68.0	2.5	11	55	9Ω	160mA	WH40T
100	2.5	10	50	11Ω	150mA	WH41U
150	0.79	7.2	40	13Ω	130mA	WH42V
220	0.79	5.3	45	17Ω	110mA	WH43W
330	0.79	5.0	45	22Ω	100mA	WH44X
470	0.79	4.0	45	27Ω	94mA	WH45Y
680	0.79	3.4	45	33Ω	84mA	WH46A
1mH	0.79	2.7	45	40Ω	76mA	WH47B

(Choke plus Value)

### OPEN-WOUND R.F. CHOKES

Ferrite core high Q chokes. 16mm long. The following types are available.

Inductance	DC Resistance
5μH	1.75Ω
1.5mH	7.5Ω
2.5mH	10Ω
5mH	14.5Ω
7.5mH	19Ω
10mH	22Ω



Order As HW28F (Choke 5μH HC)  
HX15R (Choke 1.5mH)  
HX16S (Choke 2.5mH)  
HX17T (Choke 5mH)  
HX18U (Choke 7.5mH)  
HX19V (Choke 10mH)

### HEAVY DUTY R.F. CHOKES

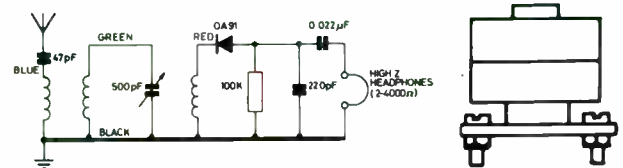


Two r.f. chokes suitable for use on transmitters (especially RFC 9A) terminated with 50mm of tinned copper wire.

Type:	RFC5	RFC9A
Inductance:	2.6mH	2.6mH
D.C. Resistance:	20Ω	9.3Ω
Max. current:	100mA DC	250mA DC
Self capacity:	1pF	1.3pF
Frequency coverage:	2 to 60MHz	1.7 to 60MHz
Overall size:	40 x 16mm dia	45 x 27mm dia

Order As HX22Y (Choke RFC5)  
HX23A (Choke RFC9A)

### CRYSTAL SET COIL

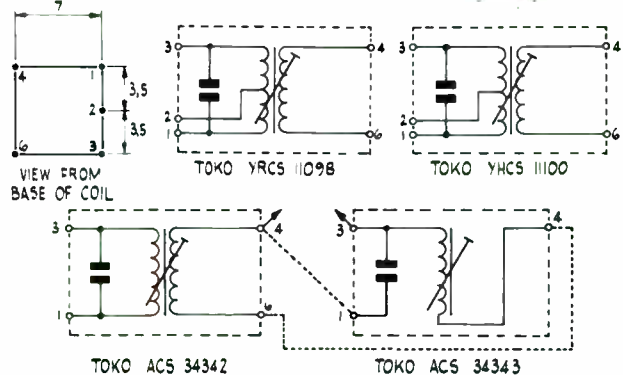


A crystal set coil for medium wave. Wound in a small pot core (type 10D). Supplied with details of how to build a complete simple crystal set requiring in addition to coil only the following components: Ceramic 47pF; Dilecon 500pF; Diode OA91; Min Res 100k; Ceramic 220pF; Polyester 0.022μF; Mag Headset or Crystal Earpiece; and an aerial.

Order As HX29G (Crystal Set Coil PCC1)

### SUB-MINIATURE I.F. TRANSFORMERS

Low-cost sub-miniature i.f. transformers. Overall size of screening can: 10mm square x 12mm high.



\* These two coils may be used together to form a double tuned detector and the dotted lines in the diagram show how to make the interconnections for this application.

### Specification

Type	YRCS11098	YHCS11100	ACS34342	ACS34343
Q	90	140	70	70
Internal capacitor	180pF	180pF	51pF	51pF
Turns between pins:				
1 & 2	140	104	15	
1 & 3				
2 & 3	25	36		
3 & 4				
4 & 6	4	20	1	15 1/2
Application:	1st i.f.	3rd i.f.	FM i.f.*	Series trap*
Nominal frequency:	455kHz	455kHz	10.7MHz	10.7MHz
Range:	455 to 470kHz	455 to 470kHz	9 to 11.4MHz	9 to 11.4MHz

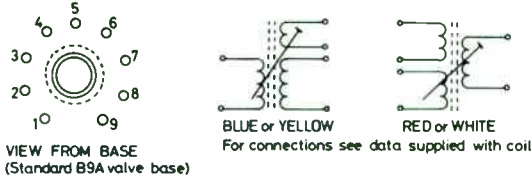
Order As HX42V (Toko YRCS11098)  
HX43W (Toko YHCS11100)  
HX97F (Toko ACS34342)  
HX98G (Toko ACS34343)

## TRANSISTOR TUNING COILS

A range of tuning coils for rf stages in transistor superhets and converters. They provide complete coverage from 150kHz to 31.5MHz (9.5 to 2000m). This is split into five ranges in each of which four coils are available. The low loss polystyrene formers on which the coils are wound are colour coded as follows:

- Blue: Aerial coil with base input winding.
- Yellow: Interstage rf coil with couplings.
- Red: Oscillator coil for 465kHz I.F.
- White: Oscillator coil for 1.6MHz I.F.

The following table gives the coverage obtained with these coils using the recommended 300pF tuning capacitor.



Range	1T	2T	3T	4T	5T
MHz	0.15 to 0.4	0.515 to 1.545	1.67 to 5.3	5 to 15	10.5 to 31.5
Metres	2000 to 750	580 to 194	180 to 57	60 to 20	28 to 9.5

The gaps in the range occur at the I.F. points, but these may be covered since all the coils are adjustable by about  $\pm 15\%$  of their nominal inductance.

The coils have brass threaded adjustable iron-dust cores and are supplied with a data sheet packed in an aluminium container which can be used as the screening can.

### Order As

HX69A (Trans Coil 1T Blue)	HX74R (Trans Coil 2T Red)	HX79L (Trans Coil 3T White)	HX92A (Trans Coil 4T Yellow)
HX70M (Trans Coil 1T Red)	HX75S (Trans Coil 2T White)	HX80B (Trans Coil 3T Yellow)	HX93B (Trans Coil 5T Blue)
HX71N (Trans Coil 1T White)	HX76H (Trans Coil 2T Yellow)	HX89W (Trans Coil 4T Blue)	HX94C (Trans Coil 5T Red)
HX72P (Trans Coil 1T Yellow)	HX77J (Trans Coil 3T Blue)	HX90X (Trans Coil 4T Red)	HX95D (Trans Coil 5T White)
HX73Q (Trans Coil 2T Blue)	HX78K (Trans Coil 3T Red)	HX91Y (Trans Coil 4T White)	HX96E (Trans Coil 5T Yellow)

## I.F. TRANSFORMERS

A range of miniature I.F. transformers suitable for use in transistor radios and designed for printed circuit board or chassis mounting. All have adjustable tuning cores, and are supplied with drilling and connection details.

### IFT13

A miniature I.F. transformer, nominal frequency: 470 kHz. Size of aluminium screening can: 13.5mm square x 17.5mm high.

Order As LB00A (IFT 13)

### IFT14

A miniature last I.F. transformer, nominal frequency: 470kHz. Size of aluminium screening can: 13.5mm square x 17.5mm high.

Order As LB01B (IFT 14)

### IFT16

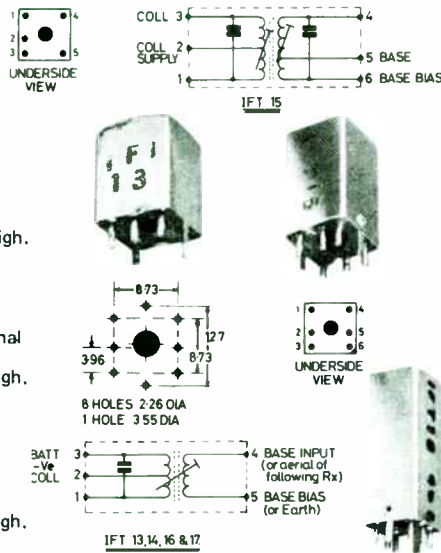
A miniature I.F. transformer, nominal frequency: 1.6MHz. Size of aluminium screening can: 13.5mm square x 17.5mm high.

Order As LB03D (IFT 16)

### IFT17

A miniature last I.F. transformer, nominal frequency: 1.6MHz. Size of aluminium screening can: 13.5mm square x 17.5mm high.

Order As LB04E (IFT 17)



### IFT15

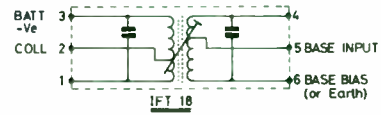
A 10.7MHz double tuned transformer with tapped primary and secondary windings. Wound on bakelite former complete with iron-dust tuning cores and sub-miniature polystyrene foil capacitors. Bandwidth of single transformer: 250kHz ( $-6\text{dB}$ ). Unloaded Q of winding: 70. Size of aluminium screening can: 13.5mm square x 24mm high.

Order As LB02C (IFT 15)

### IFT18

A double tuned transformer available for either 465kHz or 1.6MHz I.F.'s. Size of aluminium screening can: 13.5mm square x 38mm high.

Order As LB05F (IFT 18 465kHz)  
LB06G (IFT 18 1.6MHz)



### TOC1

A miniature transistor medium wave oscillator coil for use with our Twin 00 tuning capacitor.

Order As HX28F (Toc 1)



## CERAMIC FILTER

A ceramic filter designed primarily for use in FM receivers using a 10.7MHz i.f. The filters are small in size with high selectivity, good temperature stability and low distortion.

### Specification

Bandwidth:	300k Hz ( $-3\text{dB}$ ) 600k Hz max ( $-20\text{dB}$ )
Spurious peaks: (9 to 12MHz):	<40dB (typical)
Insertion loss:	6dB
Input-Output Impedance:	$330\Omega \pm 15\%$
Breakdown voltage:	50V DC max
Ripple:	<1dB



aware of this fact and all commercial designs usually allow the i.f. to be tuned to at least 10.58 to 10.82. The fact that the i.f. is not exactly 10.7MHz has no effect whatsoever on any other parameter and the overall quality of the tuner is not affected in any way.

However it is absolutely vital that all the ceramic filters in one tuner have the same nominal centre frequency. Therefore during manufacture they are tested and colour coded into matched groups as follows:

10.64 MHz $\pm 30\text{kHz}$	Black	10.73 MHz $\pm 30\text{kHz}$	Orange
10.67 MHz $\pm 30\text{kHz}$	Blue	10.76 MHz $\pm 30\text{kHz}$	White
10.70 MHz $\pm 30\text{kHz}$	Red		

Therefore if you are ordering ceramic filters for more than one tuner please indicate how many filters are required per tuner so that we can supply them in sets if we do not have enough of one colour to fulfil the whole order.

Order As HX99H (Ceramic Filter 10.7MHz)



**CRYSTALS**

A range of crystals for various applications. All types are cut for parallel resonance, but if it is required to use them in a series resonant circuit simply connect a Trimmer 65pF only in series with the crystal. The crystals are supplied in metal cans and details of the cans are given in the table.



**Frequency Standards**

Three crystals for use in frequency counters etc. and offering very high stability are available.

Frequency	Can Style	Adjustment Tolerance	Temperature Stability	Temperature Range	Load Capacitor
100kHz	HC 34/U	—	±100ppm	0°C to +70°C	32pF
1MHz	HC-6/U	±10ppm	±20ppm	-20°C to +65°C	30pF
10MHz	HC-18/U	±20ppm	±10ppm	20°C to +70°C	30pF

Order As **FY77J** (FS Crystal 100kHz)  
**HX62S** (FS Crystal 1MHz)  
**FY78K** (FS Crystal 10MHz)

**Microprocessor Crystals**

Six crystals for use with the most popular microprocessor chips. Their typical applications are listed below:

1MHz	6800
2MHz	F8; 2650A; SC/MP; CDP18C2
2.5MHz	Z80
4MHz	Harris 6100; IM6100; PACE; Z80A; 6802
6.144MHz	8085
18.432MHz	AM9080/8080A

Frequency	Can Style	Adjustment Tolerance	Temperature Stability	Temperature Range	Load Capacitor
1MHz	HC-33/U	±50ppm	±50ppm	0°C to 50°C	32pF
2MHz	CTV	±2500ppm	±50ppm	0°C to 50°C	30pF
2.5MHz	HC-33/U	±20ppm	±50ppm	-10°C to 60°C	30pF
4MHz	HC-18/U	±20ppm	±10ppm	-20°C to 70°C	30pF
6.144MHz	HC-18/U	±20ppm	±50ppm	-10°C to 60°C	30pF
18.432MHz	HC-18/U	±50ppm	±100ppm	0°C to 50°C	30pF

Order As **FY79L** (MP Crystal 1MHz)  
**FY80B** (MP Crystal 2MHz)  
**FY81C** (MP Crystal 2.5MHz)  
**FY82D** (MP Crystal 4MHz)  
**FY83E** (MP Crystal 6.144MHz)  
**FY84F** (MP Crystal 18.432MHz)

**Radio Control Crystals**

A range of crystals for radio controlled models etc. All are plug-in and directly interchangeable. Can style: HC-25/U. Adjustment tolerance: ±30ppm. Temperature stability: ±50ppm. Temperature range: -10°C to 60°C. Load capacitor: 20pF. Available only in matched pairs as follows.

Channel	Transmitter frequency	Receiver frequency	Order As
Brown	26.995MHz	26.540MHz	<b>HX30H</b>
Red	27.045MHz	26.590MHz	<b>HX31J</b>
Orange	27.095MHz	26.640MHz	<b>HX32K</b>
Yellow	27.145MHz	26.690MHz	<b>HX33L</b>
Green	27.195MHz	26.740MHz	<b>HX34M</b>
Blue	27.245MHz	26.790MHz	<b>HX35Q</b>

Suitable for use with 455kHz i.f.'s.

(MRC Crystal Pairs plus Channel Colour)

**Colour TV Crystal**

A crystal for use in colour TV receivers, TV games etc. operating at the colour sub-carrier frequency in PAL (standard British) TV receivers. Frequency: 4.433619MHz. Can style: CTV. Adjustment tolerance: ±30ppm. Temperature stability: ±30ppm. Temperature range: 0°C to 50°C. Load capacitor: 20pF.

Order As **FY85G** (Colour TV Crystal)

**Special Frequency Crystals**

Two crystals, one for generating 1Hz and one for generating 50Hz when divided by 2<sup>n</sup>, for timekeeping purposes, counters etc., using simple flip-flop divider stages. The crystal for generating 50Hz can be used to drive mains operated clocks from a battery when mains fails or in portable applications.

Frequency  
 3.2768MHz For 50Hz divide by 2<sup>16</sup>  
 4.194304MHz For 1Hz divide by 2<sup>22</sup>.

For both types: Can style: HC-18/U. Adjustment tolerance: ±20ppm. Temperature stability: ±50ppm. Temperature range: -10°C to 60°C. Load capacitor: 12pF.

Order As **FY86T** (Crystal 50Hz x 2<sup>16</sup>)  
**FY87U** (Crystal 1Hz x 2<sup>22</sup>)

Style	Plug-in or Wire-in	Pins or Wire length	Pin or Wire Spacing	Can Dimensions (mm)		
				Height	Width	Thickness
HC-6/U	Plug-in	6mm pins	12.3mm	19.7	19.2	8.9
HC-18/U	Wire-in	38mm wires	4.9mm	13.5	10.9	4.5
HC-25/U	Plug-in	6mm pins	4.9mm	13.5	10.9	4.5
HC-33/U	Wire-in	38mm wires	12.3mm	19.7	19.2	8.9
HC-34/U	Wire-in	38mm wires	12.3mm	38.8	19.2	8.9
CTV	Wire-in	38mm wires	9.5mm	19.7	19.2	8.9

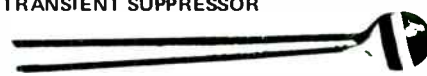
**Crystal Sockets**

Two moulded nylon crystal sockets. One suits crystals with HC-25/u base and has printed circuit connections, while larger type fits HC-6/u base crystals and has solder tag connections.



Order As **HX60Q** (Crystal Socket 25u)  
**HX61R** (Crystal Socket 6u)

**MAINS TRANSIENT SUPPRESSOR**



Simply connect this device across the mains. It has a very high resistance at 240V rms and therefore usually may be ignored, but the moment a spike appears on the supply line which exceeds the peak level of the mains voltage, the impedance of the device drops immediately to a very low level while it dissipates the unwanted energy.

Order As **HW13P** (Mains Trans Supp)

**RF SUPPRESSOR CHOKES**



Designed for use at 250V AC these small heavy current rf chokes are ideal for the suppression of motor-driven appliances and in input circuits of power units. Inductance is approximately 6μH. PVC sleeve is colour coded. Three types are available.

Rating	Dimensions			Colour Code	Order As
	Length	Diameter			
1 Amp	15mm	5.1mm		White	<b>HW04E</b>
2 Amp	19mm	5.1mm		Yellow	<b>HW05F</b>
3 Amp	23mm	7.6mm		Black	<b>HW06G</b>

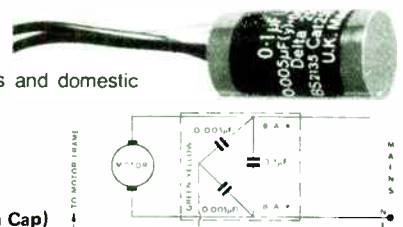
(RF Supp Choke plus Rating)

**MOTOR SUPPRESSOR**

For radio suppression of small electric motors and domestic appliances. 250V AC

0.1 + 0.005 + 0.005uF

Order As **HW07H** (Delta Cap)



## SUB-MINIATURE MAINS TRANSFORMERS

A range of very small transformers that are wire ended. All types are 1.2VA. Overall size: 30 x 27 x 25mm. Fixing centres: 36mm. All primaries tapped 0 to 240V.



Type	Secondary	Max current
6V	6-0-6V	100mA
9V	9-0-9V	67mA
12V	12-0-12V	50mA

Order As **WB00A** (Sub-Min Tr 6V)  
**WB01B** (Sub-Min Tr 9V)  
**WB02C** (Sub-Min Tr 12V)

## CLOCK TRANSFORMER

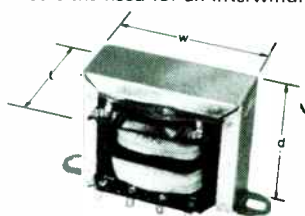
A transformer designed primarily for use with our MA1023 clock module. Primary is 0 to 240V, secondary 4-0-4V at 140mA plus 0-9V at 15mA. (Note the 0V points are internally commoned). Size, as 6VA Min Tr types.

Order As **WB28F** (Clock Transformer)

## MAINS TRANSFORMERS

A range of good quality mains transformers, all with primaries tapped: 0 to 240V. All types conform to BS415 and are therefore suitable for use in domestic appliances. They feature a split bobbin construction which eliminates the need for an interwinding screen.

### Miniature Types



Type	Secondary	Max. current	VA	Overall size (wxdxl)	Fixing centres
6V	(1) 0-6V	500mA	6VA	46x36x33mm	54mm
	(2) 0-6V	500mA			
9V	(1) 0-9V	500mA	9VA	59x48x42mm	70mm
	(2) 0-9V	500mA			
12V	(1) 0-12V	250mA	6VA	46x36x33mm	54mm
	(2) 0-12V	250mA			
15V	(1) 0-15V	200mA	6VA	46x36x33mm	54mm
	(2) 0-15V	200mA			
15V	(1) 0-15V	330mA	10VA	59 x 48 x 42mm	70mm
	(2) 0-15V	330mA			
20V	(1) 0-20V	150mA	6VA	46x36x33mm	54mm
	(2) 0-20V	150mA			
24V	(1) 0-24V	125mA	6VA	46x36x33mm	54mm
	(2) 0-24V	125mA			
36V	(1) 0-36V	83mA	6VA	46x36x33mm	54mm
	(2) 0-36V	83mA			

Order As **LY03D** (Tr 10VA 15V)  
**WB06G** (Min Tr 6V) **WB16S** (Min Tr 20V)  
**WB11M** (Min Tr 9V) **WB20W** (Min Tr 24V)  
**WB10L** (Min Tr 12V) **WB21X** (Min Tr 36V)  
**WB15R** (Min Tr 15V)

## Stereo Amplifier Transformer

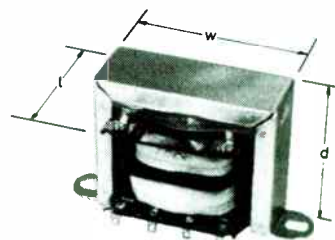
A very high quality transformer designed primarily for use with our 40W Stereo Amplifier. The transformer has an electrostatic screen to keep hum fields to a minimum.

### Specification:

Primary: 110-0-110V  
 Secondary 1: 22-0-22V at 1½A  
 Secondary 2: 15-0-15V at 1A  
 Rating: 96VA  
 Size: 85 x 100 x 70mm  
 Fixing centres: 63 x 55mm  
 Style: Similar to Tr 20V 1A etc.

Order As **LW34M** (15/22V Power Tran)

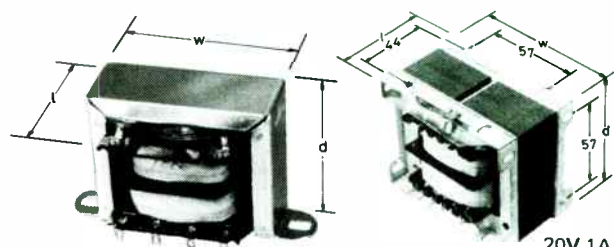
## 12V Types



Type	Secondary	Max. current	VA	Overall size (wxdxl)	Fixing centres
1A	0-12V	1A	24VA	69x57x57mm	83mm
	0-12V	1A			
2A	0-12V	2A	48VA	78x66x53mm	92mm
	0-12V	2A			

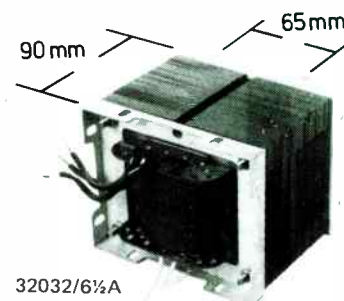
Order As **WB25C** (Tr 12V 1A)  
**WB26O** (Tr 12V 2A)

## High Power Types



9V 1½A

20V 1A  
and  
28V 1½A



32032/6½A

Type	Secondary	Max current	VA	Overall size (wxdxl)	Fixing centres
9V1½A*	0-8-9V	1.5A	27VA	68x58x58mm	82mm
	0-8-9V	1.5A			
20V1A*	0-15-20V	1A	40VA	89x75x63mm	see illustration
	0-15-20V	1A			
28V1½A*	0-28V	1.5A	84VA	89x75x63mm	see illustration
	0-28V	1.5A			
32032/6½A	32-0-32V	6.5A	450VA	118x99x127mm	see illustration
	12-0-12V	1.5A			

\* TR 9V 1½A is a suitable replacement for CT2.  
 \* TR 20V 1A is a suitable replacement for MT206AT.  
 \* TR 28V 1½A is a suitable replacement for Repanco 0722.

Order As **WB03O** (Tr 9V 1½A)  
**WB12N** (Tr 20V 1A)  
**WB17T** (Tr 28V 1½A)  
**XB38R** (Tr 32032/6½A)

## TRANSFORMER MOUNTING PLATE

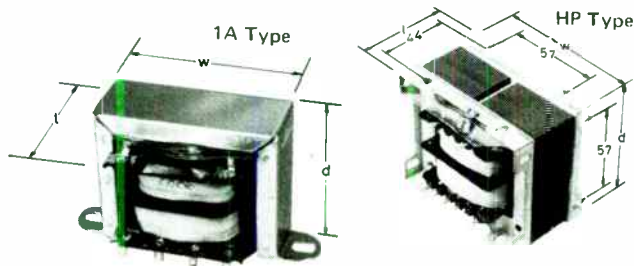
A load spreading mounting plate for fixing TR32032/6½ to wooden cabinets. A pair are required, one either side of the piece of wood with the transformer bolts clamping the "sandwich" together.



Order As **HX59P** (Transformer Mtg Plate)



**Multi-tapped Types**



Type	Secondary	Max current	VA	Overall size (wxdxh)	Fixing centres
1A	0-10-12-15-17	1A	34VA	78x65x57mm	93mm
	0-10-12-15-17	1A			
HP*	0-10-12-15-17	2A	68VA	89x75x63mm	see illustration
	0-10-12-15-17	2A			

\*TR34VHP is a suitable replacement for TRMT3AT.

Order As **WB07H** (Tr 34V 1A)  
**WB22Y** (Tr 34V HP)

**Isolation Type**

Primary: 240V  
Secondary: 240V  
Max current: 50mA  
VA rating: 12VA  
Overall size: W:59mm, d:48mm, l:42mm  
Fixing centres: 70mm

Order As **LW33L** (Tr 240V Isotran)

**AUDIO TRANSFORMERS**

Two miniature transformers.



Type No.	Application	Primary	Secondary	Dimensions mm
LT44	Driver	20kΩ	1kΩ CT	20 x 16 x 15
LT700	Output	1.2kΩ CT	5Ω 200mW	20 x 16 x 15

Order As **HX82D** (Min Tr LT44)  
**LB14Q** (Min Tr LT700)

**PULSE TRANSFORMER**

A pulse transformer designed for use with thyristors and triacs, but also suitable for slow speed pulse applications to provide isolation, and for wideband transformer applications. In this latter case the transformer has a very low insertion loss from 1kHz to 1MHz.

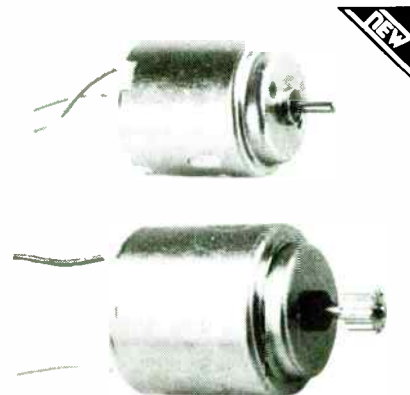


Turns ratio: 1:1  
Input impedance: 50Ω  
Output impedance: 50Ω  
Interwinding proof voltage: 2.8kV (peak)  
Interwinding working voltage: 440V rms  
Minimum primary inductance: 3mH  
Primary resistance: 1.1Ω  
Secondary resistance: 0.9Ω  
Capacitance: 20pF  
Output voltage-time product: 200Vμsec.

Order As **HX81C** (Pulse Transformer)

**MOTORS**

**Low-Cost Miniature**



A choice of two extremely low-cost DC motors.

	Small	Large
Operating voltage	1½-3V	1½-3V
Diameter	24mm	28mm
Length (excl. drive shaft)	31mm	37mm
Drive shaft	7 x 2mm dia.	10 x 2.5mm dia.*

\*Large motor has 12-tooth cog on shaft. dia. 7.5mm

Order As **HW29G** (Min Motor Small)  
**HW30H** (Min Motor Large)

**Motor Pulley Set**



A bubble packed kit comprising a miniature motor, 3V DC, with mounting bracket and fixing screws, two 30mm dia. nylon pulleys, two 20mm. dia. nylon pulleys, four 11mm dia. nylon pulleys, 16 interchangeable bosses for making up fixed or loose, double or single pulleys, as well as driving bands and shafting. With instructions. Incredible value.

Order As **YB05F** (Motor Pulley Set)

**Motor Gear Set**



A bubble packed kit comprising a miniature motor, 3V DC, with 10-tooth pinion, five matching gears (20, 30, 40, 50 and 60 teeth), two interlocking racks each having 50 teeth and shafting. Manufactured in nylon and suitable for making step-up and step-down gear trains, timing, actuating and control mechanisms etc. Incredible value.

Order As **YB06G** (Motor Gear Set)

## CROCODILE CLIPS

A pair of crocodile clips, one with a red and one with a black insulating vinyl sleeve. Clip length 35mm, overall length with sleeve 45mm.

Order As HF25C (Croc Clips)



## ALLIGATOR CLIP

A strong alligator clip with excellent grip and screw for connecting wire. Each handle is insulated red or black and has a 4mm socket in the end.

Order As HF23A (Alligator Clip Black)  
HF24B (Alligator Clip Red)



## BATTERY CHARGER CLIPS

Large plated clip as used on battery chargers. Overall length 75mm. Width of jaws 15mm. maximum gap between jaws when fully opened 28mm. Current rating 25A.

Order As HF26D (Charger Clip)



## TEST LEAD KIT

A very useful pack containing ten pieces of insulated stranded wire approx. 370mm long terminated at each end by a miniature insulated crocodile clip. The insulated sleeve on the clip and the wire are the same colour and there are two leads of each of five colours: Black, Green, Red, White and Yellow. Excellent value for money.

Order As BW69A (Croc. Lead Kit)



## PUSH-ON CONNECTORS

### Receptacle

Push-on receptacle for 1/4in blades.

In packs of ten

Order As HF10L (Push-On Receptacle)



### Blade

Push-on 1/4in blades suit above receptacle.

Order As HF11M (Push-On Blade)



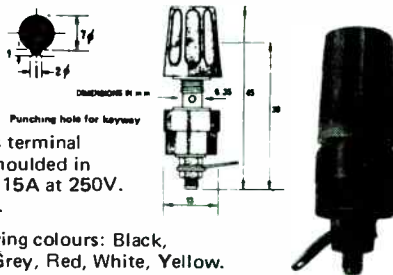
### Cover

Covers of transparent polythene to fit our 1/4in blades and receptacles. Covers overlap for maximum protection.

Supplied in pairs in packs of ten pairs.

Order As HF12N (Push-On Covers)

## TERMINAL POST



Nickel plated brass terminal post with insulation moulded in polypropylene. Rated 15A at 250V. Has a 4mm top socket.

Available in the following colours: Black, Blue, Brown, Green, Grey, Red, White, Yellow.

Order As HF02C (Terminal Post Black)  
HF03D (Terminal Post Blue)  
HF04E (Terminal Post Brown)  
HF05F (Terminal Post Green)  
HF06G (Terminal Post Grey)  
HF07H (Terminal Post Red)  
HF08J (Terminal Post White)  
HF09K (Terminal Post Yellow)

## PRESS TERMINAL

Strong spring-loaded press terminal with 3mm dia hole for wires. Panel fixing (7mm dia cut-out) and fully insulated from panel.

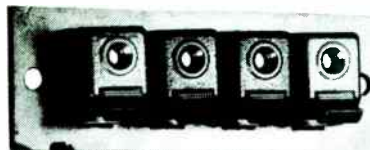
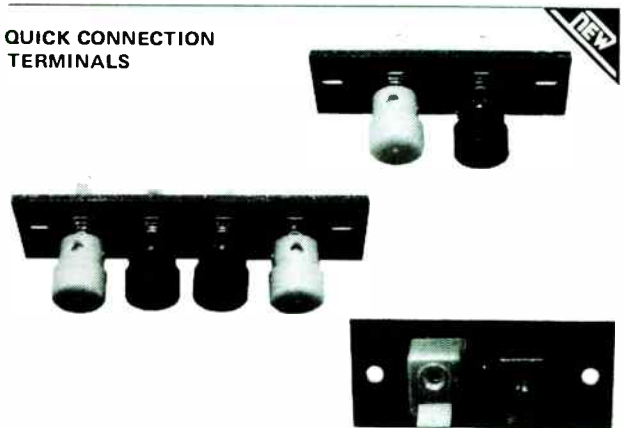
Supplied with panel fixing screw and wiring tag.

Available in Black, Blue, Green, Red, White and Yellow.

Order As HF13P (Press Terminal Black)  
HF14Q (Press Terminal Blue)  
HF15R (Press Terminal Green)  
HF16S (Press Terminal Red)  
HF17T (Press Terminal White)  
HF18U (Press Terminal Yellow)



## QUICK CONNECTION TERMINALS



A range of quick connection terminals in two or four way of two types. Push button type has one red and one black (or two red and two black) spring-loaded push terminals mounted on a paxolin strip. Terminals have a 3mm dia. wire entry hole in side. Lever type has one red and one black or two red and two black square lever-operated terminals which are spring-loaded, mounted on a paxolin strip.

Terminals have a 2.5mm dia. wire entry hole in front.

Type	Dimensions	Fixing centres
Push 2-way	55 x 20mm	45mm
Push 4-way	75 x 20mm	65mm
Lever 2-way	55 x 24mm	45mm
Lever 4-way	68 x 24mm	60mm

Order As BW70M (Quickterm Push 2-way)  
BW71N (Quickterm Push 4-way)  
BW72P (Quickterm Lever 2-way)  
BW73Q (Quickterm Lever 4-way)

## TEST PROD



A test prod with integral 4mm socket. Overall length: 107mm. Available in red or black.

Order As HF19V (Test Prod Black)  
HF20W (Test Prod Red)

## PROBE CLIP



Probe with a positive spring-loaded hook grip for use in confined spaces. Fully insulated, with acetal mouldings and gold-plated contact. Screw or soldered connections. One red and one black. Supplied in pairs only. Overall length 83mm.

Order As HF21X (Probe Clips)



## PROBES

A heavy duty pistol-action probe fitted with 4mm socket. Jaws have a very strong grip and open to 4mm at points. Overall length: 154mm. Available in red or black.

Order As **HF30H** (Pistol Probe Black)  
**HF31J** (Pistol Probe Red)



## TEST PROBE LEADS

Low-Cost 2mm

A red and black test lead pair. Terminated in 2mm plugs to suit many multimeters etc. Other end terminated in test prods. Heavy duty extra-flexible PVC covered wire 650mm long.

Order As **HF22Y** (Lo-Cost Test Probe)



## Moulded 2mm

A red and black test lead pair. Terminated in 2mm plugs to suit many multimeters etc. Other end terminated in heavy duty moulded PVC test prods. Heavy duty extra-flexible PVC covered wire 750mm long.

Order As **HF32K** (Moulded Test Probe)



## Moulded 4mm

A red and black test lead pair. Terminated in moulded 4mm plugs with 4mm socket in the plug. Other end terminated in heavy duty moulded PVC test prods. Heavy duty extra-flexible PVC covered wire 850mm long.

Order As **HF33L** (4mm Test Probe)



## 1mm PLUGS AND SOCKETS

Plug 1mm plug suitable for low-voltage circuits. Strong acetal moulding, silver-plated pin. Available in red or black. Overall length: 16mm. Pin length: 6mm. Overall diameter: 6mm.

Order As **WL57M** (1mm Plug Black)  
**WL58N** (1mm Plug Red)



## Socket

1mm socket acetal moulding, silver-plated contact 2BA fixing ring, hole 6mm dia. Available in red or black. Overall length: 16mm. Bezel dia: 6mm. Mounting hole: 5mm dia.

Order As **WL59P** (1mm Socket Black)  
**WL60Q** (1mm Socket Red)



## 2mm PLUGS AND SOCKETS

Plug 2mm plug with silver-plated pin, rated at 10 amps. Available in black, blue, green, red, white and yellow. Overall length: 32mm. Pin length: 9mm. Overall dia. 6mm. To unscrew, hold pin in one hand and turn plastic body clockwise with other hand.

Order As **HF38R** (2mm Plug Black)  
**HF39N** (2mm Plug Blue)  
**HF40T** (2mm Plug Green)  
**HF41U** (2mm Plug Red)  
**HF42V** (2mm Plug White)  
**HF43W** (2mm Plug Yellow)



## Socket

2mm socket with silver-plated contacts, rated at 10 amps. Available in same colours as 2mm PLUG.

Overall length: 19.5mm. Square front 6 x 6mm. Mounting hole: 5mm dia.

Order As **HF44X** (2mm Socket Black)  
**HF45Y** (2mm Socket Blue)  
**HF46A** (2mm Socket Green)  
**HF47B** (2mm Socket Red)  
**HF48C** (2mm Socket White)  
**HF49D** (2mm Socket Yellow)



## WANDER PLUGS & SOCKETS

Plug Nickel plated brass wander plugs. Split-pin construction. Pins 12.7mm long fit 3.2mm diameter sockets. Available in Black, Blue, Green, Red, White, Yellow. Overall length: 33mm. Overall diameter: 9.3mm.

Order As **HF50E** (Wander Plug Black)  
**HF51F** (Wander Plug Blue)  
**HF52G** (Wander Plug Green)  
**HF53H** (Wander Plug Red)  
**HF54J** (Wander Plug White)  
**HF55K** (Wander Plug Yellow)



## Socket

Wander socket with plated contacts 3.2mm diameter will fit panels up to 6.6mm thick. Available in same colours as WANDER PLUG.

Overall length: 21mm. Bezel diameter: 11.7mm.

Order As **HF56L** (Wander Socket Black)  
**HF57M** (Wander Socket Blue)  
**HF58N** (Wander Socket Green)  
**HF59P** (Wander Socket Red)  
**HF60Q** (Wander Socket White)  
**HF61R** (Wander Socket Yellow)



Mounting hole: 8mm dia.

## 4mm PLUGS & SOCKETS

Plug 4mm plug with nickel alloy plated brass pin and stainless steel spring to maintain adequate pressure in 4mm sockets.

Available in black, blue, brown, green, red, white, yellow. Overall length: 44mm. Pin length: 19mm. Overall diameter: 8mm.

Order As **HF62S** (4mm Plug Black)  
**HF63T** (4mm Plug Blue)  
**HF64U** (4mm Plug Brown)  
**HF65V** (4mm Plug Green)  
**HF66W** (4mm Plug Red)  
**HF67X** (4mm Plug White)  
**HF68Y** (4mm Plug Yellow)



## Socket

4mm socket with silver-plated contact. Available in same colours as BANANA PLUG.

Overall length: 29.2mm. Bezel diameter: 11.7mm. Mounting hole: 8mm dia.

Order As **HF69A** (4mm Socket Black)  
**HF70M** (4mm Socket Blue)  
**HF71N** (4mm Socket Brown)  
**HF72P** (4mm Socket Green)  
**HF73Q** (4mm Socket Red)  
**HF74R** (4mm Socket White)  
**HF75S** (4mm Socket Yellow)



## PATCH CORD

A red and black patch cord pair. Terminated each end in moulded 4mm plugs with 4mm socket in the plug. Heavy duty extra-flexible PVC covered wire 900mm long.

Order As **HF34M** (4mm Patch Cord)



## PHONO PLUGS AND SOCKETS

Plastic A phono plug with a smart screw-on plastic cap. Available in Black, Blue, Green, Grey, Red, White and Yellow. Overall length: 34mm. Pin length: 9mm (from end of shield). Overall dia: 11.5mm.

Order As **HQ54J** (Screw-Cap Phono Black)  
**HQ55K** (Screw-Cap Phono Blue)  
**HQ56L** (Screw-Cap Phono Green)  
**HQ57M** (Screw-Cap Phono Grey)  
**HQ58N** (Screw-Cap Phono Red)  
**HQ59P** (Screw-Cap Phono White)  
**HQ60Q** (Screw-Cap Phono Yellow)



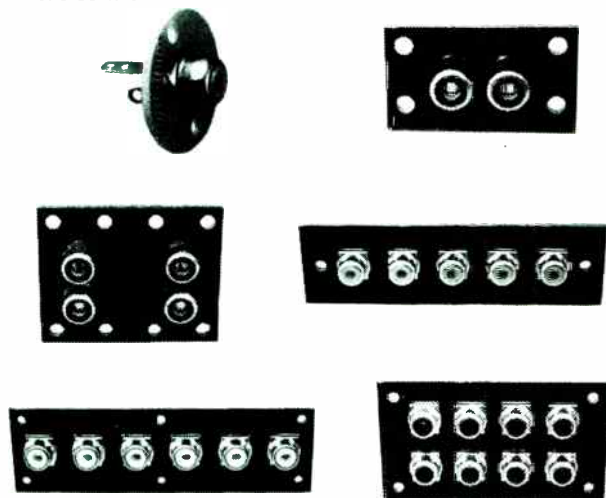
## Screened

Phono plug with screened metal barrel

Order As **HH01B** (Scr Phono)



## Chassis Socket



Chassis mounting phono sockets on paxolin mountings. Various sizes are available.

No. of sockets	Dimensions of mount	Fixing centres	Order As
1	24mm dia.	18mm	HH02C (Phono Socket Single)
2	38 x 22mm	30 x 12.5mm	HH03D (Phono Socket Twin)
4	46 x 38mm	30 x 38mm	BW74R (Phono Socket Quad)
5	91 x 26.5mm	80mm	BW75S (Phono Socket 5-way)
6	92 x 27mm	85 x 20mm	BW76H (Phono Socket 6-way)
8	70 x 40mm	60 x 30mm	BW77J (Phono Socket 8-way)

## Line Socket

An in-line screened metal barrel phono socket



Order As **HH04E** (Line Phono)

## Line Connector

A phono line connector for connecting two phono plugs together. With metal barrel



Order As **HH05F** (Phono Conn)

## 2.5 mm JACK PLUGS

### Plastic Barrel Plug

2.5mm Jack plug with plastic barrel.



Order As **HF76H** (2.5 Plug Plas)

### Screened Plug

2.5mm Jack plug with metal barrel.



Order As **HF77J** (2.5 Plug Scr)

## Chassis Socket

2.5mm Jack socket, open-type with break contact.



Order As **HF78K** (2.5 Jack Skt)

## Line Socket

2.5mm line Jack socket with metal barrel.



Order As **HF79L** (2.5 Line Skt)

## 3.5 mm JACK PLUGS

### Plastic Barrel Plug

3.5mm Jack plug with plastic barrel.



Order As **HF80B** (Plug Plas 3.5)

### Screened Plug

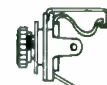
3.5mm Jack plug with metal barrel.



Order As **HF81C** (Plug Scr 3.5)

## Chassis Socket

3.5mm Jack socket, open-type with break contact.



Order As **HF82D** (Jack Skt 3.5)

## Plastic Barrel Line Socket

3.5mm line Jack socket with plastic barrel.



Order As **HF83E** (Line Skt Plas 3.5)

## Screened Line Socket

3.5mm line Jack socket with metal barrel.

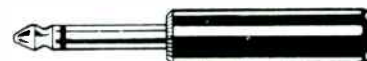


Order As **HF84F** (Line Skt Scr 3.5)

## STANDARD 1/4in. JACK PLUGS

### Plastic Barrel Mono Plug

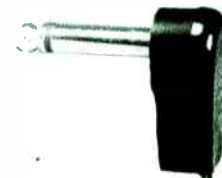
Standard 1/4in Jack plug with plastic barrel.



Order As **HF85G** (Jack Plug Plas)

### Side Entry Mono Plug

Standard 1/4in. Jack plug mono side entry with plastic body



Order As **HF86T** (Side Jack Plas)

### Screened Mono Plug

Standard 1/4in Jack plug with metal barrel.



Order As **HF87U** (Jack Plug Scr)



### Plastic barrel Stereo Plug

Standard 1/4in Jack plug  
3-pole stereo with plastic barrel.



Order As **HF88V (Jack Pl Sto Plas)**

### Screened Stereo Plug

Standard 1/4in Jack plug  
3-pole stereo with metal barrel.



Order As **HF89W (Jack Pl Sto Scr)**

All Jack sockets require 9.5mm (3/8 in.) panel cut-out.

### Moulded Mono Chassis Socket

#### Plastic Bezel

Standard 1/4in moulded Jack socket  
with 2 break contacts.



Order As **HF90X (Jack Skt Brk)**

#### Chromed Bezel

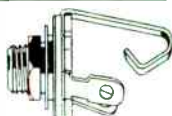
Standard 1/4 in. moulded Jack socket with  
2 break contacts. Bezel is domed and  
chromed and contacts are gold-plated.



Order As **BW78K (Chromed Mono Jack Skt)**

### Open Mono Chassis Socket

Standard 1/4in open-type  
mono Jack socket



Order As **HF91Y (Jack Skt Open)**

### Moulded Stereo Chassis Socket

#### Plastic Bezel

Standard 1/4in moulded stereo Jack  
socket with 3 break contacts.



Order As **HF92A (Jack Skt Sto)**

#### Chromed Bezel

Standard 1/4 in. moulded stereo Jack  
socket with 3 break contacts.  
Bezel is domed and chromed and  
contacts are gold-plated.



Order As **BW79L (Chromed Stereo Jack Skt)**

### Open Stereo Socket

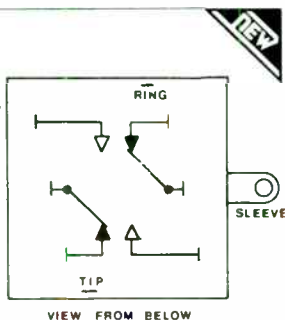
Standard 1/4in open-type  
3-pole stereo Jack socket



Order As **HF93B (Stereo Open Skt)**

### DPDT Jack Socket

A standard 6.3mm (1/4in.) stereo jack  
socket with two changeover contacts  
which are not connected to the plug  
when it is inserted. 9 contacts. Ideally  
suited as headphone outlet with  
amplifier switches used to change  
main output from speakers to  
dummy loads.



Order As **BW80B (DPDT Jack Socket)**

### Plastic Barrel Mono Line Socket

Standard 1/4in line Jack  
socket with plastic barrel.



Order As **HH19V (Line Jack Plas)**

### Screened Mono Line Socket

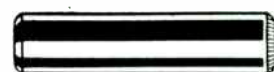
Standard 1/4in line Jack socket  
with metal barrel.



Order As **HH20W (Scr Line Jack)**

### Plastic Barrel Stereo Line Socket

Standard 1/4in line Jack socket  
3-pole stereo with Plastic barrel.



Order As **HH21X (Stereo Line Skt)**

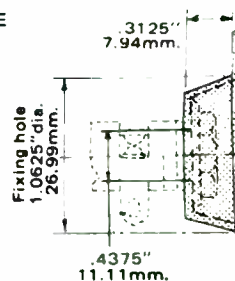
### Screened Stereo Line Socket

Standard 1/4in line Jack socket  
3-pole stereo with metal barrel.



Order As **HH22Y (Scr Stereo Line Skt)**

### RECESS PLATE



A recess plate to allow flush mounting of our jack sockets and  
some other panel mounting components.

Order As **HH23A (Recess Plate)**

### CO-AXIAL PLUGS AND SOCKETS

#### Metal Plug

A standard co-ax plug with  
aluminium body and cap



Order As **HH07H (Co-ax Plug Aly)**

#### Plastic Plug

A standard co-ax plug with plastic  
covered body and plastic cap



Order As **HH06G (Co-ax Plug Plas)**

### Chassis Socket

A panel mounting socket which  
protrudes above the chassis  
surface



Order As **HH08J (Co-ax Socket Pan)**

### Flush Socket

A panel mounting socket which  
fits flush to the chassis surface



Order As **HH09K (Co-ax Socket Flush)**

### Line Connector

A line connector for connecting  
two co-ax plugs together



Order As **HH11M (Co-ax Conn)**

## CAR AERIAL CONNECTORS

### Skeleton Plug

A skeleton-type plug which fits the aerial sockets fitted to most car radios.



Order As HH13P (Skeleton Car Plug)

### Plastic Plug

A car aerial plug with plastic body and cap.



Order As HH12N (Car Plug Plas)

### Socket

A chassis mounting socket to suit above car plugs. As fitted on many car radios.



Order As HH14Q (Chassis Car Socket)

### Line Socket

A high quality all metal line socket for extending aerial leads in cars



Order As HH15R (Car Line Socket)

## FM AERIAL PLUG

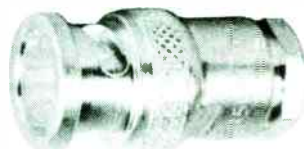
Moulded plugs for connecting aerials to radiograms etc.



Order As HH16S (FM Aerial Plug)

## BNC CONNECTOR

A high quality BNC plug and socket with heat-treated beryllium copper contacts, bright silver plated and Argalin passivated. Insulating parts made from PTFE (Teflon). Superior pressure sleeve cable clamp. Nominal impedance 50Ω, but both plug and socket will mate with 75Ω types if impedance matching is not critical.  
Peak working voltage: 500V  
Frequency: 10,000MHz  
Free plug 50Ω



Order As HH17T (BNC Plug 50Ω)

Chassis mounting socket requires 9.7mm mounting hole



Order As HH18U (BNC Socket 50Ω)

## UHF SERIES PLUGS AND SOCKETS

A range of 'uhf' type high quality plugs and sockets. The nominal impedance is 50Ω, but this is not constant and although satisfactory up to 200MHz caution should be exercised between 200 and 500MHz. Working voltage: 500V peak. (Note that all 'uhf' series connectors of all makes have a non-constant impedance).



### Plug (PL259)

Suits Cable UR67. Size 38 x 19mm dia. Cable entry hole: 11mm dia.



Order As BW81C (Plug PL259)

### Reducer Small

Screws into Plug PL259 to enable it to be used with cables around 5.3mm dia. e.g. UR76.



Order As BW82D (UHF Reducer Small)

### Reducer Large

Screws into Plug PL259 to enable it to be used with cables around 6.4mm dia.



Order As BW83E (UHF Reducer Large)

### Round Socket

Mounting hole: 16.5mm dia.



Order As BW84F (UHF Socket Round)

### Square Socket

Cut-out 16.5mm dia. Fixing centres: 18 x 18mm x 6BA (M3) clear.



Order As BW85G (Socket SO239)

### Elbow Adaptor

A right-angle coupler, PL259 to SO239.



Order As BW86T (UHF Elbow Adaptor)

### Straight Adaptor

Adaptor to couple two PL259 plugs together.



Order As BW87U (UHF Straight Adaptor)

### 'T' Adaptor

Adaptor to couple two PL259 plugs and then join them to an SO239 socket.



Order As BW88V (UHF T Adaptor)

**XLR-TYPE CANNON-TYPE CONNECTORS**



Professional quality connectors for use on audio and test equipment etc. The strong metal housings are sandblasted die-cast zinc then copper and nickel plated. Contacts are brass, mercury dipped then silver plated. Self-adjusting strain-relief sleeves on line plug and socket will accommodate cables from 4 to 7mm dia. preventing damage to cable sheath up to 50kg stress. Cable clamp has no metal parts and no screws.

Current rating: 15A at 120V AC  
Contact resistance: 5mΩ max

All parts are latching and will mate with other 3-pin XLR connectors.

**3-pin Plug**

Overall length: 87mm Diameter: 19mm



Order As **BW89W (XLR Line Plug)**

**3-pin Chassis Socket**

Mounting hole: 24mm dia. Bezel: 27 x 36.5mm  
Fixing centres: 26 x 17mm x M3 countersunk  
Overall depth (excl. latch release): 37mm



Order As **BW90X (XLR Chassis Socket)**

**3-pin Line Socket**

Overall length: 101mm Diameter (excl. latch release): 19mm



Order As **BW91Y (XLR Line Socket)**

**3-pin Chassis Plug**

Mounting hole: 19mm dia. Bezel: 22 x 36.5mm  
Fixing centres: 27mm x M3 countersunk  
Overall depth: 25mm



Order As **BW92A (XLR Chassis Plug)**

**LATCHING SCREENED DIN PLUGS AND SOCKETS**



A range of high quality DIN plugs and sockets with screened metal bodies and incorporating a latching mechanism. Plugs and line sockets have cable clamps and support sleeves. All plugs and sockets from this range will mate with the appropriate part from any other standard DIN range, but they will only latch when mated with other parts from this range.

**Plugs**

3-pin Order As **BW93B (Dinlatch 3-pin Plug)**  
5 pin A (180°) Order As **BW94C (Dinlatch 5-pin A Plug)**

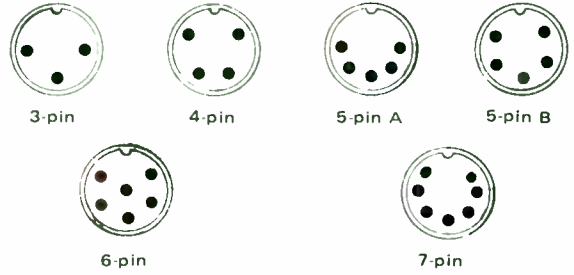
**In-Line Sockets**

3-pin Order As **BW95D (Dinlatch In-line 3-pin)**  
5-pin A (180°) Order As **BW96E (Dinlatch In-line 5-pin A)**

**Chassis Sockets**

3-pin Order As **BW97F (Dinlatch Socket 3-pin)**  
5-pin A (180°) Order As **BW98G (Dinlatch Socket 5-pin A)**

**DIN PLUGS AND SOCKETS**



**Plugs**



2-pin plug  
Order As **HH24B (DIN L/S Plug)**

3-pin plug  
Order As **HH25C (DIN Plug 3-pin)**

4-pin plug  
Order As **HH26D (DIN Plug 4-pin)**

5-pin plug 180° (Type A)  
Order As **HH27E (DIN Plug 5-pin A)**

5-pin plug 240° (Type B)  
Order As **HH28F (DIN Plug 5-pin B)**

6-pin plug  
Order As **HH29G (DIN Plug 6-pin)**

7-pin plug  
Order As **HH30H (DIN Plug 7-pin)**

**Chassis Sockets**



2-pin socket  
Order As **HH31J (DIN L/S Socket)**

3-pin socket  
Order As **HH32K (DIN Socket 3-pin)**

4-pin socket  
Order As **HH33L (DIN Socket 4-pin)**

5-pin socket 180° (Type A)  
Order As **HH34M (DIN Socket 5-pin A)**

5-pin socket 240° (Type B)  
Order As **HH35Q (DIN Socket 5-pin B)**

6-pin socket  
Order As **HH36P (DIN Socket 6-pin)**

7-pin socket  
Order As **HH37S (DIN Socket 7-pin)**



## DIN In-Line Sockets



2-pin line socket  
Order As **HH40T** (DIN Line Socket 2-pin)

3-pin line socket  
Order As **HH41U** (DIN Line Socket 3-pin)

4-pin line socket  
Order As **HH42V** (DIN Line-Socket 4-pin)

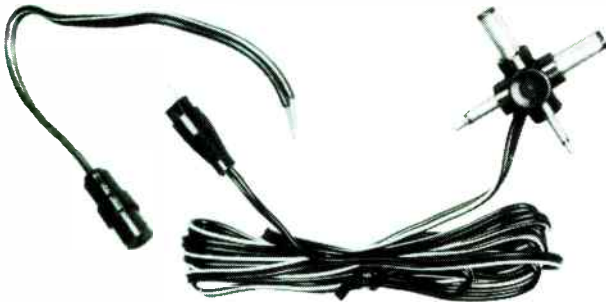
5-pin line socket 180° (Type A)  
Order As **HH43W** (DIN Line Socket 5-pin A)

5-pin line socket 240° (Type B)  
Order As **HH44X** (DIN Line Socket 5-pin B)

6-pin line socket  
Order As **HH45Y** (DIN Line Socket 6-pin)

7-pin line socket  
Order As **HH46A** (DIN Line Socket 7-pin)

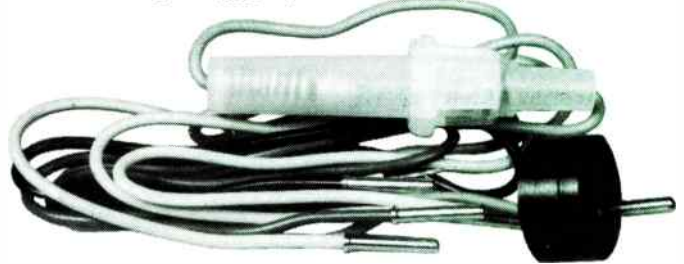
## UNIVERSAL PLUG



A four-way plug: 2.1 power; 2.5 power; 2.5mm jack; 3.5mm jack; moulded onto 2m of 2-core flex with moulded 2-pin plug and socket approx. 200m from end of lead.

Order As **HH38R** (Universal Plug)

## LOW-POWER CONNECTION CORD



A plastic moulding to accept the pins fitted to five leads colour coded red, grey, orange, green and black. The red has an in line fuse-holder fitted with a 1 1/2in. 3A fuse connected in the lead. Leads are 300mm long except red which is 300mm long on each side of the fuseholder. The pins may be inserted in the moulding in dozens of different combinations of positions (since moulding has 10 holes in it) to suit the socket on the equipment to be powered.

Order As **HH39N** (Multi-Position Plug)

## MULTI-POLE CONNECTORS

A range of standard multi-pole connectors in 4, 8, 12, 18 and 25 ways. Both plugs or sockets may be chassis mounted or connected in line. The cover is available in two variations; with cable entry in the side or cable entry in the top. The cover fits both the plug and the socket. If the connection to be made is in line and the plug and socket both have covers fitted then the hinge plate may be fitted to one and the latch plate to the other so that the plug and socket may be clipped tightly together. Alternatively if one half is chassis mounted a spring latch may be fitted which clips over the covered unit and latches the plug and socket tightly together. Both units may be chassis mounted and connected together if desired, but no latching facility is available under these circumstances.

Plug and socket bodies are moulded in nylon loaded PF. Pins are 2.35mm dia. tin dipped silver plated brass. Socket contacts are tin dipped silver plated phosphor bronze.

Working voltage: 1000V DC  
Breakdown voltage between contacts (min.): 5000V DC  
Breakdown voltage contacts to chassis (min.): 6000V DC  
Max. contact resistance: 3mΩ  
Max. current per contact: 3A (If 75% of contacts are carrying 1A or less remaining contacts may be rated at 5A)

A complete set of parts is available for each of the following number of ways: 4-way; 8-way; 12-way; 18-way; 25-way. (A spring latch is not available for the 4-way types).



**Plug Body Order As**  
HH47B (Multiplug 4-way)  
HH53H (Multiplug 8-way)  
HH64U (Multiplug 12-way)  
HH71N (Multiplug 18-way)  
HH78K (Multiplug 25-way)

**Socket Body Order As**  
HH48C (Multiskt 4-way)  
HH54J (Multiskt 8-way)  
HH65V (Multiskt 12-way)  
HH72P (Multiskt 18-way)  
HH79L (Multiskt 25-way)

**Latch Plate Order As**  
HH51F (Multilatch 4-way)  
HH57M (Multilatch 8-way)  
HH68Y (Multilatch 12-way)  
HH75S (Multilatch 18-way)  
HH82D (Multilatch 25-way)

**Hinge Plate Order As**  
HH52G (Multihinge 4-way)  
HH58N (Multihinge 8-way)  
HH69A (Multihinge 12-way)  
HH76H (Multihinge 18-way)  
HH83E (Multihinge 25-way)

**Top-Entry Cover Order As**  
HH49D (Multicover 4-way)  
HH55K (Multicover 8-way)  
HH66W (Multicover 12-way)  
HH73Q (Multicover 18-way)  
HH80B (Multicover 25-way)

**Side-Entry Cover Order As**  
HH50E (Sidecover 4-way)  
HH56L (Sidecover 8-way)  
HH67X (Sidecover 12-way)  
HH74R (Sidecover 18-way)  
HH81C (Sidecover 25-way)

**Spring Latch Order As**  
HH59P (Springlatch 8-way)  
HH70M (Springlatch 12-way)  
HH77J (Springlatch 18-way)  
HH84F (Springlatch 25-way)

## OCTAL PLUGS & SOCKETS

A range of plugs and sockets based on the international Octal valve-holder and valve-base. Plug pins tinned brass; socket contacts tinned phosphor bronze, 1000V 5A max. per contact.

### Chassis Plug

8-way chassis mounting plug

Order As **HL01B (Octal Ch Plug)**



### Chassis Socket

8-way chassis mounting socket

Order As **HL00A (Octal Ch Skt)**



### Line Plug

8-way line plug with black polythene cover.

Order As **HL02C (8-way Socket)**



### Line Socket

8-way line socket with black polythene cover.

Order As **HL03D (8-way Plug)**



## PRINTED CIRCUIT BOARD CONNECTORS

These connectors are intended as a simple and inexpensive method of making cable to printed circuit board connections. Pins are on a 0.2in pitch.

Picture shows WAFERCON TERMINALS on a strip, but these terminals are supplied loose.

### Wafers

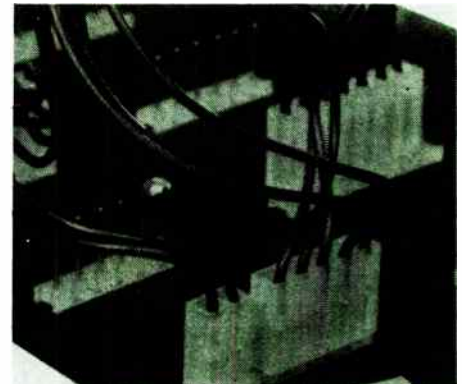
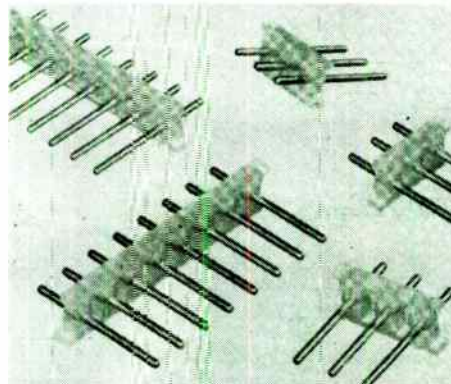
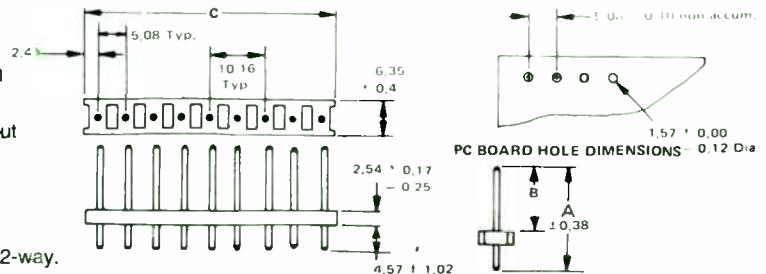
Nylon wafers with round tin-plated brass pins.

Available in five types: 3-way, 4-way, 6-way, 8-way and 12-way.

Dimensions:	(mm)
Pin length A	19.05
Pin length B	11.94
Dimension C	No. of pins
14.99	3
20.07	4
30.23	6
40.39	8
60.71	12

### Order As

- HL04E (Wafercon Plug 3-pin)**
- HL05F (Wafercon Plug 4-pin)**
- HL06G (Wafercon Plug 6-pin)**
- HL07H (Wafercon Plug 8-pin)**
- HL08J (Wafercon Plug 12-pin)**



## Terminal Housings

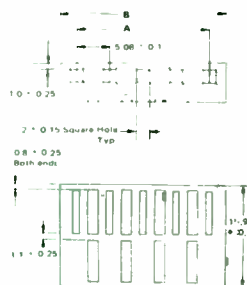
Nylon housing for accepting WAFERCON TERMINALS. Available in five types: 3-way, 4-way, 6-way, 8-way and 12-way.



Dimensions	Nominal
No. of Pins	Dim. A    Dim. B
3	10.16    15.24
4	15.24    20.32
6	25.40    30.48
8	35.56    40.64
12	55.88    60.96

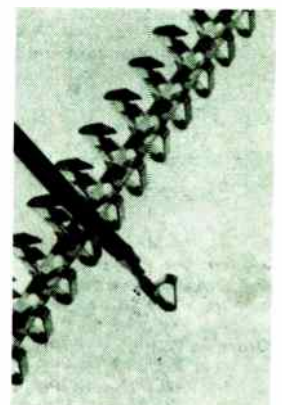
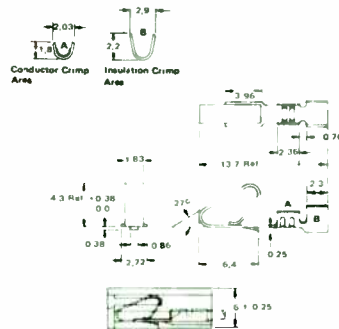
### Order As

- HL09K (Wafercon Skt 3-pin)**
- HL10L (Wafercon Skt 4-pin)**
- HL11M (Wafercon Skt 6-pin)**
- HL12N (Wafercon Skt 8-pin)**
- HL13P (Wafercon Skt 12-pin)**



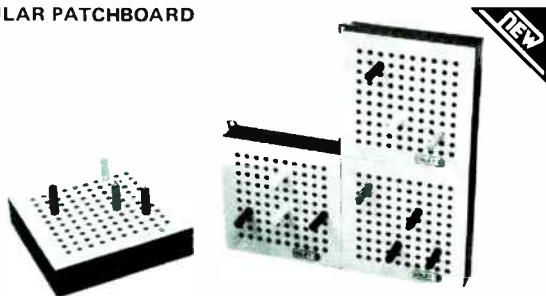
## Terminals

Tin-plated brass terminals, may be soldered or crimped on to wire, then slid into WAFERCON SOCKET where they make a snap fit.



Order As **HL14Q (Wafercon Terminal)**

## MODULAR PATCHBOARD



Modular patchboard with 10 x 10 holes on a 5mm matrix. The board consists of crossed bus bar pairs. The bus bars are arranged on two levels and can be electrically connected at any of the 100 crossing points by means of plugs. The bus-bars are beryllium copper and lead-out pins may be linked to another patchboard in any direction by means of fishplates (supplied). Other fishplates are supplied which are inserted in the corner slots between the front plate and the vertical layer to enable any configuration of vertically and horizontally interconnected boards to be assembled.

Contacts are rated: 5A at 250V AC  
 Contact resistance: 5mΩ  
 Working voltage: Component plug 250V AC  
 Breakdown voltage: 3000V DC  
 Capacitance: <3.5pF between adjacent contact strips.

### Crosstalk.

Frequency	System impedance			
	10k Hz	50Ω	600Ω	10k Ω
100k Hz	98dB	78dB	54dB	
1MHz	79dB	55dB	33dB	
	60dB	36dB	14dB	

### Dimensions:

Front plate: 63 x 63mm  
 Front to back (excl. tag): 15mm  
 Tag length: 4.5mm

Order As YB07H (Patchboard Module)

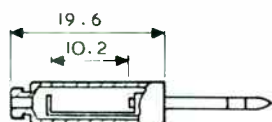
## Shorting Plugs



The plugs may be inserted to give electrical connection between the two planes of the patchboard at that point. Plugs are available in the following colours: Black, Blue, Green, Red and White.

Order As WQ00A (Mod PB Pin Black)  
 WQ01B (Mod PB Pin Blue)  
 WQ02C (Mod PB Pin Green)  
 WQ03D (Mod PB Pin Red)  
 WQ04E (Mod PB Pin White)

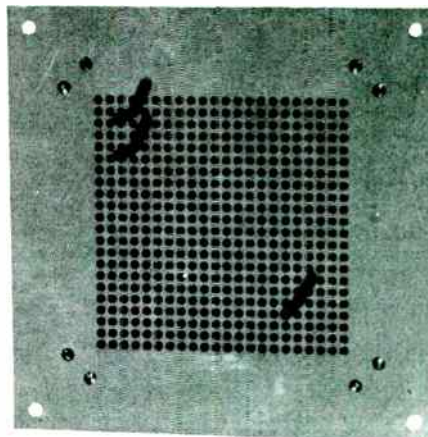
## Wireable Component Plugs



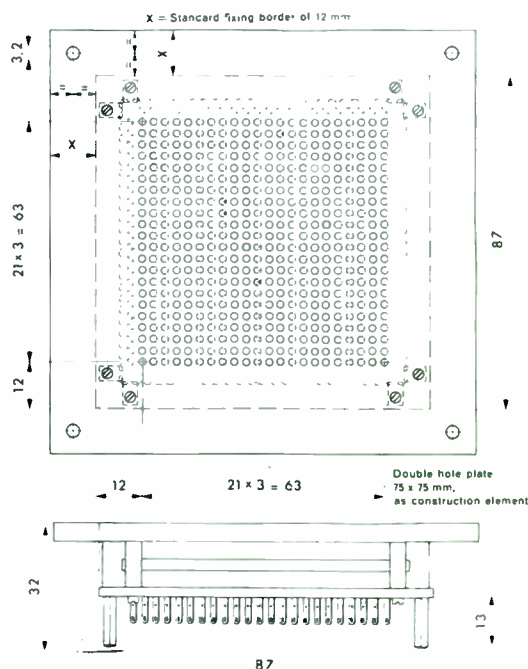
These plugs are insulated between tip and ring and connections are brought out so that components up to 10.2 x 1.5mm may be fitted and a wire may be connected. Plugs are available in the following colours: Black, Blue, Green, Red and White.

Order As WQ05F (WPB Plug Black)  
 WQ06G (WPB Plug Blue)  
 WQ07H (WPB Plug Green)  
 WQ08J (WPB Plug Red)  
 WQ09K (WPB Plug White)

## PATCHBOARD



Patchboard with 22 x 22 holes on a 3mm matrix. The board consists of crossed bus bar pairs. The bus bars are arranged on two levels and can be electrically connected at any of the 484 crossing points by means of plugs. The bus bars are gold-plated hardened beryllium copper. Contacts are rated 6A at 50V. Size 111 x 111 x 32mm. Board includes fixing borders with 6BA clear mounting holes at 99mm centres. Boards are supplied unengraved.



Order As HF00A (Patchboard)

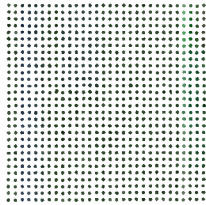
## Plugs for 22 x 22 Hole Patchboard

Gold-plated brass plugs suitable for Patchboard. Pin is 17mm long. Coloured plastic body 16mm long available in the following colours: Black, Blue, Green, Red, White and Yellow.

Order As WL37S (Patch Plug Black)  
 WL38R (Patch Plug Blue)  
 WL39N (Patch Plug Green)  
 WL40T (Patch Plug Red)  
 WL41U (Patch Plug White)  
 WL42V (Patch Plug Yellow)



**LARGE PATCHBOARD**



maplin

Patchboard with 30 x 30 holes on a 4mm matrix. The board consists of crossed bus bar pairs. The bus bars are arranged on two levels and can be electrically connected at any of the 900 crossing points by means of plugs. The bus-bars are silver-plated phosphor bronze. Contacts are rated 2A at 300V DC. Size: 150 x 150 x 39 mm. Board includes fixing borders with 6BA clear mounting holes on 142mm centres.

**Order As YB08J (Large Patchboard)**

**Plugs for Large Patchboard**

Silver-plated plugs suitable for use with Large Patchboard. Pin is 21mm long. White plastic body is 17mm long.

**Order As WQ10L (Large Patch Plug)**

**CASSETTE POWER PLUGS AND SOCKETS**

**Plugs**

2.1mm power plug of standard length



**Order As HH60Q (Std Power Plug 2.1)**

2.1mm power plug having a long reach



**Order As HH61R (Long Pwr Plug 2.1)**

2.5mm power plug of standard length



**Order As HH62S (Std Power Plug 2.5)**

2.5mm power plug having a long reach



**Order As HH63T (Long Pwr Plug 2.5)**

**Sockets**

2.1mm chassis socket with break contact, suits STD POWER PLUG 2.1



**Order As HH85G (Power Skt 2.1)**

2.5mm chassis socket with break contact suits STD POWER PLUG 2.5



**Order As HH86T (Power Skt 2.5)**



**CASSETTE MAINS SOCKETS**

**Nivico Type**



A cassette two pin mains socket with changeover switch for disconnecting internal battery etc. when plug is inserted. Suits Nivico plug (see Mains leads on page ). Designed to be mounted on a sub-chassis. Fixing holes 8BA clear on 20mm centres. Sub-chassis cutout: 11.5x17mm. Distance from rear of main panel to front of sub-chassis 14mm with 14x10mm cutout in main panel.

**Order As HH87U (Cassette Skt Nivico)**

**Paros Type**



A cassette two pin mains socket with changeover switch for disconnecting internal battery etc. when plug is inserted. Suits Paros plug (see Mains leads on page ). Fixing centres: 6BA clear holes 30mm apart. Panel cutout required: 18.5x13mm.

**Order As HH88V (Cassette Skt Paros)**

**MAINS PLUGS AND SOCKETS**

**American Style**

A two pin 7.5A line plug with flat pins on 1/2 inch centres (12.7mm).



**Order As HL17T (USA Mains Plug)**

A two pin 7.5A chassis socket to suit USA MAINS PLUG.



Fixing centres 27mm.

**Order As HL18U (Flat Pin M/S)**

A two pin 7.5A line socket to suit our USA MAINS PLUG.



**Order As HL19V (Flat Pin Conn)**

**European Style**

Rated 6A at 250V AC.

**Socket.**

Socket has cord grip and strain relief sleeve.



**Order As HL16S (Eurosocket)**

**Plug**

Mounting hole: 27 x 20mm. Fixing centres: 40 x 6BA (M3) countersunk. Overall depth: 33mm.



**Order As HL15R (Europlug)**

**Socket**

Mounting hole: 28.24 x 23.24mm Overall depth: 33mm Socket is snap-in fixing. Sockets are shuttered.



**Order As HL42V (Euro Facility Outlet)**

**Plug**

Plug has cord grip and strain relief grommet. The pins are partly shrouded for extra safety.



**Order As HL43W (Euro Facility Plug)**

## Moulded European Style



A three pin chassis plug and line socket, permanently moulded to 1.5m of 3-core flex. Rated at 6A. Not available separately.

Order As **BW99H** (Euroconn Lead)

## 3-Pin Low Current Range

### P429

A three pin chassis plug. Overall depth: 21mm. Mounting hole: 19mm dia. Bezel diameter: 24.7mm dia. Rated: 1.5A at 250V, 2A at 110V, 3A at 6V AC and DC. Mates with sockets P646 and P430SE.



Order As **HL20W** (Mains Plug P429)

### P646

A 3-pin line socket to fit plug P429. With cord grip and strain relief sleeve. Rated: (as P429).



Order As **HL44X** (Mains Socket P646)

### P430SE

A 3-pin line socket; side-entry version of P646. With cord grip. Rated: (as P429).



Order As **HL23A** (Mains Socket P430SE)

### P649

A 3-pin line plug with cord grip and strain relief sleeve. Rated 2.5A at 250V, 3A at 110V, 4A at 6V AC and DC. Mates with socket P650.



Order As **HL45Y** (Mains Plug P649)

### P650

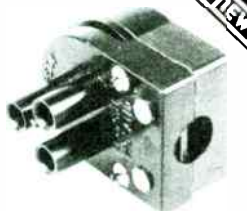
A 3-pin chassis socket. Mounting hole: 19mm. Rated (as P649). Mates with plug P649.



Order As **HL46A** (Mains Socket P650)

### SA2403

A 3-pin line plug with shielded pins and cord grip. Plug is side entry type. Rated 2A at 250V, 3A at 110V and 4A at 6V AC and DC. Mates with socket SA2404.



Order As **HL47B** (Mains Plug SA2403)

### SA2404

A 3-pin chassis socket. Mounting hole 19mm. dia. Rated (as SA2403). Mates with plug SA2403.



Order As **HL48C** (Mains Socket SA2404)

## 3-pin 5A Range

Please note that these connectors are not suitable for use on domestic equipment at voltages over 50V unless they are inaccessible without the use of a tool as defined in the Electrical Equipment (Safety) Regulations 1975. (Except when SA2190 and SA2111 are used as a pair.)

### SA2190

A 3-pin chassis plug. Overall depth: 33mm. Mounting hole: 27mm dia. Bezel dia. 40mm. Fixing centres: 32mm x 4BA. Rated: 5A at 250V AC (see note above), 6A at 110V AC (see note above), 7A at 6V AC and DC. Mates with socket SA1862.



Order As **HL27E** (Mains Plug SA2190)

### SA1862

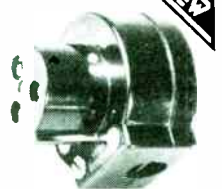
A 3-pin line socket to fit plug SA2190. With cord grip. Strain relief sleeve available separately, if required. Rated (as SA2190).



Order As **HL28F** (Mains Socket SA1862)

### SA2111

A 3-pin line socket; side entry version of SA1862. With cord grip. Fits plug SA2190. This connector pair is suitable for use at 250V AC in domestic applications. Rated (as SA2190).



Order As **HL49D** (Mains Socket SA2111)

### SA2019A

A 3-pin line plug with cord grip. Strain relief sleeve available separately if required. Rated: 250V at 5A AC (see note above), 110V at 5A AC (see note above) 6V at 6A AC, 1A DC. Mates with socket SA2020.



Order As **HL30H** (Mains Plug SA2019A)

### SA2020

A 3-pin chassis socket. Overall depth: 35mm. Mounting hole: 27mm dia. Bezel dia: 39mm. Fixing centres: 32mm x 6BA (M3). Rated (as SA2019A). Mates with plug SA2019A.



Order As **HL31J** (Mains Socket SA2020)

## Four-Pole Mains Connector

### SA2367

A 4-pin line plug with shielded pins and cord grip. Plug is side entry type. Rated 2A at 250V, 3A at 110V and 4A at 6V AC and DC. Mates with socket SA2368. Plug is keyed so that it can only be inserted one way.



Order As **HL33L** (Mains Plug SA2367)

### SA2368

A 4-pin chassis socket. Overall depth: 28mm. Mounting hole: 19mm. Bezel dia: 25mm. Rated: (as SA2367). Mates with plug SA2367.



Order As **HL34M** (Mains Socket SA2368)

### Six-Pole Mains Connector

Please note that this connector is not suitable for use on domestic equipment at voltages over 50V unless it is inaccessible without the use of a tool as defined in the Electrical Equipment (Safety) Regulations 1975.



#### P427

A six-pin chassis plug. Overall depth: 38mm. Mounting hole: 19mm. Bezel dia: 23mm. Rated: 1.5A at 250V (see note above), 2A at 110V (see note above), 3A at 6V AC and DC. Mates with socket P428.

Order As HL36P (Mains Plug P427)

#### P428

A six-pin line socket with strain relief sleeve. Rated (as P427). Mates with plug P427.

Order As HL37S (Mains Socket P428)



### Eight-Pole Mains Connector

An eight-pole mains connector which is fully shrouded and completely safe when de-mated. It is also polarised and keyed so that mis-mating is impossible. Consequently inputs and outputs may be connected simultaneously through one plug and socket pair with absolute safety. Centre pin is designated 'earth' and unfailingly mates first and de-mates last.

#### P551



An eight-pin line plug with cord grip. Side entry type. Will accept up to eight full size insulated conductors or two to three mains cables simultaneously. Rated (per pin): 6A at 250V, 10A at 2.5V AC. Mates with socket P552.

Order As HL39N (Mains Plug P551)

#### P552



An eight-pin chassis socket. Overall depth: 23mm. Mounting hole: 38mm dia. Bezel: 41 x 41mm. Fixing centres: 33 x 33mm x 6BA (M3) countersunk. Rated (as P551). Mates with plug P551.

Order As HL40T (Mains Socket P552)

### Strain Relief Sleeve

A moulded black strain relief sleeve suitable for use with Socket SA1862 and Plug SA2019A.

Order As HL50E (Sleeve 8037)



### Insulating Boots

Flexible black covers providing neat tangle-free cable connection and giving protection against accidental contact.



#### Type 9455

Fits over the back of Plug P429 and P427 and Sockets P650, SA2404 and SA2368.

Order As HL51F (Boot 9455)

#### Type 8878

Fits over the back of Plug SA2190 and Socket SA2020.

Order As HL52G (Boot 8878)

### NOTE

Please order all above individually, but for your information listed below are details of the part numbers given to the various pairs of plugs and sockets which you may find quoted from time to time.

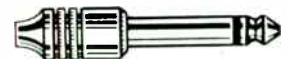
Manufacturer's Part No. of

Pair	Plug	Socket
P73	SA2190	SA1862
P73SE	SA2190	SA2111
P194	P427	P428
P360SE	P429	P430SE
P437	SA2019A	SA2020
P550	P551	P552
P560	SA2367	SA2368
P561	SA2403	SA2404
P630	P649	P650
P632	P429	P646

### ADAPTOR PLUGS

3.5mm socket to Standard jack plug

Order As RW00A (Adaptor A)



Phono socket to Standard Jack plug

Order As RW01B (Adaptor B)



Standard jack socket to 3.5mm jack plug

Order As RW02C (Adaptor C)



2.5mm socket to 3.5mm jack plug

Order As RW03D (Adaptor D)



Phono socket to 3.5mm jack plug

Order As RW04E (Adaptor E)



Standard jack socket to Phono plug

Order As RW05F (Adaptor F)



3.5mm socket to Phono plug

Order As RW06G (Adaptor G)



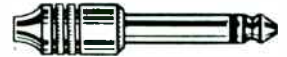


2.5mm socket to Phono plug



Order As **RW07H** (Adaptor H)

2.5mm socket to Standard Jack plug



Order As **RW11M** (Adaptor M)

3.5mm socket to 2.5mm jack plug



Order As **RW08J** (Adaptor J)

Standard stereo jack socket to 3.5mm jack plug



Order As **RW12N** (Adaptor N)

Standard jack socket to 2.5mm jack plug



Order As **RW09K** (Adaptor K)

### HEADPHONE SOCKET ADAPTOR

Adaptor has a 5-pin 360° (Dice pattern) plug (suitable for plugging into the headphone socket on many amplifiers) internally connected to a standard stereo jack socket (as fitted on most headphones).

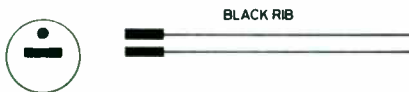


Order As **HL53H** (Adaptor P)

## AUDIO LEADS

### DIN to Open

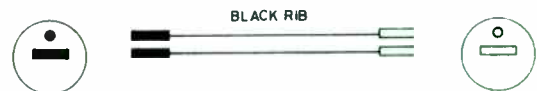
Loudspeaker plug to open end. Length: 3m.



Order As **RW27E** (Dinpak P)

### DIN to DIN

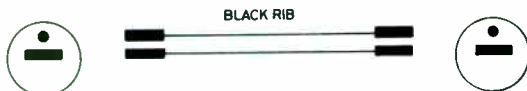
Loudspeaker plug to loudspeaker line socket. Length: 10m.



Order As **RW25C** (Dinpak M)

### DIN to DIN

Loudspeaker plug to loudspeaker plug. Length: 3m.



Order As **RW26D** (Dinpak N)

### DIN to Spades

Loudspeaker plug to two coded 4BA (M4) spade terminals. Length: 5 metres.



Order As **RW46A** (Dinpak 274)

### DIN to DIN

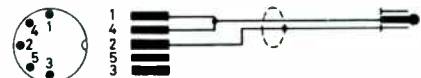
Loudspeaker plug to loudspeaker plug. Length: 10 metres.



Order As **RW45Y** (Dinpak 273)

### DIN to 3.5mm Jack

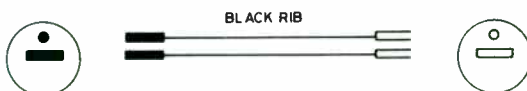
5-pin DIN plug (pins 1 & 4) to 3.5mm jack plug. Length: 1.2m.



Order As **RW22Y** (Dinpak J)

### DIN to DIN

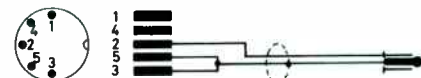
Loudspeaker plug to loudspeaker line socket. Length: 3 metres.



Order As **RW44X** (Dinpak 262)

### DIN to 3.5mm Jack

5-pin DIN plug (pins 3 & 5) to 3.5mm jack plug Length: 1.2m.



Order As **RW23A** (Dinpak K)

### DIN to DIN

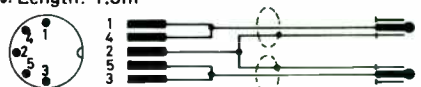
Loudspeaker plug to loudspeaker line socket. Length: 5 metres



Order As **RW47B** (Dinpak 275)

### DIN to 3.5mm Jack

5-pin DIN plug (pins 1 & 4 and pins 3 & 5) to two 3.5mm jack plugs. Length: 1.3m



Order As **RW24B** (Dinpak L)

**DIN to Phono**

5-pin DIN plug (pins 1 & 4) to 2 phono plugs. Length: 1.2m.



Order As RW18U (Dinpak E)

**DIN to Phono**

5-pin DIN plug (pins 3 & 5) to 2 phono plugs. Length: 1.2m.



Order As RW19V (Dinpak F)

**DIN to Phono**

5-pin DIN plug to 4 phono plugs. Length: 1.2m.



Order As RW17T (Dinpak D)

**DIN to Phono**

5-pin DIN plug (pins 3 & 5) to two phono line sockets. Length 23cms.



Order As RW41U (Dinpak 251)

**DIN to Phono**

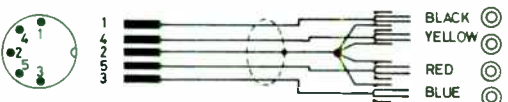
5-pin DIN plug (pins 1 & 4) to two phono line sockets. Length: 23cms.



Order As RW42V (Dinpak 252)

**DIN to Phono**

5-pin DIN Plug to 4 phono line sockets. Length: 1.2m.



Order As RW20W (Dinpak G)

**DIN to Phono**

Two phono plugs to 5-pin DIN line socket (pins 3 & 5). Length 23cms.



Order As RW49D (Dinpak 280)

**DIN to Phono**

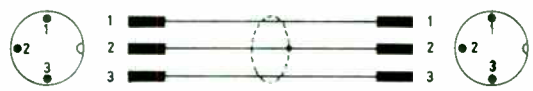
5-way DIN line socket to phono plugs. Length: 1.2m.



Order As RW21X (Dinpak H)

**DIN to DIN**

5-pin DIN plug to 3-pin DIN plug. Length: 1.2m.



Order As RW15R (Dinpak B)

**DIN to DIN**

5-pin DIN plug to 5-pin DIN plug. Length: 1.2m.



Order As RW14Q (Dinpak A)

**DIN to DIN**

5-pin DIN plug to 5-pin DIN plug with reversed (mirror-image) connections. Length 1.2 metres.



Order As RW43W (Dinpak 254)

**DIN to DIN**

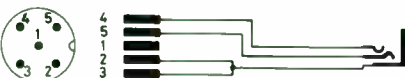
5-pin DIN plug to 5-pin DIN plug with two 470kΩ resistors in series with pins 1 and pins 4. Length 1.2 metres.



Order As RW40T (Dinpak 249)

**DIN to Std Jack**

5-pin DIN headset plug to stereo jack line sockets. Length: 23cms.



Order As RW37S (Dinpak 205)

**DIN to DIN**

5-pin DIN plug to 5-way DIN line socket. Length: 1.2m.



Order As RW16S (Dinpak C)

**PHONO CONNECTORS**

**Phono to Phono**

Phono plug to phono plug. Length: 1.2 metres.



Order As RW48C (Plugpak 279)

**Phono to Phono**

Phono plug to phono line socket. Length: 3 metres.



Order As RW52G (Plugpak 289)

### Phono to Phono

Phono plug to phono line socket. Length: 10 metres.



Order As RW54J (Pluggak 291)

### Phono to Phono

Two phono plugs to two phono plugs. Length: 1.2 metres.



Order As RW50E (Pluggak 282)

### Phono to Phono

Four phono plugs to four phono plugs. Length: 1.2 metres.



Order As RW51F (Pluggak 283)

### OTHER TYPES

#### 3.5mm Jack to 3.5mm Jack

3.5mm jack plug to 3.5mm jack plug. Length: 1.2m.



Order As RW28F (Pluggak Q)

#### 3.5mm Jack to 3.5mm Jack

3.5mm Jack plug to 3.5mm line socket. Length 1.2m.



Order As RW39N (Pluggak 236)

#### Car Aerial Lead

Car aerial extension lead (capacitor loaded). Length: 1m.



Order As RW29G (Pluggak R)

#### Car Aerial Lead

Car aerial extension lead (capacitor loaded). Length: 3.5m.



Order As RW30H (Pluggak S)

#### Headphone Lead

Headphone extension lead. Stereo jack plug to stereo line socket. Coiled lead. Length: 6m.



Order As RW31J (Pluggak T)

#### Headphone Lead

Headphone adaptor lead. Stereo jack plug to two stereo line sockets



(So that two sets of stereo headphones can be connected to one outlet).

Length: 0.2m.

Order As RW32K (Pluggak V)

#### Guitar Lead

Guitar lead. Standard (straight) jack plug to standard (angled) jack plug with coiled screened lead. Length: 6m.



Order As RW34M (Pluggak X)

#### Guitar Lead

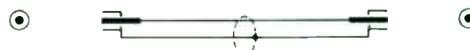
Professional heavy duty guitar lead. Standard mono (straight) jack plug to standard mono (angled) jack plug with coiled screened lead. Length: 6 metres.



Order As RW35Q (Pluggak HD Guitar)

#### TV Aerial Lead

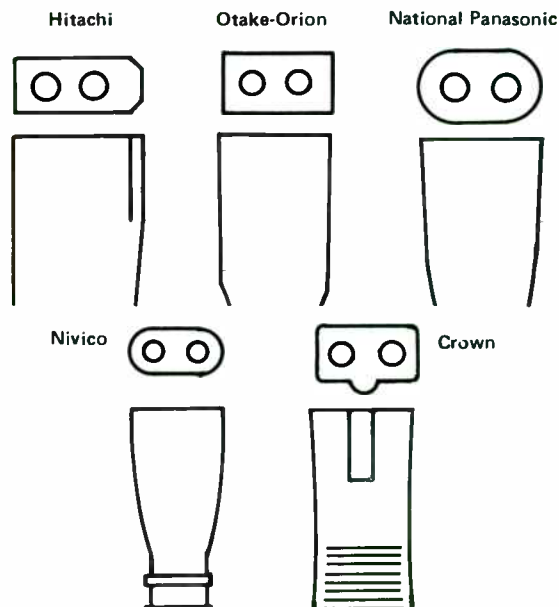
TV co-ax plug to TV co-ax plug. Length: 2 metres.



Order As RW36P (Pluggak 200)

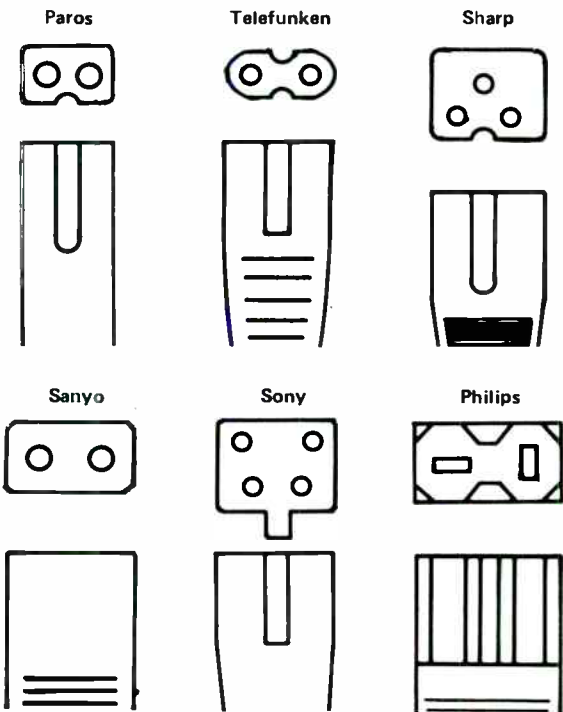
### CASSETTE MAINS LEADS

A range of mains leads with moulded plugs designed to fit the mains sockets on most cassette players, radios etc. The following types are available: Crown, Hitachi, National Panasonic, Nivico, Otake-Orion, Paros, Philips, Sanyo, Sharp, Sony, Telefunken.



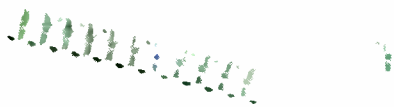
Continued on Page 129





- Order As  
 RW56L (Cassette Lead Crown)  
 RW57M (Cassette Lead Hitachi)  
 RW58N (Cassette Lead National Panasonic)  
 RW59P (Cassette Lead Nivico)  
 RW60Q (Cassette Lead Otake-Orion)  
 RW61R (Cassette Lead Paros)  
 RW62S (Cassette Lead Philips)  
 RW63T (Cassette Lead Sanyo)  
 RW64U (Cassette Lead Sharp)  
 RW65V (Cassette Lead Sony)  
 RW66W (Cassette Lead Telefunken)

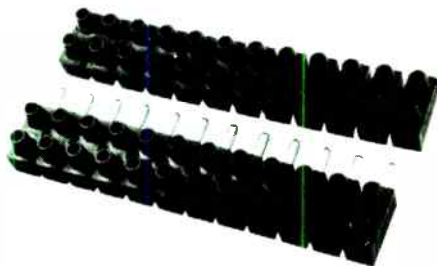
**TERMINAL BLOCKS**



12-way flexible moulded terminal block strips that may be easily cut into shorter lengths. Screw terminals. Three types are available: 5Amp, 15Amp and 30Amp.

- Order As HF01B (Terminal Block 5A)  
 HL54J (Terminal Block 15A)  
 HL55K (Terminal Block 30A)

**TERMINAL BLOCK PLUG AND SOCKET**



A pair of 12-way flexible moulded terminal block strips that may be easily cut into shorter lengths. One block has one screw terminal and a plug per position and the other block has one screw terminal and a socket per position. Rating: 5Amps.

- Order As HL56L (Terminal Block Connector)

**ELECTRICAL ACCESSORIES**

A range of very high quality British-made\* electrical accessories. With the help of our Book BP31 (Practical Electrical Re-wiring and Repairs by C.E. Miller or Book NB245 (Home Electrics by Geoffrey Burdett) and our house wiring cables described on pages 43 and 44 you can re-wire or make repairs or alterations to your house wiring with complete confidence. Remember that the lives of your family may depend on the quality and safety features built into the accessories you choose. The accessories we stock for you are of the highest standard, meet all the relevant specifications and comply with the latest safety standards required by law. Nevertheless they are offered at highly competitive prices which make them a genuine best buy. All accessories are rated at 240V AC unless stated. (Not suitable for DC)

\*Except where stated.

**PLUGS**

**5 - Amp**

A 5A mains plug moulded in hard-wearing heat-resistant white nylon. Fitted with cord-grip. Not fused. Conforms to BS546A.

- Order As HL57M (5 Amp Plug Nylon)



**13 - Amp Nylon**

A 13A mains plug moulded in hard-wearing heat-resistant white nylon. Fitted with 13A fuse and cord-grip. Conforms to BS1363A.

- Order As RW67X (13 Amp Plug Nylon)



**13 - Amp Rubber**

A 13A mains plug moulded in unbreakable, tough white rubber. Fitted with 13A fuse and cord-grip. Conforms to BS1363A.

- Order As HL58N (Rubber 13A Plug)



**15 - Amp**

A 15A mains plug moulded in hard-wearing heat-resistant white nylon. Fitted with cord-grip. Not fused. Conforms to BS546A.

- Order As HL59P (15A Plug Nylon)



**Kettle Connector**

A 3-pin connector that fits most electric kettles. Moulded in black and rated at 13A.

- Order As HL60Q (Kettle Connector)



**ADAPTORS**

**Flex Connector**



A 10A 3-pin flex connector. The pins are shrouded and the earth pin is off-set so that the connector is non-reversible. Connect mains to socket side and appliance to plug side. Fitted with cord-grip and moulded in hard-wearing heat-resistant white nylon.

- Order As HL61R (Flex Connector)

**2-Way Multiplug**

A 13A 3-pin adaptor that plugs into a standard 13A socket and allows up to two appliances to be plugged into it. Maximum total load: 13A. Unfused. Sockets are shuttered. White.

- Order As HL62S (Mains Adaptor 2-Way)



NEW

# ELECTRICAL ACCESSORIES

# MAPLIN

### 3-Way Multiplug

A 13A 3-pin adaptor that plugs into a standard 13A socket and allows up to three appliances to be plugged into it. Maximum total load: 13A. Unfused. Sockets are shuttered. White.



Order As HL63T (Mains Adaptor 3-Way)

### Shaver Adaptor

Standard 13A 3-pin plug internally connected to a 2-pin socket suitable for accepting the plugs fitted to electric shavers. Sockets are shuttered. Fitted with a 1A fuse. White. Imported type.

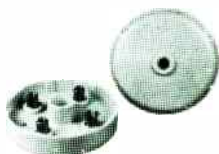


Order As HL64U (Shaver Adaptor)

### JUNCTION BOXES

#### 5-Amp

A 4-terminal junction box rated 5A per terminal. White. Size 57mm (2 1/4 in.) diameter.



Order As HL65V (Junction Box Small)

#### 15-Amp

A 4-terminal junction box rated 15A per terminal. White. Size 76mm (3 in.) diameter.



Order As HL66W (Junction Box Lge)

#### 30 Amp

A 3-terminal junction box rated 30A per terminal. For interconnections in ring main circuits. White. Size 76mm (3 in.) diameter.

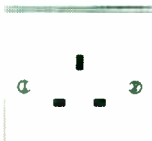


Order As HL67X (Junction Box RM)

### SOCKET OUTLETS

#### Unswitched Single

A 13A socket without switch. White. BS1363. Supplied with fixing screws. Shuttered.



Order As HL68Y (Single Skt Unswitched)

#### Unswitched Double

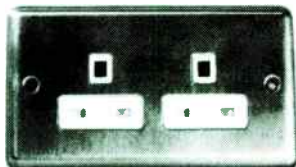
A double 13A socket without switches. White BS1363. Supplied with fixing screws. Shuttered.



Order As HL69A (Dble Skt Unswitched)

#### Unswitched Double Stainless Steel

A double 13A socket without switches. Stainless steel. BS1363. Supplied with fixing screws. Shuttered.



Order As HL70M (Dble Skt Unswchd Silver)

#### Switched Single

A 13A socket with double pole switch that switches both live and neutral for absolute safety. White. BS1363. Supplied with fixing Shuttered.



Order As HL71N (Single Sw Socket)

#### Switched Double

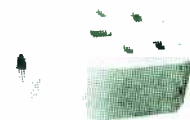
A double 13A socket each with its own double pole switch that switches both live and neutral for absolute safety. White. BS1363. Supplied with fixing screws. Shuttered.



Order As HL72P (Double Sw Socket)

#### Trailing Single Socket

A single 13A socket without switch. Finished in a resilient white thermoplastic. With cord grip. Shuttered. Designed to be fitted to the end of an extension lead.



Order As HL73Q (Trailing Skt Single)

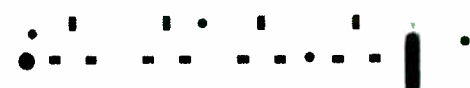
#### Trailing Double Socket

A double 13A socket without switches. Finished in a resilient white thermoplastic. With cord grip. Shuttered. Designed to be fitted to the end of an extension lead.



Order As HL74R (Trailing Dble Skt)

### Distribution Board



A plug board with four 13A sockets moulded in unbreakable white PVC. Cord grip on cable inlet at right-hand end enables use with trailing lead or four knockouts are provided in the base by which the unit may be fixed to a wall etc. Sockets have safety shutters and a red neon glows when board has power connected to it. A 13A 1in fuse is fitted and may be removed with power connected.

Total load must not exceed 13A.

Order As RW68Y (Dis Board 4-Way)

### Cooker Controls



A cooker control produced to BS4177C. The cooker switch is a large double pole switch rated at 45A. A switched 13A socket is also provided for electric kettles etc. The socket is shuttered. For ease of wiring separate earth terminals are provided for socket and cooker. Both switches have red rockers and are double pole to switch both live and neutral for absolute safety. Supplied with fixing screws. White. Available without neon indicators.

Order As HL76H (Cooker Switch)

Also available with neon indicators for cooker switch and socket switch.

Order As HL77J (Neon Cooker Switch)



**Shaver Socket for Bathrooms**

A dual voltage shaver socket to BS3052. Two sockets are provided one giving 115V and one giving 240V; in each case they suit the appropriate plug. Both sockets are shuttered and their operation automatically switches on and off the double wound safety isolating transformer, that is protected by a self-resetting overload device. The sockets and shutters are positioned to prevent the transformer being overloaded by the insertion of two shavers simultaneously.



Designed for use in bathrooms where it meets the relevant IEE regulations. Supplied with fixing screws. White.

**Order As HL78K (Shaver Skt Isolated)**

**Shaver Socket for Bedrooms**

A shaver socket to suit any type of shaver plug. This socket must not be fitted in a bathroom where it would be extremely dangerous. The socket is not shuttered and we recommend mounting it out of reach of small children. White. Imported type. Surface mounting only. Supplied with fixing screws.



**Order As HL79L (Shaver Socket)**

**CONNECTING UNITS**

**Cooker Outlet Clamp Type**

A white plate cover, steel support plate and cable clamp to make a neat finish to the outlet for the cable from the cooker control unit to the cooker. Supplied with fixing screws.



**Order As HL80B (Cooker Outlet C)**

**Cooker Outlet Terminal Block Type**

A white plate cover, terminal block on steel support, insulated internal cover and cable clamp to make a neat finish to the outlet for the cable from the cooker control unit to the cooker. Supplied with fixing screws.



**Order As HL81C (Cooker Outlet T)**

**Flex Outlet Unswitched**



A connecting unit, max. load 13A with a flex outlet in a white plate cover. Unswitched. BS1363. Supplied with fixing screws.

**Order As HL82D (Flex Outlet Unswitched)**

**Flex Outlet Switched**

A connecting unit, max load 13A with a flex outlet in a white plate cover and a double pole switch. BS1363. Supplied with fixing screws.



**Order As HL83E (Switched Flex Outlet)**

**Clock Connector Surface Mounting**

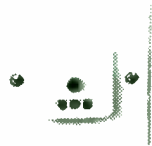
A surface mounting clock connector box in white. With cable grip and earth terminal. Box has 41mm fixing centres. Fixing screws supplied. In accordance with IEE wiring regulation F7.



**Order As HL84F (Clock Connector S)**

**Clock Connector Flush Mounting**

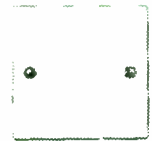
A flush mounting clock connector plate in white to BS1363. With cable grip and earth terminal. Fixing screws supplied. In accordance with IEE wiring regulation F7.



**Order As HL85G (Clock Connector B)**

**Blanking-off Plate**

A white plate that will blank-off any spare single mounting box. BS1363. Supplied with fixing screws.



**Order As HL86T (Blanking Plate)**

**SWITCHES**

**20A Plain**

A plain white plate switch with a single double pole switch rated 20A. With flex outlet and cord-grip. Fixing screws supplied. BS3676.



**Order As HL87U (20A Plateswitch)**

**20A 'Water Heater'**

A white plateswitch marked 'water heater' and containing a red neon indicator. With a single double pole switch rated 20A, plus flex outlet and cord-grip. Fixing screws supplied. BS3676.



**Order As HL88V (20A Water Heater Switch)**

**Single Light Switch 1-Way**

A single one-way switch rated at 5A and also suitable for fluorescent fittings. White. Fixing screws supplied. BS3676.

**Order As HL89W (Light Switch ST Single)**

**Single Light Switch 2-Way**

A single two-way switch rated at 5A and also suitable for fluorescent fittings. For use where two switches are used to operate the light/s e.g. in hall and stairways. White. Fixing screws supplied. BS3676.

**Order As HL90X (Light Switch DT Single)**

**Double Light Switch**

Two separate two-way switches rated at 5A and also suitable for fluorescent fittings. White. Fixing screws supplied. BS3676.



**Order As HL91Y (Light Switch Dual)**



**NEW**

# ELECTRICAL ACCESSORIES

**MAPLIN**

## Triple Light Switch

Three separate two-way switches rated at 5A and also suitable for fluorescent fittings. White. Fixing screws supplied. BS3676.

Order As HL92A (Light Switch Triple)

## Quadruple Light Switch

Four separate two-way switches rated at 5A and also suitable for fluorescent fittings. White. Fixing screws supplied BS3676.

Order As HL93B (Light Switch Quad)

## LIGHT DIMMERS

A range of attractive modern light dimmers for filament lamps e.g. standard domestic light bulbs, having a total rating up to the rating shown. All types (except outdoor type) fit our 16mm flush or 20mm surface pattresses. These dimmers are extremely simple to fit. Switch off electricity at main fuse box, remove existing switch, connect the two wires to the dimmer and screw on to existing pattress. The dimmer switches the light on and off or sets brightness to desired level depending on position of knob.

### Rotary Control

White plate with elegant spun aluminium knob. Rotary knob controls up to 250W. Order As FQ10L (250W Rotary Dimmer)

### Brass Push-on Push-off

Luxurious solid cast brass plate with brass effect knob. Switching is push-on push-off so that light may be switched on or off at any brightness setting. Rated 250W. Order As FQ11M (Brass Dimmer)

### White Push-on Push-off Single

White plate with elegant spun aluminium knob. Switching is push-on push-off so that light may be switched on or off at any brightness setting. Rated 250W.

Order As FQ12N (250W Push Dimmer Single)

### White Push-on Push-off Double

White plate with elegant spun aluminium knobs. Switching is push-on push-off so that light may be switched on or off at any brightness setting. Two completely independent switches giving full control of two different lamps (or sets of lamps). Rated 250W each control.

Order As FQ13P (250W Push Dimmer Double)

### Touch Dimmer

White plate with touch pad. When touched light switches on and slowly brightens reaching full brightness after 4 seconds approx, then brightness diminishes again and light switches off after a further 4 seconds. Removing finger from touch pad at any time clamps brightness at that level. Rated 630W.

Order As FQ14Q (630W Touch Dimmer)

### Security Dimmer

White plate with elegant spun aluminium knob. Switching is push-on push-off so that light may be switched on or off at any brightness setting. Switch on and off can also be automatic so that light automatically switches on as dusk falls and switches off at dawn, giving extra security when you are away from home, or a cosy welcome home in the evening. Rated 400W.

Order As FQ15R (Security Dimmer)

### Outdoor Automatic Switch

A junction box designed for direct connection to an outdoor lamp. Automatically switches on at dusk and off at dawn, for security and for safety when you return home at night. Rated 1000W.

Order As FQ16S (Auto Security Switch)

**WARNING:** These dimmers must not be used with fluorescent lamps.

## PATTRESSES

### Flush Mounting

A range of flush mounting boxes which are designed to be buried in the wall with the edges flush with the plaster. Five types are available. All are to BS1363.

#### Single 16mm

For all light switches. 16mm deep with earth terminal. One adjustable lug, brass inserts in both lugs. One 20mm and two 16mm oval knock-outs. Moulded in white PVC.

Order As YB09K (Flush Pattress 16mm Single)



#### Single 25mm

For all socket outlets, 25mm deep. One adjustable lug, brass inserts fitted in both lugs. Eight 20mm round knockouts. Moulded in white PVC.

Order As YB10L (Flush Pattress 25mm Single)



#### Double 25mm

For all double panels except cooker and shaver units. 25mm deep. One adjustable lug, brass inserts fitted in both lugs. Twelve 20mm round knockouts. Moulded in white PVC.

Order As YB11M (Flush Pattress 25mm Double)



#### Double 35mm

For cooker panels 35mm deep. One adjustable lug, brass inserts fitted in both lugs. Twelve 20mm round knockouts. Moulded in white PVC.

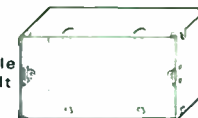
Order As YB12N (Flush Pattress 35mm Double)



#### Double 47mm

For shaver panel. 47mm deep. Two adjustable and four fixed steel lugs. Earth terminal built in. Has several 16mm, 20mm and 25mm round knockouts. Steel box.

Order As YB13P (Steel Pattress 47mm)



### Surface Mounting

A range of surface mounting boxes all moulded in bright white plastic. Five types are available. All to BS1363.

#### Single 20mm

For all light switches. 20mm deep with earth terminal.

Order As YB14Q (Surface Pattress 20mm Single)



#### Single 29mm

For all socket outlets. 29mm deep.

Order As YB15R (Surface Pattress 29mm Single)



#### Double 29mm

For all double panels except cooker and shaver units. 29mm deep.

Order As YB16S (Surface Pattress 29mm Double)



#### Double 47mm

For cooker and shaver panels. 47mm deep.

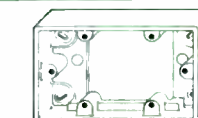
Order As YB17T (Surface Pattress 47mm Double)



### Conversion Unit

May be fitted onto a single flush mounting box so that a double plate may be fitted.

Order As YB18U (Conversion Pattress)



**Ceiling Switches**



A ceiling mounted cord operated light switch for use in bathrooms (wall mounted switches are not permitted in bathrooms). Available with a one-way or two-way switch. Rated at 5A and suitable for fluorescent fittings. White with tough white nylon pull-cord. Fixing centres 51mm.

Order As **FQ00A** (Ceiling Switch 1-way)  
**FQ01B** (Ceiling Switch 2-way)

**LIGHT FITTINGS**

**BC Lampholder**

A standard BC lampholder to BS52. With cord-grip and sprung plungers, plus short skirt. White.



Order As **FQ02C** (Lampholder 702)

**Switched BC Lampholders**



A standard BC lampholder to BS52 with single-pole on-off pushbar switch. With sprung plungers, and short skirt. White. Available with cord-grip (CG) entry or with 12.7mm (1/2in.) standard threaded entry for table lamps.

Order As **FQ03D** (Lampholder 254 CG)  
**FQ04E** (Lampholder 252 1/2 in)

**Battenholder**



A standard BC lampholder to BS52 in a plastic mount with short skirt. This battenholder has sprung plungers and is finished in white. Diameter of base 63.5mm. Fixing centres 51mm. Overall height 47mm.

Order As **LB63T** (Bayonet L/Hidr)

**Ceiling Rose**



A white satin finish ceiling rose that does not need a separate backplate or pattress. Designed to BS67 1969 with three separate terminals with captive screws housed in a transparent shield providing individual loop-in facilities. A separate earth terminal is also provided. Positive cable restraint. Diameter of base 82.5mm. Fixing centres 51mm.

Order As **FQ05F** (Ceiling Rose)

**Lampholder Adaptor**

A BC lampholder adaptor in white.



Order As **FQ06G** (BC Adaptor)

**Fluorescent Tube Starter**



A starter switch suitable for use with most domestic fluorescent tubes rated 4 to 80W. Standard 2-pin Pygmy connector. Fitted with radio interference suppressors. In a white nylon can. BS3772.

Order As **FQ07H** (Starter 80W)

**TIME SWITCH**



A mechanical time switch that plugs into a standard 13A socket outlet. Appliance then simply plugs into time-switch. Time switch may be programmed to give up to 48 on/off cycles during every 24 hours. Graduated in 15 minute intervals on a 24-hour clock.

Max load: 11A (2.8kW)

Order As **YB19V** (Time Switch)

**POWER CONTROLLER**



A free standing controller for speed control of power tools, brightness control of lighting etc. Moulded in white plastic the controller plugs into the mains by means of cable provided (675mm long). The equipment to be controlled simply plugs into switched 13A socket on controller. Speed or brightness etc. can now be adjusted using the knob provided.

Dimensions: 165 x 87.5 x 50mm high.

The controller will run any number of mains devices providing their total wattage does not exceed the ratings given below. Heaters may be controlled provided they do not contain electric driven fans and blowers.

**Ratings**

- Power tools: 1000W for short periods
- Tungsten filament lamps: 1000W
- Spot lamps: 500W
- Fluorescent lamps.
- synchronous motors: not suitable

Order As **RW69A** (1kW Power Controller)

**Room Thermostat**



A room thermostat which may be used to control heating appliances, heating systems and ancillary equipment e.g. circulating pump, where mains voltage switching is required. Moulded in a smart light-fawn case overall size 108 x 62 x 36mm. Supplied for surface mounting or fixing direct to conduit box with a light-fawn pattress size 114 x 87mm. Overall depth with pattress 42mm. Knob marked 10°C to 30°C. Rated 20A resistive, 4A inductive 240V AC. Switch SPST. Supplied with instructions.

Order As **YB20W** (Room Thermostat)

## QUICKTEST

### Specification

Max rating: 13A, 240V AC  
 Size: 127 x 60 x 49mm high  
 Weight: 245 gms. (8½ oz)

A completely safe way of connecting mains cables to the power supply without having to fit plugs. The wire ends of the cable simply fit under three clips which are exposed when the lid is lifted. With lid lifted it is not possible to touch any live part. When lid is closed all live parts are fully enclosed and mains is connected to the clips and thus to the cable.

A neon light is incorporated and this will light if mains is connected to the Quicktest. It is manufactured in tough plastic materials: phenolic moulded base and flame retardant glass-filled thermoplastic lid. A 13A 1in. mains fuse is fitted.

Order As YB21X (Quicktest)



## MAINS ADAPTORS

Mains adaptor/battery eliminators which plug directly into standard 13A sockets. Each unit has approximately 1.75m of lead terminated in a multiplug unit having 2.5mm and 3.5mm jack plugs and 2.1mm and 2.5mm dc power plugs to suit most battery powered equipment.

Polarity is reversible on all types, and they all meet British Standard Specifications. Four types are available.

### Low Voltage Unregulated

This unit has outputs of 3V, 4.5V and 6V DC at 100mA (max). The unit is not stabilised and therefore at low current drains the voltage rises to a max of around 6.8V, 7.2V, 7.5V respectively.

Order As YB22Y (AC Adaptor 3DC)

### High Voltage Unregulated

This unit has outputs of 6V, 7.5V and 9V DC at 300mA (max). The unit is not stabilised and therefore at low current drains the voltage rises to a max of around 9.5V, 11V, 13.5V respectively.

Order As XX09K (AC Adaptor BR300)

### High Voltage Regulated

This unit has outputs of 6V, 7.5V and 9V DC at 300mA (max). The unit is regulated to keep the output voltages at their rated values for any current drain up to 300mA

Order As YB23A (AC Adaptor MVA31)

### 8V Regulated (TV Games)

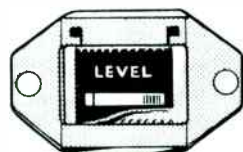
A single output of 8V at up to 150mA to suit most TV games. The output is regulated.

Order As YB24B (TV Game Mains Adaptor)



## PANEL METERS

### MINIATURE LEVEL METER

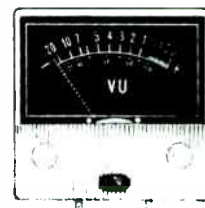


Dimensions 23 x 22 x 26mm. FSD 200µA, 0dB 130µA 1,200 ohms.

Miniature moving coil meter, for accurate level indication for tape recorders, amplifiers, etc. Neat design and rugged construction — will withstand five times rated value.

Order As RW74R (Level Meter)

### MINIATURE SQUARE VU METER



A square-faced VU meter which may be back-lit to show up scale. Scale is marked -20 to 0dB and then to +3dB (0 to +3dB section is in red, remainder in white). Also marked 0 to 100%. Sensitivity 130µA at 0dB, 200µA at FSD. Internal resistance: 1200Ω. Dimensions: 40 x 40 x 29mm.

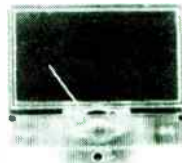
Order As RW73Q (VU Meter V41)

### MINIATURE SIGNAL STRENGTH METER

A square faced signal strength meter which may be back lit to show up a green scale. Scale is marked 'Signal' and 0 to 5 for calibration.

Sensitivity: 250µA FSD  
 Internal resistance: 675Ω ±5%  
 Dimensions: 40 x 40 x 29mm

Order As LB80B (Sig Strength Meter)

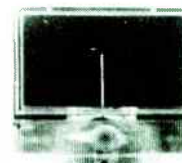


### MINIATURE TUNING METER

A square faced tuning meter which may be back lit to show up a green scale. Scale is marked 'Tune' and meter has a centre-zero movement.

Sensitivity: 125-0-125µA FSD  
 Internal resistance: 675Ω ±5%  
 Dimensions: 40 x 40 x 29mm

Order As LB79L (Tuning Meter)



### MOVING IRON TYPE



A range of modern styled panel meters which have a transparent plastic cover and a white base. The coil is exposed at the rear and a set zero adjustment is not provided.

The following types are available.

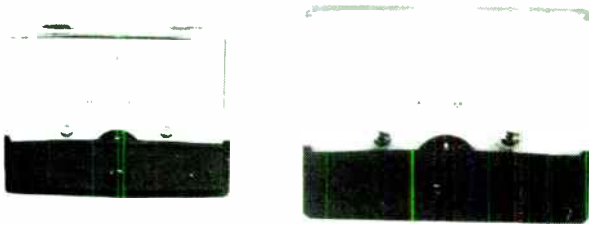
Range	Internal Resistance	Scale marked
2V to 15V	58Ω	0 to 2V then to 15V in 0.5V steps.
8V to 60V	860Ω	0 to 8V then to 60V in 2V steps
40V to 300V	20,400Ω	0 to 40V then to 300V in 10V steps
0.1A to 1A	0.7Ω	0 to 0.1A then to 1A in 20mA steps
0.5A to 5A	0.028Ω	0 to 0.5A then to 5A in 0.1A steps
2A to 15A	0.004Ω	0 to 2A then to 15A in 0.5A steps
4A to 25A	0.0018Ω	0 to 4A then to 25A in 0.5A steps

Front face size: 69.4 x 53.4mm  
 Overall depth: 29.1mm  
 Panel cutout: 40mm diameter  
 Accuracy: ± 5%  
 Suitable for AC or DC operation.

Order As RX92A (Meter MI 15V)  
 RX87U (Meter MI 60V)  
 RX88V (Meter MI 300V)  
 RX89W (Meter MI 1A)  
 RX90X (Meter MI 5A)  
 RX91Y (Meter MI 15A)  
 RX93B (Meter MI 25A)

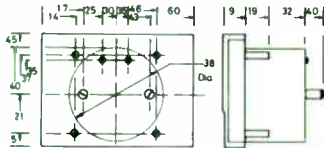


**MOVING COIL TYPE**



A range of modern styled panel meters which have a snap-on acrylic face to facilitate insertion of alternative scales. (Please note that we cannot supply alternative scales.) The meter is ready wired to accept ILLUMINATING KIT and the 12V required should be connected to the two small-terminals on the rear of the meter. The movement is wired to the two large terminals.

- Front face size: 60 x 45mm
- Overall depth: 40mm
- Panel cut-out: 38mm (1½in) diameter
- Accuracy: ± 2½%



The following types (full scale deflection: FSD) are available.

FSD	Internal Resistance	Scale marked
50-0-50µA DC	1250Ω	In 2µA steps
100-0-100µA DC	580Ω	In 4µA steps
500-0-500µA DC	170Ω	In 20µA steps
50µA DC	1250Ω	0 to 50µA in 2µA steps
100µA DC	580Ω	0 to 100µA in 4µA steps
500µA DC	170Ω	0 to 500µA in 20µA steps
1mA DC	170Ω	0 to 1mA in 40µA steps
5mA DC	170Ω	0 to 5mA in 200µA steps
10mA DC	6Ω	0 to 10mA in 400µA steps
50mA DC	0.5Ω	0 to 50mA in 2mA steps
100mA DC	0.5Ω	0 to 100mA in 4mA steps
500mA DC	0.5Ω	0 to 500mA in 20mA steps
1A DC	0.5Ω	0 to 1A in 40mA steps
50V DC	50kΩ	0 to 50V in 2V steps
*300V AC	300kΩ	0 to 300V in 10V steps
S Meter	170Ω	S 0 to 9 in 1dB steps. Then to +30dB in 10dB steps
VU Meter	5250Ω	-20 to 0+3VU (Volume Units) and 0 to 100%

\*Rectifier type movement.

- Order As **RW97F** (2in. Pan Meter 50-0-50µA)
- RW98G** (2in. Pan Meter 100-0-100µA)
- RW99H** (2in. Pan Meter 500-0-500µA)
- RW91Y** (2in. Pan Meter 50µA)
- RW92A** (2in. Pan Meter 100µA)
- RW93B** (2in. Pan Meter 500µA)
- RW94C** (2in. Pan Meter 1mA)
- RW95D** (2in. Pan Meter 5mA)
- RW96E** (2in. Pan Meter 10mA)
- RX32K** (2in. Pan Meter 50mA)
- RX33L** (2in. Pan Meter 100mA)
- RX34M** (2in. Pan Meter 500mA)
- RX35Q** (2in. Pan Meter 1A)
- RX36P** (2in. Pan Meter 50V)
- RX37S** (2in. Pan Meter 300V)
- RX52G** (2in. Pan Meter 'S')
- RX53H** (2in. Pan Meter 'VU')

**PANEL METER ILLUMINATING KIT**



Two 6.3V bulbs which push fit into our 2in PAN METERS or LARGE PANEL METER.

Order As **RX55K** (Illuminating Kit)

**LARGE MOVING COIL METER**

Dimensions: 110 x 82 x 46mm deep. FSD 50µA. Internal resistance 1400ohms.



A large moving-coil panel micro-ammeter having a 4in scale length. Calibrated 0-50, but front plastic cover unclips to facilitate fitting different scales to your design. (Please note that we do not stock spare scales).

Order As **RX54J** (Large Panel Meter)

To convert this meter to read larger currents use the following formula:

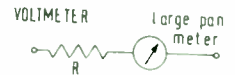
$$\frac{0.07}{\text{FSD required (in Amps)} - (50 \times 10^{-6})} = R \text{ AMMETER large pan meter}$$

where R is the resistance required directly across the meter.

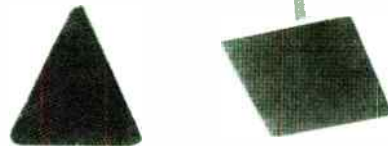
To convert this meter to a voltmeter use the following formula:

$$\left( \frac{\text{Full scale voltage required (V)}}{50 \times 10^{-6}} \right) - 1,400 = R$$

where R is the resistance required in series with either lead.



**TOUCH PADS**



Matt finish chrome-flashed steel touch pads with bevelled edges. An 18.5mm long 6BA threaded stud is welded centrally to the back of the pad. Suitable for mounting on plastic or any insulating material. Available in two shapes:

- Triangular: Width of base 21mm. Height: 22mm
- Rectangular: 30 x 22.5mm

- Order As **HY00A** (Touch Pads Rectangular)
- HY01B** (Touch Pads Triangular)

**PRESSURE MAT**

Designed for use with intruder alarms etc., the mat is placed under a carpet, rug etc and gives an abrupt change from open to short circuit when stepped on.

Size: 750 x 420 x 2mm  
Order As **YB91Y** (Pressure Mat)

## MORSE KEYS

### Beginners

A well-designed morse key ideal for beginners.



Order As LQ00A (Beginners Morse Key)

### Professional

A professional high-speed morse key mounted on a cast metal base. With fine adjustment and override switch for tuning.



Order As LQ01B (Professional Morse Key)

## ULTRASONIC TRANSDUCERS



A high sensitivity ultrasonic transmitter and receiver, sold only in pairs, for sending and receiving ultrasonic sound through the air, either as a continuous wave or pulses. Applications include burglar alarm systems, proximity switches, liquid level meters, anti-collision devices, counters for moving objects, TV remote control systems etc.

Characteristics:

	Transmitter	Receiver
Sensitivity (dB)	17±6 <sup>1</sup>	-56±6 <sup>2</sup>
Resonant frequency (kHz)	40±1	40±1
Max. input voltage (V <sub>rms</sub> )	7	—
Impedance (Ω) approx	200	70k
Capacitance (pF) ±20%	1400	1400
Pulse rise time (msec)	2	0.5
Max. input voltage pulse operation:	60V p-p	—

<sup>1</sup> OdB = 1μBar/V/m <sup>2</sup> OdB = 1V/μBar with 47kΩ shunt.

Overall size 14mm dia. x 11mm deep (connecting pins protrude a further 5mm). Pins are 8.5mm apart.

Order As HY12N (Ultrasonic Transducer)

## BUZZERS

A miniature solid state buzzer featuring long life, high reliability, low current drain, no moving contacts, no arcing, no r.f. noise. It is small but with a clear penetrating sound. It is important that the buzzer is firmly fixed to a rigid base.



Dimensions: 23 x 16.4 x 15.7mm deep.  
Fixing centres: 28 x 4.5 mm x 8BA  
Overall length: 33.5mm.

Finished in white plastic. Two types are available:

Type	Operating voltage	Current at nominal voltage	Impedance	Frequency	Output level at 1 metre
6V	3 to 9V	15mA ± 1.5mA	400Ω	450Hz	>70dB
12V	6 to 20V	15mA ± 1.5mA	800Ω	450Hz	>70dB

Buzzers are for DC operation only and approx 100mm of lead attached is colour coded: Red — positive; Black—negative.

Order As FL39N (Buzzer 6V)  
FL40T (Buzzer 12V)

## BELL

3 to 8V AC or DC bell with white case and polished chrome 70mm dia. gong.  
Overall size 141 x 75 x 31mm.



Order As FL38R (AC Bell)

## BELL TRANSFORMER

A transformer housed in a white plastic case. Primary 240V AC, secondary 4, 8 and 12V at 1A. Internally fused primary winding with Fuse 20 50mA. Overall size excluding case fixing nut 74 x 54 x 38mm.



Order As FL37S (Bell Xformer)

## Bell Push

A low voltage bell-push in white. Surface mounting. Dimensions 64 x 23mm. Fixing centres 48mm.



Order As FQ08J (Bell Push)

## Bell Push with Nameplate

A white plastic bell push with luminous button and name plate. Dimensions: 87 x 30 x 19mm.



Order As FQ09K (Nameplate Bell Push)

## SIRENS

### Baby Siren

A small, but penetrating siren finished in bright red. Operates by spinning a fan inside the case to give a very loud output. Adjustable mounting bracket and approx. 650mm of lead.

Operating voltage: 12V DC  
Current drain: 1.2A approx.  
Size: 75mm dia. x 75mm deep  
Bracket size: 80 x 40mm  
Fixing centres: 72mm x 4BA (M4) clear.

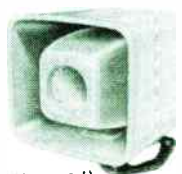


Order As YB25C (Baby Siren)

### Piezoelectric Sounder

A high output high efficiency re-entrant horn sounder, incorporating a sensitive moisture proof drive unit and solid state oscillator amplifier. By changing the leads on the unit a continuous or warbler tone output may be chosen. The sounder is ideal for use with fire and intruder alarm systems at home, in industrial premises, in the car and on boats.

Specification:  
Supply voltage: 12V DC  
Voltage range: 6–12V DC  
Current drain: 400mA (at 12V)  
Sound output: 98dBA at 3m  
Audible range outdoors: 175m (with 60dB ambient sound)  
Weight: 0.6kgm  
Finish: White ABS  
Dimensions: 133 x 232 x 203mm dia.



Order As XQ71N (Re-entrant Horn Sounder)

**MEGAPHONE**



A high quality megaphone with sturdy rubber feet for stationary operation and a shoulder strap for portable operation. The megaphone contains a powerful solid state amplifier and re-entrant horn speaker giving a crisp, clear reproduction. A differential microphone is attached via a curly lead and an on-off switch and volume control are incorporated in the hand-held microphone moulding. The differential microphone consists of two microphones connected in antiphase so that sounds applied equally to both (e.g. feedback) are cancelled, but when you hold the top microphone close to your mouth as you speak only your voice is amplified.

The megaphone is housed in a smart maroon and light-grey metal body. Supplied with instructions. Eight HP11 batteries are required (not supplied) to give 12V DC. Max. output is approx. 15W, but this is very penetrating and can be clearly heard up to 0.5 to 1km away depending on ambient sound level. Size: 340 x 230mm dia. Weight 1.6kgm.

Order As XQ72P (Megaphone)

**CAR-TOP PA SPEAKERS**

**5 Watt**

A weather-proofed horn speaker with bracket for bolting to car roof or to a bracket across car roof etc. For maximum dispersion four of these units mounted at right angles to one another will be found far more efficient than one large speaker since they are fairly directional.

The mounting bracket is adjustable and the horn is finished in gold colour.

Nominal power: 5W  
 Max. power: 8W  
 Impedance: 8Ω  
 Horn diameter: 140mm (5½in.)

Order As XQ73Q (Car PA 5W)



**15 Watt**

A weather-proofed horn speaker with bracket for bolting to car roof or to a bracket across car roof etc. For maximum dispersion two or more of these units mounted in opposing directions will be found far more efficient than one large speaker since they are fairly directional.

The mounting bracket is directional and the horn is finished in grey.

Nominal power: 15W  
 Impedance: 8Ω  
 Horn diameter: 152mm (6in.)

Order As XQ74R (Car PA 15W)



**CAR STEREO SPEAKERS**

**5W Shelf Mounting Type**

A pair of 4in Round Speakers each in a smart black plastic case for rear shelf fixing. Power handling 5W. Impedance 8Ω. Sold only in pairs.

Order As XB44X (Car Speakers Shelf)



**5W Door Mounting Type**

A pair of 4in Round Speakers each fix to a smart black plastic grille which is mounted on front doors of car. May be used on their own or with the shelf mounting version at rear to give enhanced stereo effect or with quadraphonic units or adaptors. Power handling 5W. Impedance 8Ω. Sold only in pairs.

Order As XB42V (Car Speakers Door)



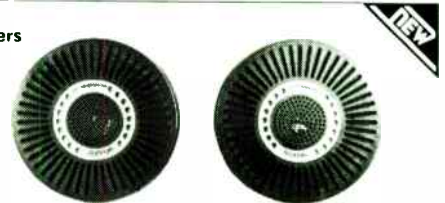
**10 Watt Car Speakers**



A pair of 133mm (5¼in.) dia, round speakers with a very smart black plastic grille and show-through red cloth. Designed for door mounting. To fit, carefully pull off plastic grille. Speakers are fitted with tweeter cone to give extended frequency response. Nominal power 10W rms. Impedance 8Ω. Heavy duty 284gm (10oz) magnet. Complete with two 3.6m lengths of twin colour coded speaker wire and six self-tapping screws. Sold only in pairs. Overall dia. 162mm. Overall depth 72mm.

Order As XQ75S (10W Car Stereo Spkrs)

**20 Watt Car Speakers**



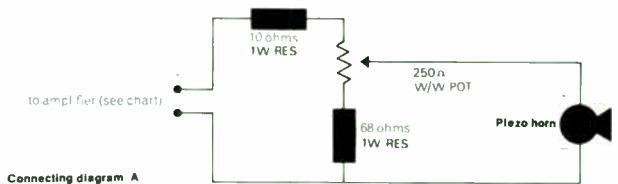
A pair of 133mm (5¼in.) dia round speakers with a very smart black plastic grille and show-through red cloth. Designed for door mounting. To fit, carefully pull off plastic grille. Speakers are fitted with tweeter cone to give extended frequency response. Nominal power 20W rms. Impedance 4Ω or 8Ω (by tapping on voice coil). Heavy duty 567gm (20oz) magnet. Complete with two 3.6m lengths of twin colour-coded speaker wire and six self-tapping screws. Sold only in pairs. Overall dia. 164mm. Overall depth 71mm.

Order As XQ76H (20W Air Suspension Speakers)

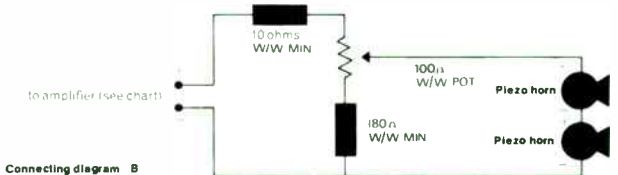
**PIEZO ELECTRIC TWEETERS**

These tweeters which can be added to any existing speaker system having not more than 200W power capability offer many advantages over ordinary (dynamic) tweeters. The elimination of the voice coil results in a very low dynamic mass in the driver which greatly improves the transient response of the speaker. The result is a beautifully clean sound with low distortion and a minimum of ringing. The piezo electric tweeter has a very high impedance (over 1000Ω at 1kHz and still over 20Ω at 40kHz) and thus presents no added load to the amplifier. It rejects low frequency power without the need for a crossover network.

**Connection details**



Connecting diagram A



Connecting diagram B

Impedance of existing speaker system	Amplifier rms power output (W)	Use circuit
4Ω	up to 100W	A
4Ω	up to 200W	B
8Ω	up to 200W	B
16Ω	up to 200W	B

Continued on page 138.



## Piezo Horns (continued from previous page)

The speaker is simply connected as shown below and the adjustment potentiometer is provided so that the tweeter output sound level can be made equal to the existing speakers. However, if adjustment after initial setting-up is not required then the pot could be removed and replaced by two 1W resistors having the nearest values to those measured on each side of the pot.

If exceptionally loud treble output is required one (in the case of system A) or two in series (in the case of system B) can be wired in parallel with the existing tweeter/s.

### Specification

Frequency response: 3.8kHz to 28kHz  $\pm$  3dB  
3.5kHz to 40kHz  $\pm$  4dB

Max continuous rms input voltage: 16V

Max peak music power (rms): 35V

Minimum series resistor: 10 $\Omega$  at 1W

## Direct Radiating Tweeter

This tweeter is ideal for use in bookshelf speaker systems and smaller high fidelity speakers where it will greatly enhance the high frequency response.

Average harmonic distortion: < 0.75%

Output sound level (input 4Vrms pink noise): 95dB

Overall diameter: 83.8mm (3.3in.)

Overall depth: 19.1mm (¾in.)

Fixing holes: 52 x 52 x 5.5mm dia.

Panel cut-out: 63.5mm dia. (2½in.)

Weight: 40gms.

Order As WF54J (Direct Radiant Piezo)



## Standard Horn

This tweeter is designed for general purpose use in high fidelity speakers of all sizes and for discos and p.a. systems etc.

Average harmonic distortion: < 1%

Output sound level (input 4V rms pink noise): 105dB

Overall size: 85 x 85 x 70 mm deep.

Fixing holes: 71 x 71 x 5.5mm dia.

Panel cut-out: 76mm. dia. (3in.)

Weight: 63gms.

Available in two types.  
With mounting flange flush with front of horn.

Order As WF09K (Piezo Horn Flush)

With mounting flange recessed 12mm. so that front of horn may be more nearly flush with front of baffle when mounted.

Order As WF55K (Piezo Horn Recessed)



## Wide Dispersion Horn

This tweeter is designed to give a wide dispersion pattern and is therefore ideal in stereo hi-fi systems and in high quality discos etc.

Average harmonic distortion: < 0.75%

Output sound level (input 4V rms pink noise): 105dB

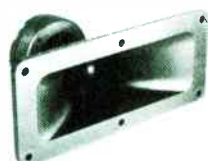
Overall size: 178 x 83 x 108mm deep

Fixing holes: 86 + 86 x 63.5 x 5.5mm dia.

Panel cut-out: 155 x 51mm.

Weight: 130gms.

Order As WF56L (Wide Angle Piezo)



## MINIATURE LOUDSPEAKERS

A range of miniature loudspeakers designed as replacements for transistor radios, but ideal for all sorts of projects where a small transducer is required.

Type	Size (dia.)	Overall depth	Impedance	Rating
388	38 mm	16mm	8 $\Omega$	0.1W
458	45mm	16mm	8 $\Omega$	0.1W
508	50mm	18mm	8 $\Omega$	0.2W
568	56mm	20mm	8 $\Omega$	0.2W
668	66mm	22mm	8 $\Omega$	0.3W
64 $\Omega$	66mm	22mm	64 $\Omega$	0.3W

Order As WB04E (L/S Lo-Z 388)  
WB05F (L/S Lo-Z 458)  
WB08J (L/S Lo-Z 508)  
WB09K (L/S Lo-Z 568)  
WB13P (L/S Lo-Z 668)  
WF57M (Hi-Z L/S 64 $\Omega$ )



## TWEETERS

### Standard Tweeter

A small standard tweeter with 76mm (3in) dia cone.

Frequency response: 2kHz to 20kHz

Power handling (max): 5W rms

Impedance: 8 $\Omega$  (suitable for 4 to 8 $\Omega$  systems)

Dimensions: Baffle cut-out: 70mm dia.  
Fixing centres: 60 x 60mm x 4BA(M4)  
Mounting plate: 76 x 76mm  
Overall depth: 28mm

Crossover point:  $\geq$ 3kHz

Order As WF58N (3 inch Tweeter)



### Multi-cellular Horn Tweeter

A horn tweeter with a multi-cellular front to aid dispersion of the high frequencies which tend to be very directional.

Frequency response: 3kHz to 18kHz.

Power handling (max): 30W rms.

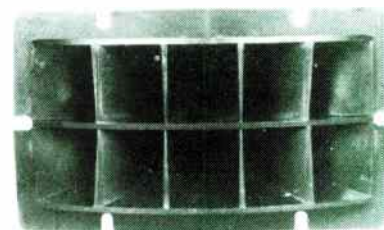
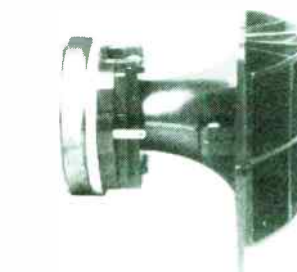
Impedance: 8 $\Omega$  (suitable for 4 to 8 $\Omega$  systems).

Dimensions: Baffle cut-out 120 x 60mm.

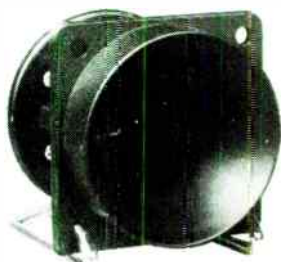
Fixing centres:

Mounting plate dimensions: 137 x 80mm.  
Overall depth (front to back): 92mm  
Crossover point:  $\geq$ 3kHz

Order As WF24B (Multi-Cell Tweeter)



## Horn Tweeter



A free standing or baffle mounting horn tweeter.

Frequency response: 3kHz to 20kHz.  
 Power handling (max): 30W rms.  
 Impedance: 8Ω (suitable for 4 to 8Ω systems).  
 Dimensions: Baffle cut-out: 60mm dia.  
 Fixing centres: 50 x 50mm x 2BA.  
 Mounting plate dimensions: 64 x 64mm.  
 Overall depth (front to back): 91mm.  
 Crossover point: >3kHz.

Order As **WF33L** (Free Stand Tweeter)

## Dome Tweeter

A slim dome tweeter with a heavy duty ceramic magnet.

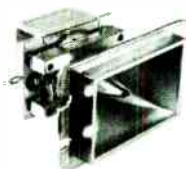


Frequency response: 2kHz to 20kHz  
 Power handling (max): 50W  
 Impedance: 8Ω (suitable for 4 to 8Ω systems)  
 Dimensions: Baffle cut-out: 78mm dia.  
 Fixing centres: 68 x 68mm x 4BA(M4)  
 Mounting plate: 96 x 96mm  
 Overall depth: 31mm  
 Crossover point: 4.5kHz approx.

Order As **WF43W** (Dome Tweeter)

## Rectangular Tweeter

A rectangular shaped tweeter with silver coloured diecast flared horn.



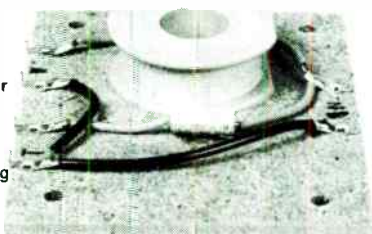
Frequency response: 5kHz to 20kHz  
 Power handling (max): 80W peak  
 Impedance: 8Ω (suitable for 4 to 8Ω systems)  
 Dimensions: Baffle cut out: 63 x 43mm  
 Fixing centres: 75 x 21mm x 4BA(M4)  
 Mounting plate: 85 x 53mm  
 Overall depth: 68mm  
 Crossover point: 7.5kHz (approx.)

Order As **WF44X** (Rectangular Tweeter)

## CROSS-OVER NETWORKS

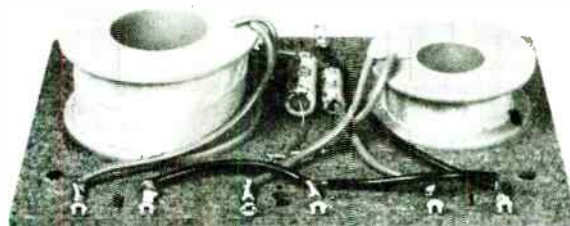
### Two-way

A cross-over network for operating a woofer and tweeter together. Cross-over is at approx 3kHz. Components are mounted on a piece of hardboard (100 x 80mm) for mounting inside a cabinet. Power handling: 30W rms.



Order As **WF02C** (30W Crossover 2-way)

### Three-way



A cross-over network for operating a woofer, tweeter and mid-range speaker together. Cross-over is at approx. 1kHz and 5kHz. Components are mounted on a piece of hardboard (130 x 90mm) for mounting inside a cabinet. Power handling: 30W rms.

Order As **WF03D** (30W Crossover 3-way)

### Three-Way on Escutcheon



A three-way crossover network mounted on a matt finish black plastic escutcheon with spring-loaded red and black terminals.

Nominal impedance: 8Ω (suitable for 4 to 8Ω systems)  
 Crossovers: 1kHz (6dB/octave)  
 6kHz (6dB/octave)  
 Power handling: 30W rms  
 Dimensions: Cut-out: 118 x 80mm  
 Fixing centres: 63.5 x 63.5 x 87.5mm x 6BA(M3)  
 Mounting plate: 140 x 99mm  
 Overall depth: 44mm

Order As **WF45Y** (Escutcheon Crossover)

### Three-Way Controlled



A three-way crossover network mounted on a flat panel with volume controls for the mid-range speaker and the tweeter. Black anodised finish with silver lettering and spring-loaded red and black terminals.

Nominal impedance: 8Ω (suitable for 4 to 8Ω systems)  
 Crossovers: 1kHz (6dB/octave)  
 6kHz (6dB/octave)  
 Power handling: 40W rms  
 Dimensions: Fixing centres: 133 x 114mm x 6BA (M3)  
 Front plate: 150 x 130mm  
 Overall depth: 50mm

Order As **WF46A** (Controlled Crossover)

## LOUDSPEAKERS LOW-COST ROUND SPEAKER

A low-cost speaker suitable for use in larger transistor radios, small car systems etc.



Impedance: 5Ω (suitable for 4Ω systems)  
 Power handling: 1W  
 Dimensions: Baffle cut-out: 106mm dia.  
 Fixing centres: 84 x 84mm x 2BA(M5)  
 Overall size: 117 x 117mm  
 Overall depth: 43mm

Order As **WF47B** (Low-Cost 4inch Speaker)

## Car Speaker

A 4in round speaker ideally suited for car stereo speakers and is a direct replacement in many commercial types. The speaker has a ceramic magnet and its impedance is 8Ω making it suitable for 4 to 8Ω outputs.

Power handling: 5W rms  
Overall size: (l x w x d) 119 x 119 x 41mm  
Fixing centres: 84 x 84mm

Order As WB27E (Rd Speaker CM420)



## Heavy Duty Car Speaker

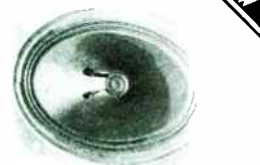


A 5 1/4 round speaker ideally suited for car stereo speakers and as a direct replacement in many commercial types. The speaker has a ceramic magnet and its impedance is 8Ω, making it suitable for 4 to 8Ω outputs.

Power handling: 10W rms  
Overall size: 133 x 133mm  
Overall depth: 53mm  
Fixing centres: 97 x 97mm

Order As WF48C (Heavy Duty Car Speaker)

## Low-Cost Elliptical Speaker



A low-cost elliptical speaker for general purpose applications.

Impedance: 5Ω (suitable for 4Ω systems)  
Power handling: 2W  
Dimensions: Nominal: 6in x 4in  
Fixing centres: 117 x 92mm x 4BA(M4)  
Overall size: 153 x 102mm  
Overall depth: 42mm

Order As WF49D (Low-Cost 6 x 4in Speaker)

## Elliptical Speakers



A range of very high quality loudspeakers. All have high flux density ceramic magnets and therefore feature a very wide frequency response when mounted on a baffle or in an enclosure. All types are 8Ω impedance and are suitable for 4 to 8Ω outputs.

Size	Cone	Frequency response	Power (rms)	Overall size (l x w x d)	Fixing centres	Type
6 x 4in	Standard	30Hz-20k Hz	3W	155 x 104 x 41mm	117 x 91mm	CM641
7 x 4in	Standard	30Hz-20k Hz	3W	179 x 105 x 47mm	93-118(slot) x 92mm	CM741
7 x 4in	Standard	30Hz-20k Hz	5W	179 x 105 x 49mm	93-118(slot) x 92mm	CM742
8 x 5in	Twin Cone	20Hz-25k Hz	8W	203 x 128 x 57mm	112 x 112mm	CM582

Order As WF50E (Elliptical Speaker CM641)  
WF17T (Elliptical Speaker CM741)  
WF18U (Elliptical Speaker CM742)  
WF23A (Elliptical Speaker CM852)

## Round Speakers



A range of very high quality loudspeakers. All have high flux density ceramic magnets and therefore feature a very wide frequency response when mounted on a baffle or in an enclosure. All types are 8Ω impedance and are suitable for 4 to 8Ω outputs.

Size	Cone	Frequency response	Power (rms)	Overall size (dia x depth)	Fixing centres	Type
5in	Long throw	25Hz to 19k Hz	10W	135 x 135 x 49mm	107 x 107mm	LT530
6in	Standard	25Hz to 15k Hz	5W	155 x 54mm	110 x 110mm	CM610
6in	Long throw	25Hz to 18k Hz	10W	167 x 65mm	112 x 113mm	LT610
6 1/2in	Twin cone	18Hz to 22k Hz	5W	167 x 57mm	113 x 113mm	CM620
6 1/2in	Long throw	18Hz to 22k Hz	10W	167 x 60mm	113 x 113mm	LT630
8in	Twin cone	20Hz to 22k Hz	8W	207 x 70mm	139 x 139mm	CM820
8in	Long throw	18Hz to 22k Hz	15W	207 x 73mm	139 x 135mm	LT830
8in	Long throw	18Hz to 25k Hz	25W	207 x 81mm	139 x 139mm	LT840

Order As WF00A (Rd Speaker LT530)  
WF51F (Rd Speaker CM610)  
WF52G (Rd Speaker LT610)  
WF01B (Rd Speaker CM620)  
WF07H (Rd Speaker LT630)  
WF08J (Rd Speaker CM820)  
WF11M (Rd Speaker LT830)  
WF12N (Rd Speaker LT840)

## Mid-Range Speaker



A mid-range round speaker for use in three-way speaker systems.

Frequency response: 850Hz to 7k Hz  
Power handling (max): 20W rms  
Impedance: 8Ω (suitable for 4 to 8Ω systems)  
Dimensions: Baffle cut-out: 110mm dia.  
Fixing centres: 85 x 85mm x 2BA (M5)  
Overall size: 130mm dia.  
Overall depth: 48mm  
Crossover points: 1kHz and 6kHz

Order As WF53H (20W Squawker)

## HIGH-POWER LOUDSPEAKERS

### 50W 12-inch

A low-cost 12in unit with a pressed steel chassis and 2inch extra high power voice coil.



**Specification**  
Flux density 14,000 Gauss  
Total flux 186,000 Maxwells  
Frequency response 50 to 8000Hz  
Power handling 50 Watts continuous rms  
Impedance 4Ω or 8Ω  
Chassis diameter 305mm (12in)  
Mounting 4 holes 6.35mm dia on 298.5mm dia. circle  
Baffle cut-out 279mm  
Overall height 119mm  
Main resonance 75Hz

Order As XQ77J (Fane 50 4Ω)  
XB26D (Fane 50 8Ω)



### Disco 80W 12in

A 12 in unit having a 2 in extra high power voice coil, designed specifically for use with discotheques. Other features include high sensitivity, high reliability (guaranteed for 2 years!), linen cone surround for low bass resonance (gives maximum strength in this vulnerable area), cone specially designed for high power requirements and a large tweeter cone that extends the frequency range up to 15 kHz.

#### Specification

Flux density 14,000 Gauss  
 Total flux 236,000 Maxwells  
 Frequency range 40 to 16,000 Hz  
 Power handling 80W continuous rms  
 Impedance 4Ω or 8Ω  
 Main resonance 45Hz  
 Dimensions As Fane 50 above

Order As XQ78K (Disco 80 4Ω)  
 XB27E (Disco 80 8Ω)



### 150W 15inch

This high quality 15 inch bass speaker is a no compromise high performance unit built on a rigid aluminium die-cast chassis. It has a long fibre paper cone with cambric elastomer damped surround and a cambric dome. It has a massive 7.2kg anisotropic ceramic magnet system and three inch very high temperature voice coil. Ideal for use with bass guitars, organ pedal sections, bass drive unit in multiple speaker systems etc.

#### Specification:

Flux density: 16,000 Gauss  
 Total flux: 280,000 Maxwells  
 Frequency range: 25 to 4000 Hz  
 Power handling: 150W continuous rms  
 Impedance: 8Ω or 16Ω  
 Main resonance: 40Hz  
 Chassis diameter: 397mm (15.625in)  
 Mounting: 8 holes 6.3mm (1/4in) dia on 381mm (15in) circle  
 Baffle cut-out: Front mounting: 351mm (13.8 in)  
 Rear mounting: 343mm (13.5 in)

Order As XQ83E (C15 Bass 8Ω)  
 XQ84F (C15 Bass 16Ω)

### HIGH QUALITY HIGH POWER SPEAKERS

A range of high quality high power speakers designed for use in demanding applications e.g. guitar, PA, organ, disco, synthesiser etc. The voice coils feature breathing and ventilation holes over the winding to assist in relief of the high temperatures and pressures which can occur in the coil, a feature normally found on only the most expensive speakers. Reliability is assured by the high level of quality control during all stages of production. When choosing speakers remember that instantaneous and distorted peak levels from your amplifier can reach as much as twice the amplifier's quoted rms power rating. Power ratings given for the speakers assume a rigidly constructed airtight cabinet with an internal volume of 2500 cu. in. (40 litres) per 12in speaker, 5000 cu. in. (80 litres) per 15in. speaker. If the cabinet is vented power ratings must be reduced accordingly.

### 50W 12inch

This high quality 12 inch speaker has twin cone to give an extended frequency response. It has a paper cone surround with a cambric dome, a 2 inch voice coil and a massive 2.2kg magnet system. Finished in maroon texture.

#### Specification

Flux density: 11,000 Gauss  
 Total flux: 142,000 Maxwells  
 Frequency range: 45 to 14000Hz  
 Power handling: 50W continuous rms  
 Impedance: 8Ω or 16Ω  
 Main resonance: 75Hz  
 Chassis diameter: 311mm (12.25in)  
 Mounting: 4 holes 6.3mm (1/4in.) dia on 298mm (11 1/2in) circle

Baffle cut-out: Front mounting: 284.5mm (11.2in) dia.  
 Rear mounting: 279.5mm (11in)

Order As XQ79L (Forte 1250TC 8Ω)  
 XQ80B (Forte 1250TC 16Ω)



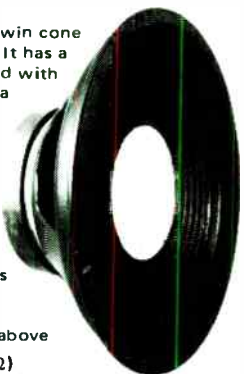
### 80W 12inch

This high quality 12 inch speaker has a twin cone to give an extended frequency response. It has a cambric elastomer damped cone surround with a cambric dome, a 2 inch voice coil and a massive 4.2kg magnet system. Finished in maroon texture.

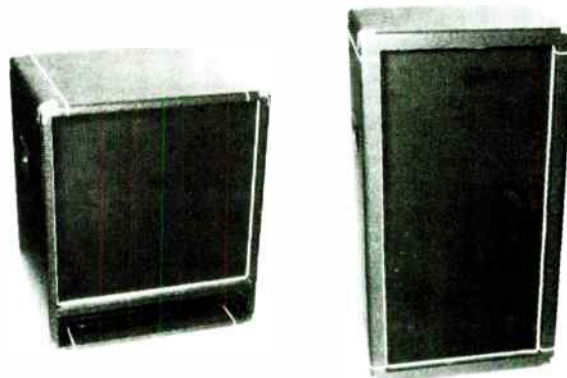
#### Specification:

Flux density: 14,000 Gauss  
 Total flux: 200,000 Maxwells  
 Frequency range: 35 to 14000 Hz  
 Power handling: 80W continuous rms  
 Impedance: 8Ω or 16Ω  
 Main resonance: 45 Hz  
 Dimensions: As Forte 1250 TC above

Order As XQ81C (Forte C1280TC 8Ω)  
 XQ82D (Forte C1280TC 16Ω)



### HIGH POWER LOUDSPEAKER CABINETS



Heavy duty speaker cabinets finished in hard wearing black vynide with carrying handles inset and a smart black grille cloth. Speakers are loaded from the front to ensure a perfect seal once the speakers are fitted. The cabinets are not lined internally and the sound can be improved by lining the cabinets with our Acoustic Wadding described on page 58.

#### Two Twelve Cabinet

The baffle is cut out to accept two twelve inch speakers which are fixed with clamps supplied with cabinet. There are also two cut-outs for piezo horns (76mm (3in.) dia.), but these are blocked off with easily removable wooden blocks. Internal volume: 5000 cu. in. (approx.). Overall size: 450mm wide, 350mm deep, 840mm high. To load speakers, lever out front grille.

Order As XB28F (Power L/S Cabinet) (Delivery by carrier)

#### One Fifteen Cabinet

The baffle is cut out to accept one of our Forte 15 inch Bass speakers, which is fitted with clamps supplied with cabinet. The cabinet is vented below the front grille to improve the frequency response. Internal volume: 5000 cu. in. (approx.) Overall size: 470mm wide, 470mm deep, 560mm high. To load speaker, lever out front grille.

Order As XQ05F (15 inch Power Cab) (Delivery by carrier)

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## LOW-COST TYPE

A low cost stereo headphone with padded head-band and comfortable padded earphones with adjustable position.

Impedance: 8  $\Omega$  (suits 4 to 16  $\Omega$ ).

Max. input: 0.5W

Frequency response: 30 to 18,000Hz

Supplied complete with coiled lead terminated with a stereo jack plug.

Order As WF13P (Stereophone HP110C)



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## HIGH QUALITY TYPE

A high quality stereo headphone with large padded head-band and comfortable padded earphones with adjustable position. Each phone is fitted with its own slider volume control.

Impedance: 8  $\Omega$  (suits 4 to 16  $\Omega$  )

Max. input: 0.5W

Frequency response: 20 to 18,000Hz

Supplied complete with coiled lead terminated with a stereo jack plug.

Order As WF14Q (Stereophone SA5500)



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## ELECTRET TYPE

A very high quality electret condenser type stereo headphone which does not require a power supply. It is fitted with large padded headband and comfortable padded earphones which are very light owing to the lack of loudspeaker magnets and sound insulation materials since they are of open air type construction. The reproduction is extremely realistic, better than any dynamic headphone we have heard.

Impedance: 8  $\Omega$  (suits 4 to 16  $\Omega$  )

Frequency response: 20Hz to 20kHz

Supplied complete with 2½m of lead terminated in a stereo jack plug.

Order As WF19V (Stereophone Electret 100)



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## MONO HEADSET

A standard mono headset. Two 1000 $\Omega$  magnetic phones connected in series to give 2000 $\Omega$  load. Fully adjustable plastic headband and padded earpieces. Connected to 2m of lead and terminated in a 3.5mm jack plug. Frequency response: 30Hz to 15kHz.

Order As WF20W (Mag Headset)

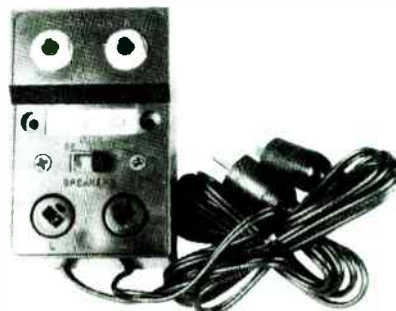


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## HEADPHONE ADAPTOR

A very useful unit which allows one or two pairs of headphones to be used alone or simultaneously with speakers whilst maintaining correct matching of impedances under all conditions. Supplied with two 950mm leads connected to DIN loudspeaker 2-pin plugs. Body has two 2-pin DIN sockets in it, into which loudspeakers plug. Two stereo jack sockets are provided for two pairs of headphones. A three position slide switch is provided which gives headphone/s only or speakers only or both headphones and speakers together. Overall size: 55 x 85 x 39mm high.

Order As LB13P (Headphone Adaptor)



## EARPIECES

### Magnetic

Magnetic earpiece 8 ohms impedance. Approx 95mm of lead terminated in a 2.5 or 3.5mm jack plug.

Order As **LB23A** (Mag Earpiece 2.5mm)  
**LB24B** (Mag Earpiece 3.5mm)



### Crystal

Crystal earpiece. Approx 100mm of lead terminated in a 3.5mm jack plug.

Order As **LB25C** (Crystal Earpiece)



## TRANSISTOR AND I.C. SOCKETS

P.C.B. mounting low-profile sockets with contacts on a 0.1in pitch (except I.C. SKT 10-LEAD). Glass-filled-nylon body with gold-plated phosphor-bronze contacts. Current rating: 1A per contact. Overall height 9.1mm. Pin length 3.5mm. body dia: T018 types 7.1mm, T05 types 10.9mm.

### 3-LEAD T018 SOCKET

For 3-lead T018 transistors.

Order As **WR29G** (Transocket 3-lead T018)



### 4-LEAD T018 SOCKET

For 4 lead T018 transistors.

Order As **WR30H** (Transocket 4-lead T018)



### 3-LEAD T05 SOCKET

For 3 lead T05 transistors.

Order As **WR31J** (Transocket 3-lead T05)



### 8-LEAD SOCKET

For 8 lead T05 (T099) I.C.'s.

Order As **WR32K** (IC Skt 8-lead)



### 10-LEAD SOCKET

For 10 lead T05 (T0100) I.C.'s.

Order As **WR33L** (IC Skt 10-lead)

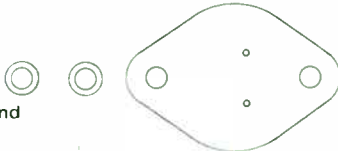


## SEMICONDUCTOR MOUNTING KITS

### T03

For mounting T03 case transistors on heatsinks. Kit comprises one mica washer and two insulating bushes.

Order As **WR24B** (Kit T03)



### T066

For mounting T066 case transistors on heatsinks. Kit comprises one mica washer and two insulating bushes.

Order As **WR25C** (Kit T066)



### S055

For mounting S055 case transistors on heatsinks. Kit comprises one mica washer and two insulating bushes.

Order As **WR27E** (Kit S055)



### T0126

For mounting T0126 case transistors on heatsinks. Kit comprises one mica washer and one large washer to cover plastic side of transistor.

Order As **WR26D** (Kit T0126)



### Plastic T066 (P)

For mounting plastic T066 case (P1, P2 and P3) semi conductors on heatsinks. Kit comprises one mica washer and one insulating bush.

Order As **WR23A** (Kit (P) Plas)



## DUAL-IN-LINE SOCKETS

A range of very high quality low-profile dual-in-line sockets with polyester bodies and tin-plated copper-nickel alloy contacts. Contacts are formed so that they make contact with both sides of the flat face of the IC pin for maximum contact area, low insertion and high retention forces. Sockets may be mounted end to end to achieve longer continuous runs of 0.1in spaced sockets. Sockets have chamfered side walls to assist insertion and pins are formed to help stop solder running up into the socket. One corner is bevelled to denote pin one.

The following types are available.

Type	'X' (mm)	X (in.)	'Y' (mm)	'Y' (in.)	'Z' (mm)	'Z' (in.)
8-pin	7.62	0.3	10.16	0.4	10.16	0.4
14-pin	7.62	0.3	17.78	0.7	10.16	0.4
16-pin	7.62	0.3	20.32	0.8	10.16	0.4
18-pin	7.62	0.3	22.86	0.9	10.16	0.4
20-pin	7.62	0.3	25.4	1.0	10.16	0.4
22-pin	10.16	0.4	27.94	1.1	12.7	0.5
24-pin	15.24	0.6	30.48	1.2	17.78	0.7
28-pin	15.24	0.6	35.56	1.4	17.78	0.7
40-pin	15.24	0.6	50.8	2.0	17.78	0.7

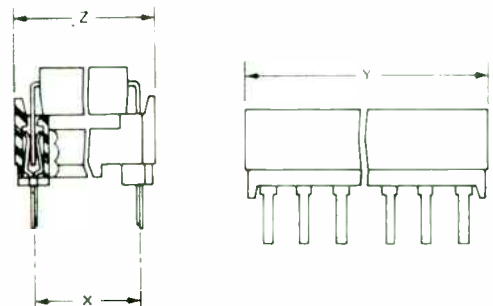
Order As **BL17T** (DIL Socket 8-pin)  
**BL18U** (DIL Socket 14-pin)  
**BL19V** (DIL Socket 16-pin)  
**HQ76H** (DIL Socket 18-pin)  
**HQ77J** (DIL Socket 20-pin)

**HQ78K** (DIL Socket 22-pin)  
**BL20W** (DIL Socket 24-pin)  
**BL21X** (DIL Socket 28-pin)  
**HQ38R** (DIL Socket 40-pin)



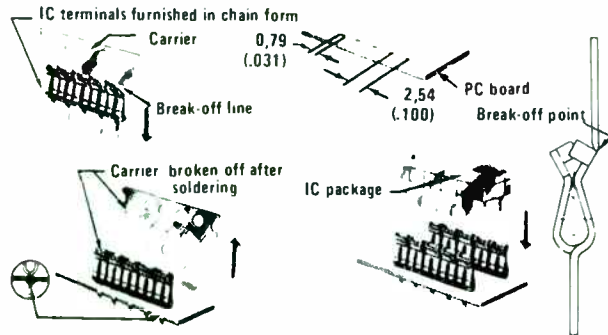
### Dimensions:

Pin length: 3.8mm  
Overall height (when mounted) above pcb: 6mm  
Height (when mounted) above pcb to base of IC: 4.3mm  
PCB hole required: 0.8mm dia per pin  
Distance between sockets (lengthwise) 0.1in (2.54mm)





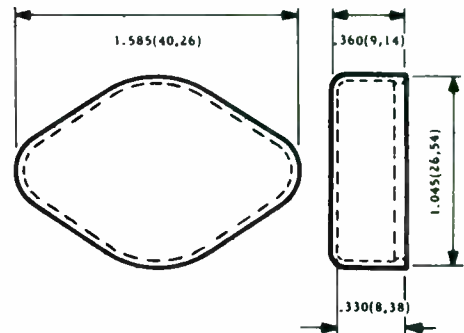
## SOLDERCON TERMINALS



Strips of 100 soldercon terminals to make up your own IC sockets in any length and width required. The terminals provide excellent electrical contact and sturdy mechanical support. Manufactured in brass and tin-plated.

Order As **XX14Q** (Soldercons)

## TO 3 INSULATING COVER



A clip on plastic insulating cover for TO3 case transistors. Prevents short circuits and provides insulation up to 30kV.

Order As **FL56L** (Transistor Cover)

## HEATSINKS

### Type 92F

Push-fit radiator with black anodised finish, suitable for T092, 'E'-line and Lokfit transistor packages. May be fixed to pcb by two integral tags on 10.16 mm (0.4in) centres or inverted for free-standing mode. Overall rise: 0.05°C/mW typical.



Order As **HQ79L** (Heatsink 92F)

### Type 18F

Push-fit lobed radiator fin, black anodised finish. Suitable for T018 package transistors. Dimensions: 15mm dia. 12.7mm high. Temperature rise: 0.05°C/mW.

Order As **HQ80B** (Heatsink 18F)

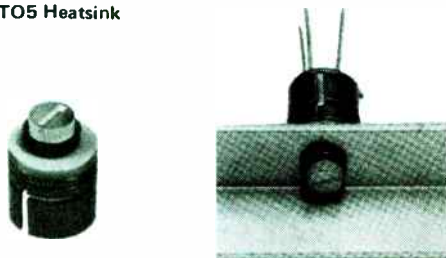


### Type 5F

Push-fit lobed radiation fin, black anodised finish. Suitable for T05 package transistors. Dimensions: 16mm dia. 12.7mm high. Temperature rise 0.05°C per mW.

Order As **FL78K** (Heatsink Clip-On)

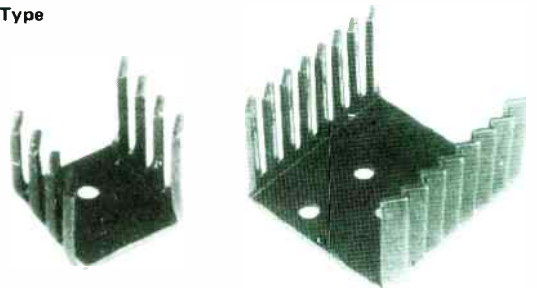
## Panel Mounting TO5 Heatsink



T05 case transistor pushes into heatsink and aluminium oxide washer provides good thermal conduction with, but electrical insulation from heatsink or chassis. Thermal resistance between transistor case and heatsink, 10°C/W. 6BA nylon screw and bush supplied. Dimensions: Height 10mm, dia. 9.6mm, Mtg. hole with bush 3.85mm, without bush 2.85mm, with screw provided chassis thickness 1.6mm to 2.4mm.

Order As **WR34M** (T05 Chassis Heatsink)

## Vaned Type

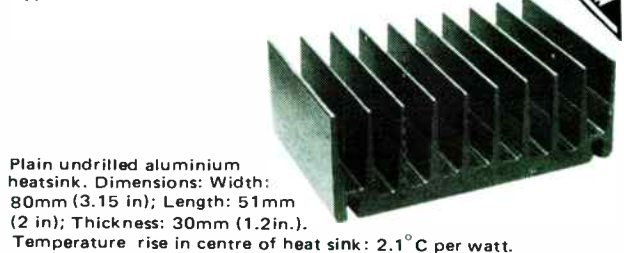


A range of heatsinks of twisted vane construction which have transistor fixing holes ready drilled. Black anodised finish.

Type	Thermal rating	Length (mm)	Width (mm)	Height (mm)
To 3	7.2°C	38	42	25
Plastic Power	17°C	22	19	19
I.C.	5.8°C per watt	47.5	22.1	25.4

Order As **FL59P** (Vaned Heatsink T03)  
**FL58N** (Vaned Heatsink Plastic Power)  
**FL57M** (Vaned Heatsink IC)

## Type 2E



Plain undrilled aluminium heatsink. Dimensions: Width: 80mm (3.15 in); Length: 51mm (2 in); Thickness: 30mm (1.2in.). Temperature rise in centre of heat sink: 2.1°C per watt.

Order As **HQ70M** (Heatsink 2E)

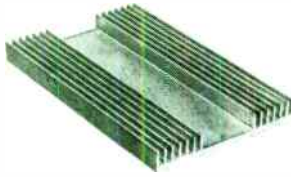
## Type 4Y



Plain undrilled aluminium heatsink. Dimensions: Width: 60mm (2.4in); Length: 102mm (4in); Thickness: 16mm (0.63in). Temperature rise in centre of heatsink: 4.5°C per watt.

Order As **FL41U** (Heatsink 4Y)

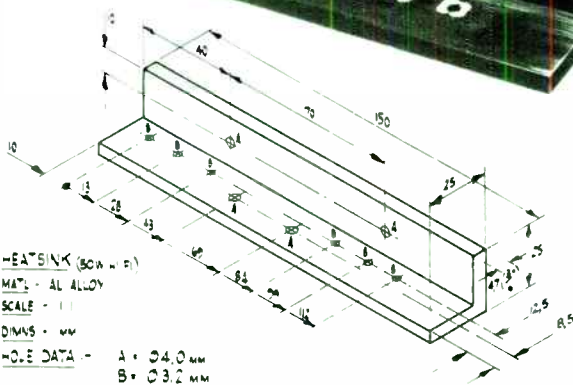
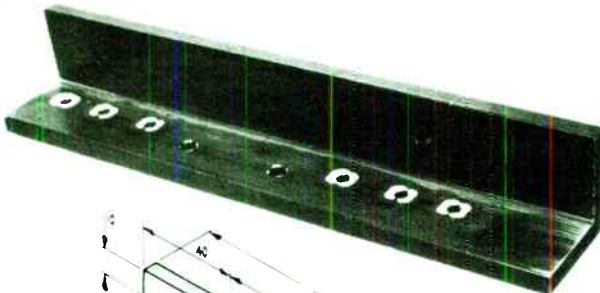
### Flat Type



Plain undrilled aluminium heatsink ideal for printed circuit boards and suitable for external mounting on equipment. Dimensions: Width: 94mm(3.7in); Length: 152mm(6in); Thickness: 14mm(0.6in). Temperature rise in centre of heatsink: 2.6°C per watt.

Order As FL42V (Flat Heatsink)

### 50W Hi-Fi Heatsink



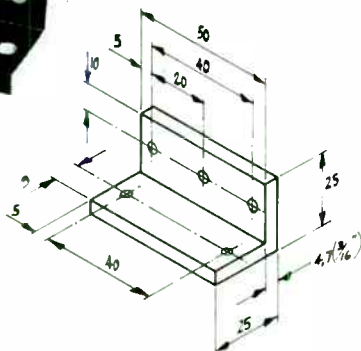
Designed to bolt to a pcb, the power transistors then bolt on to this heatsink and a further heatsink may be bolted to it. It is therefore an ideal method of transferring heat from on-board plastic power transistors to a large finned heatsink easily. Manufactured in aluminium angle 4.76mm (3/16 in.) thick and black anodised.

Order As HQ69A (50W Hi-Fi Heatsink)

### 8W Hi-Fi Heatsink



HEATSINK (8W AUDIO PA)  
 MATL - AL ALLOY  
 SCALE - 1:1  
 DIMNS - MM  
 HOLE DATA - 5 HOLES Ø3.5mm

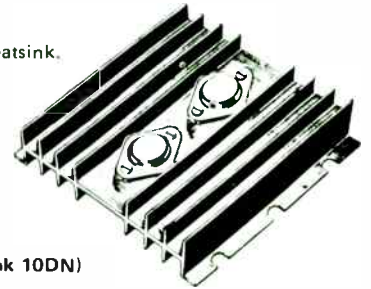


As 50W Hi-Fi Heatsink, but shorter and designed for one plastic power transistor or power IC.

Order As HQ81C (8W Hi-Fi Heatsink)

### Type 10DN

Plain aluminium undrilled heatsink. Dimensions: 27mm deep x 124mm wide (across fins) x 102mm long. Temperature rise in centre of heatsink: 2.1°C per watt.



Order As FL54J (Heatsink 10DN)

### Type 10DNDR

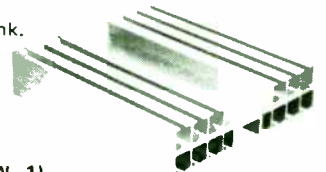
Similar to Type 10DN but drilled ready to accept one or two TO3 package transistors. Mounting notches are also cut.

Order As FL55K (Heatsink 10DNDR)

### Type 6W-1

Plain undrilled aluminium heatsink. Dimensions: Width: 130mm (5.1in); Length: 152mm(6in); Thickness: 32mm(1.25in). Temperature rise in centre of heatsink: 1.1°C per watt.

Order As FL77J (Heatsink 6W-1)



### Type 60DN for Very High Power Applications

Plain aluminium undrilled heatsink.

Dimensions:  
 Width: 117.5mm (4.6in.);  
 Length: 150mm (5.9in.);  
 Thickness: 114.3mm (4.5in.).  
 Temperature rise in centre of heatsink: 0.58°C per watt.

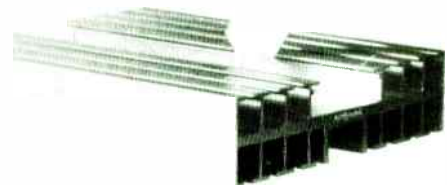
Order As YB26D (Heatsink 60DN)



### SILICONE GREASE SUBSTITUTE

Heat transferring grease having about 3½ times the thermal transmission of ordinary silicone grease. The material is non-irritant except to the eyes. In the case of such contamination wash freely with water until the smarting stops.

Supplied in a box with syringe-type applicator for accurate and wasteless placement of the compound. Contains 46gms.



Order As FL79L (Thermpath)

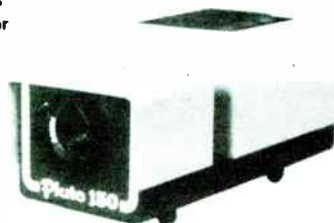
Also available in small tubs containing 12gms.



Order As HQ00A (Small Thermpath)

## DISCO LIGHTING EFFECTS

### PROJECTORS Small Projector



A lighting effects projector for mood-setting at discos and dances or at home with the hi-fi. The projector is fitted with a 60mm wide angle lens and a powerful 150W bulb and it runs directly from the mains. The basic projector is supplied with a 6inch wheel motor plate and the 6inch "liquid" wheel.

The motor plate simply slides in and out of the projector in grooves from which it picks up a 12V AC supply which drives the motor on the plate. The wheel slides onto the shaft of the motor and a screw is provided which tightens on to the shaft to hold the wheel securely. The "liquid" wheel is a 6inch glass wheel that contains various colour oils which move under the influence of the heat from the light. The whole wheel also revolves very slowly driven by the motor.

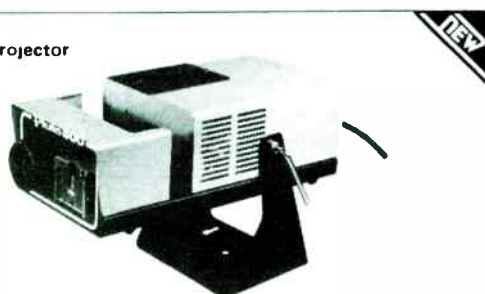
The projector is the basic unit onto which all the effects units described below may be fitted except Front of Lens accessories. Size approx. 275 x 165 x 110mm.

**Order As XB59P (Projector 150)**

Replacement bulb for Projector 150. 240V AC 150W

**Order As XB60Q (Atlas A1/167)**

### High Power Projector



An all metal portable lighting effects projector for mood-setting at discos, dances and display sites or at home with the hi-fi. This projector can be used free-standing, wall, ceiling or track-mounted. It is fitted with an 85mm wide angle lens and an extremely powerful 100W quartz iodine bulb which can be overrun for additional brightness (though reduced bulb life). The basic projector is supplied with a 6 inch wheel motor plate and the 6 inch "liquid" wheel.

The motor plate simply slides in and out of the projector in grooves from which it picks up a 12V AC supply which drives the motor on the plate. The wheel slides onto the shaft of the motor and a screw is provided which tightens onto the shaft to hold the wheel securely. The "liquid" wheel is a 6 inch glass wheel that contains various colour oils which move under the influence of the heat from the light. The whole wheel also revolves very slowly driven by the motor.

The projector is the basic unit onto which all the effects units described below including all the Front of Lens accessories may be fitted. Bulb life is 2000 hours (700 hours on overrun) and the projector is fan cooled. The 12V AC supply to the motor plate and front of lens effects is protected by an easily accessible fuse. (Fuse 20mm 2A. Spare fuse supplied).

Size approx. 330 x 216 x 191mm with stand.

**Order As XQ85G (Projector 500)**

Replacement bulb for Projector 500

12V AC 100W Quartz Iodine.

**Order As XQ86T (M28 12V QI Lamp)**

### 6 INCH PICTURE WHEELS



A range of 6 inch wheels which may be fitted directly to the motor plate supplied with the projector in place of the liquid wheel. All are beautifully coloured and when fitted approximately one twelfth of the picture is projected at any one moment.

The following designs are available:

Animal, Comic, Macabre, Primitive, Sci-Fi, Sea, Show, Space and Zodiac. Also Colour Changer — five colours: yellow, red, green, violet and blue which merge into one another in use. Take the lens out and bathe a wide area in gradually blending colours.

- Order As LB26D (Picture Wheel Animal)**  
**LB27E (Picture Wheel Comic)**  
**LB28F (Picture Wheel Macabre)**  
**LB29G (Picture Wheel Primitive)**  
**LB82D (Picture Wheel Sci-Fi)**  
**LB30H (Picture Wheel Sea)**  
**LB31J (Picture Wheel Show)**  
**LB32K (Picture Wheel Space)**  
**LB33L (Picture Wheel Zodiac)**  
**LB34M (Picture Wheel Colour Changer)**

### 6 INCH LIQUID PICTURE WHEELS



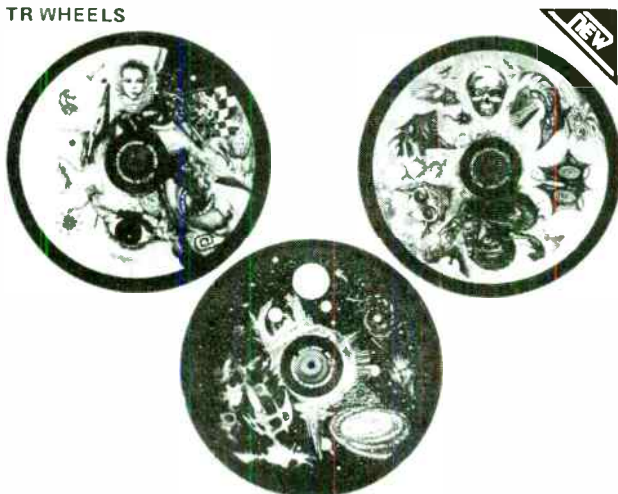
A range of wheels similar to the 6 inch picture wheels except that they also contain different coloured oils which move under the influence of the heat from the projector bulb and therefore the colours of the design are constantly changing.

The following designs are available:

- Can Can, Fairy, Girlie and Orgy.
- Order As LB81C (Liquid 6in. Wheel Can-Can)**  
**LB45Y (Liquid 6in. Wheel Fairy)**  
**LB83E (Liquid 6in. Wheel Girlie)**  
**LB46A (Liquid 6in. Wheel Orgy)**



## TR WHEELS



A range of wheels similar to the 6 inch picture wheels except that they are produced photographically in full colour from specially prepared artwork. These wheels are superbly coloured and packed full of lavish detail.

The following designs are available:  
Arabesque, Demon, Pluto, and Surreal.

### Order As

LB84F (TR Wheel Arabesque)	LB86T (TR Wheel Pluto)
LB85G (TR Wheel Demon)	LB87U (TR Wheel Surreal)

## 3 INCH CASSETTE MOTOR PLATE

This unit is interchangeable with the 6 inch wheel motor plate and enables projection of the 3 inch cassette.



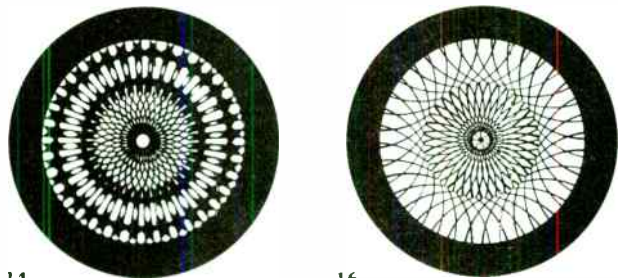
Order As **LB59P (Cassette Motor Plate)**

## 3 INCH CASSETTES

A range of 3 inch glass wheels which fix to the cassette motor plate. They have two glass plates one of which is fixed and one of which revolves very slowly.

### Pattern Cassette

This range of cassettes has a pattern drawn on each glass plate so that coloured geometric shades constantly blend and form creating many different effects. Patterns number 2 and 3 have slow moving, relaxing reactions, patterns number 14 and 23 have rapid, mesmerising reactions, patterns number 16 and 17 have broad expanses of bright colour, and patterns number 8 and 22 produce intriguing, feathery detail.



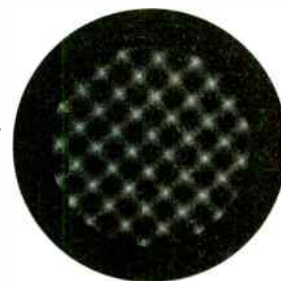
14.

16.

Order As **LB47E (Pattern Cassette 2)**  
**LB48C (Pattern Cassette 3)**  
**LB49D (Pattern Cassette 14)**  
**LB50E (Pattern Cassette 16)**  
**LB51F (Pattern Cassette 17)**  
**LB52G (Pattern Cassette 18)**  
**LB53H (Pattern Cassette 22)**  
**LB54J (Pattern Cassette 23)**

## Zoomer Cassette

A breathtaking 3D effect is produced by this cassette as the honeycomb image appears to zoom in and out. Available in two colours: red and blue.



Zoomer

Order As **LB55K (Zoomer Cassette Blue)**  
**LB56L (Zoomer Cassette Red)**

## Picture Liquid Cassette



Lovers



Go-Go Dancers

A range of cassettes where one glass plate has a coloured picture on it whilst the other contains coloured oils which move under the influence of the heat from the projector bulb. The following designs are available: Girl's Face, Go-Go Dancers, and Lovers.

Order As **LB88V (PL Cassette Girl's Face)**  
**LB57M (PL Cassette Go-Go Dancers)**  
**LB58N (PL Cassette Lovers)**

## FRONT OF LENS ACCESSORIES



These accessories clip into the front of the Projector 500 only and add colours or prismatic effects to any wheel fitted in the centre gate of the projector. Three types are available.

### Colour Flash

The Colour changer wheel fitted to a front of lens motor plate giving a most pleasing and colourful effect.

Order As **XQ87U (FOL Colour Change)**

### Prism Rotator

The motor fitted to a front of lens motor plate turns a prism which orbits through 360° deflecting the images from the projector all round the room.

Order As **XQ88V (FOL Prism Rotator)**

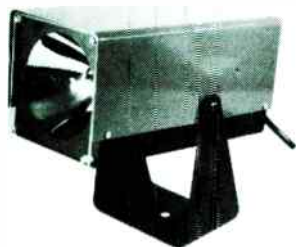
### Prism Revolver

The prism splits the image from the projector into three and the motor fitted to a front of lens motor plate revolves all three images to give a dazzling effect.

Order As **XQ89W (FOL Prism Revolver)**

## STROBES

### Mini Strobe



A modern, lightweight all metal construction strobe with a 20W per second silica xenon flash tube protected by a perspex screen. The strobe has a high efficiency reflector and is adjustable to give from one to twelve flashes per second. The unit plugs directly into the mains (240V AC) and has a mounting bracket for operation free-standing, wall, ceiling or track mounted.

Order As **XQ90X (Mini Strobe)**

### Maxi Strobe



A modern all metal construction strobe with a 40W per second long life silica xenon flash tube protected by a perspex screen. The strobe is adjustable from one to twenty flashes per second using the recessed control at the rear or by using the remote control socket. The unit plugs directly into the mains (240V AC) and has a mounting bracket for operation free-standing, wall, ceiling or track-mounted.

Order As **XQ91Y (Maxi Strobe)**

### Xenon Tubes

Replacement xenon tubes for the strobes described above. The small tube has a capacity of 20W/second, whilst the larger tube will give 40W/second. Full instructions on how to change the tube are given with the strobes.

Order As **LB89W (Xenon Tube 20W)**  
**LB90X (Xenon Tube 40W)**

## SOUND TO LIGHT UNITS

### Zeromatic



A high quality competitively priced fully automatic sound to light unit capable of switching up to 1000W per channel. Three channels for bass, middle and treble frequencies, and all are zero switched to minimise radio frequency interference. The automatic gain control means no adjustment is necessary for inputs from 30mW to 1000W when connected across a 4Ω loudspeaker.

The audio input is completely isolated from the mains and connection is by way of a stereo jack socket or two DIN L/S sockets. The output for the lamps is an eight pin socket; a Mains Plug P551 will be required to make connection.

All metal case, external size 202 x 177 x 65mm standing on 10mm high PVC feet.

Only suitable for use with tungsten bulbs e.g. our Spot Lamps. The unit is protected by special high speed fuses, and only these types may be used as replacements. One spare lamp fuse is supplied.

Order As **XQ92A (Zeromatic)**

### Multimatic



A unique electronic lighting controller offering numerous functions hitherto not available on a single portable unit. The controller basically comprises three 1000W channels of sound to light modulation with additional sound or auto sequencing. In the sound to light mode, override buttons enable each channel to be switched to a permanently on or off state, whilst the red/blue reverse button permits the exchange of lamps on the bass and treble channels.

A novel feature of this unit is the autobackground control which switches all three channels on at half power in the absence of a sound input. A suitable delay is incorporated to minimise spurious operation so that the DJ can always rely on a predictable performance to avoid sustained periods of total blackout.

AGC circuitry is included so that no adjustment is required for inputs from 30mW to 1000W across a 4Ω loudspeaker. The triacs are all zero switched to minimise radio frequency interference.

The Multimatic also doubles as a three channel sequencer having 14 different programmes, with the options of constant background lighting to provide pleasing ripple effects, or half power condition for subdued lighting effects. Chase speed can be varied over a wide range and also modulated to music in the sound chase mode.

A special feature called rhythm chase may be switched into operation by pulling out the speed control. This is a preset function to provide rapid selection of a pleasing sequencing rate related to the rhythm content of the music. In the auto sequence mode, this control freezes the animated display.

The audio input is completely isolated from the mains and connection is by way of a stereo jack socket. The output for the lamps is an 8-pin socket; a Mains Plug P551 will be required to make connection.

Only suitable for use with tungsten bulbs e.g. our Spot Lamps. The unit is protected by special high speed fuses, and only these types may be used as replacements. One spare lamp fuse is supplied.

Order As **XQ93B (Multimatic)**

### Spare Parts

The following parts are available for use with our Sound to Light Units.

### Extension Lead

A special 5-core power cord designed to be connected between the sound to light unit and the lights. It is terminated at each end in a Mains Plug P551.

Length: 3m (9ft 10in.)

Order As **XQ94C (5-Core Lead)**

### Fuses

The lamp protection fuse in both our sound to light units is a special high speed 5A fuse whilst the mains fuse is high speed 15A. Both types are 1½in. x ¼in. and are ceramic filled.

Order As **WQ11M (Hi-Speed Fuse 5A)**  
**WQ12N (Hi-Speed Fuse 15A)**

### FUZZ LIGHT

A mains operated police light which throws a bright beam around the room. Fitted with a standard clear plain Candle 60W SBC lamp, and a 2A mains fuse. Available with Blue, Amber, Green or Red translucent acrylic domes.

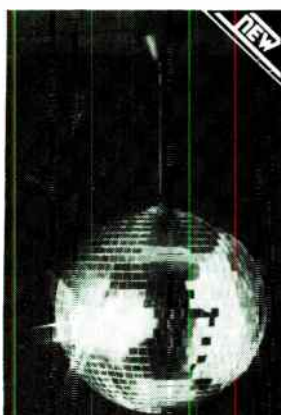


Order As **XQ95D (Fuzzlight Blue)**  
**XQ96E (Fuzzlight Amber)**  
**XQ97F (Fuzzlight Green)**  
**XQ98G (Fuzzlight Red)**

## MIRROR BALL

A 305mm (12 in) ball of tough seamless cross-linked polythene which is virtually unbreakable, completely covered by 19 mm ( $\frac{3}{4}$  in) square mirrors, all cut by hand from a solid sheet. The ball is supplied suspended from a dark-brown textured stove enamel rotator enclosing a 3 rpm 240V mains motor to rotate the ball. Thus a spectacular effect is achieved by pointing a spotlight or strobe at the rotating ball as the light is split into tiny points and spun around the room.

The ball is supplied complete with all chain, links and key rings for ceiling mounting solidly boxed to withstand arduous transportation. If ball is to be used in portable applications a stand is available, see below.



Order As XY06G (Mirror Ball 12 in)

## Stand For Mirror Ball

A floor stand for our 12 in mirror ball.



Order As XY07H (Mirror Ball Stand)

## FLASHER UNIT



A 240V mains, thermally operated changeover relay capable of switching up to 500W. The relay may be used to flash one lamp on and off and in addition a second lamp may be added such that when lamp 1 is off, lamp 2 is on and vice versa. The unit is built on a heavy ceramic base with brass inserts.

Dimensions: 95 x 38 x 29mm  
Fixing centres: 81.5 x 3.2mm

Order As LB91Y (Flasher Unit 2-way)

## LAMP HOLDERS

### Free-Standing Lampholder



A lampholder suitable for use with our Spot Lamps (not suitable for ordinary domestic light bulbs). BC fitting only. Holder may be swivelled up and down and round and round, and is fixed to a circular black metal base with two fixing holes and grommetted hole for cable. Base diameter: 85mm. Fixing centres 60mm.

Order As YB29G (Spot Holder)

## Triple Lampholder



Three BC lampholders for use with our Spot Lamps (not suitable for ordinary domestic light bulbs) mounted on a triangular section white metal base. Free standing on four rubber feet or may be wall mounted (fixing centres: 278mm). Holders may be swivelled up and down and round and round. Grommetted cable entry hole in one end and holes for cable to each lampholder are also grommetted.

To wire up the unit unscrew the four feet and slide out the base plate. Base dimensions. 368 x 96mm.

Order As XY00A(3-Bank Lampholder)

## Clip-On Lampholders

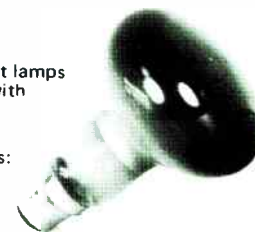


A single and twin BC mains lampholder designed for use with our spot lamps (not suitable for ordinary light bulbs). Holder has a very strong clip with 76mm wide jaws which open to 35mm max, so that lights may be quickly fixed or moved. The lamp may be swivelled through about 120° when clip is fixed.

Order As XB31J (BC Clip-On Holder Single)  
XB32K (BC Clip-On Holder Twin)

## SPOT LAMPS

Bayonet cap (BC) ended 240V spot lamps rated at 100W. If driving these bulbs with thyristors or triacs derate device's maximum power capability by around 50%. Available in the following colours: Amber, Blue, Clear, Green, Red or Violet.



Order As WF25C (Spot Lamp Amber)  
WF26D (Spot Lamp Blue)  
WF27E (Spot Lamp Clear)  
WF28F (Spot Lamp Green)  
WF29G (Spot Lamp Red)  
WF30H (Spot Lamp Violet)

## GOOSENECK LAMP HOLDER



A very flexible gooseneck lampholder fitted with a 12V 5W bulb (replacement types available from car accessory shops). Bulb is surrounded by a square section hood which may be adjusted to control beam area. Fixing box: 53 x 32mm with luminous push on-off switch. Overall length: 556mm. Goose neck is finished in chrome with black plastic attachments. Supplied with red and black connecting leads.

Order As WF22Y (Gooseneck Lamp)



## FOOT SWITCH

A snap action foot control switch with skid-proof rubber base pad, lead and 3.5mm plug. Body size 80 x 100 x 23mm.



Order As **LB64U** (Foot Switch)

## FOOTSWITCH



A tough hard-wearing non-slip on/off footswitch moulded in black. Switch is SPST push for on, push for off for control of effects units etc. Supplied complete with two metres of low-noise screened cable and standard mono jack plug.

Order As **LB65V** (SP Foot Sw)

## MINI-PHASER



An audio effects unit which provides a cyclic phasing effect with variable rate. The unit is fully built and includes a foot operated on-off push switch and non-slip base. Input and output are by mono standard jack sockets in rear of unit. It operates on a battery (supplied) and is supplied with instructions. Circuit uses six op-amp stages and four F.E.T's. (Battery replacement type PP3).

Order As **LB66W** (Mini-Phaser)

## FUZZ BOX



A fuzz box for use with guitar. Black crackle-finish sloping front box houses foot-operated on-off switch. Input and output are standard mono jack sockets. Volume control and depth of fuzz control are also provided. Supplied with battery (replacement type PP3).

Order As **YB30H** (Fuzz Box)

## VIBRA-CHORUS



Add fantastic effects to your playing or singing with this electronic musical instrument or microphone effects unit. Ready built and mains operated, fitted with input and output mono jack sockets.

The unit will add tremolo, vibrato or shift effects to any input signal and has variable intensity and switchable cycle times of  $\frac{1}{12}$ ,  $\frac{1}{8}$ ,  $\frac{1}{6}$ ,  $\frac{1}{4}$ ,  $\frac{1}{2}$  and 1 sec. A master volume control is fitted along with a quick cancel button so that the desired effect may be instantaneously switched on and off as the performance demands.

Size: 270x160x80mm with sloping front panel.

Case is finished in hard-wearing black crackle finish with highly polished front panel.

Order As **XB34M** (Vibra Chorus)

## FUZZ-WAH-WAH PEDAL



An electronic musical instrument effects pedal. Foot switch at rear of pedal turns fuzz effect on and off. Controls on side of pedal select: pitch of fuzz; fuzz sustain and overall volume of fuzz. Volume of fuzz is adjusted by moving the pedal up and down. The switch for the wah-wah effect is switched on and off by pressing down heavily on the pedal as the switch is situated under the pedal. The effects will operate simultaneously if desired.

Unit has a large hard-wearing non-slip pedal and the case has a black crackle-finish. Input and output connections are by standard mono jack sockets fitted in the rear of the unit. Supplied complete with instructions and battery (replacement type PP3).

Overall size: 270x120x100mm

Order As **XB41U** (Fuzz-Wah Pedal)

## COMPRESSOR

A foot-operated compressor for guitars for sound level limiting. A distortion free sustain is obtained by turning up the level control. A foot-operated switch is provided so that sound may be switched from compressed to straight through or vice versa.



Order As **YB88V** (Mini Compressor)

## ECHO CHAMBERS Standard Type



A superior quality echo chamber at a very low price. Designed for use with microphones or any electronic musical instrument this echo chamber is supplied with a tape cartridge which will last substantially longer than an ordinary echo chamber with loop tape. The unit is mains operated and is finished in hard-wearing black textured plasticised cloth, with carrying handle and the front panel is highly glossed anodised aluminium.

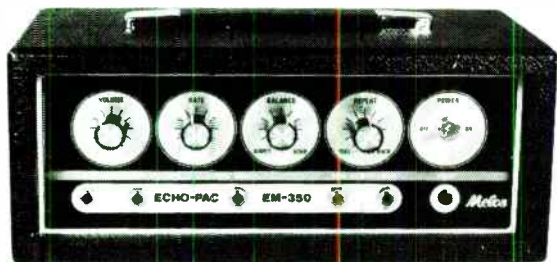
The inputs are standard mono jack sockets, one has a low impedance—600 $\Omega$  and the other has a high impedance—50k making it suitable for guitars and indeed by using the input volume control a very wide range of inputs can be accommodated (for instance the main output of a mixer could be fed in here so that echo could be added to the composite signal). Two outputs on mono jack sockets are also provided for feeding on to a power amp, one output gives high volume and the other gives a low volume, slightly less than a tenth that of the high output.

A balance control is provided which is continuously variable between straight-through sound only (no echo) and echo only. A repeat control is provided which adjusts the loss in the volume of each repeat of the same sound (i.e. it sets how fast an echo dies away) and a control is provided which varies the speed of the tape and therefore the time between repeats of the echo.

The tape cartridge which is an endless loop fits into the rear of the chassis and is hidden by the back of the cabinet. This rear panel also incorporates a standard mono jack socket into which a foot switch may be plugged. The switch will then instantaneously turn the echo effect on and off without affecting the straight-through signal. Overall size: 270 x 165 x 130mm

Order As XB33L (Echo Chamber)

## Sound-on-Sound Facility



An identical echo chamber to the one described above except that it has a more attractive front panel, and it has a 'sound-on-sound' facility which cuts off the erase head so that one could make a pre-recorded tape loop lasting 2 to 4 minutes (depending on setting of rate control).

The foot-switch socket is on the front of the unit.

Overall size: 320 x 163 x 138mm

Order As XY01B (Sound-on-Sound Echo-Pac)

## Tape For Echo Chambers

A replacement endless loop tape cartridge for use with our echo chambers. Size 85 x 70 x 12mm

Order As LB67X  
(Echo Chamber Tape)



## TELEPHONE PICK-UP COIL



Small pick-up coil in black plastic moulding with rubber suction pad to attach to telephone. Will pick up conversations for recording. Connected to approx. 1m of lead terminated in a 3.5mm jack plug.

Order As LB92A (Phone Coil)

## CRYSTAL MICROPHONE INSERT



A small crystal microphone insert. Metal container size: 35mm dia. x 11mm thick.

Order As LB93B (Crystal Mic Insert)

## CASSETTE MICROPHONES

### Dynamic



A dynamic microphone suitable for use with cassette recorders. Microphone has built-in on-off switch for remote control of recorder. Supplied with small plastic desk stand. Impedance: 200 $\Omega$ . Two types available. The type for use with Japanese-type recorders is terminated in two jack plugs: a 2.5mm plug and a 3.5mm plug. The type for European/Philips type recorders is terminated in two DIN plugs: a 3-pin and a 5-pin 'B' plug.

Order As YB31J (Cassette Mic Jacks)  
YB32K (Cassette Mic DIN)

### Condenser



An electret condenser microphone specially designed for use with cassette recorders. Its output level is higher than most dynamic types. Microphone has built-in on-off switch for remote control of recorder. Lead is terminated in two jack plugs: a 2.5mm plug and a 3.5mm plug.

### Specification:

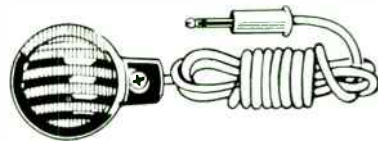
Sensitivity: -63dB  $\pm$ 3dB at 1kHz  
Frequency response: 50 Hz to 16 kHz  
Impedance: 600 $\Omega$

The microphone is supplied complete with battery (replacement type HP7).

Order As YB33L (Electret Cassette Mic)

## LAPEL MICROPHONE

Low-cost crystal lapel microphone with lapel clasp, lead and 3.5mm jack plug.



Order As LB68Y (Lapel Mic)

## DESK MICROPHONE

Dynamic pencil-type microphone in chrome and black finish. Microphone has integral on-off switch and approx. 1m of lead with prepared open end for connection to plug to suit your equipment. A heavy diecast desk stand finished in black is supplied with the microphone.



Omni-directional Impedance: 50k  $\Omega$

Order As WF04E (Desk Mic)

## DYNAMIC BALL MICROPHONE



A high quality dynamic unidirectional microphone with a metal meshed ball top and slim satin finish alloy stem. Supplied complete with 6m of lead terminated with a standard mono jack plug and plastic cradle for fixing to stands, booms, goosenecks etc. The microphone has an integral on-off slide switch in the stem.

Frequency response: 100 to 12,000Hz

Output impedance: 600  $\Omega$  or 50k  $\Omega$

Cardioid unidirectional response

Order As WF35Q (Dynamic Ball Mic)

## COMMUNICATIONS MICROPHONE



A hand-held communications-type microphone with integral push to talk switch. Supplied with 2m of coiled black cable and a screw-on bracket so that microphone can be hung up when not in use. Lead is supplied with prepared ends for connection of plug to suit your equipment. White lead is the signal connection and its screen is the earth. There is an open circuit between the red and black wires when the switch is normal. They are shorted together when the switch is pressed.

Impedance: 50k  $\Omega$  dynamic

Order As WF05F (Communications Mic)

## TIE-CLIP MICROPHONE

A very high quality tie-clip type electret condenser microphone. Supplied complete with 4m of lead (terminated in a 3.5mm jack plug) and battery. (replacement type RM675H) and a chromed tie-clip holder.



### Specification:

Frequency response: 40 to 16,000 Hz

Impedance: 1000  $\Omega$

Sensitivity: -48dB  
(0dB = 1mW/10  $\mu$  Bars)

Operating voltage: 1.1 to 1.5 volts

Dimensions: 40 x 14mm dia.

Weight (incl. battery): 9.3 grammes

Order As LB69A (Tie-Clip Mic)

## LOW-COST ELECTRET CONDENSER MICROPHONE



An omnidirectional low-cost electret condenser microphone, with built-in on-off switch. Supplied with battery (replacement type HP7) and plastic desk stand. Lead terminated in standard mono jack plug. Size: 164 x 19mm dia. Impedance: 600  $\Omega$ .

Order As YB34M (Low-Cost Electret Mic)

## MEDIUM-COST ELECTRET CONDENSER MICROPHONE



A unidirectional medium-cost electret condenser microphone with built-in on-off switch. This microphone gives a remarkably good performance considering its price. Supplied with battery (replacement type HP7), threaded stand adaptor, wind shield and 6m of cable terminated in a standard mono jack plug. Aluminium cylindrical body with lead that is not detachable.

### Specification

Frequency response:	30Hz to 18kHz
Impedance:	600 $\Omega$
Sensitivity:	-65dB $\pm$ 3dB
Power:	1.5V battery (fits inside microphone)
Battery life:	10,000 hours (nominal)
Size:	170 x 22mm dia.
Weight:	85gm

Order As YB35Q (Electret Mic EM507)

## ELECTRET CONDENSER MICROPHONE



A unidirectional electret condenser microphone with built-in on-off switch. Microphone can be connected to suit high or low impedance inputs. Microphone is built in a heavily chromed cylindrical copper body. Supplied with battery (replacement type HP7), threaded stand adaptor, wind-shield and 6m of cable terminated in a standard mono jack plug. The lead is connected to the microphone via a lockable plug which may be inserted in two ways to effect the impedance change.

### Specification:

Frequency response:	30Hz to 18kHz
Impedance:	600 $\Omega$ and 50k $\Omega$
Sensitivity:	600 $\Omega$ : -65dB $\pm$ 3dB at 1kHz 50 $\Omega$ : -48dB $\pm$ dB at 1kHz
Power:	1.5V battery (fits inside microphone)
Battery life:	10,000 hours (nominal)
Size:	190 x 20mm dia.
Weight:	150gm

Order As WF34M (Electret Mic Dual-Z)



## UNISOUND MICROPHONES



A range of superb quality microphones for professional use.

### OMNIDIRECTIONAL ELECTRET CONDENSER MICROPHONE

A very high quality omnidirectional electret condenser microphone having an extremely flat, wide frequency response. Microphone can be connected to suit high or low impedance inputs and has a brushed aluminium cylindrical body. Supplied with battery (replacement type HP7), threaded stand adaptor, windshield and 5m of cable terminated in a standard mono jack plug. The lead is connected to the microphone via a lockable plug which may be inserted in two ways to effect the impedance change.

#### Specification:

Frequency response: 30Hz to 22kHz ( $\pm 3$ dB) Low impedance  
70Hz to 20kHz ( $\pm 3$ dB) High impedance  
30Hz to 22kHz ( $+3 - 6$ db) High impedance

Impedance: 500 $\Omega$  and 40k $\Omega$

Output level: Low:  $-48$ dB (0dB = 1mW/10 $\mu$  Bars)

(at 1kHz) High:  $-39$ dB (0dB = 1mW/10 $\mu$  Bars)

Power: 1.5V battery (fits inside microphone)

Battery life: 10,000 hours (nominal)

Size: 188 x 22mm dia.

Weight: 100 gm

Order As YB36P (Unisound Mic EM82D)

### UNIDIRECTIONAL ELECTRET CONDENSER MICROPHONE

A very high quality unidirectional cardioid response electret condenser microphone as EM82D except that it is unidirectional.

#### Specification:

Frequency response: 30Hz to 22kHz ( $\pm 3$ dB) Low impedance  
80Hz to 20kHz ( $\pm 3$ dB) High impedance  
30Hz to 22kHz ( $+3 - 6$ dB) High impedance

Impedance: 1k $\Omega$  and 40k $\Omega$

Output level: Low:  $-54$ dB (0dB = 1mW/10 $\mu$ Bars)

(at 1kHz) High:  $-46$ dB (0dB = 1mW/10 $\mu$ Bars)

Front to back ratio: 20dB at 1kHz

Power: 1.5V battery (fits inside microphone)

Battery life: 10,000 hours (nominal)

Size: 194 x 22mm dia

Weight: 100gm

Order As YB37S (Unisound Mic EM83D)

### PROFESSIONAL CARDIOID MICROPHONE



A very high quality super cardioid dual impedance dynamic microphone with an extremely wide, uniform response curve. The cardioid polar pattern is very uniform and the off/on response is virtually identical. The microphone has a built-in spherical windshield thus eliminating breath blast noises. It is ideally suited for quality vocal or music recording as well as PA and disco work. The microphone is strongly built and will withstand a certain amount of rough handling. If, however, at any time the windshield or microphone capsule become damaged we can supply replacement parts (see below). Supplied complete with threaded stand adaptor and 5m of cable terminated in a standard mono jack plug. The lead is connected to the microphone via a lockable plug which may be inserted in two ways to effect the impedance change.

#### Specification:

Frequency response: 50Hz to 17kHz

Impedance: 200 $\Omega$  and 20k $\Omega$

Sensitivity: Low:  $-76$ dB

High:  $-56$ dB

Size: 167 x 33mm dia. (max)

Weight: 250gm

Order As YB38R (Unisound Dynamic DM1500D)

### Spare Parts for Unisound Dynamic Mic DM1500D

The windshield which unscrews from the DM1500D and the microphone capsule which unscrews and unplugs may be replaced should they ever be damaged.

Windshield Order As LB94C (Screen S15)

Capsule Order As LB95D (Mic Unit U15)

## MICROPHONE WINDSHIELD



Functionally styled, controlled density foam windshields that fit most slimline dynamic or electret microphones. Essential for suppressing explosive breath sounds, squeals and booming effects. Only available in black

Order As LB35Q (Mic Windshield)

## GOOSENECK MICROPHONE STAND

A 21 in (535mm) chromed gooseneck microphone stand threaded to accept standard microphone carriers. Base is internally threaded. Diameter of neck: 16mm.



Order As WF36P (Gooseneck Mic Stand 21in)

## BRACKET FOR GOOSENECK MICROPHONE STAND

A threaded stud to suit our Gooseneck Mic Stand welded to a flat plate (60 x 60mm) with fixing holes on 48mm centres (4BA and M4 clearance). Cadmium plated.



Order As WF37S (Bkt For Gooseneck Stand)

## DESK STAND

A table-top microphone stand. Chrome plated tripod legs hinge outward to give firm base. Standard brass thread at top suits the stand adaptors supplied with our and nearly all other microphones.



Order As LB96E (Table-Top Mic Stand)

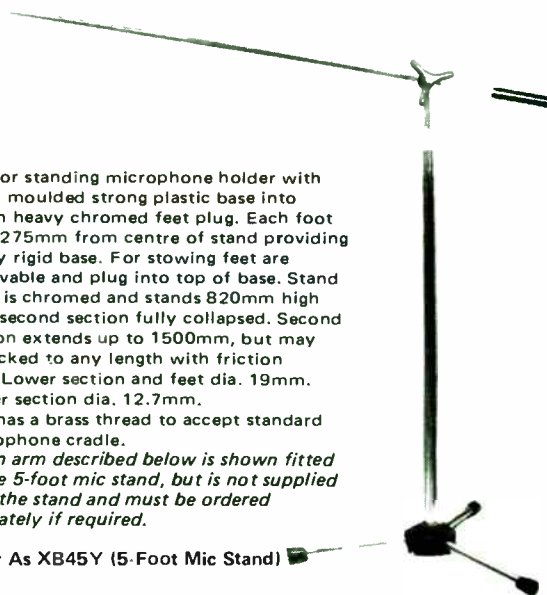
## 5-FOOT MICROPHONE STAND

A floor standing microphone holder with black moulded strong plastic base into which heavy chromed feet plug. Each foot ends 275mm from centre of stand providing a very rigid base. For stowing feet are removable and plug into top of base. Stand itself is chromed and stands 820mm high with second section fully collapsed. Second section extends up to 1500mm, but may be locked to any length with friction grip. Lower section and feet dia. 19mm. Upper section dia. 12.7mm.

Top has a brass thread to accept standard microphone cradle.

*Boom arm described below is shown fitted to the 5-foot mic stand, but is not supplied with the stand and must be ordered separately if required.*

Order As XB45Y (5-Foot Mic Stand)



## BOOM ARM

A boom arm for use with our 5 foot mic stand or almost any floor stand. Boom is chromed and has a heavy counterweight. It can be rotated through 360° and can be set at any angle. Total length of arm: 1m Boom length is adjustable up to 878mm from centre of stand. End of boom arm is threaded to accept standard microphone cradle (stand adaptor).

Order As XB46A (Boom Arm)

## MICROPHONE MATCHING TRANSFORMER

### Type 1

The unit is designed to feed balanced or unbalanced low impedance microphones into an unbalanced high impedance input. Or it can be used to feed high impedance microphones into balanced or unbalanced inputs. It can also be used to extend high impedance microphone leads and in this case two transformers would be required.



Low impedance input is fitted with standard stereo jack socket whilst high impedance input is fitted with standard mono jack socket. Switch is provided to select balanced or unbalanced on low impedance side. Size: 70 x 65 x 30mm.

Two types are available:

MX5 Low impedance 20 to 50  $\Omega$  and 50k  $\Omega$ .

MX6 Medium impedance 200 to 600  $\Omega$  and 50k  $\Omega$ .

Order As **LB70M** (Mic Xformer MX5)  
**LB71N** (Mic Xformer MX6)

### Type 2



The unit is designed to match low impedance balanced or unbalanced microphones into a high impedance input. The transformer is enclosed in a screened case to minimise hum pickup. Fixing is by means of  $\frac{3}{8}$  in. bush through which pass flexible connecting leads. Size: Height: 32mm. Diameter: 34mm.

Two types are available:

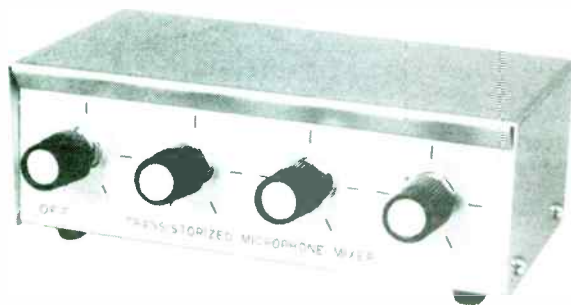
Low impedance 20 to 30  $\Omega$ , output 50k  $\Omega$

High impedance 200 to 600  $\Omega$ , output 50k  $\Omega$

Order As **LR05F** (Mic Xformer Type 2 20–30  $\Omega$ )  
**LR06G** (Mic Xformer Type 2 200–600  $\Omega$ )

## MICROPHONE MIXERS

### Mono Type



A four channel mono microphone mixer. Inputs are by mono jack sockets. output is by phono socket. On-off switch ganged with level control of channel one.

Overall size: (excl. knobs) 150 x 80 x 57mm high

Input impedance: 4 x 50k  $\Omega$

Gain: approx. 3dB max.

Input (max.): 1V rms

Output (max.): 1.3V rms

Signal to noise ratio:  $\approx$  60dB

Battery (not supplied): PP3 (life: 400 hours)

Unit is supplied with detailed operating instructions.

Order As **XB30H** (Mono Mic Mixer)

### Stereo Type



A four channel stereo microphone mixer having two inputs connected to each of the two stereo channels when in stereo mode. In mono mode the four inputs are outputted equally on both main channels. Inputs are by four mono standard jack plugs and outputs are by two phono sockets. Two meters are provided one for each main channel.

Each input may be switched to give low impedance or high impedance matching.

The unit has an extremely smart appearance and is finished in black with a black anodised front panel.

Input impedance: 600  $\Omega$  or 50k  $\Omega$   
Output impedance: Load should be  $>$ 50k  $\Omega$   
Input sensitivity for 250mV out: Low: 0.3mV  
High: 2mV

Maximum output into 500k  $\Omega$  load: 1.8V (distortion  $<$ 5%)

Signal to noise ratio: Better than 60dB

Frequency response: 30Hz to 20kHz  $\pm$ 3dB

Operation is by battery (supplied) replacement type PP3

Order As **XB29G** (Stereo Mixer)

## PRE-AMPLIFIER MODULES

### EQ2S Mono

A tiny ready-built pcb suitable for use as a pre-amplifier for magnetic cartridges, tape heads (NAB response) and low level microphones. Two will be required for stereo.



#### Specification:

Gain (at 1kHz):	Phono: 34dB (5mV input – 240mV output)
	Response curve RIAA
	Tape: 33dB (5mV input – 220mV output)
	Response curve NAB
	Flat: (Microphone etc): 38dB (3mV input – 230mV output)
Max. output:	2.5V (with 30mV input)
Input impedance:	50k $\Omega$ (approx.)
Output impedance:	5k $\Omega$ (approx.)
Power supply:	10V $\pm$ 2V at 1mA (e.g. 9V battery PP3)
Size:	60 x 35 x 20mm
Fixing centres:	50 x 25mm x 6BA clear.

Supplied with connecting instructions.

Order As **LB97F** (Pre-Amp EQ2S)

### CS5 Stereo



A mains operated ready-built pre-amplifier for use where magnetic cartridge is to be used with a power amp or an amplifier which has only ceramic or crystal cartridge inputs and not magnetic. The cartridge input and amplifier output are via phono sockets and approx. 1.5m of mains lead is fitted. The unit is designed for stereo operation.

#### Specification:

Gain:	10mV input, $\approx$ 500mV output
Max. output:	1.8V (at 1% distortion)
Input impedance:	50k $\Omega$ (approx.)
Output impedance:	5k $\Omega$ (approx.)
Signal to Noise ratio:	$>$ 60dB
Frequency response:	30Hz to 20kHz RIAA response.
Power supply:	240V AC at 0.4mA (0.1W)
Size:	120 x 69 x 38mm
Fixing centres:	108mm x 4 mm dia. (2 wood screws supplied).

Supplied with full instructions

Order As **YB39N** (Pre-Amp CS5)

## GUITAR PICKUPS

### Crystal Type



A low cost crystal unit which clips onto the sound board of an acoustic guitar. A volume control is provided and 1.4m of lead terminated in a standard mono jack plug. No other connections required. Just plug into amplifier and play.

Order As YB40T (Crystal Guitar Pick-up)

### Magnetic Nylon Strings



A pick-up for nylon strung acoustic guitars. Unit clips onto sound board with adjustable clamp. Incorporates a magnetic microphone with volume control. The lead which is detachable is 2.5m long terminated at one end with a 3.5mm jack plug to suit socket on pick-up and a standard mono jack plug at the other end for connection to amplifier input. Heavily chromed finish.

Order As YB41U (Nylon Magnetic Pick-up)

### Magnetic Steel Strings



A pick-up for steel strung guitars. Unit clamps onto sound board under strings, with adjustable clamp, so that each of the six holes in the microphone unit is beneath one string. The control unit is fixed to the microphone unit by a long adjustable clamp and incorporates a volume and a tone control. The lead which is detachable is 3m long terminated at one end with a 3.5mm jack plug to suit socket on control unit and a standard mono jack plug at the other end for connection to amplifier input. Heavily chromed finish. Contains two ceramic magnets, 3.4kΩ impedance. Supplied with instructions.

Order As YB42V (Steel Mag Pick-up)

## QUAORAPHONIC SYNTHESISER

Just add two speakers and this synthesiser to your existing stereo equipment and you've got a fully adjustable surround sound system. The unit has a black front panel with chromed lettering and a veneered wooden cabinet. Inputs and outputs are by way of six phono sockets on the rear panel.

**Note:** The unit is not suitable for 4Ω speakers. It is designed to operate with 8 to 16ohm speakers.

The synthesiser is supplied with detailed instructions.

Order As XB48C (Quodraptor)



## INTERCOM

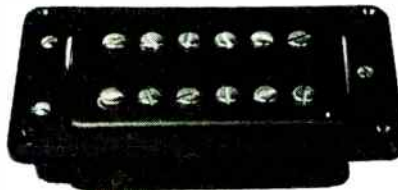
A good quality two station intercom supplied complete with 20 metres of lightweight connecting cable with 3.5mm jack plugs on each end. Intercom has buzzer calling with push-buttons and a volume control on master unit. Operates with battery (supplied) and has a 200mW output.

Size: 120×83×51mm. (Battery replacement type PP3)

Order As LB72P (Intercom 2-Station)



## Humbucker



A super humoucking "sustainer" pick-up featuring very high output, high voltage to feedback ratio, high sensitivity and "sustain". It has been acclaimed by famous musicians all over the world for its versatility, high output and fantastic frequency range.

With chromium adjustable pole pieces and cased in matt black plastic that does not interfere with the pick-up's magnetic field.

Order As LB74R (Humbucker)

## GUITAR STRINGS

### Nylon

A set of replacement nylon guitar strings for Spanish acoustic guitars, silver plated wound. Pack contains an extra 1st and 4th string (total 8 strings).



Order As LB78K (Guitar Strings Nylon)

### Steel

A set of replacement steel guitar strings for electric and acoustic guitars, round wound. Pack contains an extra 1st and 2nd string (total 8 strings).

Order As LB60Q (Guitar Strings Steel)

## STRAP BUTTCN

A button for guitar straps; made from solid brass bar and heavily chrome plated.



Order As LB98G (Strap Button)



All the turntables shown on this page will fit the cut-outs in our Disco Cabinet motor board. All the turntables are supplied in chassis form and without a cartridge (except the Autochanger which has a cartridge ready fitted).

## AUTOCHANGER

A good quality autochanger that will play up to eight average thickness records of the same speed and diameter. A stereo ceramic cartridge is fitted, type BSR SC12M having an output of 500mV at 5cm/sec. The stylus pressure is factory adjusted to suit the cartridge fitted.

Capacity: 170, 250 or 300mm (7in, 10in, or 12in) records.  
Speeds: 33 $\frac{1}{3}$ , 45 or 78 rpm  
Power supply: 200 to 240V 50Hz

The unit is finished with a satin black mainplate with chromed lettering and a black and aluminium, pick-up arm and turntable. Supplied with instruction leaflet.

Order As XQ00A (Autochanger)



## RIM DRIVE TURNTABLE

If you're looking for an inexpensive turntable to start off your hi-fi system, yet one which has many high precision features, choose this beautifully styled unit. Its combination of superb sound reproduction, extensive list of refinements and exceptional value for money, is unbeatable.

It is a single play turntable with auto and manual cueing and incorporates an 'S' shaped, low resonance, polished aluminium tonearm which floats in a concentric gimbal style mount with counterbalance. Please note that the counterbalance is not calibrated and a stylus balance will be required to set the stylus pressure accurately. A viscous damped cueing device is provided and all the controls are slider type for smooth operation. A lightweight headshell is provided for good tracking at low stylus pressures and cartridges that track in the range 2 to 4 gms are suitable.

Capacity: 170, 250 or 300mm (7in, 10in, or 12in) records.  
Speeds: 33 $\frac{1}{3}$ , 45 or 78 rpm  
Power supply: 200 to 240V 50Hz

The unit is finished with a satin black mainplate and control panel with a combination of black and polished aluminium on tonearm. Supplied with instruction leaflet.

Order As XB23A (Rim Drive Turntable)



## BELT DRIVE TURNTABLE

A belt drive transcription turntable at a remarkably low price. The turntable has ultra-modern styling and silent power transmission achieved by a constant speed, high torque motor, and non-magnetic turntable linked by a strong resilient belt resulting in very low rumble and wow and flutter figures.

The unit incorporates an 'S' shaped, low resonance, polished aluminium tonearm, which floats in a concentric gimbal style mount, with heavy knurled counterbalance weight to suit cartridges which track between 1 and 4 gms. The deck has slider type controls for smooth operation and a lightweight headshell and pick-up leads for good tracking at low stylus pressures. An anti-skating device (use figures 2 to 4 for elliptical and 2 to 6 for spherical styli) and viscous damped cueing device are also provided.

Capacity: 170, 250 or 300mm (7in, 10in or 12in) records.  
Speeds: 33 $\frac{1}{3}$  or 45 rpm  
Power supply: 200 to 240V 50Hz

The unit is finished with a satin black mainplate and control panel with a combination of black and polished aluminium on tone arm. Supplied complete with full instructions.

Order As XB25C (Belt Drive Turntable)





## SPARE PARTS FOR BSR TURNTABLES

### Cartridge Slides

All types fitted with four leads, red, green, black and white. These slides are suitable for use as replacements or as a quick and easy way to use alternative cartridges. Fit one cartridge to each slide; then to change cartridges simply slide out one and slide in the other. Three types are available.



Type	For use with	Front width (mm)	Carrier width (mm)	Depth (mm)
MP60	MP60, HT70, 510, 610, P128, P144, BDS80.	22	18	35
710	710, 810	21	18	39
BDS95	BDS95	24	18	42

Order As **FQ17T** (Cartridge Slide MP60)  
**FQ18U** (Cartridge Slide 710)  
**FQ19V** (Cartridge Slide BDS95)

### Drive Wheel

A rubber drive wheel or jockey pulley with metal centre. Suits most models except 710 and 810.



Order As **LB75S** (Drive Wheel BSR)

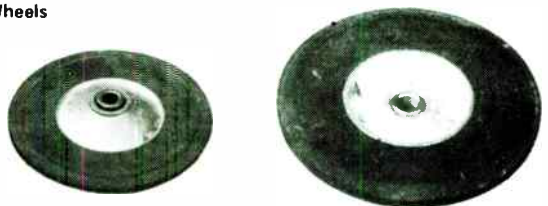
### Spindles



Chrome-plated metal spindles. Autochanger type fits all 'C'-range autochangers except minichangers. Manual type fits all models.

Order As **FQ20W** (Spindle Auto BSR)  
**FQ21X** (Spindle Manual BSR)

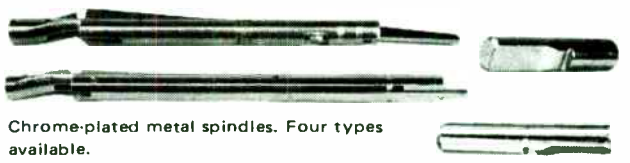
### Drive Wheels



Rubber drive wheels (interwheels) with metal centre. Two types available. Large type suits, SP25 series, AT series, SL series, 2025 series, AP76, 1000, 1025 and others. Small type suits, 6100C, 6200C, 6200CP, 6300, 6400.

Order As **LB76H** (Drive Wheel Garrard Large)  
**FQ30H** (Drive Wheel Garrard Small)

### Spindles



Chrome-plated metal spindles. Four types available.

Type	Garrard Part No.	Overall length (mm)	Suits turntables type
Manual Short	59830	33	SP25II, 2025 series, AT series, 1000 series, 1025 series etc.
Manual Long	75013	39	SP25III, SP25IV
Auto Short	70932	100 (excl. lever)	1000, 1025, 2000, 2025, 2200, 3000, 3500, AT series.
Auto Long	72340	114 (excl. lever)	SL72, SL75, SL95, Zero 100.

Order As **FQ31J** (Spindle Manual Short)  
**FQ32K** (Spindle Manual Long)  
**FQ33L** (Spindle Auto Short)  
**FQ34M** (Spindle Auto Long)

### Tone Arm



A complete tone-arm with wires, but excluding headshell (type SL95 fits) for replacement on models SP25IV. Will also fit SP25 III. Garrard Part No. 77194.

Order As **YB43W** (SP25IV Tone Arm)

### Counterbalance Weight

A replacement counterbalance weight for use on above arm. Fits SP25III and SP25IV. Garrard Part No. 75070.



Order As **FQ35Q** (CB Weight SP25IV)

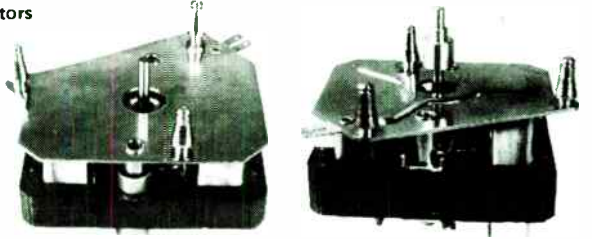
### Drive Belt



A replacement drive belt to suit models, SP25V, 86SBI, 86SBI1, 125SB, GT10, GT20, GT35, GT55, 35SB. Garrard Part No. 79633.

Order As **FQ36P** (Garrard Drive Belt)

### Motors



Spare motors. Small type suitable for use with SP25III. Rated 60mA at 240V 50Hz and 120mA at 120V 60Hz. Large type suitable for use with SP25IV. Rated 65mA at 240V 50Hz.

Order As **YB44X** (SP25III Motor)  
**YB45Y** (SP25IV Motor)

## SPARE PARTS FOR GARRARD TURNTABLES



### Cartridge Carriers

All types fitted with four leads, green, red, white and blue. These carriers are suitable for use as replacements or as a quick and easy way to use alternative cartridges. Fit one cartridge to each carrier, then simply interchange carriers. The following types are available.

Type	For use with	Includes fixing hardware	Front width (mm)	Carrier width (mm)	Depth (mm)	Notes
SL75K	AP75, SL75, SL75B	Yes	23	19	66	Tapers back
SL95	SP25III, SP25IV, AP76, SL72, SL95, SL55B, SL65B	No	25	20	50	Tapers back
SL95K	As SL95 type	Yes	25	20	50	Tapers back
Zero 100	86SB, Zero 100 Series	No	26	21	52	Sliding 1/2in fixing
SP25II	SP25II, AT60	No	23	26	75	Complete plastic headshell
LAB80	A70, LAB80	No	24	23	83	Complete metal headshell
SP25V	SP25V, 86SBI1, 125SB, DD75	No	20	20	47	
SP25VK	As SP25V type	Yes	20	20	47	Also includes finger-lift

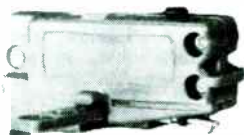
Order As **FQ22Y** (Carrier Kit SL75K)  
**FQ23A** (Carrier Kit SL95)  
**FQ24B** (Carrier Kit SL95K)  
**FQ25C** (Carrier Kit Zero 100)  
**FQ26D** (Carrier Kit SP25II)  
**FQ27E** (Carrier Kit LAB80)  
**FQ28F** (Carrier Kit SP25V)  
**FQ29G** (Carrier Kit SP25VK)

*Note:* With regard to styli SS refers to a changeover stylus where both sides are sapphire and one side is designed to play 78rpm records while the other side is designed to play mono or stereo 45rpm or 33 $\frac{1}{3}$  rpm records. Similarly DS is a changeover stylus where the side designed to play 78rpm records is sapphire and

the side designed to play mono or stereo 45rpm or 33 $\frac{1}{3}$  rpm records is diamond. The term DD refers to a changeover stylus where both sides are designed to play mono or stereo 45rpm or 33 $\frac{1}{3}$  rpm records.

## MONO (STEREO COMPATIBLE) CRYSTAL

### Acos GP91



A crystal mono cartridge which is suitable for playing stereo records. Supplied with carrier for centre hole fixing or standard  $\frac{1}{2}$ in. fixing.

Overall size: 28 x 7.5 x 13mm (excl. tabs and lugs)  
Fitted with a sapphire stylus.

	<b>GP91-1SC</b>	<b>GP91-3SC</b>
Output at 1.2cm/sec.	200mV	630mV
Tracking weight	3–6gm	5–10gm
Frequency response	50Hz–17kHz	50Hz–15kHz
Recommended load	Not less than 1M $\Omega$	
Stylus	LP: 0.0007in./78:0.003in. changeover	
Replacement stylus	GP91SC (SS), (DS) or (DD)	

Order As **FQ37S** (Cartridge Acos GP91-1SC)  
**HR00A** (Cartridge Acos GP91-3SC)

## BSR SX6M and SX6H



A crystal stereo cartridge supplied with carrier for centre hole fixing or standard  $\frac{1}{2}$ in fixing.

Overall size: 28 x 15 x 11m (excl tabs and lugs)

Fitted with a sapphire stylus

	<b>SX6M</b>	<b>SX6H</b>
Output at 1cm/sec:	280mV	700mV
Tracking weight:	4 to 6gm	5 to 7gm
Frequency response:	40Hz to 10kHz	
Recommended load:	2M $\Omega$ and 100pF	

	<b>SX6M</b>	<b>SX6H</b>
Stylus fitted:	(ST12) 78/LP changeover	(ST12)
Replacement styli:	ST12(SS)	
	ST14(DS)	
	ST15(DD)	

Order As **HR04E** (Cartridge BSR SX6M)  
**HR05F** (Cartridge BSR SX6H)

## BSR X5M and X5H



A crystal mono cartridge which is suitable for playing stereo records. Supplied with carrier for centre hole fixing or standard  $\frac{1}{2}$ in fixing.

Overall size: 28 x 15 x 11mm (excl tabs and lugs).  
Fitted with a sapphire stylus.

	<b>X5M</b>	<b>X5H</b>
Output at 1cm/sec:	400mV	1V
Tracking weight:	3 to 6gm	5 to 9gm
Frequency response:	40Hz to 10kHz	
Recommended load:	2M $\Omega$ and 100pF	

	<b>X5M</b>	<b>X5H</b>
Stylus fitted:	(ST12) 78/LP changeover	(ST8)
Replacement styli:	ST12(SS)	ST8 (SS)
	ST14(DS)	ST9 (DS)
	ST15(DD)	ST10 (DD)

Order As **HR01B** (Cartridge BSR X5M)  
**HR02C** (Cartridge BSR X5H)

## STEREO CERAMIC

### Acos 104



A ceramic stereo cartridge supplied with carrier for centre hole fixing or standard  $\frac{1}{2}$ in fixing.

Overall size: 23 x 9 x 6mm (excl tabs and lugs)  
Fitted with a diamond stylus

Output at 1cm/sec:	100mV
Tracking weight:	3 to 4gm
Stereo separation:	>20dB at 1kHz
Recommended load:	2M $\Omega$ and 100pF
Stylus fitted:	GP104(DS): LP0.005in/78:0.003in changeover

Replacement stylus: GP104 (SS), (DS) or (DD)

Order As **HR06G** (Cartridge Acos 104)

## STEREO CRYSTAL

### Acos GP93-1



A crystal stereo cartridge supplied with carrier for centre hole fixing or standard  $\frac{1}{2}$ in fixing.

Overall size: 27 x 15 x 11mm (excl tabs and lugs).

Fitted with a sapphire stylus

Output: 280mV at 1cm/sec

Tracking weight: 4 to 8gm

Frequency response: 30Hz to 18kHz

Recommended load: not less than 1M $\Omega$

Stylus LP: 0.0005in/78:0.003 in changeover

Replacement stylus: GP93 (SS), (DS) or (DD).

Order As **HR03D** (Cartridge Acos GP93-1)

## BSR SC12M and SC12H



A ceramic stereo cartridge supplied with carrier for centre hole fixing or standard  $\frac{1}{2}$ in fixing.

Overall size: 28 x 9 x 8mm (excl tabs and lugs)

Fitted with a sapphire stylus.

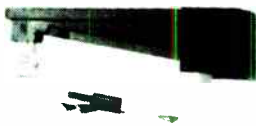
	<b>SC12M</b>	<b>SC12H</b>
Output at 1cm/sec:	100mV	170mV
Tracking weight:	2 to 6gm	4 to 6gm

	<b>SC12M</b>	<b>SC12H</b>
Stylus fitted:	(ST16) 78/LP changeover	(ST16)
Replacement stylus:	ST16(SS)	
	ST17(DS) or (DD)	

Order As **HR09K** (Cartridge BSR SC12M)  
**HR10L** (Cartridge BSR SC12H)



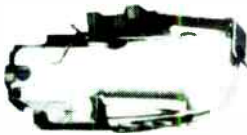
## Rigonda 2SB



A replacement cartridge for Rigonda, Symphonia, Marksman and Bolshoi audio equipment. Sapphire stylus.

**Order As FY75 S (Cartridge Rigonda 2SB)**

## Sonotone 9TAHC



A stereo ceramic cartridge supplied with carrier for standard 1/2in fixing only.

Overall size: 28 x 13 x 8mm (excl tabs and lugs).

Output at 1cm/sec: 70mV

Fitted with a diamond stylus

Tracking weight: 2 to 4gm

Recommended load: 1 to 2MΩ

Stylus fitted: 9TAHC(DS) LP/78 changeover

Replacement stylus: 9TAHC(DS) or (DD)

**Order As HR11M (Cartridge Sonotone 9TAHC)**

## Sonotone 3509/3549/3559



A stereo ceramic cartridge supplied with brackets for either centre hole or standard 1/2in fixing.

Overall size: 27 x 11 x 10mm (excl tabs and lugs)

Fitted with a diamond stylus

	3509	3549	3559
Output at 1cm/sec:	140mV	100mV	70mV
Tracking weight:	5 to 7gm	3 to 6gm	2 to 4gm
Recommended load:	1 to 2MΩ and 100pF		
Stylus fitted:	A(DS)78/LP	B(DD)LP/LP	C(DS)78/LP
	3509	3549	3559
Replacement stylus:	A(DS)78/LP	B(DS)78/LP	C(DS)78/LP
	A(DD)LP/LP	B(DD)LP/LP	C(DD)LP/LP

Output at 1cm/sec: 140mV 100mV 70mV

Tracking weight: 5 to 7gm 3 to 6gm 2 to 4gm

Recommended load: 1 to 2MΩ and 100pF

Stylus fitted: A(DS)78/LP B(DD)LP/LP C(DS)78/LP

Replacement stylus: A(DS)78/LP B(DS)78/LP C(DS)78/LP

A(DD)LP/LP B(DD)LP/LP C(DD)LP/LP

Direct equivalent

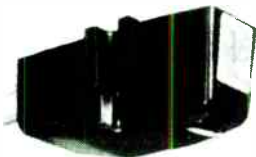
to Garrard KS40A KS41B KS41C

**Order As HR12N (Cartridge Sonotone 3509)**

**HR13P (Cartridge Sonotone 3549)**

**HR14Q (Cartridge Sonotone 3559)**

## Sonotone V100



A stereo magnetic cartridge. Standard 1/2in fixing only.

Overall size: 28 x 11.5 x 13mm (excl tabs and lugs)

Fitted with a diamond stylus

Output at 5cm/sec: 7mV rms

Tracking weight: 2 to 2½gm

Frequency response: 20Hz to 20kHz

Stereo separation: >20dB at 1kHz

Recommended load: 47kΩ

Channel balance: <2dB at 1kHz

Stylus: 0.0006in diamond

Replacement stylus: V100

**Order As HR17T (Cartridge Sonotone V100)**

## MAGNETIC CARTRIDGES

### Goldring G850



A stereo magnetic cartridge. Standard 1/2in fixing only.

Overall size: 29 x 12 x 15mm (excl tabs and lugs)

Fitted with a diamond stylus.

Output at 5cm/sec: 8mV rms

Tracking weight: 2½ to 4gm

Frequency range: 20Hz to 18kHz

Stereo separation: 20dB at 1kHz

Recommended load: 47kΩ to 100kΩ

Cartridge weight 7gm

Stylus 0.0007in diamond

Replacement stylus D120SR

**Order As HR15R (Cartridge Goldring G850)**

### Goldring G800



A stereo magnetic cartridge. Standard 1/2in fixing only.

Overall size: 28 x 13.5 x 15mm (excl tabs and lugs)

Fitted with a diamond stylus

Output at 5cm/sec: 5mV rms

Tracking weight: 1½ to 2½gm

Frequency range: 20Hz to 20kHz

Stereo separation: 20dB at 1kHz

Recommended load: 47kΩ to 100kΩ

Channel balance: 2dB

Compliance (static) 20 x 10<sup>-6</sup> cm/dyne

Tip mass 1 mgm

Cartridge weight 7.5gm

Stylus 0.0005in diamond

Replacement stylus D110SR

**Order As HR16S (Cartridge Goldring G800)**

### Goldring G800H



A stereo magnetic cartridge. Standard 1/2in. fixing only. The heavier tracking version of the G800, ideal for playing 45's owing to its slightly larger stylus tip.

Overall size: 28 x 13.5 x 15mm (excl. tabs and lugs)

Fitted with a diamond stylus

Output at 5cm/sec: 8mV

Tracking weight: 2½ to 3½

Frequency range: 20Hz to 20kHz

Stereo separation: 20dB at 1kHz

Recommended load: 47kΩ to 100kΩ

Channel balance: 2dB

Compliance (static): 18 x 10<sup>-6</sup> cm/dyne

Tip mass 1.2 mgm

Cartridge weight: 8gm

Stylus: 0.0007 in diamond

Replacement stylus: D110H

**Order As FQ38R (Cartridge Goldring G800H)**

## Goldring G800E

A high quality stereo magnetic cartridge with an elliptical stylus. Standard 1/2in fixing only.

Overall size: 28 x 13.5 x 15mm (excl. tabs and lugs)  
 Fitted with a diamond stylus  
 Output at 5cm/sec: 5mV  
 Tracking weight: 1 to 2gm  
 Frequency range: 10Hz to 25kHz  
 Stereo separation: 25dB at 1kHz  
 Recommended load: 47kΩ to 100kΩ  
 Channel balance: 2dB  
 Compliance (static): 30 x 10<sup>-6</sup> cm/dyne



Tip mass: <1mgm  
 Cartridge weight: 8gm  
 Stylus: Elliptical 0.0008in. x 0.0003in. diamond  
 Replacement stylus: D110E

Order As FQ39N (Cartridge Goldring G800E)

## Tenorel T2001D

A stereo magnetic cartridge. Standard 1/2in. fixing only.

Output at 5cm/sec: 5.5mV  
 Tracking weight: 1.5 to 3gm  
 Frequency range: 15Hz to 25kHz  
 Stereo separation: 25dB at 1kHz  
 Recommended load: 47kΩ  
 Channel balance: 2dB at 1 kHz  
 Compliance (static): 20 x 10<sup>-6</sup> cm/dyne



Tip mass: 1 mgm  
 Cartridge weight: 7 gm  
 Stylus: 0.0006in. diamond  
 Replacement stylus: N2001D

Order As FQ40T (Cartridge Tenorel T2001D)

## Tenorel T2001ED

A high quality stereo magnetic cartridge with a nude elliptical stylus. Standard 1/2in. fixing only.









Output at 5cm/sec: 5.5mV  
 Tracking weight: 1 to 2.5gm  
 Frequency range: 15Hz to 32kHz  
 Stereo separation: 25dB at 1kHz  
 Recommended load: 47kΩ  
 Channel balance: 1.2dB at 1kHz  
 Compliance (static): 25 x 10<sup>-6</sup> cm/dyne












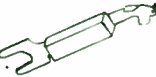








Tip mass: 0.75mgm  
 Cartridge weight: 7gms  
 Stylus: 0.0002in. x 0.0007in. elliptical diamond  
 Replacement stylus: N2001ED

Order As FQ41U (Cartridge Tenorel T2001ED)

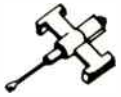




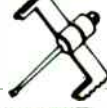

## STYLI

Cartridge Manufacturer	Stylus Type	Tip (S:Sapphire, D: Diamond)	Suits Cartridges*	Order As
ACOS	GP91SC (SS)	LP/78 SS	GP91-1SC, GP91-2SC, GP91-3SC	 HR62S (Stylus GP91SC SS) HR24B (Stylus GP91SC DS) HR25C (Stylus GP91SC DD)
ACOS	GP91SC (DS)	LP/78 DS		
ACOS	GP91SC (DD)	LP/LP		
ACOS	GP93 (SS)	LP/78 SS	GP91-1, GP91-2, GP91-3, GP92-1, GP93-1, GP94-1, GP94-5	 HR26D (Stylus GP93 SS) HR27E (Stylus GP93 DS) HR28F (Stylus GP93 DD)
ACOS	GP93 (DS)	LP/78 DS		
ACOS	GP93 (DD)	LP/LP DD		
ACOS	GP95 (SS)	LP/78 SS	GP95-1, GP96-1	 HR63T (Stylus GP95 SS) HR64U (Stylus GP95 DS) HR65V (Stylus GP95DD)
ACOS	GP95 (DS)	LP/78 DS		
ACOS	GP95 (DD)	LP/LP DD		
ACOS	GP104 (SS)	LP/78 SS	GP104	 HR29G (Stylus GP104 SS) HR30H (Stylus GP104 DS) HR31J (Stylus GP104 DD)
ACOS	GP104 (DS)	LP/78 DS		
ACOS	GP104 (DD)	LP/LP DD		
ACOS	SM6	LP D	M6	 HR66W (Stylus Acos SM6)
Audio Technica	AT55-5	LP D	AT55-5	 HR67X (Stylus AT55-5)
Audio Technica	VM8	LP D	VM8, EV6000D, National Panasonic EPS18, EPS31, Onkyo DN27, Sharp N20, Sony ND129, Trio N22, N33, Victor N6500, Yamaha VM6, MC600	 HR68Y (Stylus VM8)
BSR	TC8 (S)	LP S	Magnavox 183, 560, National Panasonic EPS04, Vaco, Western Electric MC1, Zenith 56-371, 56-480, MX8, SX8, TC8H/M/S/SM, GP83	 HR38R (Stylus BSR TC8 S) HR39N (Stylus BSR TC8 D)
BSR	TC8 (D)	LP D		

Cartridge Manufacturer	Stylus Type	Tip (S:Sapphire, D: Diamond)	Suits Cartridges*		
BSR BSR BSR	ST3 ST4 (DS) ST4 (DD)	LP/78 SS LP/78 DS LP/LP DD	C1, X2HE, SX2H, (Early types of X1M, X1H, X1HE, SX1M, SX1H) ST5, ST6		HR69A (Stylus BSR ST 3) HR70M (Stylus BSR ST4 DS) HR71N (Stylus BSR ST4 DD)
BSR BSR BSR	ST8 ST9 ST10	LP/78 SS LP/78 DS LP/LP DD	(Later types of X1M, X1H, X1HE, SX1M, SX1H) X3M, X3H, X211, X5H, SC5H, SX2H, X4H, SX5H, (Early types of X5M, SX5M)		HR40T (Stylus BSR ST8) HR41U (Stylus BSR ST9) HR42V (Stylus BSR ST10)
BSR BSR BSR	ST12 ST14 ST15	LP/78 SS LP/78 DS LP/LP DD	X5M, SX6M, SX6H, SX5M, SC5M, ST19		HR43W (Stylus BSR ST12) HR44X (Stylus BSR ST14) HR45Y (Stylus BSR ST15)
BSR BSR BSR	ST16 ST17 (DS) ST17 (DD)	LP/78 SS LP/78 DS LP/LP DD	SC7M, SC8H, SC12M, SC12H, X8M4, SC10H		HR72P (Stylus BSR ST16) HR46A (Stylus BSR ST17DS) HR47B (Stylus BSR ST17DD)
BSR BSR	ST20 ST21	LP S LP D	G850, Lenco M95, Sony ND150		HR73Q (Stylus BSR ST20) HR74R (Stylus BSR ST21)
Decca	Deram	LP D	Decca Deram Stereo Blue		HR75S (Stylus Decca Deram)
Goldring	D110E	LP D	G800E		HR76H (Stylus D110E)
Goldring	D110H	LP D	G800H		HR77J (Stylus D110H)
Goldring	D110SR	LP D	G800		HR48C (Stylus D110SR)
Goldring	D120SR	LP D	G850		HR49D (Stylus D120SR)
Hitachi	ST101	LP D	ST101, STL101		HR78K (Stylus Hitachi ST101)
Hitachi	ST103	LP D			HR79L (Stylus Hitachi ST103)
Luxor/Vaco Luxor/Vaco	65977 (S) 65977 (D)	LP S LP D	Luxor 65977, Piezo SC501, SPJ4, STL1D, VX25P, Calrad, Victor, Sony ND116P, Hitachi ST9		HR80B (Stylus LV65977S) HR81C (Stylus LV65977D)
National Panasonic	EPS 19	LP D			HR82D (Stylus NP EPS19)
National Panasonic	EPS36	LP D	EPS36		HR83E (Stylus NP EPS36)
National Panasonic	EPS52	LP D	EPS56		HR84F (Stylus NP EPS52)
Philips Philips Philips	GP200 (SS) GP200 (DS) GP200 (DD)	LP/78 SS LP/78 DS LP/LP DD	GP200, GP224, AG3224, GP228, AG3228		HR85G (Stylus Philips GP200SS) HR86T (Stylus Philips GP200DS) HR87U (Stylus Philips GP200DD)
Philips Philips	22/GP204 22/GP205	LP S LP D	AG3306, GP204, GP205, GP306, GP230, AG3230, GP235, GP300, AG3310, GP310, 946/SS50, 946/DS51		HR88V (Stylus Philips 22/GP204) HR89W (Stylus Philips 22/GP205)
Philips	GP400	LP D	946/D60		HR90X (Stylus Philips GP400)



Cartridge Manufacturer	Stylus Type	Tip (S: Sapphire, D: Diamond)	Suits Cartridges*				
Rigonda Rigonda Rigonda	RIG-2SB (SS) RIG-2SB (DS) RIG-2SB (DD)	LP/78 SS LP/78 DS LP/LP DD	ER-2SX, GKS25, ER-2SB, GKS26, RIG-2SB, ER-H3, S3, D3		HR91Y (Stylus RIG-2SB SS) HR92A (Stylus RIG-2SB DS) HR93B (Stylus RIG-2SB DD)		
Ronette/Decca Ronette/Decca	BF40 (S) BF40 (D)	LP S LP D			Decca Binofluid Stereohead, Ronette Binofluid, BF40, DC284-0V, DC284-P, DC284-T, DC395, DC395S, Stereo 105, Stereo 106, Stereo 208, DC400, Collaro Studio P/T, DC284, SA050ST, D11050ST, SA075ST, D1075ST, SA250, SA100, DA100, D1100, SA250ST, SA050, DSA050 Zenith 56-403B, 421B, 442B		HR50E (Stylus BF40S) HR51F (Stylus BF40D)
Sansui	SN28	LP D					HR95D (Stylus Sansui SN28)
Sanyo	ST28	LP D	Neat VS80, Ronette DM500/7, Sonotone 200S		HR96E (Stylus Sanyo ST28)		
Sanyo	2611	LP D	Victor DT25H, DT29, 2611		HR97F (Stylus Sanyo 2611)		
Sharp	706	LP D			HR98G (Stylus Sharp 706)		
Sharp	717	LP D			HR99H (Stylus Sharp 717)		
Sonotone/ Garrard Sonotone/ Garrard	2529 (DS) 2529 (DD)	LP/78 DS LP/LP DD	2529, 2139, GCS38, GSS2, GDS2		FQ42V (Stylus 2529 DS) FQ43W (Stylus 2529 DD)		
Sonotone/ Garrard Sonotone/ Garrard	2539 (DS) 2539 (DD)	LP/78 DS LP/LP DD			2109, 2509, 2539, GCM31, GCS35, GCS36, GSS1, GDS1	FQ44X (Stylus 2539 DS) FQ45Y (Stylus 2539 DD)	
Sonotone/ Garrard Sonotone/ Garrard	KS40A (DS) KS40A (DD)	LP/78 DS LP/LP DD	3509 KS40A		HR52G (Stylus KS40A DS) HR53H (Stylus KS40A DD)		
Sonotone/ Garrard Sonotone/ Garrard	KS41B (DS) KS41B (DD)	LP/78 DS LP/LP DD			3549 KS41B	HR54J (Stylus KS41B DS) HR55K (Stylus KS41B DD)	
Sonotone/ Garrard Sonotone/ Garrard	KS41C (DS) KS41C (DD)	LP/78 DS LP/LP DD	3559 KS41C		HR56L (Stylus KS41C DS) HR57M (Stylus KS41C DD)		
Sonotone Sonotone Sonotone	9TAHC (SS) 9TAHC (DS) 9TAHC (DD)	LP/78 SS LP/78 DS LP/LP DD			9TAHC		HR58N (Stylus 9TAHC SS) HR59P (Stylus 9TAHC DS) HR60Q (Stylus 9TAHC DD)
Sonotone	V100	LP D	V100, Hitachi ST110		HR61R (Stylus Sonotone V100)		
Sony	ND100	LP D			FQ46A (Stylus Sony ND100)		
Sony	ND114	LP D	VM10P		FQ47B (Stylus Sony ND114)		

Cartridge Manufacturer	Stylus Type	Tip (S:Sapphire, D: Diamond)	Suits Cartridges*			
Sony	ND128	LP D	UX24P, Sharp N12, N14		FQ48C	(Stylus Sony ND128)
Sony	ND133	LP D	VL30G		FQ49D	(Stylus Sony ND133)
Sony	ND134	LP D			FQ50E	(Stylus Sony ND134)
Tenorel	N2001D	LP D	T2001D		FQ51F	(Stylus Tenorel N2001D)
Tenorel	N2001ED	LP D	T2001ED		FQ52G	(Stylus Tenorel N2001ED)
Toshiba	N-3C	LP D	Europhton N3000, Sharp 707		FQ53H	(Stylus Toshiba N-3C)
Victor	DT33	LP D			FQ54J	(Stylus Victor DT33)

\*Other styli for which our stylus is a suitable replacement are also shown in this column.

### Music Centre Cross Reference Chart

Music Centre Type	Replacement Stylus Type	Music Centre Type	Replacement Stylus Type	Music Centre Type	Replacement Stylus Type	Music Centre Type	Replacement Stylus Type	
Dynatron	HFC30 Series HFC100 HFC101 HFC102 HFC103	Nat Panasonic	SG1060L 1030L 1020L 1060L 1070 2050 1010	Sony	GT X4500 2411 2611 2615 4731K 4730K 4521K 3520K 2311KL 2511KL	Sony	HP211A HP239A PS1700 PS1700 PS1450 PS2350 SM390	
Ekco	MC1010 ZU440 ZU5K ZU8 ZU9	Sonotone V100 Philips GP400	Philips RH720 512 734 732 837 852 802 836 839	Sharp	50220H 315 309 130 308 108 155H	Toshiba	3100 3150 3200 3600 5200 2200 3000 2900	
Fidelity	WC3 5 UA10 UA1 2 3/4 5 UA7 B 9	BSR ST16, ST17DS, DD BSR ST20, ST21 BSR ST12 14, 15	Pva	1500 1600 5002 5025 2611K 2711K 2711 Super 2811 KL 2711 Super Z 2411 DX T5502L	Sony	EX1K/2K HMK20 HMP20 HMK50 HMK40 HMK50 HMK70		
Hitachi	SDT2680 2690 2660 2480 2370 MC3405 SDT3660 7675 7676 7680 7778 7785 7785 7710	BSR ST16, ST17DS, DD Audio Technica VMB Hitachi ST103*	Sony	2611 Super 2711K 2711 Super 2811 KL 2711 Super Z 2411 DX T5502L	Sony	Sony 2611 Luxor/Vaco 65977 Sharp 717 Sharp 706 Sensui SN28 Sony ND100 Sony ND128 Sony ND133	JVC Weltham	SM390 3100 3150 3200 3600 5200 2200 3000 2900 2100 2700 SA5200 SM270 110 102 MF55LS 47L 45DL STM30 35 45 15
							Luxor Vaco 65977 Luxor Vaco 65977 Victor DT33 BSR ST16, 17DS DD	

### Record Care Kit (Type 59)

A very low-priced kit comprising a black plastic Groov-Kleen, record handler, stylus cleaning brush, and record duster in a smart presentation box. For single-play turntables only.



Order As LX00A (Popular Care Kit 59)

### Record Care Kit (Type 57)

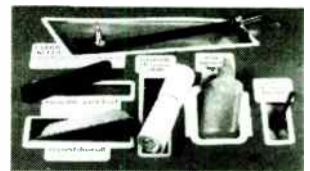
A very low-priced kit comprising a plastic Groov-Kleen, record handler, stylus cleaning brush, 22cc bottle of anti-static cleaner and a record cleaner bubble-packed on a circular card printed to look like a gramophone record. For single-play turntables only.



Order As YB46A (Golden Disc Care Kit 57)

### Record Care Kit (Type 43)

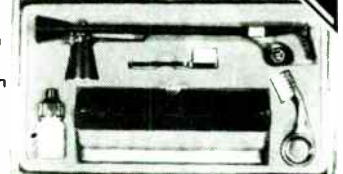
The kit contains a chrome-finish plastic Groov-Kleen, a record dust-off, spirit level, stylus cleaning brush, cleaning cloth and a bottle of stylus and turntable cleaning fluid. Supplied in an attractive presentation box. For single-play turntables only.



Order As LX01B (Record Care Kit 43)

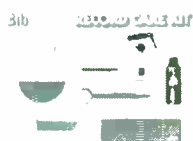
### Record Care Kit (Type 107)

The kit contains an all black-finish metal Groov-Kleen with roller cleaning brush, record dust-off and stylus brush with a bottle of cleaning fluid. Supplied in a plastic box with transparent plastic lid. For single-play turntables only.



Order As YB47B (Record Care Kit 107)

## "Golden" Record Care Kit



Our top-of-the-range record care kit contains a black and chrome finish metal Groov-Kleen with roller cleaning brush, stylus cleaner in dust-free container, record handler, inspection mirror, stylus balance and record dust-off. Supplied in an attractive gold-coloured presentation box. For single-play turntables only.

Order As LX02C (Golden Care Kit 79)

## Autochanger Care Kit



The kit contains a Groov-Kleen for use with auto-changers. The Groov-Kleen can be fitted to practically any pick up cartridge housing which has a flat top. Also included a roller cleaning brush, record handler, stylus cleaner in dust-free container, and a record dust-off. Supplied in an attractive presentation box.

Order As YB48C (Autochanger Care Kit 81)

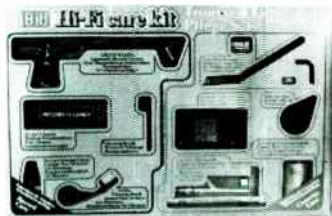
## Musicentre Care Kit



An all-in-one record and cassette care kit containing a black plastic Groov-Kleen with roller cleaning brush, stylus cleaner in dust-free container, record dust-off, cassette-tape head cleaner cassette, re-record tabs and extractor tool and a pack of title labels. Supplied in an attractive presentation box. Not suitable for autochanger record players.

Order As LX03D (Musiccentre Kit 105)

## Hi-Fi Care Kit



A comprehensive combination kit containing a Groov-Kleen 42 with roller cleaning brush, record cleaner, stylus brush with a bottle of cleaning fluid, cassette tape splicer, a roll of splicing tape, a multi-angle tape head cleaner, a pack of title labels, 22cc bottle of tape head cleaning fluid and a pack of cassette tape ferrets. Supplied in a plastic box with a transparent plastic lid. Not suitable for auto changer record players.

Order As YB49D (Hi-Fi Care Kit 89)

## Plastic Groov-Kleen



A black plastic Groov Kleen similar to metal type, but offering a considerable cost-saving. Not suitable for autochangers.

Order As YB50E (Groov Kleen 50)

## Metal Groov-Kleen



A record cleaning brush that cleans the record while it is playing. It looks like a miniature high quality pick-up cartridge arm and is finished in chrome, bright aluminium and gleaming black. Self-adhesive base enables it to be fitted easily and permanently. The aluminium arm has its own armrest and the adjustable counterweight ensures that the brush, which removes the dust silently from the record grooves, and the 'velvet' roller, which collects the dust, do not slow down the record speed appreciably. A separate brush for cleaning the roller is provided.

Not suitable for auto changers

Order As LX06G (Groov Kleen 42)

## Autochanger Groov-Kleen

This Groov-Kleen will fit onto any flat topped pick-up cartridge holder and cleans the records as they play.



Order As YB51F (Groov Kleen 45)

## Replacement Parts for Groov-Kleens

### Type 42/S

A replacement self-adhesive base pad, roller and brush for use with Groov-Kleen 42 and the Groov-Kleens supplied in Kits 107, 79 and 89.

Order As FR44X (Roller Pack GK42/S)

### Type 45/S

A replacement roller and brush for use with Groov-Kleen 45 and the Groov-Kleen supplied in Kit 81.

Order As FQ55K (Roller Pack 45/S)

### Type 50/S

A replacement self-adhesive base pad, roller and brush for use with Groov-Kleen 50 and the Groov-Kleens supplied in Kits 59, 57 and 105.

Order As FR42V (Roller Pck 50/S)

### Type 60/S

A replacement self-adhesive base pad, roller and brush for use with the Groov-Kleen supplied in Kit 43.

Order As FR43W (Roller Pack RC60/S)

## Static Tester

A quick and effective way of testing records for static. Simply hold tester within 5mm of record and if there is any static on the record the metal leaves in the tester will move apart.



Order As FQ56L (Electroscope)

## Anti-Static Fluid

A bottle containing 22cc of anti-static fluid. Ideal for cleaning tape heads, stylii, glass, plastic and colour TV screens. Does not scratch or smear.



Order As FR52G (Anti-Stat Fluid 69)

## Anti-Static Turntable Mat

A turntable mat which removes the static from discs while they are playing. It is the static charge on the discs that causes them to attract dust and this mat will greatly reduce this effect.



Order As LX10L (Anti-Stat Mat 102)



### Anti-Static Gun



A highly effective and simple to operate hand tool for removing static charges from the surface of records, films or any charged surface. After operation dust will no longer cling to the surface and may easily be removed with a fine light brush.  
**Order As LX04E (Anti-Stat Gun)**

### Electronic Groov-Stat



An electronic version of the anti-stat gun. Requires one HP11 battery (not supplied) to function. Hold Groov-Stat about 300mm (12in.) from record, point it at centre and press button. A red indicator will light to show that Groov-Stat is operating correctly. After 3 seconds release button. A check with the static tester (supplied with Groov-Stat) will show that static charge has been completely removed. The dust and dirt particles which the static previously attracted and held to the record may now be easily removed with a fine brush. The unit will neutralise the charge present on most plastic surfaces. Supplied in plastic box with transparent plastic lid.  
**Order As YB52G (Groov-Stat 3000)**

### Record Cleaner

A plush velvet cloth on a tubular holder, a simple and effective record cleaner.



**Order As FQ57M (Record Cleaner 2B)**

### Record Dust-off

A record-cleaning cloth fitted to a neat plastic holder.



**Order As FR48C Dust-Off 71)**

### Groov-Guard

An anti-static record-protective fluid sufficient for about 50 records. Supplied with spray applicator and a record cleaner. The fluid forms a very thin hard protective layer on the record without affecting quality of reproduction.



**Order As YB53H (Groov-Guard 114).**

### Record Valet



A hand-held record cleaner in a bright silver-coloured metal holder and cover. Cleaner has a velvet pad and a brush along one edge. There is a plug in the top centre of the record valet which should be filled with anti-static fluid from the bottle supplied. This damps the velvet cloth which stops static building up on the record as the record valet is being used. A brush is also supplied to clean the velvet pad.

**Order As YB54J (Record Valet 110)**

### Stylus Cleaner (Type 76)

A special purpose stylus cleaning brush and bottle of stylus liquid cleaner packed in a dust free container. Essential for maintaining stylus free from dust and dirt.



**Order As FR46A (Stylus Cleaner 76)**

### Stylus Cleaner (Type 103)

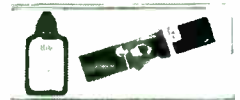
A stylus cleaner brush with a special soft brush fitted to an easy-grip plastic handle. Supplied with a bottle of stylus cleaning fluid in a neat hinged lidded plastic box.



**Order As FQ58N (Stylus Cleaner 103).**

### De Luxe Stylus Cleaner

A specially designed stylus cleaner brush which incorporates an inspection mirror. Supplied with a bottle of anti-static cleaner.



**Order As FQ59P (Stylus Cleaner 112).**

### Record and Stylus Cleaning Kit (Type 36)

A simple and easy to use kit for removing dust from records and stylus. Comprises two record cleaning cloths and stylus cleaning brush.



**Order As FR47B (Record Cloth 36A).**

### Stylus and Turntable Cleaning Kit

This useful kit is essential for maintaining stylus and turntable free from dirt. Kit contains cleaning brush, absorbent cleaning cloth, anti-static cleaner and stylus inspection mirror all packed in a plastic wallet.



**Order As LX07H (Turntable Cleaning Kit 70).**

### Record and Stylus Cleaning Kit (Type 64)

A record cleaner in plastic container, a stylus cleaning brush with a special soft brush fitted to an easy-grip plastic handle, and a 22cc bottle of anti-static cleaner fluid all in a bubble-pack.



**Order As YB55K (Cleaning Kit 64)**

### Spirit Level

Uneven turntables cause poor tracking resulting in distortion as well as stylus and record wear. This spirit level fits over the spindle on the turntable and has two levels at right-angles to one another such that it is possible to see immediately whether the turntable is completely flat.



**Order As FQ60Q (Spirit Level 44)**

### Stylus Balance



Precision built and manufactured from non-magnetic alloy and fitted with non-scratch base. Accurate within 1/4gm, from 1/4gm to 5gms.

**Order As FR49D (Stylus Balance 32A)**

## Record Turntable Speed Indicator

Place this indicator on record player turntable and view with an electric mains lamp. With turntable rotating at precise speed ( $33\frac{1}{3}$ , 45, 78 rpm) spokes on disc appear stationary. One side is calibrated for 50Hz mains and the other for 60Hz.

Order As FR50E (Gram Speed Indicator)



## Popular Cassette Care Kit

The kit contains a storage tray for ten cassettes, a fast hand tape winder, a head-cleaning cassette and a pack of title labels. Supplied in an attractive presentation box.

Order As LX13P (Popular Cassette Kit 104)



## Cassette Tape Recorder Care Kit



This ideal gift for anyone with a cassette player. Kit contains: Cassette cleaner tape, salvage cassette, re-record kit, tape splicer ( $\frac{1}{8}$ in), splicing tape, title labels and full instructions.

Order As LX14Q (Cassette Tape Care 26A)

## Cassette Care Kit



The kit contains a head-cleaning cassette, a salvage cassette and re-record kit, a cassette tape splicer, splicing tape and a pack of title labels. Supplied in an attractive presentation box.

Order As LX16S (Cassette Care Kit 51)

## De-Luxe Cassette Care Kit



The kit contains a head-cleaning cassette, a cassette tape splicer, splicing tape, tape cutter, tape piercer, re-record tabs and extractor and a pack of title labels. Supplied in a plastic box with a transparent plastic lid.

Order As YB56L (Cassette Care Kit 109)

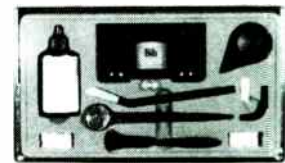
## Reel-to-Reel Tape Care Kit



The kit contains a 6.3mm ( $\frac{1}{4}$ in.) tape splicer, a roll of splicing tape, a bottle of anti-static tape head cleaning liquid, two applicator tools and a chinagraph pencil. Supplied in a plastic box with a transparent plastic lid.

Order As YB57M ( $\frac{1}{4}$  in. Tape Care Kit 111)

## Universal Head Cleaning and Editing Kit



A comprehensive tape care kit comprising a multi-angle head cleaning tool, inspection mirror, cleaning brush, a 22cc bottle of tape head cleaning fluid, splicing tape, tape cutter, and a tape splicer for cassette tape and 6.3mm ( $\frac{1}{4}$ in.) tape. Supplied in a plastic box with a transparent plastic lid.

Order As YB58N (Universal Tape Care Kit 150)

## Cassette Tape Head Cleaner

Essential for regular cleaning of tape heads, capstan and roller on cassette players.

Pack contains blue tape head applicator and white tape head polisher tools, bottle of special formula cleaning fluid and full instructions for use.



Order As RB04E (Cassette Head Cleaner 62)

## Tape Head Cleaning Kit (Type J)

A kit designed for use with reel to reel tape recorders, but can also be used to advantage on cassette players. This kit comprises: bottle of tape head cleaner, two blue tape head applicator tools, two white tape head polisher tools, ten applicator and polisher sticks, and cleaning cloth — all packed in a plastic wallet.



Order As LX11M (Tape Cleaning Kit J)

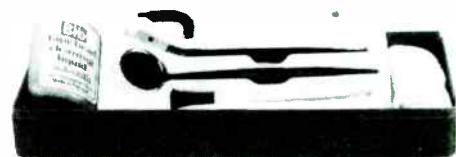
## Tape Head Cleaning Kit (Type 25)

Suitable for use with all tape recorders the kit contains a multi-angle head cleaning tool, cleaning brush, inspection mirror and a 22cc bottle of tape head cleaning fluid.



Order As YB60Q (Head Cleaning Kit 25)

## De-Luxe Tape Head Maintenance Kit



Suitable for use with cassette players or any type of tape recorder, the kit contains a specially designed cleaning tool with an interchangeable head which permits access to all tape heads regardless of the angle of entry. The kit also contains cleaning pads for use with the cleaning tool, anti-static cleaning liquid, cleaning brush, cleaning cloth and inspection mirror.

Order As RB02C (Tape Head Maintenance Kit 99)

## Replacement Felts for Multi-Angle Head Cleaning Tool

A pack of replacement felts for use with the tool supplied in Kits 89, 150, 25 and 99.

Order As FQ61R (Replacement Felts 99A)



### Cassette Head Cleaner

A special cleaning tape incorporated in a cassette for cleaning tape heads in one quick operation. Suitable for all cassette machines and packed in a plastic "library" case.



Order As FR54J (Cassette Cleaner Tape 31)

### Tape-Head Demagnetiser



Two types are available. With a straight tubular probe or with a flat curved probe which is ideal for difficult to reach heads.

Order As FR62S (Demagnetiser)  
FQ62S (Curved Probe Demagnetiser)

### Universal Tape Splicing Kit

The kit contains a tape splicer for cassette and 6.3mm (1/4 in.) tapes, a tape cutter and a roll of splicing tape.



Order As YB61R (Universal Splicing Kit 56)

### Cassette Editing and Splicing Kit



The kit contains a cassette tape splicer, tape cutters, a roll of splicing tape and a tape piercer. Supplied in a plastic box with a transparent plastic lid.

Order As YB62S (Splicing Kit 98)

### Cassette Tape Editor



For easy, trouble-free editing, splicing and tape transfer, including fast tape winding. Black metal base measuring 230 x 160mm is fitted with winder and cassette tape splicing block as well as four protective feet. Splicing tape, tape cutter, tape piercer and spare empty cassette are also supplied. In an attractive presentation box.

Order As YB63T (Cassette Editor)

### Cassette Salvage Kit

A comprehensive repair kit for damaged cassettes. Contains a salvage cassette, a cassette opener for welded cassettes, a pair of tweezers and two screwdrivers.



Order As FR57M (Cassette Repair Kit 108)

### Tape Splicer 1/4 in.



Essential for accurate tape editing. Fitted with clamps for holding tape for diagonal or butt splices. Special non-slip base, complete with non-magnetic razor cutter and instructions. For use with 1/4 in (6.3mm) recording tape of any thickness.

Order As FR53H (Tape Splicer 1/4 in. 20)

### Cassette Tape Splicer

For use with 1/4 in recording tape of any thickness. Essential for accurate tape editing. Fitted with clamps for holding tape for diagonal or butt splices. Special non-slip base, complete with non-magnetic razor cutter and instructions.



Order As FR56L (Cassette Tape Splicer 30A).

### Splicing Tape

A high quality splicing tape supplied on dispenser. Suitable for reel to reel (1/4 in) and cassette (1/4 in) recording tape. Tape does not ooze.



Order As LX17T (Splicing Tape 33)

### Spare Cassette Boxes

A pack of two cassette replacement containers, complete with index cards.



Order As RB03D (Cassette Case Pack 55)

### Cassette Index Cards

Replacement index cards for library containers. Pack of ten cards.



Order As FR60Q (Cassette Index 61)

### Cassette Title Labels

Pack contains 20 full size replacement cassette title labels and 10 library container edge labels. Ideal for identifying new recordings.

Order as FR61R (Cassette Titles 83)

### Cassette Fast Hand Winder

Very simple and easy to use cassette fast winder enables you to wind tape in one cassette while you are listening to another cassette. If you have a battery recorder, always use the Fast Winder to save the high battery consumption when fast winding. It winds a C90 cassette in 60 seconds – faster than most recorders.



Order As RB01B (Cassette Fast Winder 78)



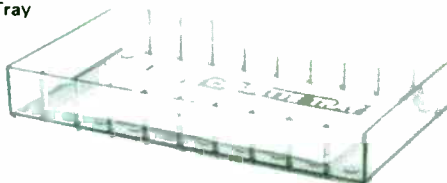
## Stereo Test Cassette



How to get the best stereo and mono reproduction and recording is explained on this cassette recorded by Decca. Includes channel identification, balance control, speaker phasing, adjusting record volume controls, reducing tape hiss and eliminating hum, wow and flutter, and sounds you can record yourself. You will hear: 523 musicians, 6 symphony orchestras, d'Oyly Carte Opera Co., grand organ, brass band, and six individual instruments. Plays for 50 minutes.

Order as **FR59P (Test Cassette 53)**

## Cassette Storage Tray



Smoke grey plastic tray holds 10 cassettes in their library cases. Trays may be used horizontally or vertically, or built into shelving or a cabinet to accommodate hundreds of cassettes. Alternatively, the trays may be stuck to a wall with self-adhesive pads supplied.

Order as **RB05F (Cassette Tray 52A)**

## Cassette Case

A smart black PVC padded case with carrying handle for home or car; holds 12 cassettes.



Order as **YB64U (Cassette Case 34)**

## CASSETTE TAPE HEADS

### Glass Ferrite

A long-life very high quality glass ferrite cassette tape head with standard fixing bracket. Designed for use on stereo cassette recorders as the record and/or playback head. Has tape guide fitted.

#### Specification:

DC Resistance: 160Ω  
 Impedance: 750Ω at 1k Hz  
 Record current: 50μA  
 Bias current: 170μA at 50k Hz  
 Playback sensitivity: 300μV at 333Hz  
 Dimensions of head: Width: 11.2mm  
 Depth: 15mm  
 Height: 9.5mm  
 Bracket fixing centres: 17mm x M2 clear



Order as **FQ63T (GF Cassette Head)**

### Standard Mono

A standard quality replacement cassette tape head with standard fixing bracket. Designed for use on mono cassette recorders as the record and/or playback head. Has tape guide fitted.

#### Specification:

DC Resistance: 250Ω  
 Impedance: 650Ω at 1k Hz  
 Record current: 50μA  
 Bias current: 400μA at 50k Hz  
 Playback sensitivity: 550μV at 330Hz  
 Dimensions of head: Width: 11mm  
 Depth: 12.6mm  
 Height: 8.5mm  
 Bracket fixing centres: 17mm x M2 clear



Order as **FQ64U (Mono Cassette Head)**

## Luxury Cassette Case

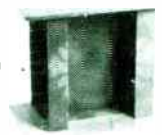
A high quality cassette case finished in simulated brown pigskin PVC, with carrying handle. Holds 30 cassettes. Size: 381 x 210 x 83mm. (15x8¼x3¼ in.)



Order as **YB65V (Luxury Case 37)**

## Cassette Rota-Rack

A revolving simulated wood finish plastic cassette rack which holds up to 40 cassettes. Size 256x213x143mm. (10¼x8 3/8x 5¼in.)



Order as **RB07H (Rota-Rack 73)**

## Cassette Cabinet (Type 86)

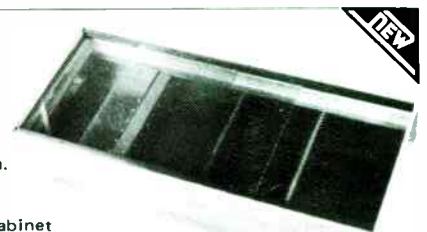
A simulated teak wood finish cassette cabinet with a smoked acrylic hinged lid. Holds up to 30 cassettes. Size: 450x230x90mm. (15¼x9x3½in.)



Order as **RB06G (Cassette Cabinet 86)**

## Cassette Cabinet (Type 87)

A superb piece of furniture that will grace any living room. The unit can be used free standing or wall-mounted. The cabinet is finished in simulated teak and has smoked acrylic sliding doors. Holds up to 40 cassettes. Size 515x230x105mm. (20¼x9 1/8x4 1/8in.)



Order as **YB66W (Cassette Cabinet 87)**

## Standard Stereo

A standard quality replacement cassette tape head with standard fixing bracket. Designed for use on stereo cassette recorders as the record and/or playback head. Has tape guide fitted.

#### Specification:

DC Resistance: 220Ω  
 Impedance: 850Ω at 1k Hz  
 Record current: 35μA  
 Bias current: 350μA at 50k Hz  
 Playback sensitivity: 250μV at 333Hz  
 Dimensions of head: Width: 11mm  
 Depth: 12.6mm  
 Height: 8.5mm  
 Bracket fixing centres: 17mm x M2 clear



Order as **FQ65V (Stereo Cassette Head)**

## Erase

A standard quality replacement cassette tape head with standard fixing bracket. Designed for use on mono or stereo cassette recorders as the erase head. Has tape guide fitted.

#### Specification:

DC Resistance: 5Ω  
 Impedance: 190Ω at 100k Hz  
 Erase current: 50mA  
 Dimensions of head: Width: 10.5mm  
 Depth: 12.4mm  
 Height: 9.2mm  
 Bracket fixing centres: 15.5mm x 8BA (M2) clear



Order as **FQ66W (Cassette Erase Head)**

**REEL-TO-REEL TAPE HEADS**

**Two-Track Record/Playback**

A very high quality half track stereo (or mono) record and/or playback head for use on two-track reel-to-reel tape recorders.

**Specification:**

DC Resistance: 135Ω  
 Impedance: 825Ω at 1kHz  
 Record current: 65μA  
 Bias current: 700μA at 50kHz  
 Playback sensitivity: 600μV at 333Hz  
 Dimensions: Width: 12.7mm  
 Depth: 14.1mm  
 Height: 12.7mm



Order As FQ67X (Tape Head Two-Track RP)

**Two Track Erase**

A very high quality half track stereo (or mono) erase head for use on two-track reel-to-reel tape recorders.

**Specification:**

D.C. Resistance: 8Ω  
 Impedance: 675Ω at 50kHz  
 Erase current: 30mA at 50kHz  
 Dimensions: Width: 12.7mm  
 Depth: 13.5mm  
 Height: 12.7mm



Order As FQ68Y (Tape Head Two-Track Erase)

**Four-Track Record/Playback**

A very high quality quarter track stereo (or mono) record and/or playback head for use on four-track reel-to-reel tape recorders.

**Specification:**

DC Resistance: 135Ω  
 Impedance: 825Ω at 1kHz  
 Record current: 75μA  
 Bias current: 490μA at 50kHz  
 Playback sensitivity: 450μV at 333Hz  
 Dimensions: Width: 12.7mm  
 Depth: 14.1mm  
 Height: 12.7mm



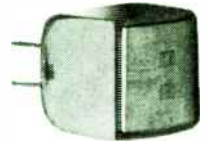
Order As FQ69A (Tape Head Four-Track RP)

**Four Track Erase**

A very high quality quarter track stereo (or mono) erase head for use on four-track reel-to-reel tape recorders.

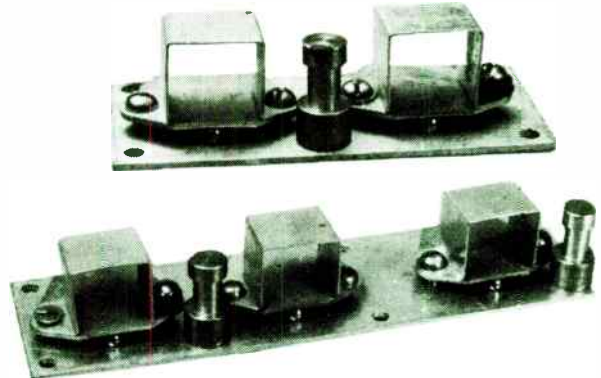
**Specification:**

DC Resistance: 3Ω  
 Impedance: 270Ω at 50kHz  
 Erase current: 48mA at 50kHz  
 Dimensions: Width: 12.7mm  
 Depth: 13.5mm  
 Height: 12.7mm



Order As FQ70M (Tape-Head Four-Track Erase)

**TAPE HEAD BRACKETS**



Brackets to suit our reel-to-reel tape heads and available in two or three-head types. Heads fit into clamps mounted on ball-bearings for simple azimuth adjustments. Brackets have brass tape guides fitted and brass screws.

	Two Head Type	Three Head Type
Bracket dimensions:	63.5 x 28.5mm	100 x 28.5mm
Fixing centres:	57 x 22mm x 6BA clear	36 x 57 x 22 x 6BA clear
Overall height:	18mm	18mm

Order As FQ71N (2-Head Bracket)  
 FQ72P (3-Head Bracket)

**CAR RADIO AERIAL WING MOUNTING**



A fully retractable four-section telescopic car radio aerial for wing mounting. Aerial retracts into plastic cylinder and can be pulled up with a key (two supplied) which fits into slots in top of aerial. Fully extended length: 980mm. Underhang: 270mm. Aerial is chromed and supplied fitted with 1175mm of lead with car radio plug fitted, and through-chassis grommet supplied. A bar is also supplied which clamps the bottom of the plastic cylinder so that the aerial is firmly secured.

Order As HW18U (Car Aerial Pull-Up)

**CAR RADIO AERIAL ROOF-MOUNTING**

A two-section telescopic car radio aerial for roof mounting. Fully extended length: 790mm, closed length: 460mm. Aerial is chromed and fitted with 2.2m of lead with car radio plug fitted. Aerial is spring-loaded.

Order As YB67X (Car Aerial Roof-Top)



**CAR CIGARETTE LIGHTER**

A cigarette lighter plug and socket for 12V DC supply. Plug snaps in to heat and pops out automatically when hot. Plug may be withdrawn and socket used for supplying power to car accessories.

Order As HW11M (Cigar Lighter)



**CAR ACCESSORY PLUG**

A plug for cigarette lighter sockets to which car accessories may be connected.



Order As HW12N (Car Accessory Plug)

**MAP LIGHT**



A map light with a 12V bulb fitted which plugs directly into the cigarette lighter socket in a car. Alternatively it may be used with the extension lead shown below. A magnet is fitted to the moulding so that it may be 'stuck' to any metal part of the car when not in use. A silvered shield around the bulb converges the light on to the map etc. and the light is therefore shielded from the driver's eyes.

Order As FQ73Q (Map Light)

**CIGARETTE LIGHTER EXTENSION LEAD**



An extension lead with plug at one end to fit the cigarette lighter socket in a car and socket at other end to accept cigarette lighter plug. Approx. 1.7m of lead.

Order As YB68Y (Car Lighter Ext. Lead)

## CAR VOLTAGE CONVERTER

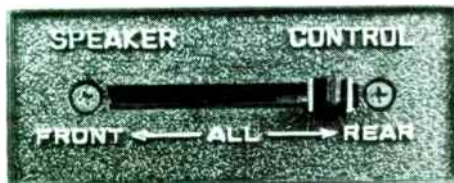


The unit plugs directly into the car cigarette lighter socket and the output is via 1.75m of lead to a spider plug consisting of a 2.5mm jack, a 3.5mm jack, a 2.5mm power plug and a 2.1mm power plug. Output polarity may be reversed by switch on unit and output voltage may be switched to give 3V, 4.5V, 6V, 7.5V, 9V or 12V DC. Max current 300mA.

A similar unit having a max. current of 800mA is also available.

Order As **FQ74R** (Car Power Supply 0.3A)  
**FQ75S** (Car Power Supply 0.8A)

## CAR SPEAKER CONTROL



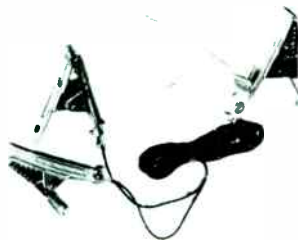
If the loudspeaker in your car is mounted in the front of the car the chances are you have to be deafened if the passengers in the rear want to hear the radio or music clearly, and the opposite is true if the loudspeaker is at the rear. However, with two speakers one mounted at the front and one at the rear, and with this simple unit the volume of both speakers can be controlled to provide comfortable listening for all.

Black crackle plastic finish with chromed lettering and slider control unit fits to underside of dash with two screws (supplied). Full instructions supplied. Size 100x40x31mm deep.

Order As **HW10L** (Car Speaker Control)

## INSPECTION LAMPS

A 12V DC inspection lamp fitted to a large crocodile clip (jaws open to 20mm). Lamp is connected to 1.3 metres of flex terminated on large crocodile clips for connection to car battery. Lamp head swivels on clip.



Order As **HW22Y** (12V Inspection Lamp)



A 12V inspection lamp fitted with a 5W bulb in a black plastic holder with clear acrylic cover lensed slightly at top to give a beam or illuminate a wide area through the side. Anti-glare reflector incorporated in transparent cover. A hook is provided so that lamp may be hung. Lead is 2.5m long and terminated in a cigarette lighter plug. Cover can be removed to replace bulb.

Order As **FQ76H** (Inspection Lamp L86)

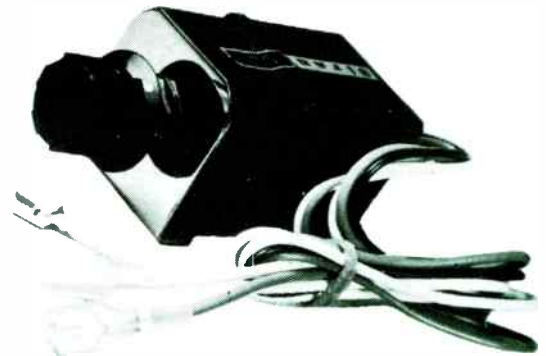
## JUMPER LEADS



A pair of jumper leads for cars. One black and one red heavy duty cable with heavy duty zinc-plated clips with insulated handles. Cable length: 2.1m.

Order As **FQ77J** (Jumper Leads)

## WINDSCREEN WIPER CONTROLLER



Easily fitted on any 12V self-parking wiper system, the unit allows the wipers to operate intermittently without manual intervention. Delay between wipes may be adjusted for any period between 5 and 50 seconds. Complete with full fitting instructions.

Order As **HQ30H** (Wiper Controller)

## BATTERY CHARGER AMMETER

A small circular ammeter suitable for incorporation in battery chargers. Marked 0-5Amps with the section between 4 and 5 amps in red. Size 41mm dia.



Order As **HQ35Q** (Charger Ammeter)

## CAR AMMETER

A 30-0-30 Amp ammeter designed for use in cars. Unit is illuminated by internal bulb supplied and is non-glare. Mounting hole: 52.5mm. dia. Supplied with mounting bracket and connection instructions.



Order As **FQ78K** (Car Ammeter)

## CAR FLASHER UNITS



A 4 lamp or 6 lamp flasher (plus dashboard pilot) unit for car indicator lamps. Supplied with wiring instructions.

4 lamp type dimensions: 49 x 30mm dia.  
 6 lamp type dimensions: 25 x 30mm dia.

Order As **HW16S** (Car Flasher 4-Lamp)  
**HW17T** (Car Flasher 6-Lamp)



## CARAVAN FLASHER UNIT



A 6-lamp flasher plus 2 dashboard pilots for car indicator lamps. Suits lamps up to 21W (12V only). Will flash 3 lamps (or 6 for hazard warning) simultaneously.  
 Dimensions: 50 x 30 x 30mm  
 Supplied with fitting instructions.

Order As **FQ79L (Caravan Flasher)**

## TWIN-TONE CAR HORN



A pair of car horns, one low frequency and one high frequency suitable as a replacement for all popular types. Chromed fronts. Supplied with mounting kit.

Working voltage: 12V  
 Current (each horn): 2.5A  
 Output sound level: 105dB

Order As **YB69A (Car Horns)**

## IGNITION COILS

Oil filled ignition coils for use on most cars (12V). Standard straight type or type requiring external ballast resistor available.

Supplied with mounting clamp.

Dimensions of coil:  
 145mm high x 55mm dia.



Order As **FQ80B (Ign Coil Straight)**  
**FQ81C (Ign Coil Ballast)**

## IGNITION CAPACITORS



Three types are available:

Type	Similar to
367	Delco-Remy, Vauxhall 1869704, 1928111
368	Lucas 420303, 421487, 421267, 423871
369	Ford Autolite C6AH-12300A

Order As **FQ82D (Ign Cap 367)**  
**FQ83E (Ign Cap 368)**  
**FQ84F (Ign Cap 369)**

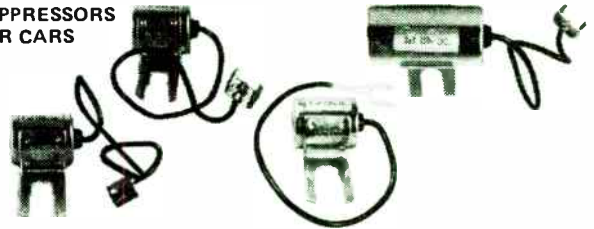
## CAR THERMOSTATS



A 54mm dia. thermostat, wax type. Two temperatures available: 82°C and 88°C. Brass. Fits most cars.

Order As **FQ85G (Thermostat 82)**  
**FQ86T (Thermostat 88)**

## SUPPRESSORS FOR CARS



Suppressor capacitors for suppression of radio interference from car dynamo, ignition, heater, petrol pump, windscreen wipers etc. Four types are available.

	Principal use	Value
With small Lucar connector	Coil	1µF 150V DC
With large Lucar connector	Dynamo	3µF 150V DC
With large Lucar connector	Alternator	3µF 150V DC
With spade connector	General purpose	1µF 150V DC

Order As **HW01B (Supp Cap Small Lucar)**  
**HW02C (Supp Cap Large Lucar)**  
**HW03D (Supp Cap Spade)**  
**FQ87U (Supp Cap 3µF)**

## CAR SUPPRESSOR RESISTORS



Three types of suppressor resistors for plug leads. All types have approx. 15kΩ resistance. Two types, straight and angled fit directly onto the spark plug and have a screw at the other end to fix the cable, the other type is an in-line type fitted in the plug lead – simply cut the lead and screw suppressor onto cut ends.

Order As **FQ88V (Plug-Top Suppressor Straight)**  
**FQ89W (Plug-Top Suppressor Angled)**  
**FQ90X (In-line Plug Suppressor)**

## CHOKE FOR CAR RADIOS



An in-line choke which is used in conjunction with an in-line fuse-holder e.g. F/H Car to suppress interference fed to the radio from the 12V line.

Order As **FQ91Y (Suppressor Choke)**

## TRAILER BOARD PARTS

### 7-Pin Connector Plug



A diecast aluminium alloy bodied 7-pin plug of conventional type to fit most sockets for trailers. Screw terminals and pins are brass. With cord grip and polythene cable seal. Overall size: 92mm long x 42 mm dia. Rated 12V, 8A.

Order As **FQ92A (7-pin Trailer Plug)**

### 7-Pin Connector Socket



A diecast aluminium alloy bodied 7-pin chassis mounting socket to suit most trailer plugs. Screw terminals and pins are brass. With spring loaded cover which also acts as plug retainer when plug is inserted. Fixing bolts supplied separately, see below. Overall size: 50 mm high x 70 mm dia. Rated 12V, 8A.

Order As **FQ93B (7-pin Trailer Socket)**

### 7-pin Socket Mounting Screws

A set of three 2BA x 1/4in. bolts, three 2BA full nuts, three 2BA washers and three 2BA shakeproof washers to mount 7-pin Trailer Socket.



Order As FQ94C (Trailer Socket Bolts)

### Seven-Core Cable

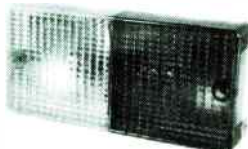


A seven-core cable for use with Trailer Connectors. Stranded core, six 14/0.25mm and one 14/0.3mm copper conductors.

Sheath: Brown, Blue, Yellow, Green, Red, Black (14/0.25mm) and White (14/0.3mm) PVC in an overall black PVC sheath.  
 Overall diameter: 9mm.  
 Nominal conductor area: White 1mm<sup>2</sup>, Other 0.7mm<sup>2</sup>.  
 Max current: White: 8.75A, other 5.5A.  
 Sold per metre. Max length in one piece: 50m.

Order As XR55K (7-core Trailer Cable)

### Lamp Cluster



A rectangular lamp cluster, red and amber combined, complete with bulbs. One end has transparent section so that tail lamp lights number plate. (Two clusters would be required for trailer board.

Bulbs fitted:

Flasher: 12V 21W (Green wire).  
 Tail: 12V 5W (Red wire) †  
 Stop: 12V 21W (Green/Violet wire) †  
 (Tail and Stop are one dual filament bulb).  
 † Check as bulb may be reversed.

Overall dimensions: 165 x 82 x 46mm  
 Conforms to BS AU40 and ECE requirements.

Order As YB70M (Trailer Lamp Cluster)

### Triangular Reflector

A large red plastic triangular reflector with white plastic surround. Conforms to BS AU40 and ECE Class III. Dimensions: 170 mm high x 190 mm wide. (Two would be required for trailer board.



Order As YB71N (Trailer Reflector)

### 50 MPH Signs

A peel-off self-adhesive '50' sign for use on trailers etc. (2 would be required for trailer board). White 50 on black background. Oval. Size: 170 x 115 mm. Character height: 80mm.



Order As FQ95D (Sign 50 mph)

### GB SIGN

A peel-off self-adhesive 'GB' sign. Black GB on white background. Oval. Size: 180 x 130 mm. Character height: 83mm.



Order As FQ96E (Sign GB)

### ANTI-GLARE STRIP

An anti-glare strip for attaching to top of windscreen. Supplied in a roll: 1.27m x 127mm (50 x 5in.)



Order As FQ97F (Anti-Glare Strip)

### LUGGAGE ELASTIC

A 455mm (18in.) long expandable luggage elastic with smart yellow, blue and red woven covering and claw at each end.



Order As FQ98G (Luggage Elastic)

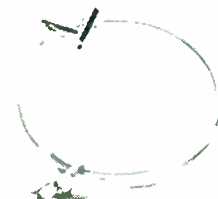
### ICE-SCRAPER

A combined handy tool with an ice-scraper at one end and rubber strip at other for clearing water, dew etc, from windows.



Order As FQ99H (Ice-Scraper)

### TOW ROPE



A 3.65m (12ft.) long steel tow rope with strong plastic coating. Fitted with brackets so that a loop can easily be made at each end. Supplied with red warning flag. Breaking strain: 2 tons.

Order As YB72P (Tow Rope)

### KEEP CLEAN KIT

If you break down or you have to change a tyre when you've got your best clothes on, don't get dirty. Get one of our Keep Clean Kits and stay clean! Supplied in a neat plastic pack 135 x 95mm, it contains a pair of polythene gauntlet gloves with long cuffs, a long apron coverall and a pre-moisturised towelette sachet. When you've used it, throw it away and get another kit. At this ridiculous price you can't afford to be without one.



Order As FY00A (Keep Clean Kit)

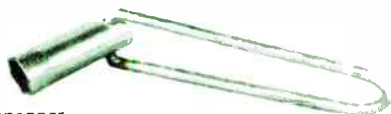
### FOOT PUMP



A solidly made all metal foot pump with 0.6m of hose and standard tyre valve clip. Available as standard or with pressure gauge fitted. Gauge reads 0 to 100 lbs/sq. in and incorporates adjustable reference pointer.

Order As XY02C (Foot Pump Standard)  
 XY03D (Foot Pump Gauge)

## PLUG SPANNER



An all-metal spark-plug spanner.  
Spanner length: 76mm. Overall length: 250mm

Order As **YB94C** (Plug Spanner)

## TYRE PRESSURE GAUGE



A chrome plated tyre pressure gauge with pocket clip. Gauge measures from 6 to 50lbs/sq. in. and includes a valve extractor tool. Overall length: 112mm.

Order As **FY01B** (Tyre Pressure Gauge)

## UTILITY KNIFE



A standard knife supplied with three blades.

Order As **FY02C** (Utility Knife)

## RETRACTABLE BLADE KNIFE



A retractable action trimming knife supplied with three blades. Blade retracts right back into the handle when not in use.

Order As **FY03D** (Retractable Knife)

### Replacement Blades

A set of five replacement blades for use with retractable knife and utility knife.

Order As **FY04E** (Knife Blades)

## SCALPEL

A surgical scalpel which will be found the most suitable tool for making PCB artworks using our tapes etc. They are also suitable for all kinds of accurate and delicate cutting work. The handles and blades must be ordered separately.



### Handle

A small metal handle designed to hold the blades detailed below.

Order As **FY05F** (Scalpel Handle)

### Blade

A blade to fit the scalpel handle described above. Blades are made of the finest surgical steel and are supplied in a sterile pack. Supplied in packs of five.

Order As **FY06G** (Scalpel Blade Type 11)

## MINIATURE SCREWDRIVER SET

Five precision miniature screwdrivers in a plastic wallet. Screwdrivers are chromed with swivel cap. Blade widths (overall length of screwdriver in brackets): 0.8mm (71mm); 1mm (74mm); 1.2mm (77mm); 1.6mm (82mm); 2mm (88mm).



Order As **FY07H** (Min Screwdriver Set)

## PRECISION SCREWDRIVER SET

Six precision instrument screwdrivers in a hinged plastic box with transparent cover. Each consists of a specially hardened, nickel-chrome molybdenum steel blade set into a heavily chromed, knurled brass holder with swivel cap. Blade widths (overall length of screwdriver in brackets): 0.8mm(74mm); 1.4mm(83mm); 2mm(92mm); 2.4mm(103mm); 2.9mm(114mm); 3.8mm(128mm).



Order As **BR58N'** (Jewellers Screwdriver Set)

## INTERCHANGEABLE SCREWDRIVER SET

Heavily chromed and knurled holder (92mm long) has a swivel cap and screw chuck end that accepts any of five interchangeable blades consisting of three flat blade screwdrivers (blade widths: 3.5mm, 2.5mm, 1.5mm), one pozidrive size 1 and one awl. All screwdriver blades are of specially hardened nickel-chrome molybdenum steel and the whole set is housed in a cylindrical plastic case with a transparent domed cover.



Order As **BR79L** (Interchangeable Screwdriver Set)

## INTERCHANGEABLE UTILITY SET

A very useful set of small tools all of which fit into screwdriver-type body. 19 different tools: Box spanners 3mm, 3.5mm, 4mm, 4.5mm, 5mm; Open-ended spanners 4mm, 4.5mm, 5mm, 5.5mm, 6mm; Allen keys 1.5mm, 2mm, 2.5mm; Pozidrive screwdriver size 0 and size 1; Flat blade screwdrivers (blade widths) 1.5mm, 2.5mm, 3.5mm; and an Awl. These miniature precision tools (all approx 50mm long; handle 92mm long) are supplied in a hinged plastic case.



Order As **FY08J** (Utility Set)

## TRIMMING TOOLS



Tool moulded in blue acetal for adjusting 6mm cores with 0.1 in a/f hexagon centre hole. Hexagon at each end with screwdriver extension at one end only.

Length: 127mm.

Order As **BR48C** (Hex Trimmer)



Moulded tool, with a phosphor bronze blade at each end. Designed to fit 4mm and 6mm cores. Suitable for use with our pot cores.

Length: 46mm

Order As **BR51F** (Trim Tool)



A trim tool for preset potentiometers. Double-ended with protruding blade for single turn presets etc., and recessed blade for our 15-turn cermet etc. Recess prevents blade slipping out during adjustment.

Length: 130mm

Order As **BR49D** (Preset Trimmer)



A trim tool suitable for adjusting our IFT's, Trans Coils and Iron Dust Cores. 2mm wide copper blade fixed to long plastic handle (150mm long including blade). Blade length 12mm approx.

Order As **BR50E** (Trim TT5)

## SCREWDRIVERS



Pocket screwdriver, with coloured plastic handle.

Blade length: 2½ in x ⅛ in dia.

Order As **BR52G** (Small Screwdriver)



Blade length 4 in x ⅛ in dia.

Order As **BR53H** (Large Screwdriver)



## LONG REACH SCREWDRIVER



Overall length: 366mm. Blade width: 3mm.  
Shaft length: 291mm. Fully insulated shaft.

Order As **FY09K** (Long Screwdriver)

## SCREWDRIVERS

A range of good quality screwdrivers for slotted screws with chrome vanadium steel shafts and plastic handles with grips.

## Type S3



Overall length: 156mm. Blade width: 4mm. Shaft length: 76mm.

Order As **FY10L** (Driver S3)

## Type S4



Overall length: 180mm. Blade width: 4.5mm. Shaft length: 100mm

Order As **FY11M** (Driver S4)

## Type S5



Overall length: 215mm. Blade width: 6mm. Shaft length: 126mm.

Order As **FY12N** (Driver S5)

## Type S6



Overall length: 240mm. Blade width: 6.5mm. Shaft length: 152mm.

Order As **FY13P** (Driver S6)

## Type S8



Overall length: 310mm. Blade width: 10mm. Shaft length: 201mm.

Order As **FY14Q** (Driver S8)

## POZIDRIVE SCREWDRIVERS

A range of screwdrivers to suit Pozidrive-head screws. Chrome vanadium steel shafts and plastic handles with good grip. Four types available: Types P1 and P1L are suitable for use with M2, M2.5, M3 and M3.5 screws, and types P2 and P2L are suitable for use with M4, M5 and M6 screws.

## Type P1



Overall length: 158mm. Shaft length: 77mm.

Order As **FY15R** (Pozidriver P1)

## Type P1L



Overall length: 283mm. Shaft length: 202mm

Order As **FY16S** (Pozidriver P1L)

## Type P2



Overall length 189mm. Shaft length: 99mm

Order As **FY17T** (Pozidriver P2)

## Type P2L



Overall length 290mm. Shaft length: 200mm

Order As **FY18U** (Pozidriver P2L)

## PHILIPS SCREWDRIVER



A small cross-head screwdriver. (not pozidrive). Chrome-vanadium and moulded plastic handle with fingergrrips. Total length: 150mm; Blade length: 75mm

Order As **BR57M** (Philips Driver)

## MAINS TESTER



A mains tester screwdriver with neon in handle. Neon lights when screwdriver point is touched on voltages between 100 and 500 volts AC or DC with thumb touching metal clip to give earth reference. Has metal pocket clip. Blade length 48mm with insulating sleeve

Order As **BR71N** (Mains Tester)

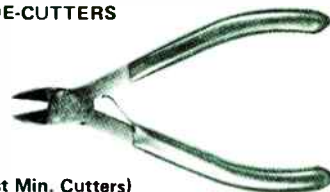
## CUTTERS

## LOW-COST MINIATURE SIDE-CUTTERS

A pair of low-cost lap-jointed miniature side-cutters with leaf-spring and insulated handles.

Size: 110mm (4½in.)

Order As **FY19V** (Low-Cost Min. Cutters)

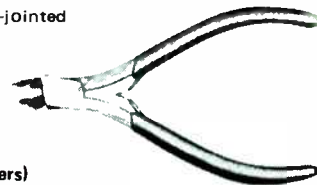


## BOX-JOINTED MINIATURE INSULATED SIDE-CUTTERS

A pair of very high quality box-jointed side-cutters with flush cutting precision edges, polished heads, leaf springs and insulated handles.

Size 115mm (4½in.)

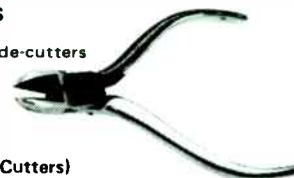
Order As **BR75S** (Ins Min Cutters)



## BOX-JOINTED MINIATURE UNINSULATED SIDE-CUTTERS

A pair of miniature box-jointed side-cutters with rounded nose, precision cutting edges and uninsulated handles. Size 110mm (4½in.)

Order As **BR70M** (Box-Joint Min Cutters)



## BOX-JOINTED MINIATURE UNINSULATED END-CUTTERS

A pair of miniature box-jointed end-cutters with precision cutting edges and uninsulated handles. Size 110mm (4½in.)

Order As **FY20W** (Box-JT End Cutters)



## LOW-COST SIDE-CUTTERS

A pair of low-cost lap-jointed side-cutters with conventional rounded nose and insulated handles. Size 135mm (5in.)

Order As **FY21X** (Low-Cost Cutters)



## LOW-COST LARGE SIDE-CUTTERS

A pair of low-cost lap-jointed side-cutters with conventional rounded nose and insulated handles. Size: 170mm (6½in.)

Order As **FY76H** (Large Low-Cost Cutters)



**LAP-JOINTED STANDARD INSULATED SIDE-CUTTERS**

A pair of lap-jointed side-cutters with conventional rounded nose and insulated handles. Size 125mm (5in.)



Order As BR74R (Side Cutters)

**BOX-JOINTED STANDARD INSULATED SIDE-CUTTERS**

A pair of box-jointed side-cutters with conventional rounded nose and insulated handles. Size 125mm (5in.)



Order As FY22Y (Box-JT Side Cutters)

**LAP-JOINTED PIANO WIRE QUALITY INSULATED SIDE-CUTTERS**

A high quality pair of lap-jointed side cutters made of special high grade alloy steel with an induction hardened cutting edge and heavy plastic insulated handles with anti-slip guards. Will cut hardened wire and piano wire up to 16 s.w.g. Size 140mm (5½in.).



Order As BR72P (Side Cutters S55)

**HIGH LEVERAGE SIDE-CUTTERS**

A pair of lap-jointed side-cutters with off-set pivot giving extra leverage for cutting hard wire. Uninsulated handles. Size 180mm (7in.)



Order As FY23A (High Leverage Cutters)

**PLIERS****LOW-COST MINIATURE PLIERS**

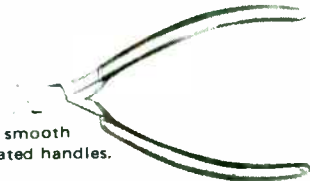
A pair of low-cost lap-jointed miniature pliers with smooth jaws, leaf-spring and insulated handles. Size: 135mm (5in.)



Order As FY24B (Low-Cost Min Pliers)

**BOX-JOINTED MINIATURE INSULATED PLIERS**

A pair of very high quality box-jointed snipe nose pliers with finely polished head, smooth inside jaws, leaf spring and insulated handles. Size 120mm (4½in.)



Order As BR78K (Ins Min Snipe)

**BOX-JOINTED MINIATURE UNINSULATED PLIERS**

A pair of miniature box-jointed pliers with smooth inside face to jaws and uninsulated handles. Size 110mm (4¼in.)



Order As BR69A (Box-Joint Min Pliers)

**LAP-JOINTED STANDARD INSULATED PLIERS**

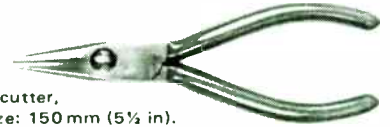
A pair of lap-jointed snipe nose pliers with insulated handles and serrated jaws. Size 125mm (5in.).



Order As BR77J (Bright Pliers)

**LOW-COST PLIERS**

A pair of low-cost lap-jointed pliers with serrated jaws, cutter, and insulated handles. Size: 150mm (5½ in.)



Order As FY25C (Low-Cost Pliers)

**BOX-JOINTED COMBINATION PLIERS**

A high quality pair of box-jointed snipe nose pliers with side-cutters, serrated jaws and insulated handles. Size 125mm (5in.).



Order As FY26D (Box Combined Pliers)

**EXTRA LONG PLIERS**

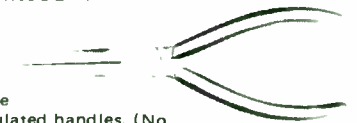
A pair of box-jointed extra long snipe nose pliers with serrated jaws and uninsulated handles. Size 180mm (7in.).



Order As BR73Q (Long Snipe Pliers)

**LAP-JOINTED STANDARD INSULATED PLIERS**

A pair of very high quality box-jointed pliers with finely polished jaws with fine points and serrated tips. Insulated handles. (No cutting facility.) Size 165mm (6in.)



Order As BR90X (Box Radio Pliers)

**LOW-COST LONG NOSE PLIERS**

A pair of low-cost lap-jointed long nose pliers with serrated jaws, cutter, and insulated handles. Size: 200mm (8in.)



Order As FY27E (Low-Cost Long Pliers)

**LAP-JOINTED COMBINATION PLIERS**

A pair of lap-jointed snipe nose pliers with serrated jaws, cutter and burner hole and heavy plastic insulated handles with anti-slip guards. Size 200mm (8in.).



Order As BR92A (Combination Pliers)

## LOW-COST ELECTRICIANS PLIERS



A pair of low-cost lap-jointed electricians pliers with bevelled edge jaws, cutter and burner hole and insulated handles. Size: 165mm (6½in)



Order As FY28F (Low-Cost Elect Pliers)

## LOW-COST HEAVY-DUTY PLIERS



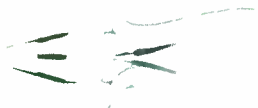
A pair of low-cost lap-jointed heavy-duty electricians pliers with cutter and burner hole and heavily insulated handles with anti-slip guards. Size: 180mm (7in.)



Order As FY29G (Low-Cost HD Pliers)

## ELECTRICIANS PLIERS

A high quality pair of lap-jointed electricians pliers with bevelled cutter and burner hole and heavy plastic insulated handles with anti-slip guards. Size 150mm (6in.).



Order As BR91Y (Electricians Pliers)

## CARPENTERS PINCERS



A pair of pincers, lay-on-joint, ball and claw pattern. Size 180mm (7in.)



Order As FY30H (Pincers)

## CRIMPING, STRIPPING & CUTTING TOOL



A useful low-cost combination tool with plastic handles with anti-slip guards. Tool has bolt cutters for M2.5, M3, M3.5, M4 and M5 bolts, strippers for cables/wires of conductor area, 0.75, 1.5, 2.5, 4, 6 and 10mm<sup>2</sup>, and a crimping tool for red, blue and yellow industrial-type insulated crimp connectors.

Please note that we found the 1.5mm<sup>2</sup> hole ideal for stripping 1mm<sup>2</sup> T & E wires, the 2.5mm<sup>2</sup> hole ideal for stripping 1.5mm<sup>2</sup> T & E, the 4mm<sup>2</sup> hole ideal for stripping 2.5mm<sup>2</sup> T & E, and the 10mm<sup>2</sup> hole ideal for stripping 6mm<sup>2</sup> T & E.

Order As FY31J (Crimp Tool)



## STRIPPERS

### END-ACTION WIRE STRIPPERS

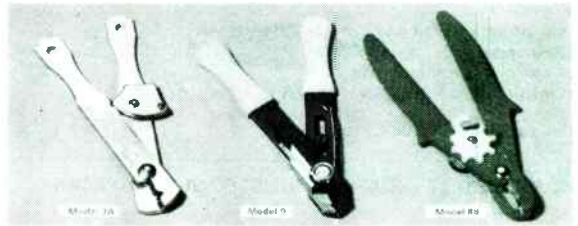
An end-action wire stripper for removing insulation from cable ends without damaging the conductor. The hardened steel jaws are adjustable to accept conductors up to 0.156in (3.9mm, 8 swg) overall diameter. By turning the knurled wheel between the jaws, the conductor can be severed without altering the stripper setting. An opening spring facilitates action and reduces operator fatigue. With PVC insulated handles.

Size 165mm (6½in.)

Order As BR76H (End Action Strippers)



## SIDE-ACTION WIRE STRIPPERS



A range of three wire strippers all of which strip insulation quickly and easily from flex and cable without cutting the wire and are easily adjustable to most wire sizes. They also have cutting blades for cutting wire easily and splitting plastic twin flex.

Model 3A: Simple to use with 4-gauge selector. Four and 6BA spanners in handles.

Model 8B: Fitted with a unique 8-gauge selector and handle locking device. Spring incorporated for automatic opening. Easy-grip red plastic covered handles.

Model 9: Easily adjusts for most sizes of flex and cable. Fitted with extra strong spring for automatic opening after each stripping operation. Ideal for repetitive work. Easy-grip plastic handles. Also fitted with simple handle locking device.

Order As BR93B (Wire Strippers 3A)

BR94C (Wire Strippers 8B)

BR95D (Wire Strippers 9)

## SINGLE-ACTION WIRE STRIPPERS



For precise rapid wire stripping without risk of damage to the wire or insulation. Simply place the wire to be stripped between the jaws and squeeze the handles. The tool automatically grips the wire cuts the insulation and strips it from the wire in the one operation. The tool is made in die cast aluminium and fitted with hardened steel cutting blades which are easily changed by the removal of two screws.

The tool comes complete with blade L5361 fitted. Size 180mm (7in.).

Length of strip 22mm (7/8 in.) max.

Wire range: 0.05mm<sup>2</sup> to 0.52mm<sup>2</sup> (33 s.w.g. to 21 s.w.g.)

Order As BR96E (Stripmaster)

### Replacement Blades

Spare blades for Stripmaster are available in two sizes.

L5361 (previously known as L8826)

Wire range: 0.05mm<sup>2</sup> to 0.52mm<sup>2</sup> (33 s.w.g. to 21 s.w.g.)

Order As BR97F (Blade L5361)

L4421

Wire range: 0.32mm<sup>2</sup> to 5.26mm<sup>2</sup> (22 s.w.g. to 12 s.w.g.)

Order As XX11M (Blade L4421)



## WIRE-WRAPPING TOOL



A combined wire stripping, wrapping and unwrapping hand tool. For use with 30 awg (33 swg) wire on a standard 0.85mm diagonal terminal pin. To use the tool put the wire through the large hole in the centre, push wire down into cutter and pull wire out of tool. This will strip the sheath. Always insert the wire from the side that does not have the cutter fixed to it. Strip about 25mm (1 in) of wire). Push the bared wire into the end of the longer bit on the tool, into the tiny hole in the edge (not the larger hole in the centre) and if it does not push in easily run a drop of sewing machine oil in to ease it. Then when all the bared wire has been pushed into the tool (the end will come out the side) with the insulation flush with the end of the tool, bend the wire out at right angles. Now slide the larger hole in the end of the tool over the pin to be wrapped, hold the insulated wire tightly and twist the tool clockwise. If you wish to unwrap a wrapped joint, place the shorter bit on the other end of the tool over the pin and twist anticlockwise.

Size: 112 x 19.5mm

Order As **FY32K (Hand-Wrap Tool)**

## VEROWIRE WIRING SYSTEM

The Verowire wiring system enables fast construction of pcb's etc., requiring large numbers of wire links. It is very simple to use and the end result is neat, even when a large number of wires are packed into a small space. Simply wrap the wire around the terminal pin or component wire, set the tension on the Verowire pen and take the pen to the next component and wrap the wire there. The wire is insulated with a polyurethane coat which is mechanically tough. Now simply solder the connections: under the extreme heat at the tip of the soldering iron, the polyurethane coat melts and the solder completes the joint.

### Verowire Pen



A plastic wiring tool supplied complete with one spool of wire as described below. Pen has an integral spring wire clamp for wire retention, advancement and retraction.

Order As **HY16S (Verowire Pen)**

### Replacement Spools for Verowire Pen

A spool of 38swg copper wire with an 0.005mm coating of self-fluxing polyurethane. Max voltage: 600V DC. Current rating 100mA. Resistance: 0.86Ω per metre at 20°C. Length of wire on spool: 40m.



Order As **HY17T (Verowire Spool)**

### Wiring Combs

Plug in wiring combs can be fitted to any circuit board that has 0.04in (1mm) dia. holes on a 0.1in x 0.1in matrix. The combs are fitted to the wiring side of the board between the leads of the integrated circuits. They provide a guide and the pegs control and hold the wire ensuring a neat, stable layout.



Order As **FY33L (Verowire Comb)**

## ALLEN KEYS

A pack of eight Allen keys available in AF or metric. Both types supplied in plastic wallet.

Sizes: AF — 1/16 in, 5/64 in, 3/32 in, 1/8 in, 5/32 in, 3/16 in, 1/4 in, 5/16 in, 3/8 in.

Metric: 1.5, 2, 2.5, 3, 4, 5, 5.5, 6mm.



Order As **FY34M (Allen Keys AF)**  
**FY35Q (Allen Keys Metric)**

## MINIATURE SPANNERS

### Open Ended



Miniature chrome vanadium open-ended spanners, chrome-plated and polished. Type 24 has 2BA one end, 4BA the other, type 68 has 6BA one end 8BA the other. Overall length: type 24: 79mm; type 68: 57mm.

Order As **FY36P (Min Spanner 24)**  
**FY37S (Min Spanner 68)**

### Ring

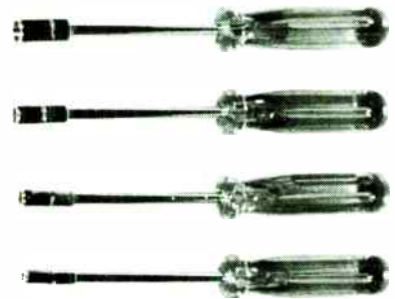


Miniature chrome vanadium ring spanner, chrome-plated and polished. Type 02 has 0BA one end, 2BA the other, type 46 has 4BA one end, 6BA the other. Overall length: Type 02: 92mm; type 46: 70mm.

Order As **FY38R (Ring Spanner 02)**  
**FY39N (Ring Spanner 46)**

## BOX SPANNERS

These spanners have a chrome vanadium steel shaft and good-size plastic handle for a firm grip. Available in four sizes: 2BA, 4BA, 6BA and 8BA.



Overall length: 190mm.  
Shaft length: 100mm.

Order As **FY40T (Box Spanner 2BA)**  
**FY41U (Box Spanner 4BA)**  
**FY42V (Box Spanner 6BA)**  
**FY43W (Box Spanner 8BA)**

## NUT PLIERS

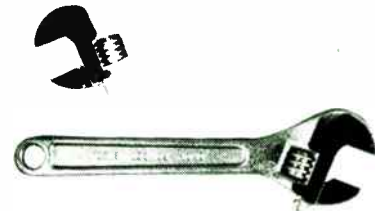
A pair of lap-jointed nut pliers with uninsulated handles. Size 160mm (6in.)



Order As **FY44X (Quick Grips)**

## ADJUSTABLE SPANNERS

An adjustable spanner in drop-forged steel. Two sizes available:

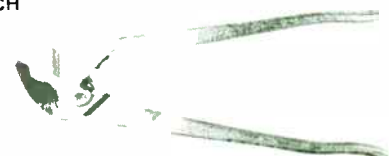


Overall length:	Max jaw opening
160mm	21mm
210mm	25mm

Order As **FY45Y (Crescent Wrench 160)**  
**FY46A (Crescent Wrench 210)**

## ADJUSTABLE WRENCH

A strong alloy steel adjustable wrench. Overall length: 235mm. Max. opening with jaws parallel: 33mm.



Order As **FY47B (Adjustable Wrench)**

## TORQUE WRENCH



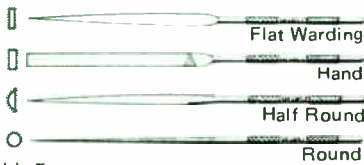
A torque wrench with a double ended  $\frac{1}{4}$  in. square drive. Calibrated to show 0 to 150ft. lbs., left and right handed. Wrench is direct reading type and no presetting is required. Overall length 490mm.  
**Order As XY04E (Torque Wrench)**

## SOCKET CONVERTER

A converter to allow our torque wrench to be used with  $\frac{3}{8}$  in square socket sets.  
**Order As FY48C (Socket Converter)**

## NEEDLE FILES

A range of very high quality needle files made from the finest Sheffield steel. All types are 160mm long; cut length: 76mm.

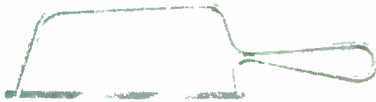


Cut number 2 (extra smooth). Four types are available: Flat/Warding, Hand, Halfround and Round.

**Order As FY49D (Needle File Flat Warding)**  
**FY50E (Needle File Hand)**  
**FY51F (Needle File Halfround)**  
**FY52G (Needle File Round)**

## JUNIOR HACKSAW

A junior hacksaw with a steel frame.



**Order As BR63T (Junior Hacksaw)**

A pack of ten replacement 6in pinned tungsten steel blades for the Junior Hacksaw. Supplied only in packs of ten.

**Order As BR64U (6 in. Hacksaw Blades)**

## SHEET-METAL PUNCHES

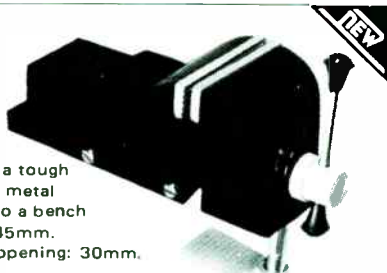


A range of punches for making holes that do not require filing or de-burring in sheet metal up to 16swg mild steel. All punches are supplied with the appropriate Allen key and full instructions. The following sizes are available:

$\frac{3}{8}$  in.,  $\frac{7}{16}$  in.,  $\frac{1}{2}$  in.,  $\frac{9}{16}$  in.,  $\frac{5}{8}$  in.,  $\frac{3}{4}$  in.,  $\frac{7}{8}$  in., 1 in.,  $1\frac{1}{8}$  in.,  $1\frac{1}{4}$  in.,  $1\frac{1}{2}$  in.,  $2\frac{1}{2}$  in.

**Order As**  
**BR59P (Punch  $\frac{3}{8}$  in)**    **BR82D (Punch  $\frac{7}{8}$  in)**  
**BR60Q (Punch  $\frac{7}{16}$  in)**    **BR83E (Punch 1 in)**  
**BR61R (Punch  $\frac{1}{2}$  in)**    **BR98G (Punch  $1\frac{1}{8}$  in)**  
**BR62S (Punch  $\frac{9}{16}$  in)**    **BR99H (Punch  $1\frac{3}{16}$  in)**  
**BR80B (Punch  $\frac{5}{8}$  in)**    **BW00A (Punch  $1\frac{1}{2}$  in)**  
**BR81C (Punch  $\frac{3}{4}$  in)**    **BW01B (Punch  $2\frac{1}{2}$  in)**

## MINIATURE VICE



A small modellers vice in a tough plastic construction with metal faced jaws. Vice clamps to a bench of maximum thickness 45mm. Jaw width: 41mm. Max opening: 30mm.

Overall dimensions fully closed (excluding bench clamp):  
 112 mm long x 44mm wide x 43mm high.

**Order As FY53H (Mini Vice)**

## ELECTRIC DRILLS

### Reliant

A sub-miniature 12V electric drill suitable for drilling printed circuit boards etc.



Rated voltage: 12V DC  
 No load current: 175mA  
 Full load current: 1.5A  
 Torque: 100gm cm  
 Speed: 9000 rpm  $\pm 7\frac{1}{2}\%$   
 Body dimensions: 76mm long x 33mm diameter

Chuck has a  $\frac{3}{32}$  in capacity and drill is supplied fitted with a collet which accepts tools with 2.35mm shank.

**Order As BW03D (Reliant Drill)**

### Titan

A miniature 12V electric drill suitable for drilling printed circuit boards, thin aluminium sheet etc.



Rated voltage: 12V DC  
 No load current: 0.45A  
 Full load current: 3.5A  
 Torque: 1000 gm cm  
 Speed: 4000-9000 rpm  
 Body dimensions: 114mm long x 38mm dia

Chuck has an  $\frac{1}{8}$  in capacity and drill is supplied with a collet which accepts tools with a 2.35mm shank.

**Order As BW02C (Titan Drill)**

## Drill Stand

A drill stand which suits the Titan drill and the Reliant drill if the special collar is fitted. Lever on stand lifts base up for drilling operation; thus alignment for hole can be made very accurately.



**Order As XB12N (Drill Stand)**

## Collar for Drill Stand

A collar which fits around the Reliant drill to enable it to be clamped into the drill stand.

**Order As BR84F (Reliant Collar)**

## Mains Power Unit

A power unit for driving the Titan or Reliant drills from the mains. Power unit output is nominally 12V DC and will deliver up to 4A.

**Order As BW04E (Drill Power Supply)**

## Drill Bits



A range of high speed drills all with 2.35mm shanks designed for use with the Reliant or Titan drills. The following sizes are available: 0.8mm (for I.C. leads); 1mm (for general wires); 1.4mm (for presets)

**Order As BR85G (HS Twist Drill 0.8mm)**  
**BR86T (HS Twist Drill 1mm)**  
**BR87U (HS Twist Drill 1.4mm)**

## Burrs



Two burrs suitable for making shaped holes, and cleaning out holes etc. Both have 2.35mm shanks for use with the Reliant or Titan drills. Two sizes are available: 0.8mm dia; 1.4mm dia.

**Order As BR65V (Twist Burr 0.8mm)**  
**BR66W (Twist Burr 1.4mm)**

**HIGH SPEED TWIST DRILLS**

A range of good quality high speed twist drills for metal. The following sizes are available: 1/16 in. to 1/2 in. in 64ths (except 3/16 in.)

- Order As **HQ02C** (HS Drill 1/16 in.)
- HQ03D** (HS Drill 3/64 in.)
- HQ04E** (HS Drill 1/32 in.)
- HQ05F** (HS Drill 5/64 in.)
- HQ06G** (HS Drill 3/16 in.)
- HQ07H** (HS Drill 1/8 in.)
- HQ08J** (HS Drill 7/32 in.)
- HQ09K** (HS Drill 1/2 in.)
- HQ10L** (HS Drill 3/16 in.)
- HQ11M** (HS Drill 13/64 in.)
- HQ12N** (HS Drill 7/32 in.)
- HQ13P** (HS Drill 15/64 in.)
- HQ14Q** (HS Drill 1/4 in.)
- HQ15R** (HS Drill 17/64 in.)
- HQ16S** (HS Drill 9/32 in.)
- HQ17T** (HS Drill 19/64 in.)
- HQ18U** (HS Drill 5/16 in.)
- HQ19V** (HS Drill 21/64 in.)
- HQ20W** (HS Drill 11/32 in.)
- HQ21X** (HS Drill 23/64 in.)
- HQ22Y** (HS Drill 3/8 in.)
- HQ23A** (HS Drill 25/64 in.)
- HQ24B** (HS Drill 13/32 in.)
- HQ25C** (HS Drill 27/64 in.)
- HQ26D** (HS Drill 7/16 in.)
- HQ27E** (HS Drill 29/64 in.)
- HQ28F** (HS Drill 15/32 in.)
- HQ29G** (HS Drill 1/2 in.)



**TAPE RULES**



Two 10ft (3m) metal tape rules marked in inches and metres. One is in a round plastic case and does not have a spring return. Size 53mm dia. x 19mm thick. The other has a smart square metal case and tape springs back. A locking device is also fitted as well as a belt clip. Size: 50 x 54 x 20mm. Both types have 13mm wide tapes and a sliding tip for accurate end-on or hook-over measurements.

- Order As **FY58N** (Round Tape Rule)
- FY59P** (Retractable Rule)

**FEELER GAUGES**

A plastic holder containing ten feeler gauges. AF and metric types available.



Holders contain:

- AF: 0.0015, 0.002, 0.003, 0.004, 0.006, 0.008, 0.01, 0.012, 0.015 and 0.025 inches.
- Metric: 0.05, 0.1, 0.15, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7 and 0.8mm
- Overall length: 100mm. Blade length: 96mm

- Order As **FY60Q** (Feeler Gauge Imperial)
- FY61R** (Feeler Gauge Metric)

**WIRE BRUSH**



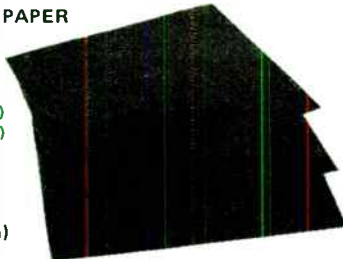
Crucible brass wire brush on wooden handle. Designed primarily for cleaning sparking plugs, but also suitable for brushing aluminium to give various finishes. Overall length: 150mm

- Order As **FY54J** (Wire Brush)

**WET AND DRY ABRASIVE PAPER**

A 280 x 224 mm sheet of wet and dry abrasive paper.

- Available in three grades:
- Fine (Approx 600 grade)
- Medium (Approx 320 grade)
- Coarse (Approx 80 grade)



- Order As **FY55K** (Wet & Dry Fine)
- FY56L** (Wet & Dry Medium)
- FY57M** (Wet & Dry Coarse)

**SENO POLISHING BLOCK**



Block is an ultrafine non-metallic polishing compound bonded in an elastic material which wears evenly. It cleans, degreases and polishes in one clean simple procedure, totally eliminating the need for abrasive pastes, water washes and solvent washes. It has been designed primarily for cleaning copper-clad boards prior to application of resist inks, or finished circuits prior to tin/silver/gold plating. It is equally useful for cleaning contacts, switch gears, potentiometers, connectors, adjustable transformers etc.

Supplied individually.

- Order As **HX04E** (Polish Block)

**SOLDERING IRONS**

**MINIATURE SOLDERING IRON**



A 17W precision miniature soldering iron featuring a double shaft. An inner shaft of ceramic to provide near-perfect insulation and virtually no leakage, and an outer shaft of stainless steel for strength. It is intended for use with modern miniature components. The iron comes fitted with a Bit No. 1100, but many alternative bits are available. 240V AC mains operated. Leakage current: 3 to 5µA. Weight 40gm (1½oz.)

- Order As **FY62S** (Iron CX)

**Type CX Replacement Element**

A 240V AC mains replacement element for the Iron CX.

- Order As **FY63T** (Element CX)

**Bits For Iron CX**

A range of bits for use with the Iron CX only. These bits are all iron clad to give long life and they must therefore not be filed or they will quickly disintegrate. They should only be cleaned by wiping with a damp sponge when they are hot. The following types are available:

Type No.	Tip Size	mm	in
6/1106	1mm	1	3/64
1100	2.3mm	2.3	3/32
1101	3mm	3	1/8
7/1101	3mm (Long life nickel-plated type)	3	1/8
1102	4.7mm	4.7	3/16
1103	6mm	6	1/4

- Order As **FR30H** (Bit 6/1106)
- FY64U** (Bit 1100)
- FY65V** (Bit 1101)
- FR31J** (Bit 7/1101)
- FY66W** (Bit 1102)
- FY67X** (Bit 1103)



## TYPE CN REPLACEMENT ELEMENT



A 240V AC mains replacement element for the IRON Type CN240  
**Order As FR01B (Element Type CN)**

## TYPE CN REPLACEMENT HANDLES

A replacement handle for the IRON Type CN240  
**Order As FR02C (Handle Type CN)**

## BITS FOR IRON TYPE CN240

A range of bits for use with the Iron Type CN240 only. These bits are all iron clad to give long life and they must therefore not be filed or they will quickly disintegrate. They should only be cleaned by wiping with a damp sponge when they are hot. The following types are available.

Type No.	Shank	Tip diameter	
102	Straight	$\frac{3}{32}$ in (2.4mm)	
104	Straight	$\frac{3}{16}$ in (4.8mm)	
106	Straight	$\frac{3}{64}$ in (1mm)	
820	Tapered	$\frac{3}{32}$ in (2.4mm)	
821	Tapered	$\frac{1}{8}$ in (3.2mm)	
822	Tapered	$\frac{3}{16}$ in (4.8mm)	

**Order As FR03D (Bit 102)**  
**FR04E (Bit 104)**  
**FR05F (Bit 106)**

**FR06G (Bit 820)**  
**FR07H (Bit 821)**  
**FR08J (Bit 822)**

## 25 WATT SOLDERING IRON



A strongly recommended 25W 240V mains soldering iron ideal for soldering transistors and integrated circuits since leakage current is a minute  $1\mu\text{A}$ . Because the element protrudes into the actual bit the iron has a heat capacity equivalent to that of 40W or 60W conventional irons. The iron comes fitted with a Bit No. 51. 240V AC mains operated. Weight 50gm (1 $\frac{1}{2}$ oz).

**Order As FR12N (Iron X25)**

## LOW VOLTAGE SOLDERING IRON

A low voltage 25 watt soldering iron designed to work from a 12V car battery. The iron is virtually identical to the X25 and the bits are interchangeable. The iron is supplied with an  $\frac{1}{8}$ in long-life iron clad bit, an  $\frac{1}{8}$ in bit (Bit No. 51)



two large crocodile clips for connection to battery terminals, and 4.5 metres of 2-core lead, (all ready fitted). The iron comes in a tough plastic envelope designed to house the iron when not in use.

**Order As FR13P (12V Iron MLX12)**

## TYPE X25 and MLX12 REPLACEMENT ELEMENTS

Replacement elements for the X25 style soldering irons. X25 type is for 240V AC mains. MLX12 type is for 12V DC.

**Order As FR14Q (Element X25)**  
**FR15R (Element MLX12)**

## BITS FOR X25 AND MLX12 IRONS

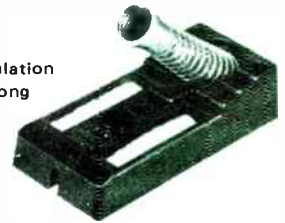
A range of bits for use with the Iron X25 or 12V Iron MLX12 only. These bits are all iron clad to give long life and they must therefore not be filed or they will quickly disintegrate. They should only be cleaned by wiping with a damp sponge when they are hot. The following types are available

Type No.	Tip Diameter	
50	2.3mm (3/32in.)	
51	3.3mm (1/8in.)	
52	4.7mm (3/16in.)	

**Order As FR16S (Bit No.50)**  
**FR17T (Bit No.51)**  
**FR18U (Bit No.52)**

## SOLDERING IRON STAND

A stand designed for use with all our soldering irons (CX, X25, MLX12). Manufactured from a high grade insulation material with a chromium plated strong steel spring. The two sponges at the side serve (when damped) to keep the soldering bits clean. Spare bits can be accommodated on the stand.



**Order As FR20W (Stand ST3)**

## Replacement Sponge For Stand ST3

A spare sponge is available as a replacement for use with the stand.  
**Order As FR11M (Sponge)**

## SOLDERING IRON KITS

### CX Kit

An attractive presentation kit that makes the perfect present for the beginner. A superb CX soldering iron and a Stand ST3 neatly packaged with full instructions on how to use the iron as well as some general hints on soldering.



**Order As FY68Y (Kit SK3)**

### X25 Kit

An attractive presentation kit that makes the perfect present for the beginner. A superb X25 soldering iron and a Stand ST3 neatly packaged with full instructions on how to use the iron as well as some general hints on soldering.



**Order As FY69A (Kit SK4)**

## HEAT SHUNT

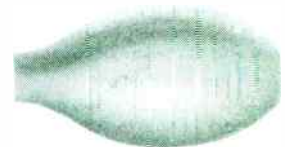
A small metal heat shunt designed for transistor leads.



**Order As FR10L (Heat Sink Tweezers)**

## SOLDER SUCKER

A handy inexpensive tool for the quick removal of solder. Small, lightweight and easy to use. The Teflon tip is easily changed or replaced.



**Order As FR23A (Solder Sucker)**

A replacement Teflon tip for the Solder Sucker.

**Order As FR24B (Sucker Tipllet)**

## DESOLDERING TOOL



Powerful desoldering tool quickly removes molten solder from joint. Spring-loaded piston is closed while solder is being melted, then released by a simple push-button. The nozzle is easily removed for cleaning or replacement. Plunger is completely enclosed so that there are no knobs to fly off into the operator's face or eyes.

**Order As FR26D (Desolder Tool)**

A replacement nozzle to suit the fully enclosed desolder tool shown above.

**Order As HY13P (Desolder Nozzle Type 2)**

A replacement foam washer to suit the fully enclosed desolder tool shown above.

**Order As FR63T (Desolder Washer Type 2)**

A replacement foam washer to suit the open style desolder tools which we were supplying prior to mid-April 1978.

**Order As FR27E (Desolder Washer)**

A replacement nozzle to suit the open style desolder tools which we were supplying prior to mid-April 1978.

**Order As FR28F (Desolder Nozzle)**

## DESOLDER BRAID

A flux-impregnated copper braid approx. 1.5m long which speedily removes unwanted solder from a joint. Place braid on defective joint and apply soldering iron for about one second. Then remove braid and iron together and joint will be left clean. Braid width: 2mm.



Order As FR29G (Solda-Mop)

## SOLDER

### Standard Solder



A 60% tin, 40% lead alloy solder containing five cores of non-corrosive flux. We recommend this solder for use with the iron-clad and nickel-clad bits supplied with our soldering irons and for use with all the electronic components shown in this catalogue. Melting temperature 188°C. Solder is 22 s.w.g. (0.71mm) Sold in packs of 10m.

Order As FR21X (Solder D622)

This product is also available on ½kg reels (approx 163m)

Order As FY70M (½kg Reel Solder)

### Aluminium Solder



A specially designed solder that will joint aluminium, brass, copper, nickel, stainless steel and tin-plate more easily than standard solder. The solder is 18% tin, 80% lead and 2% silver alloy. A higher temperature is required to melt this solder than ordinary solder so it is unlikely that a miniature iron will be satisfactory unless the volume of the parts to be jointed is very small. The solder contains four cores of non-corrosive flux. Melting temperature 270°C. Solder is 16 s.w.g. (1.63mm) Sold only in packs of 1m.

Order As FY71N (Aluminium Solder)

## FREEZER

A quick cooling chemical preparation to assist in locating faults in thermal intermittent components. Supplied in 226gm (8oz) aerosol can with full instructions.



Order As LH04E (Freeze-It)

## SWITCH CLEANER



A highly efficient switch cleaning solution that removes dirt, grease, oil etc. and leaves a residual, relatively conducting oil film, which by increasing the contact area, reduces resistance. Suitable for use on the tracks of noisy controls and on the contacts of switches. Does not attack most plastics, rubber etc.

Available in 226gm (8oz.) aerosol can with plastic applicator for reaching inaccessible points or in 170gm (6oz.) tin with 4 inch nylon reversible applicator for precise, controlled, drop-by-drop application without waste.

Aerosol Can Order As LH03D (Switch Cleaner)

Standard Tin Order As YB77J (Servisol)

## DE-GREASING SOLVENT

A selective precision cleaning agent suitable for cleaning tape-recorder heads and tapes, dry contacts and switches, relays, potentiometers, printed circuit boards, etc. It will also remove etch-resist ink from pcb's. It is harmless on all plastics, paint, rubber etc. and leaves no residue on evaporation.

Supplied in 170gm (6oz.) aerosol can with applicator.



Order As LH02C (Aero-Klene)

## AERO-DUSTER



A quick and easy way of removing dust and dirt from inaccessible places in radio, electrical and mechanical equipment such as: radio and TV chassis, variable capacitors, micro-components, tape-recorder heads, camera lens and shutters, typewriters, clocks etc. The pressure of microscopically clean gas (0.5gm/m<sup>2</sup> (70 p.s.i.) at 21°C (70°F)) penetrates into the most remote places and removes dust and grit without damaging or scratching sensitive areas.

It is non-toxic, non-flammable and non-corrosive, but must not be exposed to temperatures exceeding 50°C (120°F). Each can will give over a thousand, one second bursts.

Supplied in 200gm (7oz.) aerosol can with applicator.

Order As YB73Q (Aero-Duster)



## SILICONE GREASE



A silicone grease spray for use on switch contacts, ignition systems, EHT connections etc. It waterproofs, insulates, lubricates and preserves electrical and electronic equipment. Excellent dielectric properties, remains effective for long periods and has a working temperature range of -50°C to +200°C.

Supplied in 226gm (8oz) aerosol can with applicator.

Order As YB74R (Silicone Grease)



## PLASTIC SEAL



A transparent insulator that will prevent arcing and corona discharge on E.H.T. transformers and high voltage circuits. Can be used for weather-proofing external aerial connections and coating all types of components. Heat resistant and waterproof. Supplied in 145gm. (5oz.) aerosol can.

Order As YB75S (Plastic Seal)



## FOAM CLEANSER



A multi-purpose cleanser that will remove grease and grime from woodwork, glass, metal, paintwork, vinyl surfaces etc. It is a mixture of solvents and detergents with anti-static properties.

Supplied in 370gm (13oz) aerosol can.

Order As YB76H (Foam Cleanser)



## POLISH



A high grade polish containing silicone and wax that cleans and polishes in one process. Can be used on furniture, paintwork, leather, metal, plastic etc. and eliminates small scratches on radio and TV cabinets. Leaves a high gloss, durable finish.

Supplied in 240gm (8oz) aerosol can.

Order As YB78K (Excel Polish)



## ANTI-STATIC SPRAY MIST

A specially prepared spray that prevents the build-up of static electricity (and hence dust) on all plastic, polished metal and wooden surfaces, TV screens, radio cabinets, telephones, fluorescent light fittings etc. Gives a lasting brilliance. Supplied in 150gm (5oz) aerosol can.

Order As YB79L (Anti-Static Spray)



## FIRE EXTINGUISHER

A quick and efficient extinguisher suitable for use on small electrical, gas or oil fires in cars, caravans, boats and in the home. Used immediately, it puts out fires within a few seconds. It is clean in action and does not stain.

Supplied in 640gm (22oz.) aerosol can.  
Order As YB80B (Fire Extinguisher)



## ADHESIVES

### IMPACT ADHESIVE



A 30gm tube of impact adhesive. Ideal for plastic laminates, wood, leather, rubber, metal, fabrics etc. Not suitable for cellulose paint surfaces or foam polystyrene. To use spread adhesive evenly over both clean, dry surfaces to be bonded and allow adhesive to dry for about 15 minutes (or until dry to the touch). A strong bond is obtained immediately the surfaces are brought together. Full instructions on packet.

Order As FL43W (Evostik Impact)

### EPOXY ADHESIVES

#### Araldite Rapid

A quick setting version of the famous two part epoxy resin glue made by Araldite. Suitable for bonding almost all materials in common use: metals, wood, rubber, earthenware, glass and most plastics except polythene. Araldite sets with virtually no shrinkage and joints are resistant to chemical attack and provide a seal which is impervious to moisture, electrically insulating, and a protection against electrolytic corrosion.

Supplied in two 16gm tubes, one containing the resin and one the hardener. When cleaned, surfaces to be bonded should be roughened slightly. Mix equal amounts of resin and hardener and stir thoroughly for 30 seconds — the adhesive should be applied immediately but remains usable for about 5 minutes. A thin layer of adhesive is spread on each surface and then the two held firmly together for about 10 minutes. The adhesive sets in about ½ to 1 hour, but does not reach full strength for about 8 hours.

The tubes are supplied in a pack with detailed instructions.

Order As FL44X (Araldite Rapid)



#### Extra-Fast-Setting Adhesive



A two part epoxy resin adhesive that sets in 3 to 5 minutes. Supplied in a 3.5gm sachet simply cut off the end and squeeze out. Sachet contains exactly the correct proportional amounts of the resin and hardener to ensure a perfect mix. Stir the two parts together with stick (supplied) and apply immediately to both surfaces to be bonded then hold tightly together for a few minutes. Within one hour bond reaches a considerable strength, but is not completely cured for 24 hours. Can also be used as a filler.

Order As FL45Y (Double Bubble Sachet)

## CYANOACRYLATE ADHESIVE

A one part adhesive which forms a very strong bond in a matter of seconds. This incredible material has the following features:

- Reaches 90% of final bond strength within 10 minutes at room temperature.
- Strength of bond is in most cases greater than the strength of the bonded material (i.e. under stress material will break before bond).
- No jigs or clamps required, just light finger pressure.
- Will bond a very wide variety of similar or dissimilar materials.
- Single component — no mixing — and no shrinkage upon polymerisation.
- Maximum strength achieved with glue thickness of 0.001in., therefore it is extremely economical.
- Bond strength does not deteriorate under normal ambient conditions.
- It is a transparent material and its refractive index is the same as some glasses (e.g. refractive index 1.49 — crown glass 1.517) so that glass can be joined and glue "disappears".

The adhesive is suitable for virtually all materials except polyethylene, polypropylene, Teflon (PTFE) and very porous surfaces.

To use, ensure surfaces are free from oil or grease, preferably clean them with acetone (nail varnish remover) and with plastics, lightly roughen the surfaces. Pierce tube with a pin. Apply the adhesive to one surface only. Align surfaces then bring them together quickly applying light finger pressure. For very small bond areas spread glue by lightly rubbing components together once or twice, but once bond is established do not break it (adhesive cures in a few seconds depending on material, but in general do not handle for 10 minutes).

**IMPORTANT NOTE.** Do not allow adhesive to come into contact with the skin; we strongly recommend the use of polythene gloves when applying the adhesive. If contact with the skin does occur, wash immediately with water or acetone. If adhesive comes in contact with the eyes, flush the affected eye immediately with large quantities of water and visit your doctor or a casualty department immediately. **KEEP AWAY FROM CHILDREN.**

Supplied in 2gm tubes.

Order As FL46A (Cyanoacrylate)



## POTTING COMPOUND

Encapsulate your circuits to make them damage and moisture proof. Our potting compound pack makes up 450g of resin mix. Final mix is black. All resins get hot as they are curing, but where delicate electronic components are concerned, it can be a considerable advantage if the cure temperature is low and our compound does exhibit a comparatively low exothermicity. If the whole amount is to be used, pour hardener into resin tin. Leave for one minute then stir evenly for two minutes. The compound remains workable for about 40 minutes, and is completely cured in 24 hours. If smaller portions are to be used, mix ratio is approximately 2 parts resin to 1 part hardener. May be stored for at least 12 months without detriment. Has very high electrical resistance.

Order As LQ02C (Potting Compound)



## PVC INSULATION TAPE

Strong self-adhesive PVC insulation tape ½in width, 10m reels. Available in Black, Blue, Brown, Green, Red and White.

- Order As
- FL47B (PVC Tape Black)
  - FL48C (PVC Tape Blue)
  - FL49D (PVC Tape Brown)
  - FL50E (PVC Tape Green)
  - FL51F (PVC Tape Red)
  - FL52G (PVC Tape White)





**ELECTRICALLY CONDUCTIVE SILVER PAINT**

An air drying electrically conductive paint containing pure silver. The paint should be applied to dry, grease and oil free surfaces with a soft bristled brush to obtain as thin a coating as possible to ensure minimum resistance. After approx. 15 minutes the paint will be dry, but is not completely cured for 12 hours. The resistance will be about 0.001Ω per cm. However, by applying heat (e.g. from a hair dryer) to speed the drying time immediately after application the resistance can be reduced to less than ½mΩ per cm. Before use always shake the tube well.



Applications include: repairing broken tracks on pcb's; repairing demisters on car rear windows; bonding wires together; rf shielding; prototype pcb manufacturing; conductive ink and many more.

Supplied in a phial containing 3grm.

*Note: Shake well before use.*

Order As FY72P (Conductive Paint)

**SELF-ADHESIVE PADS**

A small foam pad 25x12mm (1mm thick) with a strong adhesive coated on both sides. Adhesive will bond to most materials. Supplied in strips of ten pads.

Order As HB22Y (Quickstick Pads)

**VELCROMOUNTS**

A versatile self-adhesive mounting and fixing system. Supplied in pairs of pads; one blue and one white. Simply stick the white pad to the non-moveable side and the blue pad to the object to be fixed to it. E.g. in speaker cabinets the pads are an ideal method of securing the grille in front loading systems and in this case the blue pad would be fixed to the grille and the white pad to the cabinet. When the two pads are pressed together lightly they form an immediate positive bond. To replace or interchange the object simply pull the pads apart; the white pad remains in place for further use and the blue pad stays on the removed object. They may continue to be used indefinitely.

Order As HB21X (Velcromounts)

**HINGE**

A 1 inch long hinge with a strong adhesive pad on each side. Will stick strongly to most materials. Dimensions: length: 25mm, width: 36mm, adhesive pad size: 24 x 11mm, total thickness: 5mm.

Order As HB20W (Flexihinge)

**SEALING STRIP**

A soft foam strip with a strong, long-lasting pressure sensitive adhesive on one side. Suitable for use as draught excluder, dust seal or air seal e.g. in loudspeaker cabinets. Sold in 3.3m lengths.

Order As LQ12N (Sealing Strip)

**TRANSISTOR TESTER**

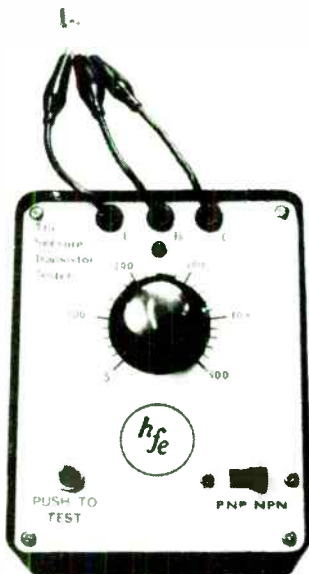
A very low cost yet very accurate fully built and tested transistor tester which measures dynamic gain ( $h_{fe}$ ). The tester is ideal for matching transistors into pairs and for testing suspect transistors. It can also be used to identify "unknown" transistors. It is supplied complete with full instructions for use.

Powered by PP3 battery (not supplied).

To insert battery, remove four screws in front panel and take tester out of case. Fit battery and replace.

Order As LH05F

(Transistor Tester HFE)



**SIGNAL GENERATOR**



A Wein Bridge oscillator fully built and tested giving high purity sine or square wave outputs with frequency and amplitude adjustable. Robust, lightweight, simple to use, yet its specification is better than many instruments of far higher price.

**Specification**

	Sine wave	Square wave
Output voltage (max)	1V rms	9V peak-to-peak
Frequency range	15Hz to 200kHz	15Hz to 100kHz (then to 200kHz non-linear with scale)

Total harmonic distortion 0.5%  
Output via 4mm terminals. Size: 127 x 102 x 51mm  
Requires PP3 battery (not supplied)

Order As YB81C (Seesure Sig Gen)

**LCR BRIDGE**

This instrument will determine the value of resistance, capacitance or inductance of any device connected to it, using a bridge nulling technique. It is fully built and tested. It has six ranges for each function allowing readings to be made (assuming one can read to a tenth of a large division) from 0.1Ω to 1MΩ, 10pF to 100μF, 1μH to 10H.



Ranges: Resistance 10Ω, 100Ω, 1kΩ, 10kΩ, 100kΩ, 1MΩ.  
Capacitance 1000pF, 0.01μF, 0.1μF, 1μF, 10μF, 100μF.  
Inductance 100μH, 1mH, 10mH, 100mH, 1H, 10H.

Accuracy: ±2%  
Requires two PP3 batteries (not supplied).

Order As YB82D (LCR Bridge)

**POCKET MULTIMETER**

A neat pocket-sized multimeter which is ideal for making quick simple tests on equipment.

Overall size: 95 x 60 x 33mm  
1000 ohms per volt DC and AC

**Ranges:**

DC Volts: 10, 50, 250, 1000  
AC Volts: 10, 50, 250, 1000  
DC Current: 1mA, 100mA  
Resistance: 0 - 150k Ω (3k Ω at centre of scale)  
Decibels: (switch at 10V AC) -10 to -22dB (ref: 0dB 1mW in 600 Ω)



Supplied complete with detailed operating instructions, one red and one black test lead with probes and one battery (replacement type HP7)

Order As FL60Q (Pocket Multimeter)



# TEST EQUIPMENT



## MICROTEST 80

A precision multimeter that is no bigger than a packet of cigarettes. The meter movement will withstand overloading up to 1000 times range setting, and ohms ranges are fitted with a fuse to give full protection. There is a special electronic regulation circuit so that ohms zero setting is automatic, no adjustment being required when changing ranges. The meter movement incorporates a compensated magnet which shields the instrument against external magnetic fields for absolute stability. The meter incorporates a two-colour mirrored scale. For absolute ease of maintenance the pcb is removable without the need for any desoldering.



### Specification:

Overall size: 90 x 70 x 18mm  
Weight: 120gms

Sensitivity: 20,000 ohms per volt DC  
4,000 ohms per volt AC  
Accuracy:  $\pm 2\%$  of full scale deflection  
Ranges:  
DC Volts: 0.1, 2, 10, 50, 200, 1000  
AC Volts: 1.5, 10, 50, 250, 1000  
DC Current: 50 $\mu$ A, 500 $\mu$ A, 5mA, 50mA, 500mA, 5A  
AC Current: 250 $\mu$ A, 2.5mA, 25mA, 250mA, 2.5A  
Resistance: 0-500 $\Omega$  (50 $\Omega$  at centre of scale)  
0-50k $\Omega$  (300 $\Omega$  at centre of scale)  
0-500k $\Omega$  (3k $\Omega$  at centre of scale)  
0-5M $\Omega$  (30k $\Omega$  at centre of scale)  
(Minimum reading: 1 $\Omega$ )  
Decibels: -26dB to +62dB in 5 ranges.  
Capacitance: 1 $\mu$ F to 25,000 $\mu$ F in 4 ranges

Supplied complete with detailed operating instructions, fault and maintenance procedures in a 56 page booklet, a pair of test leads with probes, four spare fuses (replacement type fuse 20 150mA), and battery fitted, (replacement type Mallory 627RM available from photographic shops or shops selling hearing-aid batteries e.g. Boots). The meter is supplied in an unbreakable plastic case, with hinged snap shut lid. Case size: 95 x 93 x 23mm.

Order As YB84F (Microtest 80)

## SUPERTESTER 680G

A precision multimeter with 43 useful ranges including, reactance, capacity and frequency! The meter movement will withstand overloading up to 1000 times range setting, and ohms ranges are fitted with a fuse to give full protection. It incorporates a compensated magnet which shields the instrument against external magnetic fields for absolute stability. A socket is provided on the meter into which a mains lead (supplied) plugs as some of the ranges require 240V mains to assist in the measurement. In the list below those ranges are marked †. The meter incorporates a two-colour mirrored scale. For absolute ease of maintenance the pcb is removable without the need for any desoldering.



### Specification:

Overall size: 105 x 84 x 32mm  
Weight: 230gms  
Sensitivity: 20,000 ohms per volt DC  
4,000 ohms per volt AC  
Accuracy:  $\pm 2\%$  of full scale deflection  
Ranges:  
DC Volts: 0.1, 2, 10, 50, 200, 500, 1000

AC Volts: 2, 10, 50, 250, 1000, 2500  
DC Current: 50 $\mu$ A, 500 $\mu$ A, 5mA, 50mA, 500mA, 5A  
AC Current: 250 $\mu$ A, 2.5mA, 25mA, 250mA, 2.5A  
Resistance: 0-30 $\Omega$  (5 $\Omega$  at centre of scale)  
0-10k $\Omega$  (50 $\Omega$  at centre of scale)  
0-100k $\Omega$  (500 $\Omega$  at centre of scale)  
0-1M $\Omega$  (5k $\Omega$  at centre of scale)  
0-10M $\Omega$  (50k $\Omega$  at centre of scale)  
† 0-100M $\Omega$  (500k $\Omega$  at centre of scale)  
(Minimum reading: 0.1 $\Omega$ )

† Reactance: 0-10M $\Omega$  (Minimum reading 1k $\Omega$ )  
(Note: This range gives a detection of reactance rather than a measure of it.)

Capacity: 150pF to 0.5 $\mu$ F in two ranges.  
1 $\mu$ F to 20,000 $\mu$ F in four ranges.

† Frequency: 1Hz to 500Hz  
Decibels: -10dB to +70dB in five ranges.

Supplied complete with detailed operating instructions, fault and maintenance procedures in a 56 page booklet, a pair of test leads with probes, a pair of insulated crocodile clips that plug onto the probes, four spare fuses (inside meter) (replacement type Fuse 20 150mA) battery fitted (replacement type Ever Ready 3V Cycle Battery No. 8), and mains lead with plug to suit socket in side of meter case. The meter is supplied in an unbreakable plastic case, with hinged snap-shut lid. Case size: 112 x 108 x 37mm.

Order As YB85G (Supertester 680G)

## SUPERTESTER 680R

A precision multimeter for the professional with 70 useful ranges including reactance, capacity and frequency! This superb multimeter features 1% accuracy on DC ranges. The meter movement will withstand overloading up to 1000 times range setting and ohms ranges are fitted with a fuse to give full protection. It incorporates a compensated magnet which shields the instrument against external magnetic fields for absolute stability. A socket is provided on the meter into which a mains lead (supplied) plugs as some of the ranges require 240V mains to assist in the measurement. In the list below those ranges are marked †. The meter incorporates a two-colour mirrored scale and a push switch which on AC or DC volts or amps ranges halves the sensitivity of the meter giving a full scale deflection of twice the fsd shown for that range. For absolute ease of maintenance the pcb is removable without the need for any desoldering.



### Specification:

Overall size: 128 x 95 x 32mm  
Weight: 320gms  
Sensitivity: Varies - see individual ranges.  
Accuracy:  $\pm 1\%$  of full scale deflection DC  
 $\pm 2\%$  of full scale deflection AC  
Ranges:  
AC Volts: 2, 10, 50, 250, 1000, 2500 at 4000 ohms per volt and 4, 20, 100, 500, 2000 at 2000 ohms per volt.

DC Volts: 0.1, 2, 10, 50, 200, 500, 1000 at 20,000 ohms per volt and 0.2, 4, 20, 100, 400, 2000 at 10,000 ohms per volt.  
DC Current: 50 $\mu$ A, 500 $\mu$ A, 5mA, 50mA, 500mA, 5A and 100 $\mu$ A, 1mA, 10mA, 100mA, 1A, 10A.  
AC Current: 250 $\mu$ A, 2.5mA, 25mA, 250mA, 2.5A and 500 $\mu$ A, 5mA, 50mA, 500mA, 5A  
Resistance: 0-500 $\Omega$  (5 $\Omega$  at centre of scale)  
0-10k $\Omega$  (50 $\Omega$  at centre of scale)  
0-100k $\Omega$  (500 $\Omega$  at centre of scale)  
0-1M $\Omega$  (5k $\Omega$  at centre of scale)  
0-10M $\Omega$  (50k $\Omega$  at centre of scale)  
† 0-100M $\Omega$  (500k $\Omega$  at centre of scale)  
(Minimum reading: 0.1 $\Omega$ )

† Reactance: 0-10M $\Omega$  (Minimum reading 1k $\Omega$ )  
(Note: This range gives a detection of reactance rather than a measure of it.)

Capacity: 150pF to 0.5 $\mu$ F in two ranges.  
1 $\mu$ F to 30,000 $\mu$ F in four ranges.

† Frequency: 1Hz to 500Hz  
Decibels: -24dB to +70dB in ten ranges

Supplied complete with detailed operating instructions, fault and maintenance procedures in a 72 page booklet, a pair of test leads with probes, a pair of insulated crocodile clips that plug onto the probes, four spare fuses (inside meter) (replacement type Fuse 20 150mA), battery fitted (replacement type Ever Ready 3V Cycle Battery No. 8), and mains lead with plug to suit socket in side of meter case. The meter is supplied in an unbreakable plastic case with two snap-shut lids, one covering the meter and one the accessories. The two-tone grey case has a carrying handle. Case size: 140 x 104 x 54mm.

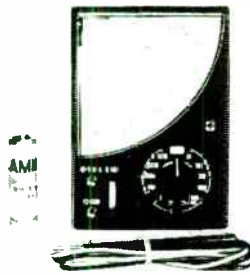
Order As YB86T (Supertester 680R)



**SMALL MULTIMETER**

This neat little multimeter has two more ranges than the Pocket Multimeter, but is far more accurate when used in transistorised circuits since it features a 20,000 ohms per volt DC and 10,000 ohms per volt AC movement.

Overall size: 113 x 78 x 35mm



Ranges:

- DC Volts: 5, 25, 125, 500, 1000 at 20,000 ohms per volt
- AC Volts: 10, 50, 250, 1000 at 10,000 ohms per volt.
- DC Current: 50 $\mu$ A, 250mA
- Resistance: 0-6k $\Omega$ , 0 to 6M $\Omega$  (300 $\Omega$  and 30k $\Omega$  at centre scale)
- Decibels: (switch at 10V AC) -20 to +22dB (ref: 0dB = 1mW in 600 $\Omega$ )

Supplied complete with detailed operating instructions, one red and one black test lead with probes and one battery (replacement type HP7).

Order As YB83E (Small Multimeter)

**MULTIMETER 360TR**

This superbly styled multimeter is not quite as accurate as the Supertesters, but includes a transistor tester. However on DC volts range the meter has a 100,000 ohms per volt input which makes the meter very accurate with high impedance circuitry. The meter incorporates a four-colour mirrored scale, a polarity switch and the movement is protected against overload.

**Specification:**

- Overall size: 180 x 140 x 80mm
- Weight: 1.3kg
- Sensitivity: 100,000 ohms per volt DC  
10,000 ohms per volt AC
- Accuracy: DC:  $\pm$ 3% of full scale deflection  
AC:  $\pm$ 4% of full scale deflection  
 $h_{FE}$  &  $I_{CO}$ :  $\pm$ 5% of full scale deflection
- Ranges:
  - DC Volts: 0.5, 2.5, 10, 50, 250, 1000
  - AC Volts: 5, 10, 50, 250, 1000
  - DC Current: 10 $\mu$ A, 25 $\mu$ A, 500 $\mu$ A, 5mA, 50mA, 500mA, 10A
  - AC Current: 10A
  - Resistance: 0-5k $\Omega$  (20 $\Omega$  at centre of scale)  
0-50k $\Omega$  (200 $\Omega$  at centre of scale)  
0-5M $\Omega$  (20k $\Omega$  at centre of scale)  
0-50M $\Omega$  (200k $\Omega$  at centre of scale)  
(Minimum reading 0.2 $\Omega$ )
- Decibels: -10dB to +62dB in five ranges



Transistor  $h_{FE}$ : 0 to 500 (NPN and PNP)  
Tester:  $I_{CO}$ : 0 to 50 $\mu$ A (NPN and PNP)

Supplied complete with instruction leaflet, a pair of test leads with probes, a set of three leads terminated in insulated crocodile clips for use with transistor tester, and two batteries (replacement type HP11). The meter has a carrying handle.

Order As YB87U (100k $\Omega$  Multitester)

**DIGITAL MULTIMETER MODULE**

**Digital Multimeter Module Kit**

A very high quality precision digital multimeter supplied with detailed building instructions. The finished module is designed to be connected directly to our pcb's for the 7106 or 7107 integrated circuits and an LED or LCD display.

**Specification**

- Overall size completed board: 114 x 83mm
- Overall depth excl. controls bush and spindle: 48mm
- Accuracy:
  - DC Volts
    - 200mV range:  $\pm$ 0.2% of reading  $\pm$ 1 digit\*
    - other ranges:  $\pm$ 0.5% of reading  $\pm$ 1 digit
  - AC Volts
    - 200mV range:  $\pm$ 1% of reading  $\pm$ 3 digits
    - other ranges:  $\pm$ 1% of reading  $\pm$ 2 digits
  - DC Current
    - all ranges:  $\pm$ 1% of reading  $\pm$ 1 digit
  - AC Current
    - all ranges:  $\pm$ 2% of reading  $\pm$ 3 digits
  - Resistance
    - all ranges:  $\pm$ 1% of reading  $\pm$ 1 digit

**Ranges**

- AC and DC Volts
  - 100 $\mu$ V to 200mV; 1mV to 2V; 10mV to 20V;
  - 100mV to 200V; 1V to 1000V.
- AC and DC Current
  - 100nA to 200 $\mu$ A; 1 $\mu$ A to 2mA; 10 $\mu$ A to 20mA; 100 $\mu$ A to 200mA; 1mA to 2A.

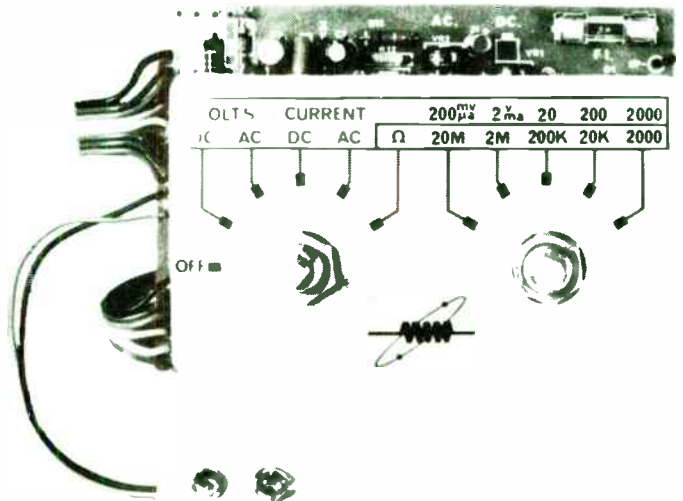
**Resistance**

- 1 $\Omega$  to 2k $\Omega$ ; 10 $\Omega$  to 20k $\Omega$ ; 100 $\Omega$  to 200k $\Omega$ ; 1k $\Omega$  to 2M $\Omega$ ;
- 10k $\Omega$  to 20M $\Omega$

**Diode Test**

On 2k $\Omega$  range - meter reads junction volts at approx. 1mA forward current.

\* Depends on users reference standard.



One adjustment sets *all* the AC ranges to quoted accuracy and another single adjustment sets *all* the DC ranges to quoted accuracy. The resistance ranges zero automatically.

Supplied complete with detailed instruction leaflet and a peel-off self adhesive front panel label printed black on silver. Two knobs will be required of your choice and a box to mount this and the display.

Order As YB27E (Digital Multimeter Kit)

**Digital Multimeter Module Ready-Built**

The kit described above is also available ready-built and calibrated, for direct connection to our pcb's for 7106 or 7107 and LED or LCD display.

Order As YB28F (DMM Module)



## DIGITAL FREQUENCY METER



A very high quality ready-built digital frequency meter capable of measuring frequencies from 10Hz to 500MHz. The six digit LED readout gives accurate frequency counting across the whole range.

Specification:	L/HF Input	UHF Input
Input impedance:	250Ω	50Ω
Input sensitivity:	<math>\leq 50\text{mV rms}</math>	100mV rms
Max input voltage:	250V DC, 5Vp-p signal	25V DC, 5V p-p signal.
Input frequency range:	10Hz to 50MHz	20MHz to 500MHz
Oscillator frequency:	3.276800MHz	
Oscillator stability:	Better than 0.5ppm/ C	
Readout definition:	Switchable	Switchable
	100's, 10's, 1's of Hz	1000's, 100's, 10's of Hz
	(All readings to +1.0 on right-hand digit)	
Power supply	240V AC or 12V DC	

Supplied with full operating instructions, mains lead, DC input plug, 2 BNC plugs for input sockets.

Order As XY05F (500MHz Frequency Counter)

## CONTINUITY PROBE



A quick and simple to use continuity probe. Fix crocodile clip to one side of wire, component, transformer winding, motor winding etc. probe to other side and if lamp in tester lights there is continuity. Requires two HP7 batteries (not supplied). Overall length: 175mm. Length of lead: 750mm. Caution: Switch power off before testing.

Order As FY88V (Continuity Probe)

## LOGIC PROBE



A logic probe for use with DTL, TTL and CMOS IC's. Simply connect crocodile clips to power supply for IC's to be tested (up to 18V max) then touch probe on pin to be tested. If a high level (logic 1) is present, red lamp lights; if a low level (logic 0) is present, clear lamp lights. Supplied with 900mm lead.

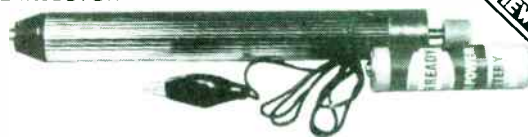
**Specification:**

Voltage range:	4.5V to 18V
Max supply voltage:	0 to 18V DC
Input impedance:	>100kΩ
Supply current:	35mA at 18V
Min detectable pulse width:	20ms

Probe is protected against input overload, negative input and reverse polarity supply voltage. Probe has grey plastic body with finger guard. Overall length: 195mm. Dia: 15mm

Order As FY73Q (Logic Probe)

## SIGNAL INJECTOR



A signal injector to speed up trouble shooting on all types of electrical and electronic equipment. Supplied with instructions on box, and battery (replacement type HP7)

Order As FL61R (Signal Injector)

## IC TEST CLIP

A very useful tool for testing dual-in-line IC's up to 16-pin. Simply clip the spring-loaded tool over the IC in situ and connect test probes, clips etc. to the pins at the top.



Size: 45 x 22mm.  
Order As FY74R (IC Test Clip)

## I.C. INSERTION TOOL

A high quality tool which makes inserting integrated circuits one simple operation. No more complicated alignment of pins or handling problems.



Order As FR25C (Insertion Tool)

## OSCILLOSCOPES

Two superb, high quality, British made portable oscilloscopes ideal for constructors, schools and service engineers. These scopes have excellent accuracy, yet are extremely simple to use. They are recommended by many education authorities in the UK for technical colleges, schools and universities, and are widely used in industry.

### Features:

**Trigger Control** – no complicated adjustment to stabilise the trace; the advanced circuit design produces *rock steady triggering* at all sweep speeds – with simple and complex waveforms – including composite video at TV line rate. Trigger level and polarity combined in one continuously variable control that gives you precise control of the point of triggering, which can be anywhere in the waveform.

**Trace Locate:** If you can't find the signal, simply press the "trace locate" button and the trace automatically returns to the screen irrespective of the control settings.

**Direct Calibration:** No variables – simply click to the desired range and make the measurement.

These features are unique compared to any scope in this price range, and make these oscilloscopes truly remarkable value for money.

### SINGLE-BEAM OSCILLOSCOPE

DC to 6MHz operation.  
10mV/cm to 50V/cm (measurements can be made from 2mV to 300V DC or peak AC).  
Timebase 1μs/cm to 100ms/cm.  
External trigger facility.  
External input for Lissajous and phase comparison.  
All solid state circuitry.  
Input – standard 4mm sockets.  
Precise control of trigger point.  
Non-reflective graticule for easy measurement.  
Trace locate button.  
X-Y position controls colour coded.  
Instant ground reference gives accurate dc measurements.



Continued on next page

## SINGLE BEAM OSCILLOSCOPE (continued from page 186)

### Vertical Deflection System.

Sensitivity: 10mV/cm to 50V/cm in 12 calibrated ranges.  
 Bandwidth: DC coupled – DC to 6MHz (–3dB). AC coupled – 3Hz to 6MHz (–3dB).  
 Input coupling: AC, DC, Ground.  
 Input impedance: 1MΩ + 35pF approx.  
 Input sockets: 4mm (19mm between centres).  
 Risetime: 60ns approx.  
 Accuracy: ± 5%.  
 Maximum input voltage: 400V DC + AC peak to 10kHz.  
 Controls colour coded RED.

### Horizontal Deflection System

Sweep speeds: 1μs/cm to 100ms/cm in 16 calibrated ranges.  
 Accuracy: ± 5%.  
 External sensitivity: 1V/cm approx.  
 External bandwidth: DC to 100kHz.  
 Max. external input: 250V (DC + AC peak to 3kHz).  
 Controls colour coded BLUE.

### Trigger Circuit

Sources: Internal; external.  
 Sensitivity: Internal: 5mm, 10Hz to 1MHz rising to 1.5cm at 6MHz.

External: 200mV, 10Hz to 1MHz rising to 500mV at 6MHz.  
 Bright line auto: Trace free runs in absence of trigger signal at all sweep speeds (facility to disable).  
 External selection: Automatically selected when 4mm plug is inserted into input socket.  
 Max external input: 250V (DC plus AC peak to 3kHz).  
 External input socket: 4mm socket.  
 Trigger level and polarity: Both functions selectable on one continuously variable control.

Control colour coded YELLOW.

### General Information.

Trace focus and brightness controls.  
 Graticule ruled 6cm x 8cm.  
 Cathode ray tube with medium persistence phosphor.  
 Dimensions (excl handle): Height 217mm (8½in). Width 159mm (6¼in). Depth 306mm (12in).  
 Weight: 4.5kg (10lb).  
 Power: 105 to 125 and 210 to 250V AC 48 to 60Hz, 15VA.

Supplied with detailed operating instructions and data. For suitable probe see next page.

Order As **XB82D** (Calscope Super 6) *Delivery by Securicor*

## DUAL BEAM OSCILLOSCOPE



DC to 10MHz operation.  
 10mV/cm to 50V/cm (measurements can be made from 2mV to 300V DC or peak AC).  
 Timebase 1μs/cm to 100ms/cm plus X5 multiplier.  
 External trigger facility.  
 TV Field trigger  
 All solid state circuitry.  
 Input on BNC socket.  
 Precise control of trigger point.  
 Non-reflective graticule for easy measurement.  
 Trace locate button.  
 Instant ground reference gives accurate dc measurements.

### Full specification:

Vertical deflection amps 'A' and 'B'.  
 Sensitivity: 10mV/cm to 50V/cm in 12 calibrated ranges.  
 Accuracy: ± 3%.  
 Bandwidth: DC coupled – DC to >10MHz (–3dB). AC coupled – <3Hz to >10MHz (–3dB).  
 Rise time (calculated): 35ns approx.  
 Overload protection: Max 400V (DC plus peak AC to 3kHz).  
 Input impedance: 1MΩ ± 3% and 33pF approx.  
 Modes: 'A' channel only – ALT (Alternate) – CHOP (approx 100kHz).

Input socket: BNC.  
 Horizontal deflection system.  
 Sweep speeds: 1μs/cm to 100ms/cm in 16 calibrated ranges.  
 Magnifier: Calibrated X5.  
 Accuracy: ± 3%.  
 Sweep output: 10V negative-going sawtooth symmetrical about earth  
 External sensitivity: 1V/cm (200mV/cm magnified).  
 External bandwidth: DC to 500kHz.  
 External input impedance: 1MΩ approx and 20pF approx.  
 Max external input: 250V DC plus peak AC to 1kHz.  
 Trigger Circuit.  
 Sources: External input – 'A' channel – power line frequency.  
 Modes: Normal and TV frame.  
 Sensitivity: Internal: 5mm minimum 10Hz to 1MHz rising to 1.5cm at 10MHz  
 External: 300mV peak to peak 30Hz to 5MHz  
 600mV peak to peak 10Hz to 10MHz.  
 Input impedance: 220kΩ approx. and 20pF approx.  
 Max input: 250V DC plus AC peak to 1kHz.  
 Bright line auto: in absence of trigger signal at all sweep speeds (facility to disable).

### General Information.

Trace focus and brightness controls.  
 Graticule ruled 6cm x 8cm.  
 Dimensions (excl handle): Height 153mm (6in). Width: 312mm (12¼in). Depth 363mm (14.3in).  
 Weight: 6kg (13¼lbs)  
 Power: 105 to 125 and 210 to 250V AC 50 to 60Hz, 25VA.

Supplied with detailed operating instructions and data. For suitable probe see next page.

Order As **XB83E** (Calscope Super 10) *Delivery by Securicor*

If it becomes necessary to return the scope to us for repair or service under guarantee or otherwise DO NOT send it to us by post. Write to us giving suitable dates and we will arrange for collection from your door.

## PROBE FOR OSCILLOSCOPES



A very high quality probe suitable for use with almost any oscilloscope. Probe has a slide switch on body for immediate selection of either times 10 or times 1 or ground for instant position reference.

### Specification

Bandwidth: DC to 70MHz  
 Rise time: <5ns  
 Overshoot: <3%  
 Switch functions: 10:1 attenuation,  $\pm 1\%$  with 'scope of  $1M\Omega$  input resistance.  
 1:1 attenuation with bandwidth of 10MHz approx.  
 Reference position, tip grounded via  $9M\Omega$ , 'scope input grounded.  
 Input capacitance: 12pF typical, depending on 'scope input capacitance.  
 Compensation range: May be used with 'scopes of up to 45pF input capacitance by adjusting trimmer in probe body. Trim tool supplied.  
 Working voltage: 500V DC, 350V AC rms.

The probe is supplied with an ultra-flexible screened lead fitted, and an earth lead with crocodile clip attached. Lead is 1.2m approx. long.

Supplied in strong seal-top plastic wallet with accessories: retractable sprung hook with fully insulating sleeve, insulating tip, IC test tip, trimming tool and BNC adaptor (BNC type only).

Available in two types. BNC type (suits most 'scopes including Calscope Super 10) is terminated in a standard BNC plug, 4mm type (suits Calscope Super 6) is terminated in a 4mm double plug.

Order As **BW05F (Scope Probe BNC)**  
**BR89W (Scope Probe 4mm)**

## 12V CAR CLOCK MODULE MA1003

A clock module designed to be operated from a 12V battery. It is ready assembled complete with display and crystal, and requires only two push switches and a 12V battery to operate it.

### Features.

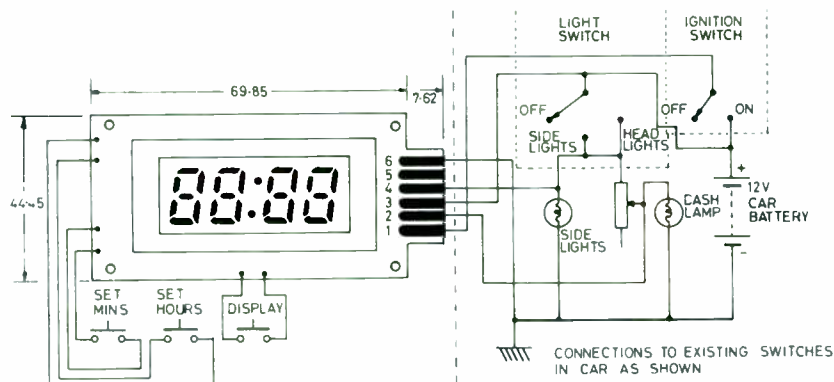
- \* Operates on 12V DC supply.
- \* Bright 0.3in green display.
- \* Internal crystal timebase.
- \* Protected against battery reversals and charging surges.
- \* Timekeeping maintained down to 5V.
- \* Timekeeping power consumption (display off) less than 5mA.
- \* 12-hour display.
- \* Colon blinks at 1Hz rate.

Clock module contains a 4-digit 0.3in green vacuum fluorescent display, a 2.097MHz crystal and several other components to form a ready assembled 12V car clock. When ignition is turned off, display is blanked to avoid wasted power. With side-light or headlights switched on, display brightness is reduced by 36%. If dash lamp

dimmer is fitted, display brightness can be made to follow dash brightness. Time setting is controlled by two push switches. 'Hours advance' moves the hours display forward by one hour per second. 'Minutes advance' moves the minutes display forward by one minute per second and count does not affect hours display if count goes through 59-00-01. A third push switch may be fitted which lights the display to full brightness when the ignition is off and the side or headlights are on. Time setting push switches do not function when ignition is off to prevent tampering. The display-on push switch is particularly desirable for portable use where module is to be operated from dry batteries.

### Characteristics

Power supply (timekeeping maintained):	5V to 24V DC
Power supply current:	Display blanked 1mA to 5mA 50% brightness (10:08) <100mA 100% brightness (10:08) <105mA



Order As **XL07H (Car Clock Module MA1003)**

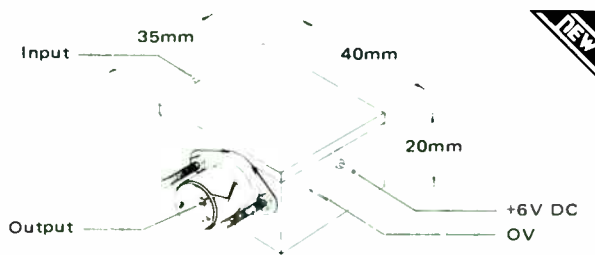


**UHF MODULATOR**

A UHF modulator suitable for 6V operation. The output is designed for UHF 625-line TV sets and is prealigned and pre-tuned at around channel 31. The input is DC-coupled and requires approximately 1V peak-to-peak video plus 0.4V peak-to-peak synchronisation pulses.

The signal is inverse modulated to suit British TV standards. A stabilised 6V supply is required at around 5mA.

Order As **XX05F** (UHF Mod No. 1)



**SAM 77**

The SAM 77 is a CMOS integrated circuit that provides 7-stages of division in one 14-pin DIL package. Twelve SAM 77's driven from one master oscillator e.g. the DMO2T will provide all the basic tone sources for an electronic organ having 8 octaves (97 notes).

The input of the SAM 77 has a Schmitt trigger so that sine or square wave inputs may be used. The amplitude of the input signal must not exceed the voltage difference between pin 7 and pin 1. The input draws 30µA from the source when  $V_{in} = OV$  (low) and less than 1µA when  $V_{in}$  is high.

**Specification**

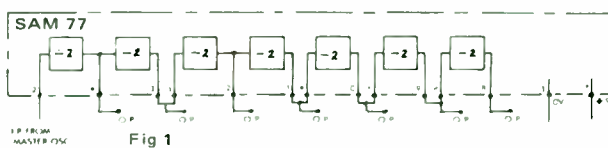
Supply voltage (pin 7):	+5V to +15V (pin 1=OV)
Supply current:	5µA ( $V_{DD} = 5V$ ) 10µA ( $V_{DD} = 10V$ ) 50µA ( $V_{DD} = 15V$ )
Output current (low):	0.8mA ( $V_{DD} = 5V, V_O = 0.5V$ ) 1.6mA ( $V_{DD} = 10V, V_O = 0.5V$ ) 2.5mA ( $V_{DD} = 15V, V_O = 0.5V$ )
Output current (high):	-0.8mA ( $V_{DD} = 5V, V_O = 4.5V$ ) -1.6mA ( $V_{DD} = 10V, V_O = 4.5V$ ) -2.5mA ( $V_{DD} = 15V, V_O = 4.5V$ )
Propagation delay (per division stage):	500ns ( $V_{DD} = 5V$ ) 250ns ( $V_{DD} = 10V$ ) 2.5MHz ( $V_{DD} = 5V$ ) 5MHz ( $V_{DD} = 10V$ )
Max. input frequency:	2.5MHz ( $V_{DD} = 5V$ ) 5MHz ( $V_{DD} = 10V$ )
Crosstalk (one stage to another):	70dB (with 5kΩ, 50pF load)

Input capacitance: 5pF  
Power dissipation: 200mW

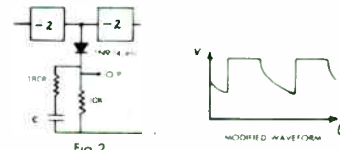
For square wave output connect as Fig. 1.

For sawtooth wave output connect as Fig. 2.

Order As **QL02C** (SAM 77)



STAGE OF DIVISION	VALUE OF C (POLYESTER)
1st	0.01
2nd	0.022
3rd	0.047
4th	0.1
5th	0.15
6th	0.1
7th	0.48



**PIN CONNECTIONS**

(Shown from above)



**DIGITAL MASTER OSCILLATOR**

**DMO2 Mk II**

**Features:**

- 13 Master Frequencies on one tiny circuit board.
- Each frequency digitally derived from a SINGLE h.f. master oscillator.
- Master oscillator temperature compensated to give negligible drift.
- Initial tuning for the WHOLE ORGAN: ONE SIMPLE ADJUSTMENT.
- Relative tuning NEVER DRIFTS.
- External control (optional) allows instant tune-up to other musicians.
- Outputs will directly drive CMOS or MOS dividers, the SAJ110 or TTL directly. At the same time outputs may be used as direct tone sources.
- Variable depth and rate frequency shift tremulant (optional extra).
- Plug-in edge connexion gold-plated.
- Complete fibre glass board, built and tested and including tremulant (if required) ONLY 3.7 x 3.75ins.
- Fully guaranteed against faulty manufacture.

The DMO2 is a top octave frequency generator intended primarily for electronic organs. The outputs act as direct tone sources for the top thirteen notes of an organ and these notes (excluding the top note) also act simultaneously as tone sources for the divider chain feeding all the other notes on the organ.

The DMO2 Master oscillator frequency is extremely stable, but if playing with other musicians it is advisable to allow the DMO2 to warm up for about five minutes. If playing solo this slight drift after switch on will be completely inaudible. After five minutes the typical frequency drift is 0.04%: Considerably less than most stringed instruments and their players will find it most useful to have such a stable frequency to tune up against.

The external tuning potentiometer (optional extra) has a range of +1 semitone, which coupled with the preset potentiometer on board gives ample range.

The DMO2 will generate the frequencies of any C to C octave of 13 notes and has a maximum top frequency of 9kHz or lowest frequency of 15Hz.

The tremulant provided on the DMO2T has a variable rate and depth. The rate is variable between 1Hz and 8Hz and the depth is variable up to +½ semitone.

The thirteenth note (pin 12) has slightly different output characteristics from the other twelve notes, but any output will drive one divider (of almost any kind) and up to ten 100k distribution resistors without buffers of any kind.

The output voltage with no load (open circuit) is around 11V peak to peak square wave except for the thirteenth note which is 15V peak to peak. All outputs have a balanced 3k5 impedance.

With one SAJ110 and one direct tone source the output voltage is reduced to around 10V peak to peak, on all outputs.

With one TTL (e.g. SN7493) and one direct tone source the voltage on all outputs is around 6V peak to peak.

With MOS dividers it is necessary to load the thirteenth note (pin 12) by connecting a MIN RES 6k8 between pin 12 and earth. If you are driving more than one tone source directly (as well as the MOS divider) the load resistor should be calculated such that the total load across the output is around 6k6. The other outputs may be used to drive the MOS divider and distribution resistors directly without the need for any load resistors.

The accuracy of the frequency generated with respect to any other frequency generated is extremely high. For maximum accuracy tune G# to the exact frequency it should be, then no other note will be more than 0.08% out of tune. The table below shows the actual frequency generated with 'A' tuned to the international standard 440Hz. For frequencies of other octave ranges multiply or divide every frequency by two. *Continued on page 190*

**DMO2T** (continued from page 189)

Note	Frequency of DMO	Frequency on Equal Tempered Scale	Percentage error
C4	261.42	261.62	-0.076%
C#4	277.07	277.19	-0.043%
D4	293.33	293.66	-0.112%
D#4	310.84	311.12	-0.099%
E4	329.71	329.62	+0.027%
F4	349.05	349.23	-0.052%
F#4	369.70	370.00	-0.081%
G4	391.72	392.00	-0.071%
G#4	415.15	415.31	-0.039%
A4	440.00	440.00	0%
A#4	466.27	466.16	+0.024%
B4	493.91	493.88	+0.006%
C5	522.84	523.24	-0.076%

By linking the pins as shown in Fig. 5 and adjusting the two on-board preset potentiometers it is possible to set the DMO to generate any range of C to C from C<sub>0</sub> to C<sub>1</sub> up to C<sub>8</sub> to C<sub>9</sub>. Tune preset A to the required frequency and check that every note plays cleanly. If any note is harsh, has no sound output, or is intermittent, adjust preset B until all the notes play correctly. Thus with a set of DMO's it is possible to construct a free phase organ requiring minimal adjustment. Each octave can have its own DMO and with DMO2T's each one can have its tremulant set at a different rate producing (with good tone colouring) one of the most pleasing sounds possible with an electronic organ. The power supply in Fig 1 will drive up to ten DMO's. The slight drift inherent in the DMO is essentially a drift with temperature change, but even this will only be noticeable in a free phase organ. If possible stack the DMO's upright side by side so that any heat rises through all the DMO's ensuring that each one drifts by the same amount. Thus the whole organ will drift together and this slight change will be inaudible.

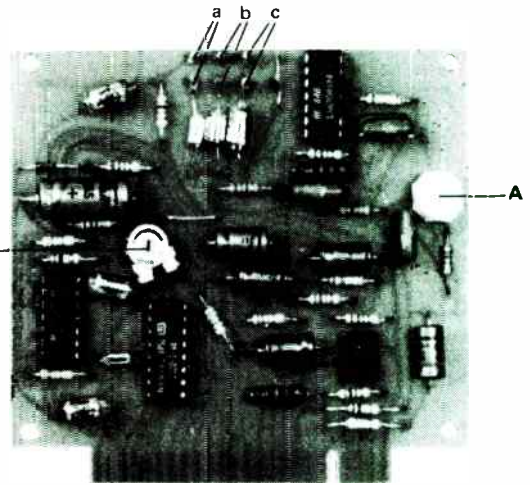
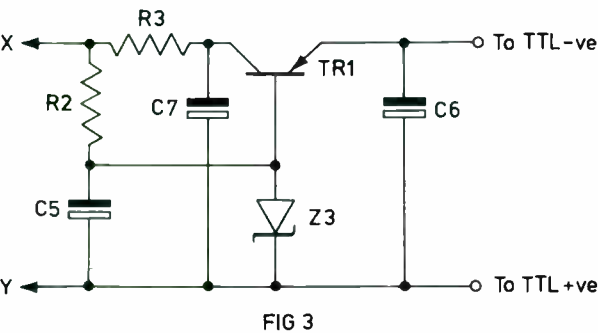
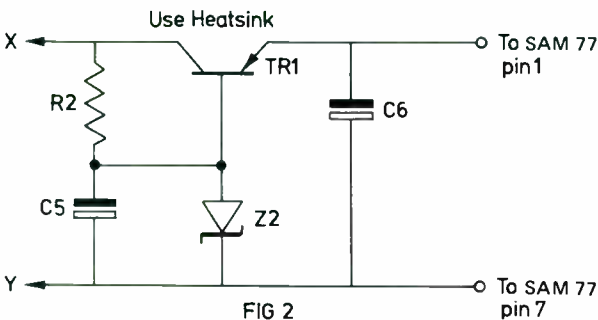
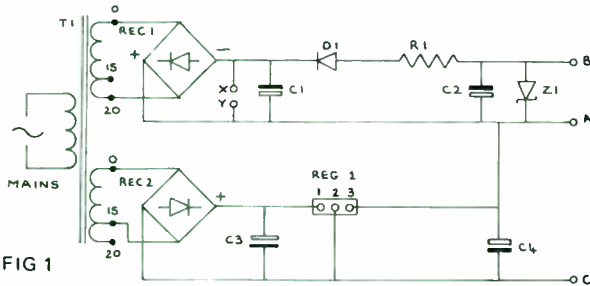


Fig. 1 shows a power supply suitable for driving the DMO and when coupled with Fig. 2 has sufficient power to drive twelve SAM 77's, as well. Fig. 3 shows a suitable addition to Fig. 1 for driving up to 21 TTL SN7493's. Note that neither Fig. 2 or Fig. 3 incorporate short circuit protection so care should be taken to ensure that an accidental short circuit never occurs between E and A or TR1 will be destroyed immediately.

Fig. 4 shows where to connect the external control potentiometers.

If you wish to cut out the tremulant altogether on the DMO2T connect a link between pins 1 and 10. Note that it will not be possible to remove the tremulant altogether unless a fully stabilised power supply such as Fig. 1 is used.



- |                        |                       |                      |                   |
|------------------------|-----------------------|----------------------|-------------------|
| <b>Component List:</b> |                       | C7                   | Axial 2200µF 40V  |
| R1                     | Std Res 120Ω          | D1                   | Diode 1N4002      |
| R2                     | Std Res 1kΩ           | Z1                   | BZY88C27          |
| R3                     | W/W Min 22Ω           | Z2                   | BZX61C9V1         |
| R4*                    | Min Res 150Ω          | Z3                   | BZX61C5V6         |
| RV1*                   | Pot Lin 1k            | TR1                  | BD132             |
| RV2*                   | Pot Lin 47k           | REC1                 | WO4 Bridge        |
| RV4*                   | Vert S-Min Preset 10k | REC 2                | WO4 Bridge        |
| C1                     | Axial 680µF 40V       | REG 1                | µA78M15UC Plastic |
| C2                     | Axial 470µF 40V       | T1                   | TR 20V 1A         |
| C3                     | Axial 1000µF 25V      | <b>Also required</b> |                   |
| C4                     | Axial 10µF 25V        | 1                    | Kit P Plas        |
| C5                     | Axial 220µF 40V       | 1                    | Kit TO126         |
| C6                     | Axial 10µF 25V        | 1                    | Heatsink 10DN     |

(TR1 and REG 1 can both be mounted on the one heatsink).

\*These parts are supplied free with the DMO2T and are not required with the DMO2.

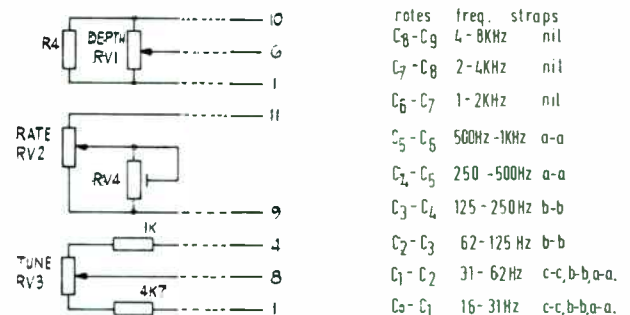


FIG 5

FIG 4

Continued on next page

**DM02T** (continued from page 190)

**DM02(T) outputs**

Output Pin	Function
1	OV line. Connect to A on the power supply.
2	27V line. Connect to B on power supply.
3	Spare.
4	-15V line. Connect to C on power supply.
5	Location slot.
6	Wiper of "depth" control (DM02T only).
7	Spare.
8	Wiper of "tune" control.
9	Wiper of "rate" control (DM02T only).
10	Top end of "depth" control track (DM02T only).
11	Top end of "rate" control track (DM02T only).
12	Lower C output.
13	D output.
14	D# output.
15	F output.
16	F# output.
17	A output.

18	A# output.
19	G output.
20	G# output.
21	B output.
22	Upper C output.
23	E output.
24	C# output.

The DM02(T) requires a -15V supply at typically 50mA and a +27V supply at typically 10mA.

The tune control shown in Fig. 4 is an optional extra and allows the DMO to be fine-tuned from the organ console. If you want this facility you will require the following parts:

- 1 x Pot Lin 10k (RV3)
- 1 x Min Res 1kΩ
- 1 x Min Res 4.7kΩ

Order As **XB10L (DM02)**  
**XB11M (DM02T)**

**SPRING-LINE UNITS AND DRIVER MODULE**

This high quality reverberation system may be used with any electronic musical instrument to give a diminishing echo effect similar to that heard in large concert halls and cathedrals. Bring your music alive with the "concert hall sound" in your own living room.

This complete reverberation system with a choice of two spring lines is described below.

**SHORT SPRING-LINE UNIT**



- Overall length 206mm
- Two 145mm long springs.
- \*Reverb. time: 2.5 to 3secs.
- Max. delay time: 25 to 35msec.
- Drive coil impedance: 16ohms.
- Output coil impedance: 10kohms.

Order As **XL08J (Short Spring Line)**

**LONG SPRING-LINE UNIT**



- Overall length 432mm
- Two 355mm long springs.
- \*Reverb. time: 7secs.
- Max delay time: 35 to 45msec.
- Drive coil impedance: 8 ohms
- Output coil impedance 2.8kohms.

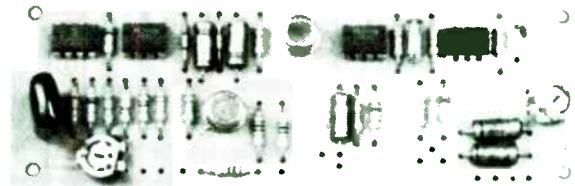
Order As **XB84F (Long Spring Line)**

**Note:**

On both lines the negative of the output is connected to the case. Do not connect any separate earth to the case; it is earthed through the driver module.

\*Reverb time is the time taken for the output to fall 60dB after disconnection of the input.

**DRIVER MODULE**



The MES Driver Module is a spring-line driver using four integrated circuits. It may be used to drive most types of spring-line. A straight through amplifier is provided having a linear frequency response and an intrinsic gain of approximately 23dB. Part of the signal is tapped off, amplified and used to drive the spring-line. The output of the spring-line can then be mixed with the straight through signal to give the desired amount of reverberation. The balance control allows the output to be continuously variable between straight through only with no reverberation, and all reverberated sound with no straight through sound present.

Most types of electronic musical instrument may be directly connected and the output taken to either a pre-amplifier or power amplifier. However, low-level microphones, magnetic cartridge record-players, and a direct output from a tape head on a tape-recorder will need amplifying (in some cases with special characteristics) before connection. If one of these latter sources is being used, the best place for connection of this unit is between your pre-amplifier and power amplifier.

**Technical Details:**

- Supply voltages +15V +2V smoothed at 20mA max (typical 15mA) and -15V +2V smoothed at 20mA max (typical 15mA)
- Input sensitivity (for max output) 35mV RMS.
- Max input (before overload with input level control almost fully clockwise) 350mV.
- Output level (max) 500mV RMS.
- Output impedance: Low.
- Straight through frequency response: 15Hz to 15kHz +0dB -3dB (ref: 1kHz = 0dB).

**MES Reverb Driver Module**

Includes:

- 1 Printed circuit board ready built and tested.
- 1 Balance control.
- 2 Mono jack sockets.
- 2m Screened cable.
- 1m Twin screened cable.
- 1m Each of seven different colour connection wire.
- 1 Installation instruction sheet.

Order As **XB85G (MES Driver Module)**

Please turn to next page for details of a suitable power supply for this module.



## POWER SUPPLY FOR MES DRIVER MODULE

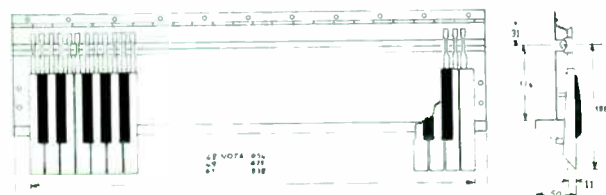
A simple power supply capable of driving the reverb module is shown below:



### Parts list for suggested power supply

Transformer: Sub Min Tr 12V	1
Diode: 1N4001	2
Resistor: MIN RES 22Ω	2
Axial capacitor: 470µF 25V	2
Zener diode: BZX61 C15V	2

## KEYBOARDS



High quality keyboards having hard-wearing plastic keys (white naturals and black sharps) mounted on nylon-bushed steel levers. Keys are mounted on a pressed steel frame with adjustable return springs on each key. The entire keyboard is hinged along the back to facilitate simple contact maintenance after the keyboard is fitted.

48 note F to E with flat fronted keys.

Order As **XB14Q** (Keyboard 48-note)

49 note C to C with modern sloping fronted keys.

Order As **XB15R** (Keyboard 49-note)

61 note C to C with modern sloping fronted keys.

Order As **XB16S** (Keyboard 61-note)

Replacement plastic keys are available should any keys be damaged. To replace key, tap on the front and lever off with a screwdriver at the rear. Glue new key cover on to lever with Araldite.

## MOUNTING STRIPS

Strips of undrilled SRBP for mounting contact blocks on our keyboards. Each strip measures approx 169 x 51mm and covers one octave thus four strips are required on the 48 or 49 note keyboards and 5 strips are required on the 61 note keyboard. Use a strong adhesive (e.g. Araldite) to glue the strips to the keyboard and the contact blocks to the strips.

Order As **XB13P** (KB Mounting Strip)

## LOW-COST KEYBOARD



An economically priced keyboard having plastic keys pivoted on a hard-wearing moulded fulcrum. It is similar in size to the 49-note keyboard described above except that it is not quite so deep (front to back).

Order As **XB17T** (Moulded Kbd 49-Note C to C)

## CONTACT BLOCKS



Picture shows Contact Block GB2 with Earth Bar fitted.

Contact blocks made of laminated bakelite thus giving smooth walls to the slots and allowing completely free movement of the contact wires. The contact wires are gold-clad phosphor-bronze and are spaced in the slots at 0.04in pitch. Body length is 36.5mm and wire contacts overhang by 24mm max. A hole is provided in the block to allow the palladium earth bar to be threaded through.

The 1WG contact block has holes for two earth bars and the single wiper then makes and breaks between the two bars. It is intended primarily for use on touch-sensitive pianos. The following types are available. Single wire, 1-pole changeover, 2-pole make, 3-pole make.

Order As <b>XB94C</b>	(Contact Block 1WG)
<b>XB01B</b>	(Contact Block GJ)
<b>XB02C</b>	(Contact Block GB2)
<b>XB03D</b>	(Contact Block GC3)

## PALLADIUM EARTH BAR

Palladium plated copper bar (18 swg) has a non-corroding hard-wearing surface (replaces Rhodium) for use as earth bar on organ key contact. (7in lengths nominal).

Order As **XB04E** (Earth Bar)

## GOLD CONTACT WIRE

Gold-clad phosphor-bronze wire suitable for making contacts on keyboards. Gold-cladding eliminates oxidation and gives long lasting and reliable contact.

0.4mm dia (27 swg). Supplied in 1 metre lengths only.

Order As **XB00A** (Gold Wire)

The Gold Wire is ideal for constructing single make contacts since contact blocks are relatively expensive though much easier to adjust where there is more than one contact. The Gold Wire makes a simple but effective contact and can be used with our keyboards as follows:

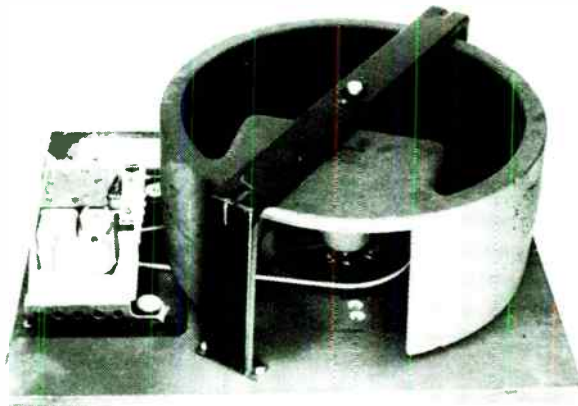
Cut a piece of SRBP 0.1 in into 0.8in. x 6in. pieces (one SRBP 0.1in. is sufficient for one 49-note keyboard) and mount each one on the keyboard by means of four Self-tapper No. 4 ½in. These can be screwed into the holes provided in the keyboard chassis and the SRBP is held off the chassis using 4BA Spacer ¼in. The screw holes in the SRBP may be made with an ⅛ in drill bit.

Cut two 2in pieces of Gold Wire (6 metres of Gold Wire is enough to make single pole contacts under 49 notes) lay one end of one piece on the unoperated nylon key plunger and thread the other end through two or three holes in the SRBP Board to hold it firmly in position. Fix the second piece of wire to the SRBP board in the same way so that its other end just reaches the key plunger. With a pair of wiring pliers put a 90° bend in the wire about a ¼in from the plunger so that this wire lies across the first wire at 90°. Now gently bend the wire away from the straight wire until the point is reached where the first wire makes with it again when the key is depressed about two-thirds of its total travel. The ends of the wires can be left sticking up through the SRBP to facilitate soldering.

## SPACESOUND SYSTEM

A two-speed rotating baffle system which when used as part of an organ speaker system produces the famous "Leslie" effect. Both units are complete with motors capable of turning the baffle or horns at 1 revolution per second or 7 revolutions per second. The most pleasing effect is produced when a fixed main speaker remote from the rotating unit is used in conjunction with one or both of these units. The player can then switch between Spacesound not turning, Spacesound turning at 1 rps and Spacesound turning at 7 rps. Motors are 240V AC working and mains should be switched between the two motors to select the speed. Two types are available.

### Mid-range Spacesound



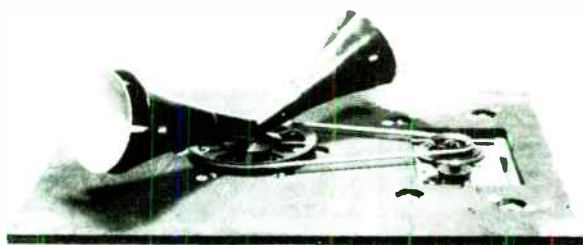
This unit is designed for use with a mid-range loudspeaker (loudspeaker is not supplied with unit) such as RD SPEAKER TYPE CM8208 etc or POP 50, DISCO 60 or any speaker larger than 8in up to 15in diameter.

To connect new speaker to existing organ speaker system, simply wire it directly across organ output with Reversolytic 47μF in series with one lead. (Remember to correctly polarise the loudspeakers).

Overall size 528 x 440 x 210mm high. (Speaker mounts underneath baseboard).

Order As **XB86T** (Spacesound Mid-Range) *Delivery by carrier*

### Treble Spacesound



This unit is designed for use with a special tweeter which is supplied with the unit.

To connect new speaker to existing organ speaker system simply wire it directly across organ output with a Polyester 2.2μF in series with one lead.

(Remember to correctly polarise the loudspeakers, positive is marked "8".) Overall size: 550 x 440 x 240mm high.

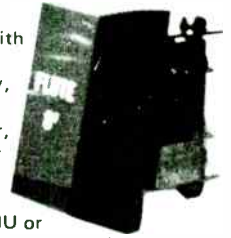
Tweeter which is supplied has 8Ω impedance and 50W power handling, and this is the only speaker available for use with this unit.

Order As **XB87U** (Rotating Horns Unit) *Delivery by carrier*

## STOP TABS

Rocker type stop tabs. DPDT switch with light noiseless action and plastic cover available in Black, Blue, Green, Grey, Ivory, Maroon, Orange, Red, White and Yellow.

The switch and cover are supplied together, but are not joined to facilitate engraving or labelling. To fix together glue carrier to switch and cover to carrier with any plastic glue e.g. Evostik Impact, Bostik, UHU or Airfix etc. It is most important that a very thin layer of glue is used.



### Order As

FL66W (Stop Tab Black)	FL71N (Stop Tab Maroon)
FL67X (Stop Tab Blue)	FL72P (Stop Tab Orange)
FL68Y (Stop Tab Green)	FL73Q (Stop Tab Red)
FL69A (Stop Tab Grey)	FL74R (Stop Tab White)
FL70M (Stop Tab Ivory)	FL75S (Stop Tab Yellow)

The covers engraved or unengraved are available separately. To order, use the code for switch and cover, write "Cover Only" to the left of the code on the order form and use the price shown against Covers Only on the price list.

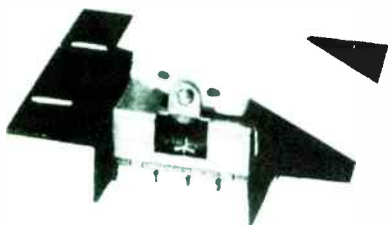
## ENGRAVED STOP TABS

The above stop tabs complete with switch and cover which is ready engraved. The following legends are available:

Order As	Engraving	Colour of Cover
BR05F	ACC DELTREM	Green
BR47B	BASS GUITAR	White
BR67X	BOURDON 8'	Black
BR06G	CELLO 16'	White
BR07H	CLARINET 8'	Grey
BR08J	CLARION 4'	Red
BY00A	CLAVICHORD	Green
BY01B	D/B TO ROTOR	Blue
BY02C	DELAY VIBRATO ACC	Green
BY03D	DELAY VIBRATO SOLO	Green
BR09K	DIAPASON 8'	Black
BR68Y	DIAPASON 16'	Black
BR10L	DRAWBARS ACC	Green
BR11M	DRAWBARS SOLO	Green
BR12N	DULCIANA 8'	Black
BR13P	FLUTE 1'	Red
BR14Q	FLUTE 2'	Red
BR15R	FLUTE 2 2/3'	Red
BR16S	FLUTE 4'	Red
BR17T	FLUTE 5 1/3'	Red
BR18U	FLUTE 8'	Red
BR19V	FLUTE 16'	Red
BR20W	FRENCH HORN 8'	Red
BR21X	GEDECKT 8'	Black
BY05F	GEDECKT 16'	Black
BY06G	HONKY TONK	Green
BR22Y	HORN 8'	Red
BY07H	MIXTURE 16'	Grey
BR23A	OBOE 8'	Grey
BR24B	OCTAVE 4'	Black
BR25C	PEDAL SUSTAIN	Green
BY08J	PIANO	Green
BY09K	PRESETS CANCEL	Blue
BY10L	PRESETS TO ROTOR	Blue
BY11M	REED 4'	Grey
BR26D	REVERB	Green
BY12N	ROTOR FAST	Blue
BY13P	ROTOR TO MAIN	Blue
BR27E	SALICET 4'	Black
BR28F	SALICIONAL 8'	Black
BR29G	SAXOPHONE 16'	Grey
BR30H	SOLO DEL TREM	Green
BR31J	STRING 4'	White
BR32K	STRING 8'	White
BR33L	SUB-BASS 16'	Black
BY14Q	SUSTAIN ACC	Green
BY15R	SUSTAIN SOLO	Green
BR34M	TREMULANT	Green
BR35O	TRUMPET 8'	Red
BR36P	TUBA 16'	Red
BY16S	VIBRATO	Green
BR37S	VOX ANGELICA 8'	Black
BR38R	VOX HUMANA 8'	Black

(Stop Tab plus Engraving)

## KEY TABS



A key type stop tab. DPDT switch with light noiseless action and plastic cover available only in white. The switch and cover are supplied together, but not joined to facilitate engraving or labelling. To fix, glue together using a plastic glue e.g. Evostik Impact, Bostik, UHU or Airfix etc.

Order As **FL76H** (Key Tab)

## MARBLE-EFFECT KEY TABS

*Note: These tabs are supplied with a high quality switch, not the switch shown in the picture.*



A very high quality key tab in highly polished marble-effect plastic. The tab is supplied with a very high quality switch with nickel silver contacts which are single pole changeover. The felt 'stops' on the switch are adjustable to give correct positioning of the tabs. The tabs may be fixed to the switch using our Quickstick Pads described on page 183 and these must be ordered separately.

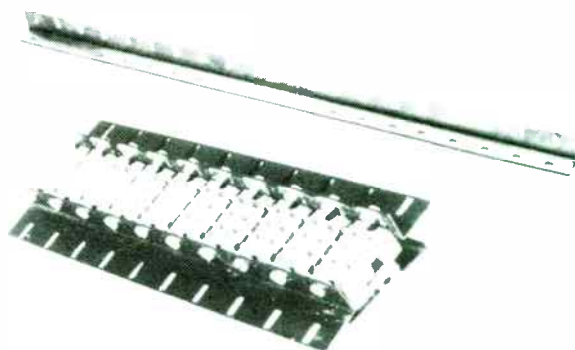
The tabs are available in various colours and with various legends engraved on them as follows:

Order As	Engraving	Colour of Cover
BY17T	CELLO 16'	Yellow
BY18U	CLARINET 8'	Red
BY19V	CLARION 4'	Red
BY20W	CLAVICHORD	Green
BY21X	D/B TO ROTOR	Black and Gold
BY22Y	DELAY VIBRATO ACC	Green
BY23A	DELAY VIBRATO SOLO	Green
BY24B	DIAPASON 8'	White
BY25C	DIAPASON 16'	White
BY26D	DRAWBARS ACC	Black and Gold
BY27E	DRAWBARS SOLO	Black and Gold
BY28F	DULCIANA 8'	Yellow
BY29G	FLUTE 1'	White
BY30H	FLUTE 2'	White
BY31J	FLUTE 2 3/4'	White
BY32K	FLUTE 4'	White
BY33L	FLUTE 5 1/2'	White
BY34M	FLUTE 8'	White
BY35Q	FLUTE 16'	White
BY36P	FRENCH HORN 8'	Red
BY37S	GEDECKT 8'	White
BY38R	GEDECKT 16'	White
BY39N	HONKY TONK	Green
BY40T	HORN 8'	Red

BY41U	MIXTURE 16'	Red
BY42V	OBOE 8'	Red
BY43W	OCTAVE 4'	White
BY44X	PEDAL SUSTAIN	Green
BY45Y	PIANO	Green
BY46A	PRESETS CANCEL	Black and Gold
BY47B	PRESETS TO ROTOR	Black and Gold
BY48C	REED 4'	Red
BY49D	REVERB	Green
BY50E	ROTOR FAST	Black and Gold
BY51F	ROTOR TO MAIN	Black and Gold
BY52G	SALICET 4'	Yellow
BY53H	SALICIONAL 8'	Yellow
BY54J	SAXOPHONE 16'	Red
BY55K	STRING 4'	Yellow
BY56L	STRING 8'	Yellow
BY57M	SUB-BASS 16'	White
BY58N	SUSTAIN ACC	Green
BY59P	SUSTAIN SOLO	Green
BY60Q	TRUMPET 8'	Red
BY61R	TRUMPET 16'	Red
BY62S	VIBRATO	Green
BY63T	VOX ANGELICA 8'	Red
BY64U	VOX HUMANA 8'	Red

(Marbled Key Tab plus Engraving)

## STOP TAB MOUNTING STRIPS

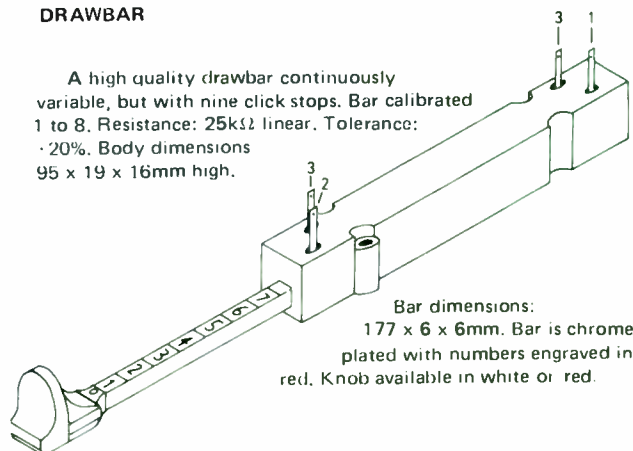


Fully drilled strips for mounting stop tabs and key tabs. Two strips (top and bottom) will hold 20 switches or one strip may be sawn in half to hold 10 switches etc. Stop tabs fit on the ST Strip and key tabs fit on the KT Strip. The marbled key tabs are best mounted directly onto a piece of wood, but they could be mounted on the ST Strip if desired.

Order As **BR46A** (ST Strip)  
**XX13P** (KT Strip)

## DRAWBAR

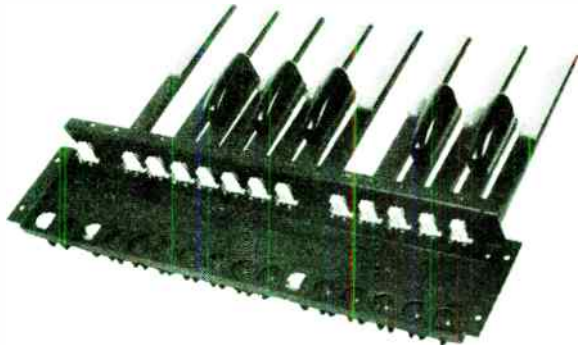
A high quality drawbar continuously variable, but with nine click stops. Bar calibrated 1 to 8. Resistance: 25kΩ linear. Tolerance: ±20%. Body dimensions 95 x 19 x 16mm high.



Order As **BR41U** (Drawbar Red)  
**BR42V** (Drawbar White)



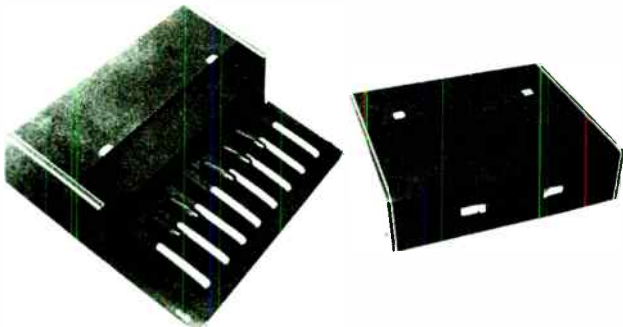
## PEDALBOARDS



A high quality 13-note C to C pedalboard. Notes are hard-wearing plastic-covered steel levers. Board is only available with double-pole changeover contacts fitted to each key.

Order As **XB18U** (Contact Pedalboard)

## FREE-STANDING PEDALBOARD



An attractively designed portable pedalboard unit, finished in hardwearing black vinyl and edged with aluminium trim that makes the unit non-slip even on shiny surfaces. The unit includes a removable lid and a strong retractable carrying handle. Fixing bolts and spacers are pre-fitted to fix the organ/guitar bass pcb and transformer if the unit is being used in conjunction with our pedal unit. Holes are also pierced in the wooden cabinet to enable a mains connector (P429) and recess plate for output signal to be fitted. The sloping front above the pedal keys is pierced with seven holes to take press-toe switches and one slot. The slot in conjunction with the metal panel allows lamps to be fitted and these light to show which stops are operated. A circuit is supplied with the panel.

In order that the free-standing pedalboard may be used by those who are not making the organ/guitar bass pedal unit all the holes are covered by the vinyl cloth. Thus the holes are invisible from the outside. If they are required, cut the cloth away with a sharp craft-knife.

Overall size: 584 x 521 x 165mm

Order As **XB19V** (Free-Standing Pedalboard) *Delivery by carrier*

## FREE-STANDING PEDALBOARD FRONT PANEL

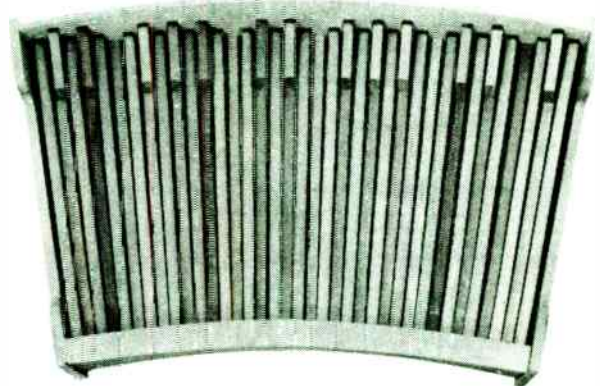


A front panel suiting our free-standing pedalboard and designed for use with our organ/guitar bass pedal unit is available. The panel, measuring 550 x 85mm is black anodised and printed in white. A leaflet is supplied with the panel showing details for connecting the LED indicators. The following additional parts will be required:

- 1 x Sub-Min Tr 6V
- 7 x Min Res 270Ω
- 2 x 1N4002
- 7 x LED Red

Order As **XB99H** (Pedal Unit Front Panel)

## 32-NOTE PEDAL BOARD



A very high quality 32-note C to G pedalboard craftsman made in solid beech with a birch external multi-ply frame. Keys are guided in soft-leather lined slots with felt end-stops. The keys are toe-sprung (i.e. sprung from the front). It is supplied unassembled ready to prepare the keys. These should first be stained the required colour with e.g. 'Coloron' dye (available from DIY shops); the sharps may be stained darker if you prefer. After staining apply two coats of clear wood sealer e.g. 'Ronseal'. The contact mounting bar is adjustable and MES54 will use a GJ contact; the 1WG contact cannot be used. A leaflet showing assembly method is supplied with the board.

Dimensions: Overall max. width 1295mm (at toe end)  
 min. width 935mm (at heel end)  
 Length of side cheek 777mm  
 Length of exposed key 685mm  
 Height 220mm

The pedalboard meets the specifications laid down by the Incorporated Society of Organ Builders (ISOB).

Order As **XB96E** (32-Note Pedalboard)

*(Delivery by carrier)*

## FOOTSWELL CONTROL

Swell pedal 250mm x 120mm fitted with 10k log. pot. Designed to be fitted into a console.



Order As **XB20W** (Swell Pedal)

## PIANO PEDALS

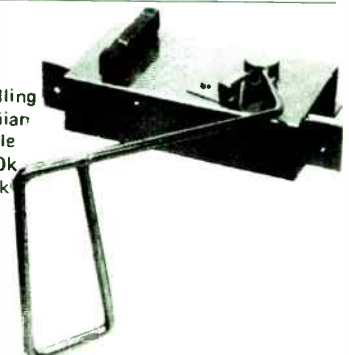
A pair of piano type pedals in a neat black box with rubber feet. A free-standing unit, it is ideal for electronic pianos. Each pedal operates its own single changeover (SPDT) contact. Contacts have solder tags and the cable passes through a grommet in the rear of the box, via a cable grip. Size of base: 199 x 150mm. Overall height: 57mm.



Order As **XB21X** (Piano Pedal)

## EFFECTS CONTROL LEVER

A knee operated lever with spring return for use in controlling for example the glide of Hawaiian guitar stop or any other variable effect. Unit is fitted with a 100k linear slide pot and whole track is traversed by the lever moving through 200mm. The lever folds away when not in use. Overall dimensions excluding lever: 185 x 94 x 54mm.



Order As **XB22Y** (Control Lever)

## ELECTRICAL BOOKS

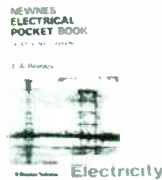
### NEWNES ELECTRICAL POCKET BOOK

Edited by E.A. REEVES, OFH (Hons), C Eng, MIEE

A thorough guide to electrical engineering practice, which remains an indispensable reference book for the engineer in the field and for all who require handy, concise yet comprehensive information on a wide range of electrical subjects.

1975 460 pages 165 x 101mm Illustrated

Order As RL27E (Book NB 147)



### QUESTIONS AND ANSWERS ON ELECTRICITY

by K. G. JACKSON

Covers the basic principles of electricity in a way that can be understood by both students and craftsmen

1969 112 pages 165x110mm Illustrated

Order As RH64U (Book NB047)



### BEGINNER'S GUIDE TO ELECTRIC WIRING

by F. GUILLOU and C. GRAY

A practical introduction to the installation of electric wiring in domestic premises, shops, small workshops etc. Explains the latest (Metric) I.E.E. wiring regulations and is designed for the layman who wishes to extend or improve his domestic installation, and apprentices in electrical engineering

1975 178 pages 184 x 120mm Illustrated

Order As RL31J (Book NB157)



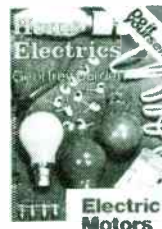
### QUESTIONS AND ANSWERS ON ELECTRIC WIRING

by H. A. MILLER

Up-to-date coverage of the requirements of the I.E.E. regulations for the electrical equipment of buildings. Embraces wiring, installation, control and protection and is of value to electrical apprentices, electricians, electrical contractors etc.

1974 128 pages 165 x 110mm. Illustrated.

Order As RL29G (Book NB152)



### PRACTICAL ELECTRICAL RE-WIRING AND REPAIRS

by C. E. MILLER

Practical information including: When and why re-wiring becomes necessary. What you have to do and what you need to do it. Lighting circuits, Power points, Immersion heater, Electric cooker, Fuse board etc

1976 80 pages 180 x 108mm Illustrated

Order As RH24B (Book BP31)

### HOME ELECTRICS

by GEOFFREY BURDETT

This book explains in detail how to do all your own electrical work around the house safely. Covers just about every kind of electrical work in domestic premises, tells you what to buy and how to install it. Includes complete re-wiring instructions

1977 120 pages 246 x 186mm Illustrated in two colours

Order As RO22Y (Book NB245)

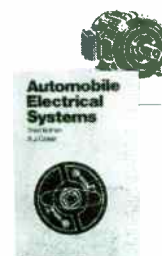
### QUESTIONS AND ANSWERS ON ELECTRIC MOTORS

by A. J. COKER and P. CHAPMAN

Covers the important practical problems that arise when installing, operating and maintaining electric motors and control gear

1976 128 pages 165 x 110mm. Illustrated

Order As RR02C (Book NB200)



### QUESTIONS AND ANSWERS ON AUTOMOBILE ELECTRICAL SYSTEMS

by A. J. COKER

A stage-by-stage guide from first principles to practical servicing, including diagnosis, location and remedy of faults. Includes wiring the charging system; the battery, the starting system, the ignition system; lamps and accessories; instruments etc

1973 132 pages 165 x 110mm. Illustrated

Order As RL13P (Book NB099)

## DATA BOOKS

### NEWNES RADIO AND ELECTRONICS ENGINEER'S POCKET BOOK

by the Editorial Staff of ELECTRONICS TODAY INTERNATIONAL. An invaluable compendium of facts, figures and formulae including common transistor and diode data and pin outs, TTL and CMOS details, radio and TV frequencies, metric conversions, wire gauges and much, much more, plus a superb index which makes the data easy to find

1978 192 pages 81 x 125mm. Illustrated

Order As RL06G (Book NB0740)



### RADIO AND ELECTRONICS COLOUR CODES AND DATA CHART

1971 Fold out sheet 584 x 458mm. Cover size 168 x 114mm.

Order As RH05F (Book BP7)

### NEWNES ENGINEER'S POCKET BOOK

Revised by J. L. NAVLER, MA, C Eng, FRAsE, FAIAA.

A reference book for engineers incorporating metrication and in SI units. Including new standards for screw threads, wing nuts, metal, spring and crinkle washers, twist drills, ball and roller bearings, aluminium alloys, metric sizes of ferrous bars, etc

1971 462 pages 82 x 127mm. Illustrated.

Order As RL02C (Book NB059)



### ENGINEERS AND MACHINISTS REFERENCE TABLES

by B. B. BABANI

1971 48 pages 168 x 114mm.

Order As RH04E (Book BP6)

### Practical Electronic Calculations and Formulae



### PRACTICAL ELECTRONIC CALCULATIONS & FORMULAE

by F. A. WILSON

This book aims to bridge the gap between complex technical theory and trial and error practical methods. It is in six sections: units and constants, DC circuits, passive components, AC circuits, networks and theorems, and measurements

1978 196 pages 180 x 108mm.

Order As RO23A (Book BP53)

### GIANT CHART OF RADIO ELECTRONIC SEMICONDUCTOR AND LOGIC SYMBOLS

by M. H. BABANI BSc(Eng)

1975 Fold out sheet 860 x 608mm. Cover size 180 x 108mm.

Order As RH21X (Book BP27)

### AF-RF REACTANCE/FREQUENCY CHART

Fold out sheet 474 x 365mm. Cover size 216 x 146mm.

Order As RH32K (Book BP196)

### COIL DESIGN AND CONSTRUCTION MANUAL

by B. B. BABANI

1960 (Revised 1974) 96 pages 180 x 108mm. Illustrated

Order As RH53H (Book BP160)

## BOOKS FOR BEGINNERS

### BASIC ELECTRONICS BOOKS

A superb set of books that will give you a real understanding of the subject. You will learn by actually building circuits on S-Dec etc, and learning how they work and what is happening in the components. You will learn about the components themselves as you use them. This method will teach you quickly and simply. There is no better way of learning basic electronics than by practical experience and this set of books is undoubtedly the very best basic course for doing just that. All the electronic parts you will need are available from this catalogue and the books show you clearly and concisely what to buy in order to do the experiments.

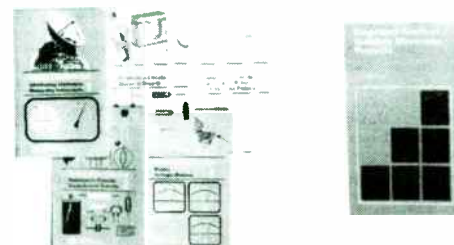
During the course you will build lots of useful projects as well: Lamp Flasher, Electronic Metronome, Photographic Timer, Metal Locator, Radio Receiver, Intercom, Intruder Alarm, Sound Switch etc etc

The books are published by the Schools Council Project Technology and the English Universities Press Ltd, and are suitable for anyone from 14 years onwards.

1975 560 pages 210 x 136mm. Illustrated

In five volumes available only as a set.

Order As XX10L (Basic Electronics Set)



### BEGINNERS' GUIDE TO BUILDING ELECTRONIC PROJECTS

by R.A. PENFOLO

This book will help the complete beginner to tackle the projects in the popular magazines with confidence. Covers component identification, tools, soldering, constructional methods, cases, legends, etc.

1977 108 pages 180 x 108mm. Illustrated

Order As RF09K (Book BP 227)



## ELECTRONICS HANDBOOKS

### BEGINNER'S GUIDE TO ELECTRONICS

by **T. L. SQUIRES, C.Eng, MIERE** and **C. M. DEASON, MSc, BSc.**

An introduction to electronics which is dealt with non-mathematically with the emphasis on illustrative examples. Contents: Electric currents, direct and alternating currents, electronic components, basic electronic circuits, test instruments etc.

1974 240 pages 185 x 120mm Illustrated  
Order As **RL19V (Book NB126)**

### QUESTIONS AND ANSWERS ON ELECTRONICS

by **CLEMENT BROWN**

A condensed account intended to give the student and layman an insight into the underlying principles and numerous applications of electronics

1966 112 pages 165 x 110mm Illustrated  
Order As **RH63T (Book NB041)**

### ELECTRONICS POCKET BOOK

Edited by **P. J. MCGOLDRICK, BSc, MSc(Eng), C.Eng, MIEE.**

**MSMPTE**

The book is written at a practical level so that it may be of maximum help and usefulness to technicians in the many branches of electronics and to students about to enter this rapidly expanding field. It should be of special value to candidates for the Electronic Servicing certificate of the Radio Trades Examination Board and the City and Guilds of London Institute.

1976 350 pages 192 x 126mm. Illustrated  
Order As **RR06G (Book NB209)**



### ESSENTIAL THEORY FOR THE ELECTRONICS HOBBYIST

by **G. T. RUBAROE, T.Eng.(ICEI), Assoc. I.E.R.E.**

This book covers most of the basic theory behind electronics in a readable manner with minimum recourse to mathematics although formulae having a practical bearing are presented with examples to illustrate their applications

1977 118 pages 180 x 108mm Illustrated  
Order As **RF10L (Book BP228)**

### FOUNDATIONS OF WIRELESS AND ELECTRONICS

by **M. G. SCROGGIE, BSc, C.Eng, FIEE**

Covers the whole basic theory, starting with a sound exposition of the elementary principles involved in all branches of electronics. No previous technical knowledge is assumed and mathematics is used only where essential.

1975 522 pages 216 x 133mm Illustrated  
Order As **RL33L (Book NB188)**

### RADIO AND ELECTRONIC HANDBOOK

by **G. R. WILDING**

A short course in basic electronics from Ohm's law to transistor output stages. In separate easily understood sections covering most practical requirements with any mathematics fully explained.

1968 156 pages 208 x 143mm Illustrated  
Order As **RR22Y (Book NB937)**

## EQUIVALENTS BOOKS

### TOWERS' INTERNATIONAL TRANSISTOR SELECTOR

by **T. O. TOWERS, MBE, BSc, C.Eng, MIERE**

Knowing just the type number, readers can find voltage rating, characteristics, case details, terminal identification, application and manufacturer of over 10,000 transistors of American, British, European and Japanese origin

1977 196 pages 253 x 177mm  
Order As **RR39N (Towers Transistor Book)**

### RADIO VALVE AND SEMICONDUCTOR DATA

by **A. M. BALL**

Characteristics of 9800 transistors, diodes, rectifiers, opto devices and 1000 valves and cathode ray tubes. Includes colour TV Tubes, I.C.s, F.E.T.s, unijunctions and tunnel diodes. Wherever possible transistors are listed with comparable types.

1975 192 pages 275 x 210mm  
Order As **RL34M (Book NB189)**

### FIRST BOOK OF TRANSISTOR EQUIVALENTS AND SUBSTITUTES

by **B. B. BABANI**

Interchangeability data for semiconductors manufactured all over the world. Equivalents and possible substitutes are included

1971 80 pages 180 x 108mm  
Order As **RH00A (Book BP1)**

### SECOND BOOK OF TRANSISTOR EQUIVALENTS AND SUBSTITUTES

by **B. B. BABANI**

A complementary volume to BP1 containing all different material. A listing of over 56,000 entries.

1974 222 pages 180 x 108mm  
Order As **RH11M (Book BP14)**



### LINEAR IC EQUIVALENTS AND PIN CONNECTIONS

by **ADRIAN MICHAELS**

Equivalents and pin connections of a selection of popular linear integrated circuits by 17 leading manufacturers. Includes details of family, function, country of origin and manufacturer.

1978 320 pages 180 x 127mm  
Order As **RO24B (Book BP41)**

### DIGITAL IC EQUIVALENTS AND PIN CONNECTIONS

by **ADRIAN MICHAELS**

Equivalents and pin connections of a selection of popular digital integrated circuits by 17 leading manufacturers. Includes details of package, family, function, country of origin and manufacturer.

1977 320 pages 180 x 127mm  
Order As **RF11M (Book BP40)**

### HANDBOOK OF IC'S EQUIVALENTS AND SUBSTITUTES

by **B. B. BABANI**

Interchangeability data on over 9500 different types

1974 128 pages 180 x 108mm  
Order As **RH35D (Book BP202)**

### FIRST BOOK OF DIODE CHARACTERISTICS, EQUIVALENTS AND SUBSTITUTES

by **B. B. BABANI**

Over 25,000 separate entries make this a very useful book

1975 160 pages 180 x 108mm  
Order As **RH44X (Book BP211)**

## TRANSISTOR HANDBOOKS

### BEGINNER'S GUIDE TO TRANSISTORS

by **J. A. REDDHOUGH** and **I. R. SINCLAIR, BSc, C.Eng, MIEE**

Describes what transistors are and how they work, the many types that are available and their many applications. Logic principles are introduced along with the latest developments in integrated circuits. The approach throughout is non-mathematical and the emphasis is on circuit operation rather than design.

1975 162 pages 190 x 127mm Illustrated  
Order As **RL25L (Book NB145)**

### TRANSISTOR POCKET BOOK

by **R. G. HIBBERD, BSc, C.Eng, FIEE.**

A comprehensive guide to the characteristics and uses of the various types of transistor

1976 312 pages 182 x 119mm. Illustrated  
Order As **RR17T (Book NB327)**

### QUESTIONS AND ANSWERS ON TRANSISTORS

by **CLEMENT BROWN**

Provides a readable account of the operation and uses of transistors and other associated devices. A section is included on servicing transistorised equipment, with advice on the precautions necessary in dealing with transistors.

1976 96 pages 165 x 110mm. Illustrated  
Order As **RR26O (Book NB1619)**

### PRINCIPLES OF TRANSISTOR CIRCUITS

by **S. W. AMOS BSc(Hons), C.Eng, MIEE.**

Introduction to the design of amplifiers, receivers and digital circuits. Generally accepted as being the standard textbook on the fundamental principles underlying the design of circuits using transistors and other semiconductor devices. Includes field effect transistors and digital techniques. Aspiring circuit designers, students, and home constructors should find this book of immense value.

1975 320 pages 216 x 136mm. Illustrated  
Order As **RR25C (Book NB1615)**

### TRANSISTOR CIRCUITS IN ELECTRONICS

by **S. S. HAYKIN, BSc, PhD, DSc, MIEE** and **R. BARRETT, BSc, C.Eng, FIEE.**

The book deals with the use of transistors in amplifiers, oscillators, linear and switching circuits with special interest for students taking degree, HND and HNC courses

1971 376 pages 216 x 136mm. Illustrated  
Order As **RL03D (Book NB061)**



### SEMICONDUCTOR CIRCUIT ELEMENTS

by **G. D. TOWERS, MBE, MA, BSc, C.Eng, MIERE**

A description of each type of semiconductor device available, circuit diagram symbols, packages, working principles, characteristics, ratings, numbering systems, circuit applications, common work force types, procurement sources, data acquisition, and specialist book coverage. The intention is that anyone seeking information on a commercial semiconductor device, however specialist, should be able to find out what it is, how it works, how it is applied in circuits and where to turn for detailed treatment.

1975 320 pages 216 x 136mm. Illustrated  
Order As **RL32K (Book NB185)**

### TRANSISTOR CIRCUIT DESIGN TABLES

by **D. S. TAYLOR, MA(Oxon) PhD**

A book of tables which reduces the complexity of designing new circuits by presenting, in tabular form, a wide range of practical component values for a number of basic circuit groupings. It will appeal to amateur and professional designers.

1971 128 pages 216 x 138mm  
Order As **RL26O (Book NB146)**

### ELEMENTS OF TRANSISTOR PULSE CIRCUITS

by **T. O. TOWERS, MBE, MA, BSc, C.Eng, MIERE**

The work is a review of the transistor building blocks commonly used in pulse circuits. The treatment is mainly descriptive and entirely practical. Contents include: linear pulse amplifiers, stable, monostable and bistable multivibrators, waveform shaping, "bumps" and "Schmitts", blocking oscillators, gates, counters, timers (frequency meters), timebases etc.

1974 208 pages 216 x 138mm. Illustrated  
Order As **RL20W (Book NB130)**

### TRANSISTOR AUDIO AMPLIFIERS

by **P. THARMA**

Based on the work done by the audio application group of the Mullard Central Applications Laboratory, this book covers the different aspects of the design of audio amplifiers. It will prove invaluable to electronic engineers, designers, and all those requiring a thorough background to the subject.

1971 422 pages 216 x 138mm. Illustrated  
Order As **RR23A (Book NB953)**



## INTEGRATED CIRCUIT HANDBOOKS

### BEGINNERS GUIDE TO INTEGRATED CIRCUITS

by I. R. SINCLAIR  
This book describes the principles and construction of IC's and includes details of their uses with circuit diagrams. Both linear and digital types are covered.  
1977 186 pages 185 x 120mm. Illustrated.  
Order As RO25C (Book NB278)

### INTEGRATED CIRCUIT POCKET BOOK

by R. G. HIBBERD, BSc, C.Eng, F.I.E.  
The technology and fabrication of unipolar and bipolar circuits are discussed, and digital and linear IC's are covered from a circuit point of view. Medium and large scale integration is then introduced, followed by a review of some standard commercial integrated circuits and their applications in practical circuits.  
1972 282 pages 184 x 120mm. Illustrated.  
Order As RL07H (Book NB076)

### QUESTIONS AND ANSWERS ON INTEGRATED CIRCUITS

by R. G. HIBBERD BSc, C.Eng, F.I.E.  
Covers all the main types of IC's - thick and thin film, monolithic and hybrid, digital and linear - and also deals with Boolean algebra and binary notation. Resistor, diode and transistor logic circuits are described and compared and typical applications are discussed.  
1974 96 pages 165 x 110mm. Illustrated  
Order As RL17T (Book NB115)

Beginner's Guide to ICs



Integrated Circuits



### OP-AMPS THEIR PRINCIPLES AND APPLICATIONS

by J. BRIAN DANCE  
This straightforward text explains how to use op amps in a non mathematical style that will appeal to the home constructor. Numerous circuits with component values are given and over 50 different op-amps are discussed including some of the very latest types available.  
1978 88 pages 215 x 134mm. Illustrated  
Order As RO26D (Book NB319)

### OPERATIONAL AMPLIFIERS

by G. B. CLAYTON, BSc, F.InstP.  
Provides an insight into the capabilities of modern operational amplifiers, and also discusses in detail the problems encountered in practical applications.  
1971 244 pages 216 x 138mm. Illustrated  
Order As RR28F (Book NB2028)

### ELEMENTS OF LINEAR MICROCIRCUITS

by T. D. TOWERS, MBE, MA, BSc, C.Eng, M.I.E.R.E.  
This book is based on a series of articles written for "Wireless World" and gives practical guidance on the selection of commercially available devices. It shows how to use the wealth of circuit functions available and gives considerable attention to the practical aspects of handling these sensitive circuits in practical assemblies. The emphasis is on applications and everyday problems of designing electronic equipment.  
1973 116 pages 210 x 154mm. Illustrated.  
Order As RL08J (Book NB077)

### A PRACTICAL INTRODUCTION TO DIGITAL IC'S

by D.W. EASTERLING  
Besides a number of simple and complex projects, the book contains full construction details of a test set that will enable the reader to identify and test TTL IC's  
1977 76 pages 180 x 108mm. Illustrated  
Order As RB25C (Book BP225)

## CONSTRUCTOR GUIDES

### ELECTRONIC DIAGRAMS

by M. A. COLWELL  
One of the first things that newcomers to radio and electronics need to come to terms with is the language used. This book aimed primarily at beginners, attempts to break down the barriers which so often deter students from taking up the subject. It takes the reader through the logical steps of building up circuit diagrams from elementary circuit symbols to complex systems.  
1976 112 pages 216 x 135mm. Illustrated in two colours  
Order As RR03D (Book NB201)

### PRACTICAL ELECTRONIC PROJECT BUILDING

by M. A. COLWELL  
This guide forms a concise introduction to some of the modern electronic project construction methods and provides useful information on finishing projects and fault finding. The book complements any project by forming a valuable source of ideas and hints on a range of subjects including tools, kits, layout and wiring, the use of wiring and printed circuit boards, chassis and cases, finishing and fault finding.  
1976 112 pages 216 x 135mm. Illustrated in two colours.  
Order As RR11M (Book NB231)

### PROJECT PLANNING AND BUILDING

by M. A. COLWELL  
This guide will help the constructor to plan, design and lay out his electronics projects. The book explains planning, use of tools, component board layout, the design and layout of chassis and cases, and assembly and wiring. There is also an extremely useful appendix.  
1976 112 pages 216 x 135mm. Illustrated in two colours.  
Order As RR09K (Book NB229)



### ELECTRONIC COMPONENTS

by M. A. COLWELL  
This guide forms an introduction to electronic components, what they are and what they do, and provides guidance on recognition and choice of component for particular applications. It also shows how to recognise faults and prevent breakdowns.  
1976 112 pages 216 x 135mm. Illustrated in two colours.  
Order As RR27E (Book NB2026)

### SIMPLE CIRCUIT BUILDING

by P. C. GRAHAM  
This guide provides a logical introduction to general purpose circuits for the home constructor and to converting theoretical circuits into practical layouts. The book covers a wide range of easy to assemble circuits, including switching and logic circuits and their layouts, operational amplifiers, a.c. amplifiers, and d.c. power supplies.  
1976 112 pages 216 x 135mm. Illustrated in two colours.  
Order As RR10L (Book NB230)

### PRINTED CIRCUIT ASSEMBLY

by M. J. HUGHES and M. A. COLWELL  
This guide takes the mystery out of techniques used in printed circuit assembly and encourages constructors to make their own printed circuit boards. The book describes the characteristics of the various bases used and guides the reader through the stages of translating circuit diagrams into printed circuit layouts.  
1976 96 pages 216 x 135mm. Illustrated in two colours.  
Order As RR04E (Book NB203)

## OPTO-ELECTRONICS BOOKS

### 50 PHOTOELECTRIC CIRCUITS AND SYSTEMS

by P. S. SMITH  
Fifty basic circuits are described which have applications in process control, photography, domestic and motor equipment and, in fact, all fields of technology. As well as a broad coverage of devices, examples are provided of different uses and details to enable selection of alternative components.  
1972 92 pages 216 x 138mm. Illustrated.  
Order As RR21X (Book NB879)



### PHOTOCELL APPLICATIONS

Produced by the Schools Council Project Technology this book explains how to use opto electronic devices such as the cadmium sulphide cell and the phototransistor. It shows you experiments that you can do at home and gives details of projects you can build including automatic parking light, disappearing ball, electronic candle, optical communication transmitter and receiver etc. All extremely well explained and easy to understand.  
1973 64 pages 296 x 210mm. Illustrated.  
Order As RR37S (Photocell Apps Book)



### PROJECTS IN OPTO ELECTRONICS

by R.A. PENFOLD  
Contains dozens of useful and interesting projects using LED's, LDR's, etc. Circuits include automatic feeder, audio compressor, lamp dimmer, stopwatch, modulated light transceivers, etc. etc.  
1978 112 pages 180 x 108mm. Illustrated.  
Order As LY05F (Book BP45)

### 50 SIMPLE L.E.O. CIRCUITS

by R.N. SOAR  
Circuits using LED's and Displays. 50 different ones, are described.  
1977 64 pages 180 x 108mm. Illustrated  
Order As RF12N (Book BP42)

### HOW TO BUILD A LOW-COST LASER

by R.M. BENREY  
Now you really can produce three dimensional images and give laser light shows in your own home. The book describes how to build a laser from readily available components, and tells you how to make holograms. American book.  
1973 112 pages 208 x 135mm. Illustrated.  
Order As RF21X (Book HD934)

## INTEGRATED CIRCUIT PROJECTS BOOKS

### 52 PROJECTS USING IC 741

by R & U REOMER

Fifty interesting and useful projects divided into four sections: Multivibrators, Amps and Oscillators, Trigger Devices and Special Devices

1975 80 pages 180 x 108mm Illustrated  
Order As RH18U (Book BP24)

### IC 555 PROJECTS

by E.A. PARR, B.Sc., C.Eng., MIEEE

Describes dozens of circuits using the NE555 timer, including car wiper delay, rev counter, emergency flashers, model railway shuntle service, station stop start, computer voice, signal generator, po ice siren, Star Trek siren etc. etc.

1978 144 pages 180 x 108mm Illustrated  
Order As LY04E (Book BP44)

### LM3900 PROJECTS

by J. KYBETT, B.Sc.

An introduction to this unusual, but very versatile op amp. Simple basic circuits are described and these may be used as a basis for more complicated uses

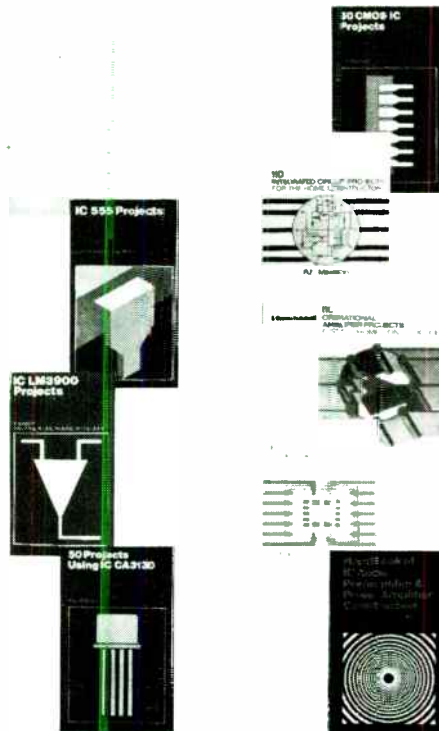
1978 128 pages 180 x 108mm Illustrated  
Order As RQ27E (Book BP50)

### 50 PROJECTS USING IC CA3130

by R.A. PENFOLD

Fifty interesting and useful projects divided into five sections: Audio projects, RF projects, Test equipment, Household projects and Miscellaneous projects

1977 96 pages 180 x 108mm Illustrated  
Order As RB23A (Book BP223)



### 50 CMOS IC PROJECTS

by R.A. Penfold

Fifty interesting and useful projects divided into four sections: Multivibrators, Amps and Oscillators, Trigger Devices and Special Devices

1977 102 pages 180 x 108mm Illustrated  
Order As RB24B (Book BP224)

### 110 INTEGRATED CIRCUIT PROJECTS FOR THE HOME CONSTRUCTOR

by R. M. MARSTON

The projects range from simple low level amplifiers to complex test equipment and include a number of hi-fi circuits and logic circuits. All the projects have been built and fully evaluated by the author

1978 120 pages 216 x 135mm Illustrated  
Order As RL01B (Book NB058)

### 110 OPERATIONAL AMPLIFIER PROJECTS FOR THE HOME CONSTRUCTOR

by R. M. MARSTON

Outlines the essential characteristics of the op amp then using the  $\mu$ A741 presents 110 useful projects ranging from single amplifiers to sophisticated instrumentation circuits

1975 128 pages 216 x 135mm Illustrated  
Order As RL30H (Book NB153)

### 110 COSMOS DIGITAL IC PROJECTS FOR THE HOME CONSTRUCTOR

by R. M. MARSTON

Introduces the reader to the basic characteristics of COSMOS digital integrated circuits and presents 110 useful projects in which they can be used

1976 115 pages 216 x 135mm Illustrated  
Order As RR07H (Book NB216)

### HANDBOOK OF IC AUDIO PREAMPLIFIER AND POWER AMPLIFIER CONSTRUCTION

by F.G. RAYER, T.Eng.(CEI), Assoc. IERE

Includes practical construction details of various IC and IC transistor designs of about 250mW to 100W output

1976 112 pages 180 x 108mm Illustrated  
Order As RH28F (Book BP35)

## PROJECTS BOOKS

### FIRST BOOK OF PRACTICAL ELECTRONIC PROJECTS

by B. B. BABANI

1975 96 pages 180 x 108mm Illustrated  
Order As RH17T (Book BP23)

### TWO TRANSISTOR ELECTRONIC PROJECTS

by F. G. RAYER, T.Eng (CEI), Assoc. IERE

Includes 28 practical designs: door tone unit, mini flasher, metronome, automatic light intercom, receivers, amplifiers etc.

1976 96 pages 180 x 108mm Illustrated  
Order As RH23A (Book BP30)

### ELECTRONIC PROJECTS FOR BEGINNERS

by F.G. RAYER

Includes a number of projects that can be built without any need for soldering. The book is divided into four sections: "No Soldering" projects, miscellaneous devices, radio and audio frequency projects and power supplies. Also included are some component and wiring layouts to aid the beginner

1978 112 pages 180 x 108mm Illustrated  
Order As RQ28F (Book BP48)

### POPULAR ELECTRONIC PROJECTS

by R.A. PENFOLD

A selection of the most popular projects, 27 in all, divided into four sections: Radio projects including MW radio, MW/LW radio, short wave converter and receiver and radio control equipment. Audio projects including pre amps, 10W power amp, filters and a mixer. Household projects including intercom and metal detector. Test equipment projects including voltmeter, transistor tester and AF signal generator

1978 136 pages 180 x 108mm Illustrated  
Order As RQ29G (Book BP49)

### 28 TESTED TRANSISTOR PROJECTS

by R. TORRENS

Includes circuit details of e.g. Power Supply, Touch Switch, Voltage Controlled Light Dimmer, Touch Operated Gain Control, Windscreen Wiper Controller etc.

1976 86 pages 180 x 108mm Illustrated  
Order As RB21X (Book BP221)

### 50 CIRCUITS USING GERMANIUM SILICON & ZENER DIODES

by R.N. SOAR

Includes circuits of crystal sets, nickel cadmium battery charger, radio control band frequency meter and 47 other fascinating little circuits

1977 64 pages 180 x 108mm Illustrated  
Order As RH29G (Book BP36)



### 50 FIELD EFFECT TRANSISTOR PROJECTS

by F.G. RAYER

Contains 11 RF amp and converter circuits, 17 circuits of test equipment and receiver aids, 11 circuits of tuners, receivers and audio stages and some miscellaneous FET circuits

1977 104 pages 180 x 108mm Illustrated  
Order As RF08J (Book BP39)

### 50 PROJECTS USING RELAYS SCR'S AND TRIACS

by F.G. RAYER

Includes circuits of model train controllers, timers, auto emergency light, alarms, drill speed controller and many more

1977 100 pages 180 x 108mm Illustrated  
Order As RH30H (Book BP37)

### 110 THYRISTOR PROJECTS USING SCR'S AND TRIACS

by R. M. MARSTON

Outlines the essential operating characteristics of the s.c.r. and the triac and presents 110 useful projects, designed, built and fully evaluated by the author, in which these devices can be used. The projects range from simple electronic alarms to self regulating electric heater power controllers

1972 138 pages 216 x 135mm Illustrated  
Order As RL05F (Book NB074)

### 110 ELECTRONIC ALARM PROJECTS FOR THE HOME CONSTRUCTOR

by R. M. MARSTON

Includes full circuit details of burglar alarms, car alarms, temperature operated and light sensitive alarms, as well as power failure alarms, over voltage alarms etc. This book is packed with useful circuits

1977 112 pages 216 x 138mm Illustrated  
Order As RB10L (Book NB269)

### HOW TO PLAN AND INSTALL ELECTRONIC BURGLAR ALARMS

by H. BIERMAN

Covers all the basic security systems, explains principles, circuits and installation. Also covers photoelectric, microwave and ultrasonic systems. American book

1977 128 pages 208 x 135mm Illustrated  
Order As RF20W (Book HD734)

### 110 WAVEFORM GENERATOR PROJECTS FOR THE HOME CONSTRUCTOR

by R. M. MARSTON

Waveform generators form the basis of many electronic instruments and gadgets, from simple alarms to complex test gear. 110 different types are shown in this book, many with practical applications in the home and on the workbench

1978 134 pages 215 x 137mm Illustrated  
Order As RQ30H (Book NB353)

More Projects Books on next page

## PROJECTS BOOKS (continued)

### 110 SEMICONDUCTOR PROJECTS FOR THE HOME CONSTRUCTOR

by R. M. MARSTON

Presents information on semiconductor devices by way of circuit design rather than by long-winded theory. All circuits have full component values and are accompanied by explicit descriptions of their operation.

1978. 122 pages. 216 x 133mm. Illustrated.  
Order As RR19V (Book NB864)

### 20 SOLID STATE PROJECTS FOR THE HOME

by R. M. MARSTON

Each project contains information on circuit theory, construction, trouble shooting and use.

1969. 114 pages. 216 x 135mm. Illustrated.  
Order As RR20W (Book NB872)

### CONSTRUCTORS MANUAL OF ELECTRONIC CIRCUITS FOR THE HOME

by B. B. BABANI

Includes circuit details of parlour games, burglar alarm, tracing buried pipes and cables, electronic dice, vari light unit etc.

Reprinted 1974. 96 pages. 180 x 108mm. Illustrated.  
Order As RH12N (Book BP15)

### 20 SOLID STATE PROJECTS FOR THE CAR AND GARAGE

by R. M. MARSTON

Twenty easily built projects for your car fully described in this book.

1970. 124 pages. 216 x 135mm. Illustrated.  
Order As RH65V (Book NB048)

### HOW TO BUILD YOUR OWN ELECTRONIC AND QUARTZ CONTROLLED WATCHES AND CLOCKS

by B. B. BABANI

1975. 96 pages. 180 x 108mm. Illustrated.  
Order As RH19V (Book BP25)

### BUILD YOUR OWN SOLID STATE HI-FI AND AUDIO ACCESSORIES

by M. H. BABANI BSc(Eng)

Includes pre-amps, mixer, stereo decoder, dynamic noise filter, compressor, voice operated relay etc.

1976. 96 pages. 180 x 108mm. Illustrated.  
Order As RH52G (Book BP220)

### HI-FI, P.A., GUITAR AND DISCO AMPLIFIER DESIGNS

by B. B. BABANI

A collection of designs mostly using valves.

1972. 144 pages. 180 x 108mm. Illustrated.  
Order As RH09K (Book BP12)

### MAJOR SOLID STATE AUDIO HI-FI CONSTRUCTION PROJECTS

by B. B. BABANI

1976. 96 pages. 180 x 108mm. Illustrated.

Order As RH22Y (Book BP29)

### SOLID STATE POWER SUPPLY HANDBOOK

by M. H. BABANI BSc(Eng)

Circuits of various power supplies.

1976. 96 pages. 180 x 108mm. Illustrated.  
Order As RH49D (Book BP217)

### ELECTRONIC CIRCUITS FOR MODEL RAILWAYS

by M. H. BABANI BSc(Eng)

Circuits of controllers, inertia controller, signal system, lighting, r.f. interference suppression, steam whistle etc.

1976. 96 pages. 180 x 108mm. Illustrated.  
Order As RH45Y (Book BP213)

### HOW TO BUILD YOUR OWN METAL AND TREASURE LOCATORS

by F. G. RAYER, TEng(CEI), Assoc. IERE

Includes principles and construction, details of various coils, detectors and amplifiers. With comprehensive construction details.

1976. 96 pages. 180 x 108mm. Illustrated.  
Order As RH25C (Book BP32)



### PRACTICAL ELECTRONIC SCIENCE PROJECTS

by B. B. BABANI

1975. 96 pages. 180 x 108mm. Illustrated.

Order As RH40T (Book BP207)

### 79 ELECTRONIC NOVELTY CIRCUITS

by B. B. BABANI

1975. 96 pages. 180 x 108mm. Illustrated.

Order As RH16S (Book BP22)

### PRACTICAL TRANSISTORISED NOVELTIES FOR HI-FI ENTHUSIASTS

by B. B. BABANI

Includes quadruphony, add two channels to your stereo system, measuring audio power output, headphone adaptor, phasing loudspeakers, 4-channel mixer, speaker gain control and contour networks.

1973. 48 pages. 172 x 114mm. Illustrated.  
Order As RH34M (Book BP201)

### PRACTICAL TRANSISTOR NOVELTY CIRCUITS

by H. NESS

Includes intercom, sound triggered flash, metal locator, burp box, electronic doorbell, siren, etc.

1972. 64 pages. 180 x 108mm. Illustrated.

Order As RH08J (Book BP11)

### SOLID STATE NOVELTY PROJECTS

Compiled by M. H. BABANI BSc(Eng)

Circuits for electronic roulette wheel, lamp dimmer, "magic" table lamp, water warbler for healthy pot plants and others.

1976. 96 pages. 180 x 108mm. Illustrated.  
Order As RH51F (Book BP219)

### ELECTRONIC NOVELTIES FOR THE MOTORIST

by B. B. BABANI

Includes circuit details of many useful projects for the motorist: cold weather starter, brake light failure indicator, capacitor discharge ignition, pulsed wind-screen wipers, automatic battery charger alarm, radio operated garage door opener, automatic parking light etc.

1973. 80 pages. 180 x 108mm. Illustrated.

Order As RH10L (Book BP13)

### PRACTICAL TRANSISTOR CIRCUITS FOR MODERN TEST EQUIPMENT

by B. B. BABANI

Includes insulation checker, solid state volt ohm meter, signal injector, r.f. oscillator, shorted turns tester, etc.

1974. 96 pages. 180 x 108mm. Illustrated.

Order As RH39N (Book BP206)

### IC AND TRANSISTOR GADGETS CONSTRUCTION BOOK

by B. B. BABANI

Includes vari tach motor speed control, analog rhythm generator, TV audio induction sound unit, low cost digital clock and others.

1974. 96 pages. 180 x 108mm. Illustrated.  
Order As RH36P (Book BP203)

### HANDBOOK OF PRACTICAL ELECTRONIC MUSICAL NOVELTIES

by B. B. BABANI

Circuits for keyless organ, autodrum, bongos, crash cymbal, etc.

1973. 96 pages. 180 x 108mm. Illustrated.

Order As RH33L (Book BP200)

### BUILD YOUR OWN ELECTRONIC EXPERIMENTERS LABORATORY USING IC'S

by B. B. BABANI

1975. 96 pages. 180 x 108mm. Illustrated.

Order As RH50E (Book BP218)

### ELECTRONIC GADGETS AND GAMES

by B. B. BABANI

1975. 96 pages. 180 x 106mm. Illustrated.

Order As RH48C (Book BP216)

## TEST INSTRUMENTS BOOKS

### MEASURING OSCILLOSCOPES

Edited by JACK GOLDING

It is a comprehensive guide to the principles of operation and applications of the modern oscilloscope, and will be of value to all who have occasion to use this instrument.

1971. 244 pages. 216 x 138mm. Illustrated.  
Order As RL00A (Book NB057)



### RADIO, TELEVISION AND AUDIO TEST INSTRUMENTS

by GORDON J. KING

A guide to test instruments and applications, with particular emphasis on the oscilloscope. Also describes gear required for colour television and high quality audio equipment.

1972. 208 pages. 254 x 160mm. Illustrated.

Order As RL04E (Book NB071)

### SERVICING WITH THE OSCILLOSCOPE

by GORDON J. KING

Shows oscilloscope traces of normal and faulty equipment such as stereo radio and colour TV.

1976. 256 pages. 216 x 138mm. Illustrated.  
Order As RR00A (Book NB195)



**RADIO HANDBOOKS**

**BEGINNER'S GUIDE TO RADIO**  
by GORDON J. KING

Surveys the whole field of radio from basic principles of electricity and magnetism, transistors and their circuits, up to radio transmission, stereo broadcasting and reception, and hi-fi reproduction. Instills a basic understanding of how and why radio receivers work.

1977 240 pages 186 x 120mm. Illustrated  
Order As RH59P (Book NB016)



**RADIO CIRCUITS EXPLAINED**  
by GORDON J. KING

This book explains the very latest circuitry in use in modern radio receivers. Each chapter is devoted to a particular section of the receiver and the functions of the various components are explained.

1977 146 pages 240 x 160mm. Illustrated  
Order As RQ31J (Book NB268)

**RADIO CIRCUITS USING IC'S**  
by J.B. DANCE, M.Sc.

This book shows circuits for a m. and f.m. radios, stereo and quad rophonic decoders (SQ) and details of voltage regulators for use in varicap applications.

1978 128 pages 180 x 107mm. Illustrated  
Order As LW28F (Book BP46)

**BOOKS ABOUT RECEIVERS AND AERIALS**

**THE COMPLETE CAR RADIO MANUAL**  
by F. C. PALMER R. Tech. Eng, MIPRE, AMIET

Discusses car radio selection, installation, aerial, interference suppression, car batteries etc.

1975 96 pages 180 x 108mm. Illustrated  
Order As RH43W (Book BP210)



**MODERN CRYSTAL AND TRANSISTOR SET CIRCUITS FOR BEGINNERS**  
by B. B. BABANI

1973 48 pages 168 x 114mm. Illustrated  
Order As RH07H (Book BP10)

**RADIO ANTENNA HANDBOOK FOR LONG DISTANCE RECEPTION AND TRANSMISSION**  
by B. B. BABANI

1975 96 pages 180 x 108mm. Illustrated  
Order As RH20W (Book BP26)

**QUESTIONS AND ANSWERS ON RADIO AND TELEVISION**  
by H.W. Hellyer and I.R. Sinclair

From the fundamentals of electricity, through sound and radio waves, the reader is taken step-by-step to an understanding of the principles of radio and television.

1976 128 pages 165 x 110mm. Illustrated  
Order As RH66W (Book NB054)



**RADIO SERVICING BOOKS**

**FM RADIO SERVICING HANDBOOK**  
by GORDON J. KING

Of interest to service engineers and home constructors the book contains details of F.e.t. front ends, i.c.'s and stereo decoders.

1970 206 pages 254 x 160mm. Illustrated  
Order As RH61R (Book NB023)



**RADIO AND AUDIO SERVICING HANDBOOK**  
by GORDON J. KING

A practical guide to fault tracing, adjustments and repair in radio receivers, car radios, radiograms, tuner units, record players, turntable units and tape recorders. Includes information on FM tuners, I.C.'s, stereo broadcasting etc.

1970 284 pages 248 x 153mm. Illustrated  
Order As RH60Q (Book NB018)

**RAPID SERVICING OF TRANSISTOR EQUIPMENT**  
by GORDON J. KING

A systematic guide to the servicing of transistor equipment, such as radio, TV, tape and high fidelity equipment, with the emphasis on speedy fault diagnosis.

1973 171 pages 216 x 138mm. Illustrated  
Order As RL18U (Book NB116)



**RADIO SERVICING POCKET BOOK**  
by VIVIAN CAPEL

A practical book containing a wealth of information on components, receivers, workshop planning and practice, test equipment, repair techniques and hints, fault diagnosis and economical repair and alignment practices. Includes: transistor receivers, F.M. radios, stereo radios, car radios, aerials, interference, alignment, and a directory of radio manufacturers and service depots.

1975 230 pages 190 x 127mm. Illustrated  
Order As RL24B (Book NB144)

**AMATEUR RADIO BOOKS**

**SHORTWAVE CIRCUITS AND GEAR FOR EXPERIMENTERS AND RADIO HAMS**  
by B. B. BABANI

1975 96 pages 180 x 108mm. Illustrated

Order As RH47B (Book BP215)



**HOW TO BUILD ADVANCED SHORT WAVE RECEIVERS**  
by R.A. PENFOLD

Includes full construction details of a number of receivers which should have levels of performance at least equal to that of commercially built sets of equal complexity. Also contains O Multiplier, S Meter, Noise Limiter etc.

1977 118 pages 180 x 108mm. Illustrated  
Order As RB26D (Book BP226)

**SOLID STATE SHORT WAVE RECEIVERS FOR BEGINNERS**  
by R.A. PENFOLD

Includes several modern solid state short wave receiver circuits that will give a fairly high level of performance using relatively few components.

1976 92 pages 180 x 108mm. Illustrated  
Order As RB22Y (Book BP222)



**HOW TO MAKE WALKIE TALKIES**  
by F.G. RAYER

Covers licensing requirements, permitted wavebands, practical circuitry and details of suitable aerials.

1977 112 pages 180 x 108mm. Illustrated  
Order As RF18U (Book BP43)

**VIDEO RECORDING BOOKS**

**VIDEO RECORDING RECORD AND REPLAY SYSTEMS**  
by G. WHITE, CGIA, CEng, MIERE

Describes the technical principles of video recording and discusses the various systems that are on the market.

1972 216 pages 216 x 138mm. Illustrated  
Order As RL11M (Book NB085)



**SOUND WITH VISION**  
by E. G. M. ALKIN, MBKS

Intended primarily for the instruction of TV sound operators, but of interest to film makers. The problems of simultaneously producing sound and pictures are discussed, and practical solutions are given.

1973 294 pages 248 x 160mm. Illustrated  
Order As RR12N (Book NB236)

## TV HANDBOOKS

### BEGINNER'S GUIDE TO TELEVISION

by GORDON J. KING

Includes up to-date developments in television including information on transistor circuits used in modern receivers. Forms an excellent introduction to the technical aspects of TV for everyone seeking a clear, concise and reasonably non-technical explanation of the subject.

1972 212 pages 185 x 118mm Illustrated.  
Order As RL10L (Book NB084)

### BEGINNER'S GUIDE TO COLOUR TELEVISION

by GORDON J. KING

Explains how and why colour television works. Includes historical outline, colours and signals, pictures and signals, the PAL system, colour transmission, colour picture tubes, domestic aerial systems, the PAL receiver, SECAM basics, colour receiver controls.

1973 198 pages 185 x 118mm Illustrated  
Order As RL14Q (Book NB101)

### QUESTIONS AND ANSWERS ON COLOUR TELEVISION

by J. A. REOIHUGH and O. KNIGHT

A simple, practical account of colour TV transmission and reception. Covers transmitting compatible signal to producing the signals to drive the picture tube (mainly on the PAL system) with particular attention devoted to the convergence circuits and their adjustment. Includes details of shadowmask, Trinitron and PIL tubes.

1975 134 pages 165 x 110mm Illustrated  
Order As RH58N (Book NB014)

Beginner's Guide to  
Colour Television



Colour Television

and Related Systems

G. V. Sims



Long Distance TV Reception



### PRINCIPLES OF PAL COLOUR TELEVISION

by H. V. SIMS, CEng, MIEE, FIERE

The principles involved in the transmission of colour TV and its reception are discussed along with effects due to non-linearity and its correction, the failure of constant luminance, differential phase distortion, and the production of Hanover bars.

1969 162 pages 216 x 135mm. Illustrated.  
Order As RR24B (Book NB970)

### SOLID STATE COLOUR TELEVISION CIRCUITS

by G. R. WILDING

Covers the most up to date innovations in colour TV design in British, European and Japanese receivers. Explanations are given as to how the circuits work (thus providing excellent back up material to manufacturers' service manuals).

1976 196 pages, 240 x 160 mm. Illustrated  
Order As RQ32K (Book NB228)

### TELEVISION ENGINEER'S POCKET BOOK

Revised by P. J. MCGOLORICK, CEng, MIEE, MSMPTE

A summary of basic facts, circuit techniques and technical data for everyday reference.

1973 380 pages, 190 x 127mm. Illustrated.  
Order As RL15R (Book NB102)

### LONG DISTANCE TV RECEPTION FOR THE ENTHUSIAST

by ROGER BUNNEY

A practical and authoritative introduction to TV DXing including details of many ingenious devices used by active enthusiasts.

1978 128 pages\* 180 x 108mm. Illustrated  
Order As RQ33L (Book BP52)

## TV SERVICING BOOKS

### TELEVISION SERVICING HANDBOOK

by GORDON J. KING

Describes the best ways of tracking down specific faults in the TV system, using the minimum of testing equipment and requiring only a basic servicing knowledge. Includes unique fault finding procedure charts.

1970 358 pages, 216 x 138mm. Illustrated  
Order As RH62S (Book NB033)



Gordon J. King

Revised Colour TV Servicing Manual



### NEWNES COLOUR TELEVISION SERVICING MANUAL VOL. 2.

by GORDON J. KING

Closely follows the presentation of volume 1. Contents: Philips GB chassis, BBC 8000, Grundig 717GB, ASA CT5003/4 receivers, Saba chassis (inc. T2700F, S2700F, T2704F, T2705F receivers), GEC and Sobell single standard hybrid chassis, Telefunken 710 110 tube chassis, Pye 713 chassis. General corporation of Japan decoder principle. Test instruments. Colour fault symptoms and causes. Index to models.

1975 242 pages, 254 x 190mm. Illustrated  
Order As RL21X (Book NB134)

### NEWNES COLOUR TELEVISION SERVICING MANUAL VOL. 3

by GORDON J. KING

Closely follows the presentation of Vols 1 and 2. Contents: B & O 4000/5000, Bush 2179, CTV1526, Decca 40 series, CS2254/2654, DER 5757, 7C09, 7C10, Ferguson 3722, 3C30, 3C28, Hitachi CSP680, CP-P475, CNP860, CS685, CNP865, ITT CV-C8, CK 720, Marconi 4722, Multibroadcast 7757 Murphy 2179 Philips G9 etc., Radio Rentals B757, Rank 2179 RR Contracts 1757, Saba 7C09/10, Thorn 9000, 9300, 7C09/10 1977 234 pages 254 x 190mm. Illustrated

Order As RF17T (Book NB240)

### COLOUR TELEVISION SERVICING

by GORDON J. KING

Covers the servicing of PAL receivers with the minimum of mathematics. Includes a fault-finding procedure chart in four colours. Also includes: locating the fault area, servicing procedures, tuned circuit alignment, faulty picture tube symptoms, purity and convergence, timebase, E.H.T. and power supplies, vision, chroma, reference generator and sound stages etc.

1975 348 pages, 254 x 160mm. Illustrated  
Order As RL23A (Book NB137)

### PRACTICAL REPAIR AND RENOVATION OF COLOUR TV'S

by CHAS E. MILLER

Shows how to obtain a working colour TV for relatively little outlay. Includes CRT Tester, Cross Hatch Generator etc.

1976 80 pages 180 x 108mm. Illustrated  
Order As RH27E (Book BP34)

## AUDIO & HI-FI BOOKS

### BEGINNERS' GUIDE TO AUDIO

by I. R. SINCLAIR

Explains in simple language, illustrated by photographs and diagrams, the working of disc recording, tape recording and stereo systems, with the emphasis on the latest techniques.

1977 184 pages 186 x 120mm. Illustrated  
Order As RF14Q (Book NB274)

### THE BIB BOOK OF HI-FI

by CLEMENT BROWN

Planned and written for beginners, this book answers the questions: 'What is Hi-Fi, and how does it work?' 'How do I choose equipment and install and adjust it?' in eight readable chapters. These include 'Planning Guidelines', 'Making a Record', 'Surround Sound', 'Improving Your Hi-Fi', and others.

1976 124 pages 212 x 152mm. Illustrated  
Order As RR38R (Book of Hi-Fi.)

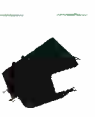
### QUESTIONS AND ANSWERS ON HI-FI

by CLEMENT BROWN, Assoc IERE

A guide for those who might be confused by the wide range of equipment available, the varied and complex specifications quoted by manufacturers and the many different claims they make. Covers disc, tape and radio and gives guidance on costs and planning requirements.

1974 104 pages 165 x 110mm. Illustrated.  
Order As RL22Y (Book NB136)

Beginner's Guide to



The Audio Handbook



### THE AUDIO HANDBOOK

by GORDON J. KING TEng(CEI), RTechEng, MIPRE, FISTC, FSCTE, MAES, MRTS.

Deals fully with all aspects of audio recording and reproduction, including fm radio, stereo on disc, and tape from twin track to eight track. Describes all the component parts of a sound system in detail and gives full information on measurements and adjustments, and includes the parameters on all the four channel systems currently available.

1975 286 pages 248 x 160mm. Illustrated  
Order As RL28F (Book NB150)

### PRACTICAL STEREO AND QUADROPHONY HANDBOOK

by B. B. BABANI

A detailed handbook which explains stereophonic reproduction and touches on quadrasonic set ups.

1975 96 pages 180 x 108mm. Illustrated  
Order As RH41U (Book BP208)

### QUAO SOUNO

by M. TEPPER

Describes the different systems, how to set up the speakers, what quasi is and how it is recorded and reproduced. American book.

1976 115 pages 208 x 135mm. Illustrated  
Order As RF23A (Book HQ987)

More Audio and Hi-Fi Books on next page

## AUDIO AND HI-FI BOOKS (continued)

### AUDIO ON WHEELS

by VIVIAN CAPEL

Assists in choosing and installing mobile audio equipment. Includes audio amplification, radio reception, sound recordings, power supplies, loudspeakers, car aeriels, car radios, stereo and multi-speaker systems, cassette players, cartridge players, motor control circuits, disc systems, installation, interference suppression, mobile public address, repairs and maintenance  
1975 208 pages 216 x 138mm Illustrated

Order As RL35Q (Book NB190)



### MASTER IN CAR ENTERTAINMENT

by V. CAPEL

Sets out the relative merits of mono, stereo or quad, and cassette or cartridge players in cars. Also deals with car radios, aeriels interference suppression, installation and trouble shooting  
1977 128 pages 222 x 141mm Illustrated in two colours

Order As RF19V (Book NB286)



### AUDIO ENTHUSIASTS HANDBOOK

by B. B. BABANI

1975 96 pages 180 x 108mm Illustrated

Order As RH46A (Book BP214)

### MOBILE DISCOTHEQUE HANDBOOK

by COLIN CARSON

This book is designed to give a general guide as to how disco s function, how to make the external connections and similar subjects. It does not give details of internal circuitry  
1978 128 pages 180 x 107mm Illustrated

Order As LW29G (Book BP47)

### MASTER HI-FI INSTALLATION

by GORDON J. KING

All you need to know about how to install your new hi fi equipment safely and correctly to obtain the best possible results  
1976 160 pages 216 x 134mm. Illustrated in two colours

Order As RR13P (Book NB237)

## BOOKS ABOUT LOUDSPEAKERS

### FIRST BOOK OF HI-FI LOUDSPEAKER ENCLOSURES

by B. B. BABANI

A comprehensive look at the types of enclosures which can be utilised including over 50 pages of diagrams of enclosures for many sizes of speaker and styles of cabinet

1974 96 pages 180 x 108mm Illustrated

Order As RH38R (Book BP205)



### HI-FI LOUDSPEAKERS AND ENCLOSURES

by A. D. COHEN

Universally recognised as a classic in the field of hi-fi literature  
1975 438 pages 216 x 138mm Illustrated

Order As RR01B (Book NB196)

### MASTER HI-FI LOUDSPEAKERS AND ENCLOSURES

by D. BERRIMAN

This book is designed for the hi-fi enthusiast seeking a thorough understanding of how loudspeakers work. The author assumes no engineering or technical knowledge and provides essential background information for anyone building their own loudspeakers  
1979 222 x 143mm 128 pages Illustrated in two colours

Order As RQ34M (Book NB369)

## TAPE RECORDING BOOKS

### BEGINNERS GUIDE TO TAPE RECORDING

by I. R. SINCLAIR

Explains the principles of tape recording and gives advice on microphones, recording for radio and disc etc, both for reel to reel and cassette machines

1978 168 pages 185 x 120mm Illustrated

Order As RQ35Q (Book NB 330)



### MASTER STEREO CASSETTE RECORDING

by I. R. SINCLAIR, BSc, CEng, MIEE, MInstP

A must for everyone who wants to get the best out of their cassette recorders. This book will help you achieve first class recordings

1976 112 pages 216 x 134mm Illustrated in two colours

Order As RR14Q (Book NB238)



### MASTER CREATIVE TAPE RECORDING

by JOHN GARDNER

A fascinating book for all those interested in tape recording. Covers the theory of recording and reproduction, the choice of a machine and microphone, improvising a studio, setting up equipment, organisation of recording sessions, recording drama features and music, and tape editing

1977 136 pages 216 x 134mm Illustrated in 2 colours

Order As RF13P (Book NB2441)

### NEWNES TAPE RECORDER SERVICING MANUAL VOL.1

by JOHN GARDNER

This book covers over 50 individual models by Altec, Baccord, Elizabethan, Ferguson, Ferrograph, Fidelity, Grundig, I.T.T., Kenwood, Marconiphone, Philips, Sanyo, Sony, Tandberg, Uher, first made between 1968-1970

1977 210 pages 254 x 190mm Illustrated

Order As RF15R (Book NB252)

### NEWNES TAPE RECORDER SERVICING MANUAL VOL. 2

by JOHN GARDNER

This book covers over 60 individual models by Akai, Ametek, Elizabethan, Ferguson, Grundig, Hitachi, I.T.T., Marconiphone, National Panasonic, Philips, Saba, Sanyo, Sharp, Sony, Tandberg, Teleton, Yamaha, first made between 1971-1974

1977 210 pages 254 x 190mm Illustrated

Order As RF16S (Book NB253)



## BOOKS ABOUT ELECTRONIC MUSIC

### MASTER ELECTRONICS IN MUSIC

by T. D. TOWERS, MBE, MA, BSc, CEng, MIERE

A fascinating insight into electronic music, special effects, electronic keyboard instruments, magnetic tape music, music synthesizers and computer music

1976 128 pages 216 x 134mm Illustrated in two colours

Order As RR16S (Book NB262)



### ELECTRONIC MUSIC AND CREATIVE TAPE RECORDING

by M.K. BERRY

The book shows how electronic music can be made at home with the simplest and most inexpensive of equipment. It then describes how the sounds are generated and how they may be recorded to build up the final composition. Circuits are included of VCO's, VCA's, VCF's, envelope shapers, mixers, fuzz and noise generators etc. and a 10 note programmable sequencer

1978 86 pages 180 x 108mm. Illustrated

Order As RQ36P (Book BP51)



## CALCULATOR BOOKS

### HOW TO GET THE MOST OUT OF YOUR LOW COST ELECTRONIC CALCULATOR

by R.M. BENREY

The book shows how a simple four-function calculator can be made to solve more complex problems. Also includes conversion and equivalence tables and reference charts. American book

1976 112 pages 227 x 152mm Illustrated

Order As RF22Y (Book HD942)



### FUN & GAMES WITH YOUR ELECTRONIC CALCULATOR

by J. VINE

Contains 101 jokes and riddles and several games that can be played on an electronic calculator together with a dictionary of words with their corresponding numbers.

1977 64 pages 180 x 108mm.

Order As RF07H (Book BP38)

### ELECTRONIC CALCULATOR USERS HANDBOOK

by M. H. BABANI BSc(Eng)

This book presents formulae, data, methods of calculation, conversion factors etc. with the calculator user in mind. An absolute wealth of information gathered together in very compact form

1976 208 pages 180 x 108mm

Order As RH26D (Book BP33)



### YOUR ELECTRONIC CALCULATOR AND YOUR MONEY

by F.A. WILSON

The book shows you how to get the most practical use out of your calculator. Topics include mortgages, cars, insurance, shopping, gambling, income tax, interest rates, savings, shares, etc.

1978 128 pages\* 180 x 108mm.

Order As RQ37S (Book BP54)



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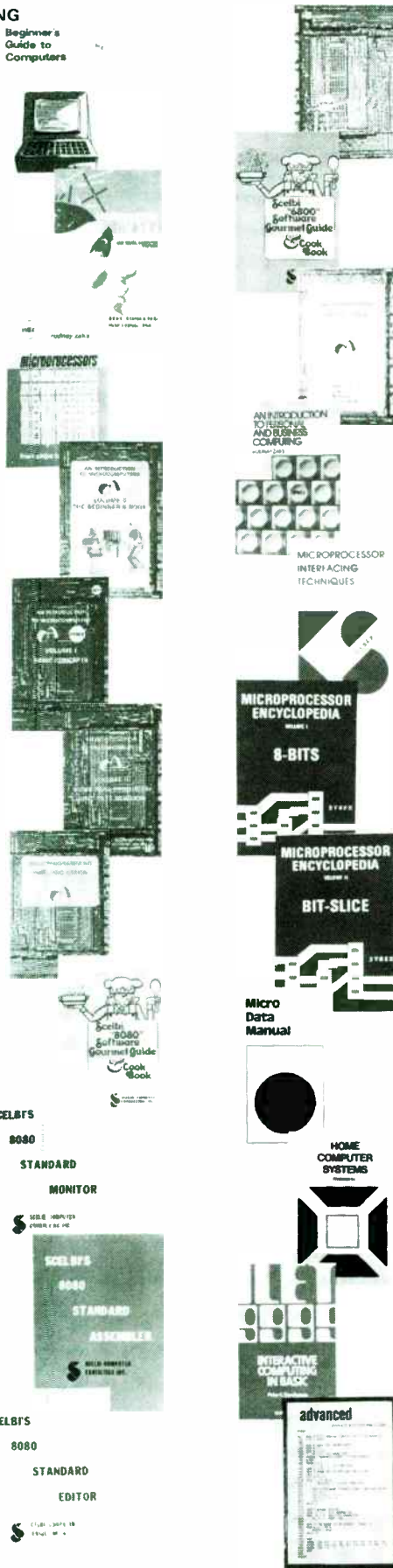
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by AUSTIN LESEA AND RODNAY ZAKS

The book presents a complete set of techniques to interface a microprocessor to the external world. The book will show you how to interconnect a complete system and interface it to all the usual peripherals. Covers 8080, Z80, 6800 and 8085. Includes circuits for a microprocessor controlled music synthesiser. American book. 1978. 416 pages. 216 x 138mm. Illustrated.

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### MICROPROCESSOR ENCYCLOPAEDIA VOL 2

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QH48C	MC3302P	Comparator	—	249	QL19V	T1543	Unijunction	11	212	QR04E	2N1302	Trans	1	208
QH49D	MC3340P	Attenuator	—	238	WQ75S	TL170C	Hall Effect	—	249	QR05F	2N1303	Trans	1	208
QH50E	MC3360P	Power Amp	47	2	WQ76W	TL172C	Hall Effect	—	249	QR06G	2N1304	Trans	1	208
WQ42V	MC44027 250ns	RAM	2	256	QL20H	µA709C	Op Amp	45	233	QR07H	2N1305	Trans	1	208
WQ43W	MC6800P	MPU	2f	—	BL22Y	µA723C TO99	Regulator	—	250	QR08Q	2N1711	Trans	5	210
WQ44X	MC6802P	MPU	2f	—	QL21X	µA723C 14 pin	Regulator	—	250	QR10L	2N1893	Trans	5	210
WQ45Y	MC6810AP 450ns	RAM	256	—	QL22Y	µA741C 8 pin	Op Amp	45	233	QR11M	2N2219	Trans	5	210
WQ46A	MC6821P	PIA	—	252	QL23A	µA741C 14 pin	Op Amp	45	233	QR12N	2N2369A	Trans	7	211
WQ47B	MCM6830L7	ROM	—	257	QL24B	µA747C	Op Amp	45	233	QR13P	2N2484	Trans	4	209
WQ48C	MC6850P	ACIA	—	252	QL25C	µA748C	Op Amp	45	233	QR14Q	2N2646	Unijunction	11	212
WQ49D	MC6852P	SSDA	—	252	QL26D	µA78L05AWC	Regulator	—	251	QR15R	2N2647	Unijunction	11	212
	MC68708L	see	2708	—	WQ77J	µA78L12AWC	Regulator	—	251	QR16S	2N2904	Trans	5	210
WQ50E	MC6875L	Clock	—	252	QL27E	µA78L15AWC	Regulator	—	251	QR17T	2N2905	Trans	5	210
	MC6885P	see	8195	254	QL28F	µA78M05UC	Regulator	—	251	QR18U	2N2906	Regulator	4	209
	MC6887P	see	8197	254	QL29G	µA78M12UC	Regulator	—	251	QR19V	2N2907	Trans	4	209
	MC6888P	see	8198	254	QL30H	µA78M15UC	Regulator	—	251	QR20W	2N2908	Trans	4	209
	MC6889P	see	8128	254	WQ78K	µA78MGUC	Regulator	—	251	QR21X	2N2926Gn	Trans	4	209
QH52G	MEF4220	FET	9	211	QL31J	µA7805UC	Regulator	—	251	QR22Y	2N2926Gn	Regulator	4	209
QH53H	MEF4220MP	FET	9	211	QL32K	µA7812UC	Regulator	—	251	QR23A	2N3053	Trans	5	210
HO61R	MEL12	Opto	—	261	QL33L	µA7815UC	Regulator	—	251	QR24B	2N3054	Regulator	6	210
QH54J	MJE340	Trans	6	210	WQ79L	µA78GU1C	Regulator	—	251	BL45Y	2N3055	Thy	6	210
WQ51F	MJE350	Trans	6	210	QL34M	µA7805KC	Regulator	—	251	QR25C	2N3525	Thy	18	214
QH55K	MJE2955	Trans	6	210	QL35Q	µA7815KC	Regulator	—	251	QR26D	2N3702	Trans	4	209
QH56L	MJE3055	Trans	6	210	WQ80B	µA78H05KC	Regulator	—	251	QR27E	2N3703	Trans	4	209
QH57M	MJ2501	Darlington	6	210	WQ81C	µA78H12KC	Regulator	—	251	QR28F	2N3704	Trans	4	209
BL38R	MJ2955	Trans	6	210	WQ82D	µA78H15KC	Regulator	—	251	QR29G	2N3705	Trans	4	209
QH58N	MJ3001	Darlington	6	210	WQ83E	µA78HGKC	Regulator	—	251	QR30H	2N3706	Trans	4	209
WQ52G	MM57160	Timer	—	245	WQ84F	µA78P055C	Regulator	—	251	QR31J	2N3707	Trans	4	209
QH59P	MPF102	FET	9	211	WQ85G	µA79L05AWC	Regulator	—	251	QR32K	2N3708	Trans	4	209
QH60Q	MPSA14	Darlington	4	209	WQ86T	µA79L12AWC	Regulator	—	251	QR33L	2N3710	Trans	4	209
QH61R	MPSA65	Darlington	4	209	WQ87U	µA79L15AWC	Regulator	—	251	QR34M	2N3711	Trans	4	209
QH62S	MPS3638	Trans	4	209	WQ88V	µA79M05UC	Regulator	—	251	QW06G	2N3771	Trans	6	210
QH63T	MPS3638A	Trans	4	209	WQ89W	µA79M12UC	Regulator	—	251	QW07H	2N3772	Trans	6	210
BL23A	MS4A	Opto	—	261	WQ90X	µA79M15UC	Regulator	—	251	QR35Q	2N3773	Trans	6	210
WQ53H	MVAM115	Variac	14	213	WQ91Y	µA79MGUC	Regulator	—	251	QR36P	2N3819	FET	9	211
WH22Y	M087	Organ	—	243	WQ92A	µA7905UC	Regulator	—	251	QR37S	2N3823	FET	9	211
HQ71N	M251	Rhythm	—	243	WQ93B	µA7912UC	Regulator	—	251	QR38R	2N3866	Trans	8	211
QH64U	M252	Rhythm	—	243	QL36P	µA7915UC	Regulator	—	251	QR39N	2N3903	Trans	4	209
WH21X	M254	Rhythm	—	243	WQ94C	µA79GUC	Regulator	—	251	QR40T	2N3904	Trans	4	209
WQ54J	NE531	Op Amp	45	237	WQ95D	µA79HGKC	Regulator	—	251	QR41U	2N3905	Trans	4	209
WQ55K	NE544	Servo	—	247	WQ96E	VN46AF	VMOS	10	211	QR42V	2N3906	Trans	4	209
QH65W	NE555V	Timer	—	248	WQ97F	VN66AF	VMOS	10	211	QR43W	2N4058	Trans	4	209
QH67X	NE556	Timer	—	248	WQ98G	VN88AF	VMOS	10	211	QR44X	2N4060	Trans	4	209
WQ56L	NE565	PLL	—	248	QL37S	W01	Bridge	16	213	QR45Y	2N4061	Trans	4	209
QH68Y	NE566	Generator	—	248	QL38R	W02	Bridge	16	213	QR46A	2N4062	Trans	4	209
QH69A	NE567	Decoder	—	249	QL39T	W04	Bridge	16	213	QR47B	2N4871	Unijunction	11	212
QH70M	OA47	Diode	13	213	QL40U	W04	Bridge	16	213	QR48C	2N5245	FET	9	211
QH71N	OA90	Diode	13	213	QL41U	2N414	AM Radio	—	240	QR49D	2N5458	FET	9	211
QH72P	OA91	Diode	13	213	QL42V	2S120	Diode	13	213	QR45Y	2N5459	FET	9	211
QH73Q	OA95	Diode	13	213	QL43W	ZTX107	Trans	4	209	QR51F	2N6073	Trans	19	214
QH74R	OA200	Diode	13	213	QL44X	ZTX108	Trans	4	209	QW08J	2N6699	Trans	6	210
QH75S	OA202	Diode	13	213	QL45Y	ZTX109	Trans	4	209	QW09K	2S350	VMOS	10	211
QH77J	OC28	Trans	3	208	QL46A	ZTX300	Trans	4	209	QW10L	25K135	VMOS	10	211
QH78K	OC35	Trans	3	208	QL48C	ZTX302	Trans	4	209	QW11M	2102 650ns	RAM	—	255
QH79L	OC36	Trans	3	208	QL49D	ZTX303	Trans	4	209	WH17T	2112 650ns	RAM	—	255
QH81C	OC44	Trans	2	208	QL50E	ZTX304	Trans	4	209	QW12N	2114 450ns	RAM	—	256
QH82D	OC45	Trans	2	208	QL51F	ZTX312	Trans	4	209	QW13P	2708 450ns	EPROM	—	256
QH83E	OC70	Trans	1	208	QL52G	ZTX313	Trans	4	209	QR52G	3N140	FET	9	211
QH84F	OC71	Trans	1	208	QL53H	ZTX314	Trans	4	209	QR53H	3N141	FET	9	211
QH85G	OC72	Trans	1	208	QL54J	ZTX326	Trans	7	211	QH51F	3403	Op Amp	45	233
QH86T	OC75	Trans	1	208	QL55K	ZTX327	Trans	7	211	QX00A	4000BE	CMOS	35	231
QH87U	OC81	Trans	1	208	QL56L	ZTX330</								



Order As	Device	Type	Table	Page	Order As	Device	Type	Table	Page	Order As	Device	Type	Table	Page
QX12N	4023BE	CMOS	35	231	YF01B	74LS01	TTL	28	226	WH06G	74145	TTL	26	226
QX13P	4024BE	CMOS	39	232	QX39N	7402	TTL	22	224	YF55K	74LS145	TTL	32	226
QX14Q	4025BE	CMOS	35	231	YF02C	74LS02	TTL	28	226	QX80V	74150	TTL	27	226
QX15R	4026BE	CMOS	39	232	QX74R	7403	TTL	22	224	WH07H	74LS151	TTL	27	226
QX16S	4027BE	CMOS	38	232	YF03D	74LS03	TTL	28	226	YF56L	74LS151	TTL	13	226
QX17T	4028BE	CMOS	39	232	QX40T	7404	TTL	22	224	YF57M	74LS153	TTL	33	226
QW20W	4029BE	CMOS	39	232	YF04E	74LS04	TTL	28	226	WH08J	74154	TTL	26	226
QW21X	4030BE	see 4070BE	37	231	QX41U	7405	TTL	22	224	YF58N	74LS154	TTL	32	226
QW22Y	4031BE	CMOS	39	232	YF05F	74LS05	TTL	28	226	YF58P	74LS155	TTL	32	226
	4032BE	CMOS	40	232	QX75S	7406	TTL	22	224	YF60O	74LS156	TTL	32	226
QW23A	4033BE	CMOS	39	232	QX76H	7407	TTL	22	224	YF61R	74LS157	TTL	33	226
QW24B	4034BE	CMOS	37	231	QX42V	7408	TTL	22	224	YF62S	74LS158	TTL	33	226
QW25C	4035BE	CMOS	37	231	YF06G	74LS08	TTL	28	226	WH09K	74160	TTL	24	225
QW26D	4036BE	CMOS	40	232	QX77J	7409	TTL	22	224	YF63T	74LS160	TTL	30	226
QW27E	4040BE	CMOS	39	232	YF07H	74LS09	TTL	28	226	YF64U	74LS161	TTL	30	226
QW28F	4041UBE	CMOS	36	231	QX43W	7410	TTL	22	224	YF65V	74LS162	TTL	30	226
QX19V	4042BE	CMOS	38	232	YF08J	74LS10	TTL	28	226	YF66W	74LS163	TTL	30	226
QW29G	4043BE	CMOS	38	232	QX44X	7411	TTL	22	224	WH10L	74164	TTL	31	226
QW30H	4044BE	CMOS	38	232	YF09K	74LS11	TTL	28	226	YF67X	74LS164	TTL	31	226
QW31J	4045BE	CMOS	39	232	YF10L	74LS12	TTL	28	226	YF68Y	74LS165	TTL	31	226
QW32K	4046BE	CMOS	44	232	QX45Y	7413	TTL	22	224	YF69A	74LS166	TTL	31	226
QX20W	4047BE	CMOS	38	232	WH11M	74LS13	TTL	28	226	YF70M	74LS168	TTL	30	226
QW33L	4048BE	CMOS	35	231	QX46A	7414	TTL	22	224	YF71N	74LS169	TTL	30	226
QX21X	4049UBE	CMOS	36	231	YF12N	74LS14	TTL	28	226	YF72P	74LS170	TTL	33	226
QX22Y	4050BE	CMOS	36	231	YF13P	74LS15	TTL	28	226	YF73Q	74LS173	TTL	34	226
QW34M	4051BE	CMOS	41	232	QX78K	7416	TTL	22	224	WH11M	74174	TTL	23	225
QW35D	4052BE	CMOS	41	232	QX79L	7417	TTL	22	224	YF74R	74LS174	TTL	29	226
QW36P	4053BE	CMOS	41	232	QX74T	7420	TTL	22	224	YF75S	74LS175	TTL	29	226
QW37S	4054BE	CMOS	39	232	YF14Q	74LS20	TTL	28	226	YF76H	74LS181	TTL	33	226
QW38R	4055BE	CMOS	39	232	QX48C	7421	TTL	22	224	YF77J	74LS189	TTL	34	226
QW39N	4056BE	CMOS	39	232	YF15R	74LS21	TTL	28	226	YF78K	74LS190	TTL	30	226
QW40T	4060BE	CMOS	39	232	YF16S	74LS22	TTL	28	226	YF79L	74LS191	TTL	30	226
QW41U	4063BE	CMOS	40	232	QX80B	7425	TTL	22	224	WH12N	74192	TTL	24	225
QX23A	4066BE	CMOS	42	232	QX81C	7426	TTL	22	224	YF80B	74LS192	TTL	30	226
QW42V	4067BE	CMOS	41	232	YF17T	74LS26	TTL	28	226	QX90X	74193	TTL	24	225
QX24B	4068BE	CMOS	35	231	QX49D	7427	TTL	22	224	YF81C	74LS193	TTL	30	226
QX25C	4069UBE	CMOS	36	231	YF18U	74LS27	TTL	28	226	WH13P	74194	TTL	25	225
QX26D	4070BE	CMOS	35	231	YF19V	74LS28	TTL	28	226	YF82D	74LS194	TTL	31	226
QW43W	4071BE	CMOS	35	231	QX50E	7430	TTL	22	224	YF83E	74LS195	TTL	31	226
QX27E	4072BE	CMOS	35	231	YF20W	74LS30	TTL	28	226	WH14Q	74196	TTL	24	225
QW44X	4073BE	CMOS	35	231	QX51F	7432	TTL	22	224	YF84F	74LS196	TTL	30	226
QW45Y	4075BE	CMOS	35	231	YF21X	74LS32	TTL	28	226	YF85G	74LS197	TTL	30	226
QW46A	4076BE	CMOS	38	232	YF22Y	74LS33	TTL	28	226	YF86T	74LS211	TTL	29	226
QW47B	4077BE	CMOS	35	231	QX52G	7437	TTL	22	224	YF87U	74LS240	TTL	34	226
QX28F	4078BE	CMOS	35	231	YF23A	74LS37	TTL	28	226	YF88V	74LS241	TTL	34	226
QW48C	4081BE	CMOS	35	231	QX82D	7438	TTL	22	224	YF89W	74LS242	TTL	34	226
QW49D	4082BE	CMOS	35	231	YF24B	74LS38	TTL	28	226	YF90X	74LS243	TTL	34	226
QW50E	4085BE	CMOS	35	231	QX53H	7440	TTL	22	224	YF91Y	74LS245	TTL	34	226
QW51F	4086BE	CMOS	35	231	YF25C	74LS40	TTL	28	226	YF92A	74LS251	TTL	34	226
QW52G	4089BE	CMOS	40	232	QX54J	7442	TTL	26	226	YF93B	74LS253	TTL	34	226
QW53H	4093BE	CMOS	35	231	YF26D	74LS42	TTL	32	226	YF94C	74LS256	TTL	29	226
QW54J	4094BE	CMOS	37	231	QX55K	7447A	TTL	26	226	YF95D	74LS257	TTL	34	226
QW55K	4095BE	CMOS	38	232	QX83E	7451	TTL	22	224	YF96E	74LS258	TTL	34	226
QW56L	4097BE	CMOS	41	232	YF27E	74LS51	TTL	28	226	YF97F	74LS259	TTL	29	226
QX29G	4098BE	CMOS	38	232	QX84F	7454	TTL	22	224	YF98G	74LS261	TTL	32	226
QW57M	4099BE	CMOS	38	232	YF28F	74LS54	TTL	28	226	YF99H	74LS266	TTL	28	226
QW58N	40100BE	CMOS	37	231	YF29G	74LS55	TTL	28	226	YH00A	74LS273	TTL	29	226
QW59P	40101BE	CMOS	40	232	QX56L	7470	TTL	23	224	YH01B	74LS279	TTL	29	226
QW60Q	40102BE	CMOS	39	232	QX57M	7472	TTL	23	224	YH02C	74LS283	TTL	33	226
QW61R	40103BE	CMOS	38	232	QX58N	7473	TTL	23	224	YH03D	74LS290	TTL	30	226
QW62S	40104BE	CMOS	37	231	YF30H	74LS73	TTL	29	226	YH04E	74LS295	TTL	30	226
QW63T	40105BE	CMOS	37	231	QX59P	7474	TTL	23	224	YH05F	74LS295	TTL	34	226
QW64U	40106BE	CMOS	35	231	YF31J	74LS74	TTL	29	226	YH06G	74LS298	TTL	31	226
QW65V	40107BE	CMOS	35	231	QX60Q	7475	TTL	23	224	YH07H	74LS299	TTL	31	226
QW66W	40108BE	CMOS	40	232	YF32K	74LS75	TTL	29	226	YH08J	74LS323	TTL	31	226
QW67X	40109BE	CMOS	36	231	QX61R	7476	TTL	23	224	YH09K	74LS363	TTL	34	226
QW68Y	40110BE	CMOS	39	232	YF33L	74LS76	TTL	29	226	YH10L	74LS364	TTL	34	226
QW69A	40160BE	CMOS	39	232	YF34M	74LS78	TTL	29	226	YH11M	74LS365	TTL	34	226
QW70M	40161BE	CMOS	39	232	QX62S	7481	TTL	27	226	YH12N	74LS366	TTL	34	226
QW71N	40162BE	CMOS	39	232	QX85G	7483	TTL	27	226	YH13P	74LS367	TTL	34	226
QW72P	40163BE	CMOS	39	232	YH14Q	74LS368	see 74LS283	22	224	YH14Q	74LS368	TTL	34	226
QW73Q	40174BE	CMOS	40	232	QX63T	7485	TTL	27	226	YH15R	74LS373	TTL	34	226
QW74R	40181BE	CMOS	48	232	YF35O	74LS85	TTL	33	226	YH16S	74LS374	TTL	34	226
QW75S	40182BE	CMOS	40	232	QX64X	7486	TTL	22	224	YH17T	74LS375	TTL	29	226
QW76H	40192BE	CMOS	39	232	YF36P	74LS86	TTL	28	226	YH18U	74LS377	TTL	29	226
QW77J	40193BE	CMOS	39	232	QX65V	7489	TTL	27	226	YH19V	74LS378	TTL	29	226
QW78K	40194BE	CMOS	37	231	YF37S	74LS89	TTL	33	226	YH20W	74LS379	TTL	29	226
QW79L	40257BE	CMOS	41	232	QX66W	7489	TTL	24	225	YH21X	74LS390	TTL	30	226
QX34M	4067J	FET	9	211	YF38R	74LS90	TTL	30	226	YH22Y	74LS393	TTL	30	226
XX01B	4136	Op Amp	45	233	QX86T	7491	TTL	25	225	YH23A	74LS395	TTL	34	226
QW80B	4151	V to F Regulator	247		QX67X	7492	TTL	24	225	YH24B	74LS398	TTL	31	226
XX02C	4195	Regulator	260		YF39N	74LS92	TTL	30	226	YH25C	74LS399	TTL	31	226
QX30H	4416BF	CMOS	42	232	QX68Y	7493	TTL	24	225	YH26D	74LS400	TTL	30</	

**Table 1 Low And Medium Power Germanium Transistors Low Frequency**

Status	Type No.	Case Style	Material	V <sub>CEO</sub> (max) V	V <sub>CBO</sub> (max) V	V <sub>EBO</sub> (max) V	I <sub>C</sub> (max) mA	P <sub>TOT</sub> (max) mW	Typ h <sub>FE</sub> @ I <sub>C</sub> (mA)	Typ f <sub>T</sub> (MHz)	Application
M	AC126	T01a	PNP	12	32	-10	100	220	140 @ 2mA	2.3	Pre-amp driver
D	AC127	T01a	NPN	32	32	10	500	340	50 @ 20mA	2.5	Class 'B' outputs
D	AC128	T01a	PNP	16	32	10	1A	1W	90 @ 300mA	1.5	Class 'A' and 'B' outputs (comp to AC176)
M	AC141	T01a	NPN	30	32		400	720	>80 @ 400mA	3	General purpose
M	AC142	T01a	PNP	30	30		400	720	<80 @ 400mA	1.5	General purpose
C	AC176	T01a	NPN	32	32	5	350	700	100 @ 500mA	1	Class 'B' outputs (comp to AC128)
D	AC187	T01a	NPN	15	25	10	1A	1W	200 @ 300mA	5	Class 'B' outputs up to 3W (comp to AC188)
D	AC188	T01a	PNP	15	25	10	1A	1W	200 @ 300mA	1.5	Class 'B' outputs up to 3W (comp to AC187)
M	ACY19	T05	PNP	40	50	-12	500	260	140 @ 300mA	1.3	Switching and general
M	ACY20	T05	PNP	32	40	-12	500	260	90 @ 50mA	1	Switching and general
M	ACY21	T05	PNP	32	40	-12	500	260	170 @ 50mA	1.3	Switching and general
M	OC70	T01b	PNP	30	30	-10	10	125	30 @ 0.5mA	5kHz	A.F. amp
M	OC71	T01b	PNP	30	30	10	10	125	41 @ 1mA	5kHz	A.F. amp
M	OC72	T01b	PNP	32	32	-10	125	125	85 @ 10mA	0.33	Class 'B' output, oscillators, switching
M	OC75	T01b	PNP	30	30	10	10	125	95 @ 3mA	0.9	High gain amp
M	OC81	T01b	PNP	16	32		200	600	150 @ 50mA	1	Class 'B' output
M	OC83	T01a	PNP	20	30	-3	500	600	90 @ 1mA	0.83	Switching and general
M	OC84	T01a	PNP	30	30	-10	500	600	90 @ 1mA	1	Switching and general
M	2N1302	T05	NPN	25	25	25	300	150	50 @ 10mA	3	General purpose and switching
M	2N1303	T05	PNP	25	30	-25	300	150	50 @ 10mA	3	General purpose and switching
M	2N1304	T05	NPN	20	25	25	300	150	115 @ 10mA	5	General purpose and switching
M	2N1305	T05	PNP	20	-30	-25	300	150	70 @ 10mA	5	General purpose and switching

**Table 2 Small Signal High Frequency Germanium Transistors**

Status	Type No.	Case Style	Material	V <sub>CEO</sub> (max) V	V <sub>CBO</sub> (max) V	V <sub>EBO</sub> (max) V	I <sub>C</sub> (max) mA	P <sub>TOT</sub> (max) mW	Typ h <sub>FE</sub> @ I <sub>C</sub> (mA)	Typ f <sub>T</sub> (MHz)	Application
M	AF114	T07	PNP	-20	20		10	85	>40 @ 1mA	75	AM/FM RF amp
M	AF115	T07	PNP	-20	20		10	85	>40 @ 1mA	75	AM/FM mixer/oscillator
M	AF116	T07	PNP	-20	20		10	85	>40 @ 1mA	75	I.F. amp in FM receivers
M	AF117	T07	PNP	-20	20		10	85	>40 @ 1mA	75	Mixer/oscillators
D	AF139	T072	PNP	15	22	0.3	10	60	50 @ 1.5mA	550	UHF amps up to 860MHz
D	AF239	T072	PNP	-15	20	-0.3	10	60	30 @ 5mA	700	TV - UHF pre-amps up to 900MHz
M	OC44	T01b	PNP	15	15	8	5	70	100 @ 1mA	7.5	Mixer/oscillators
M	OC45	T01b	PNP	-15	15	8	5	70	60 @ 1mA	3	I.F. amps
M	OC170	T07	PNP	-20	20		10	85	>40 @ 1mA	75	I.F. stages in FM receivers
M	OC171	T07	PNP	20	20		10	85	>40 @ 1mA	75	RF and mixer/oscillators in FM receivers

**Table 3 Germanium Power Transistors**

Status	Type No.	Case Style	Material	V <sub>CEO</sub> (max) V	V <sub>CBO</sub> (max) V	V <sub>EBO</sub> (max) V	I <sub>C</sub> (max) mA	P <sub>TOT</sub> (max) mW	Typ h <sub>FE</sub> @ I <sub>C</sub> (mA)	Typ f <sub>T</sub> (MHz)	Application
M	AD140	T03	PNP	-55	55	-10	3A	35W	65 @ 1A	4.5	Power amps
C	AD149	T03	PNP	-50	50	-20	3.5A	22.5W	65 @ 1A	0.5	Class 'B' push/pull outputs
C	AD161	S055	NPN	20	32	10	1A	4W	150 @ 500mA	3	Audio outputs (comp to AD162)
C	AD162	S055	PNP	-20	-32	-10	1A	6W	150 @ 500mA	1.5	Audio outputs (comp to AD161)
C	OC28	T03	PNP	-60	-80	-40	8A	30W	38 @ 1A	0.25	Switching
C	OC35	T03	PNP	-48	60	-20	8A	30W	50 @ 1A	0.25	Switching
C	OC36	T03	PNP	-60	-80	-40	8A	30W	70 @ 1A	0.25	Switching

**Table 4 Small Signal Low Frequency Silicon Transistors**

Status	Type No.	Case Style	Material	V <sub>CEO</sub> (max) V	V <sub>CBO</sub> (max) V	V <sub>EBO</sub> (max) V	I <sub>C</sub> (max) mA	P <sub>TOT</sub> (max) mW	Typ h <sub>FE</sub> @ I <sub>C</sub> (mA)	Typ f <sub>T</sub> (MHz)	Application
D	BC107B	T018	NPN	45	50	6	100	300	290 @ 2mA	300	AF driver (comp to BC177)
D	BC108C	T018	NPN	20	30	5	100	300	520 @ 2mA	300	General purpose (comp to BC178)
D	BC109C	T018	NPN	20	30	5	100	300	520 @ 2mA	300	Very low noise high gain amp (comp to BC179)
C	BC117	T039	NPN	120	120	5	20	300	40 @ 30mA	40	High voltage
D	BC147	Lokfit a	NPN	45	50	6	100	350	280 @ 2mA	300	AF driver (comp to BC157)
D	BC148	Lokfit a	NPN	30	30	5	100	350	450 @ 2mA	300	General purpose (comp to BC158)
D	BC149	Lokfit a	NPN	30	30	5	100	350	500 @ 2mA	300	AF inputs (comp to BC159)
D	BC154	T0106	PNP	-40	40	-5	10	200	215 @ 0.1mA	70	Low level amp.
D	BC157	Lokfit a	PNP	-45	50	-5	100	350	140 @ 2mA	150	AF driver (comp to BC147)
D	BC158	Lokfit a	PNP	-30	-30	-5	100	350	210 @ 2mA	150	General purpose (comp to BC148)

Continued on next page

Table 4 continued

Status	Type No	Case Style	Material	V <sub>CEO</sub> (max) V	V <sub>CBO</sub> (max) V	V <sub>EB0</sub> (max) V	I <sub>C</sub> (max) mA	P <sub>TOT</sub> (max) mW	Typ hFE @ I <sub>C</sub> (mA)	Typ f <sub>T</sub> (MHz)	Application
D	BC159	Lokfit a	PNP	30	30	-5	100	350	230 @ 2mA	150	AF inputs (comp to BC149)
D	BC168C	T092	NPN	20	30	5	100	300	650 @ 2mA	85	General purpose
D	BC169C	T092	NPN	20	30	5	50	300	650 @ 2mA	150	High gain, low noise amp
D	BC177	T018	PNP	45	-50	-5	100	300	240 @ 2mA	200	AF amp (comp to BC107)
D	BC178	T018	PNP	-25	30	-5	100	300	240 @ 2mA	200	General purpose (comp to BC108)
D	BC179	T018	PNP	-20	25	-5	100	300	410 @ 2mA	200	High gain, low noise (comp to BC109)
D	BC182L	T092	NPN	50	60	5	200	300	>125 @ 2mA	150	AF driver (comp to BC212L)
D	BC183L	T092	NPN	30	45	5	200	300	>125 @ 2mA	150	General purpose (comp to BC213L)
D	BC184L	T092	NPN	30	45	5	200	300	>250 @ 2mA	150	Low noise, high gain amp (comp to BC214L)
D	BC204	T0106	PNP	-45	50	-5	100	300	160 @ 2mA	160	General amps
D	BC209C	T0106	NPN	20	25	5	100	300	520 @ 2mA	200	Audio amp inputs
D	BC212L	T092	PNP	50	60	-5	200	300	-60 @ 2mA	200	AF driver (comp to BC182L)
D	BC213L	T092	PNP	-30	45	-5	200	300	-80 @ 2mA	200	General purpose (comp to BC183L)
D	BC214L	T092	PNP	-30	45	-5	200	300	-140 @ 2mA	200	Low noise, high gain amp (comp to BC184L)
D	BC548	T092a	NPN	30	30	5	100	500	520 @ 2mA	300	BC108 in plastic package
D	BC650	T092b	NPN	30	30	5	100	625	750 @ 2mA	300	Ultra low noise high gain audio inputs
D	BCY70	T018	PNP	-40	50	-5	200	350	300 @ 1mA	450	General purpose
D	BCY71	T018	PNP	45	45	5	200	350	300 @ 1mA	450	General purpose
D	BSX21	T018	NPN	30	120	5	50	300	40 @ 4mA	120	General purpose and numerical indicator tube driver
D	BSY95A	T018	NPN	15	20	5	100	300	100 @ 10mA	200	General purpose
D	MPSA14	T092b	NPN	30	30	300	300	500	10,000 @ 10mA	125	Darlington amp
D	MPSA65	T092b	PNP	-30	-30	300	300	500	50,000 @ 10mA	175	Darlington amp
D	MPS3638	T092b	PNP	-25	25	-4	500	310	-20 @ 10mA	100	General purpose amp and switch
D	MPS3638A	T092b	PNP	25	-25	4	500	310	-100 @ 10mA	150	General purpose amp and switch
D	PN3643	T092b	NPN	30	60	5	500	350	200 @ 150mA	250	General purpose (comp to MPS3638/A)
D	ZTX107	E-line	NPN	50	60	5	100	300	240 @ 2mA	300	
D	ZTX108	E-line	NPN	30	45	5	100	300	240 @ 2mA	350	
D	ZTX109	E-line	NPN	30	45	5	100	300	410 @ 2mA	350	
D	ZTX300	E-line	NPN	25	25	5	500	300	150 @ 10mA	150	(comp to ZTX500)
D	ZTX301	E-line	NPN	35	35	5	500	300	-50 @ 50mA	150	(comp to ZTX501)
D	ZTX302	E-line	NPN	35	35	5	500	300	-100 @ 10mA	200	(comp to ZTX502)
D	ZTX303	E-line	NPN	45	45	5	500	300	-50 @ 10mA	150	(comp to ZTX503)
D	ZTX304	E-line	NPN	70	70	5	500	300	-50 @ 10mA	150	(comp to ZTX504)
D	ZTX312	E-line	NPN	12	30	500	300	300	-40 @ 10mA	400	
D	ZTX313	E-line	NPN	15	40	500	300	300	-40 @ 10mA	500	
D	ZTX314	E-line	NPN	15	40	500	300	300	-40 @ 10mA	500	
D	ZTX330	E-line	NPN	30	30	5	500	300	-100 @ 10mA	30	(comp to ZTX530)
D	ZTX331	E-line	NPN	45	45	5	500	300	-40 @ 10mA	30	(comp to ZTX531)
D	ZTX341	E-line	NPN	100	100	100	300	300	-30 @ 10mA	100	(comp to ZTX541)
D	ZTX342	E-line	NPN	120	120	100	300	300	>30 @ 10mA	100	(comp to ZTX542)
D	ZTX500	E-line	PNP	25	-25	5	500	300	150 @ 10mA	150	(comp to ZTX300)
D	ZTX501	E-line	PNP	35	35	5	500	300	-50 @ 10mA	150	(comp to ZTX301)
D	ZTX502	E-line	PNP	-35	35	-5	500	300	-100 @ 10mA	150	(comp to ZTX302)
D	ZTX503	E-line	PNP	45	45	5	500	300	-50 @ 10mA	150	(comp to ZTX303)
D	ZTX504	E-line	PNP	70	70	-5	500	300	-50 @ 10mA	150	(comp to ZTX304)
D	ZTX510	E-line	PNP	12	-12	30	300	300	-40 @ 30mA	400	
D	ZTX530	E-line	PNP	30	30	5	500	300	-100 @ 10mA	30	(comp to ZTX330)
D	ZTX531	E-line	PNP	45	45	5	500	300	-40 @ 10mA	30	(comp to ZTX331)
D	ZTX541	E-line	PNP	100	-100	100	500	500	-30 @ 2mA	100	(comp to ZTX341)
D	ZTX542	E-line	PNP	120	120	100	500	500	-40 @ 10mA	100	(comp to ZTX342)
M	2N706	T018	NPN	20	25	3	100	300	>20 @ 10mA	200	High speed switching
M	2N708	T018	NPN	15	40	5	200	360	75 @ 10mA	300	High speed logic
M	2N2484	T018	NPN	60	60	40	40	360	300 @ 10mA	15	Low noise, low level amp
D	2N2906	T018	PNP	-40	-60	5	600	400	80 @ 150mA	200	High speed switching
D	2N2907	T018	PNP	-40	-60	-5	600	400	200 @ 150mA	200	High speed switching
M	2N2926 (Or)	T098	NPN	18	18	5	100	200	150 @ 2mA	200	General purpose
M	2N2926 (Ye)	T098	NPN	18	18	5	100	200	210 @ 2mA	200	General purpose
M	2N2926 (Gr)	T098	NPN	18	18	5	100	200	360 @ 2mA	200	General purpose
D	2N3702	T092	PNP	-25	-40	-5	200	300	180 @ 50mA	100	Audio amp
D	2N3703	T092	PNP	30	-50	5	200	300	90 @ 50mA	100	Audio amp
D	2N3704	T092	NPN	30	50	5	800	360	200 @ 50mA	100	Audio amp
D	2N3705	T092	NPN	30	50	5	800	360	100 @ 50mA	100	Audio amp
D	2N3706	T092	NPN	20	40	5	800	360	315 @ 50mA	100	Audio amp
D	2N3707	T092	NPN	30	30	6	30	250	250 @ 0.1mA	100	Low level, low noise amp
D	2N3708	T092	NPN	30	30	6	30	250	360 @ 1mA	100	General purpose
D	2N3710	T092	NPN	30	30	6	30	250	210 @ 1mA	100	General purpose
D	2N3711	T092	NPN	30	30	6	30	250	420 @ 1mA	100	General purpose
D	2N3903	T092b	NPN	40	60	5	200	300	100 @ 10mA	100	General purpose
D	2N3904	T092b	NPN	40	60	6	200	310	-100 @ 10mA	100	General purpose
D	2N3905	T092b	PNP	-40	-40	-5	200	310	-50 @ 10mA	100	General purpose
D	2N3906	T092b	PNP	-40	-40	-5	200	310	-100 @ 10mA	100	General purpose
D	2N4058	T092	PNP	30	30	-6	100	360	250 @ 0.1mA	100	General purpose
D	2N4060	T092	PNP	-30	-30	-6	100	360	105 @ 1mA	100	General purpose
D	2N4061	T092	PNP	30	-30	-6	100	360	210 @ 1mA	100	General purpose
D	2N4062	T092	PNP	-30	-30	6	100	360	420 @ 1mA	100	General purpose



**Table 5 Medium Power Low Frequency Silicon Transistors**

Status	Type No.	Case Style	Material	V <sub>CEO</sub> (max) V	V <sub>CB0</sub> (max) V	V <sub>EB0</sub> (max) V	I <sub>C</sub> (max) mA	P <sub>TOT</sub> (max) mW	Typ h <sub>FE</sub> @ I <sub>C</sub> (mA)	Typ f <sub>T</sub> (MHz)	Application
D	BC119	T039	NPN	30	60	5	500	800	90 @ 150mA	40	Up to 1W class 'A', 6W class 'B' audio output stages
D	BC139	T039	PNP	-40	40	5	500	700	90 @ 100mA	200	For audio output and driver stages
D	BC140	T039	NPN	40	60	7	1A	800	140 @ 100mA	50	Audio amps and switching up to 1A (comp to BC160)
D	BC141	T039	NPN	60	80	7	1A	800	140 @ 100mA	50	Audio amps and switching up to 1A (comp to BC161)
D	BC142	T05	NPN	60	80	5	800	800	>20 @ 200mA	40	Audio driver
D	BC143	T05	PNP	-60	-60	-5	800	800	>25 @ 500mA	100	Audio driver
D	BC160	T039	PNP	-40	-60	5	1A	800	140 @ 100mA	50	Audio amps and switching up to 1A (comp to BC140)
D	BC161	T039	PNP	-60	-80	-5	1A	800	140 @ 100mA	50	Audio amps and switching up to 1A (comp to BC141)
D	BC301/5	T039	NPN	60	90	7	500	850	105 @ 150mA	120	Audio driver stages (comp to BC303/5)
D	BC303/5	T039	PNP	-60	-85	7	500	850	105 @ 150mA	75	Audio driver stages (comp to BC301/5)
D	BC327	T092h	PNP	-45	50	5	500	625	350 @ 100mA	100	Driver and output stages in audio amps (comp to BC337)
D	BC328	T092h	PNP	-25	-30	-5	500	625	350 @ 100mA	100	Driver and output stages in audio amps (comp to BC338)
D	BC337	T092h	NPN	45	50	5	500	625	350 @ 100mA	200	Driver and output stages in audio amps (comp to BC327)
D	BC338	T092h	NPN	25	30	5	500	625	350 @ 100mA	200	Driver and output stages in audio amps (comp to BC328)
D	BC441	T039	NPN	60	75	5	2A	1W	100 @ 500mA	50	Drivers and general purpose (comp to BC461)
D	BC461	T039	PNP	60	-75	5	2A	1W	100 @ 500mA	50	Drivers and general purpose (comp to BC441)
D	BFX29	T05	PNP	60	-60	5	600	600	125 @ 10mA	360	AF driver
D	BFX30	T05	PNP	65	65	5	600	600	90 @ 10mA	100	AF switch
D	BFX84	T05	NPN	60	100	6	1A	800	112 @ 150mA	50	General purpose
D	BFX85	T05	NPN	60	100	6	1A	800	142 @ 150mA	50	General purpose
D	BFX87	T05	PNP	-50	50	4	600	600	125 @ 10mA	360	General purpose
D	BFX88	T05	PNP	-40	40	4	600	600	125 @ 10mA	360	General purpose
D	BFY50	T05	NPN	35	80	6	1A	800	112 @ 150mA	50	General purpose
D	BFY51	T05	NPN	30	60	6	1A	800	123 @ 150mA	50	General purpose
D	BFY52	T05	NPN	20	40	6	1A	800	142 @ 150mA	50	General purpose
C	2N697	T05	NPN	40	60	5	500	600	75 @ 150mA	100	Switching and amps
D	2N1711	T05	NPN	30	75	7	1A	800	200 @ 150mA	100	General purpose
M	2N1893	T05	NPN	80	120	7	500	800	80 @ 150mA	50	Amplifier outputs
M	2N2219	T05	NPN	30	60	5	800	800	200 @ 150mA	250	High speed switching
D	2N2905	T05	PNP	40	60	5	600	600	200 @ 150mA	200	High speed switching
D	2N3053	T05	NPN	40	60	5	700	800	150 @ 150mA	100	Driver

**Table 6 High Power Low Frequency Silicon Transistors**

Status	Type No.	Case Style	Material	V <sub>CEO</sub> (max) V	V <sub>CB0</sub> (max) V	V <sub>EB0</sub> (max) V	I <sub>C</sub> (max) mA	P <sub>TOT</sub> (max) mW	Typ h <sub>FE</sub> @ I <sub>C</sub> (mA)	Typ f <sub>T</sub> (MHz)	Application
D	BD131	T0126	NPN	45	70	6	3A	15W	-40 @ 500mA	60	AF output (comp to BD132)
D	BD132	T0126	PNP	45	-45	4	3A	15W	-40 @ 500mA	60	AF output (comp to BD131)
D	BD135	T0126	NPN	45	45	5	1A	8W	100 @ 150mA	250	AF driver amp comp to BD136
D	BD136	T0126	PNP	45	45	-5	1A	8W	100 @ 150mA	75	AF driver amp (comp to BD135)
D	BD139	T0126	NPN	80	100	5	1A	8W	100 @ 150mA	250	AF driver amp (comp to BD140)
D	BD140	T0126	PNP	80	-100	5	1A	8W	100 @ 150mA	75	AF driver amp (comp to BD139)
D	BD711	P1b	NPN	100	100	5	12A	75W	25 @ 4A	3	Audio amp (comp to BD712)
D	BD712	P1b	PNP	100	-100	5	12A	75W	25 @ 4A	3	Audio amp (comp to BD711)
D	MJ2501	T03	PNP	80	-80	-5	10A	150W	1000 @ 5A (min)	1	High power darlington (comp to MJ3001)
D	MJ2955	T03	PNP	60	-100	7	15A	150W	45 @ 4A	4	General purpose (comp to 2N3055)
D	MJ3001	T03	NPN	80	80	5	10A	150W	1000 @ 5A (min)	1	High power darlington (comp to MJ2501)
D	MJE340	T0126	NPN	300	300	3	500	20W	150 @ 50mA	20	Audio output stages
D	MJE350	T0126	PNP	300	-300	-3	500	20W	150 @ 50mA	20	Audio output stages (comp to MJE 340)
D	MJE2955	P3a	PNP	60	-60	-5	10A	90W	45 @ 4A	2	General purpose (comp to MJE3055)
D	MJE3055	P3a	NPN	60	70	5	10A	90W	45 @ 4A	2	General purpose (comp to MJE2955)
D	TIP31A	P1b	NPN	60	60	5	3A	40W	25 @ 3A	3	Audio amp (comp to TIP32A)
D	TIP32A	P1b	PNP	60	-60	5	3A	40W	25 @ 3A	3	Audio amp (comp to TIP31A)
D	TIP33A	P3c	NPN	60	60	5	10A	80W	75 @ 3A	3	Audio amp (comp to TIP34A)
D	TIP34A	P3c	PNP	-60	-60	-5	10A	80W	75 @ 3A	3	Audio amp (comp to TIP33A)
D	TIP41A	P1b	NPN	60	60	5	5A	65W	50 @ 3A	3	Audio amp (comp to TIP42A)
D	TIP42A	P1b	PNP	60	-60	5	5A	65W	50 @ 3A	3	Audio amp (comp to TIP41A)
D	TIP122	P1b	NPN	100	100	5	5A	65W	5000 @ 2A	5	High power darlington (comp to TIP127)
D	TIP127	P1b	PNP	-100	-100	-5	5A	65W	3000 @ 2A	5	High power darlington (comp to TIP122)
D	2N3054	T066	NPN	55	90	7	4A	29W	>25 @ 500mA	1	Audio amp
D	2N3055	T03	NPN	60	100	7	15A	115W	45 @ 4A	0.8	General purpose (comp to MJ2955)
D	2N3771	T03	NPN	40	50	5	30A	150W	30 @ 15A	0.8	High current power amps
D	2N3772	T03	NPN	60	100	7	20A	150W	30 @ 10A	0.8	High current power amps
D	2N3773	T03	NPN	140	160	7	16A	150W	40 @ 4A	0.2	Power switching, audio amps, inverters, solenoid drivers
D	2N6609	T03	PNP	140	-160	-7	16A	150W	40 @ 4A	0.2	Power switching, audio amps, inverters solenoid drivers (comp to 2N3773)

**Table 7 Small Signal High Frequency Silicon Transistors**

Status	Type No.	Case Style	Material	V <sub>CEO</sub> (max) V	V <sub>CBO</sub> (max) V	V <sub>EBO</sub> (max) V	I <sub>C</sub> (max) mA	P <sub>TOT</sub> (max) mW	Typ h <sub>FE</sub> @ I <sub>C</sub> (mA)	Typ f <sub>T</sub> (MHz)	Application
C	BF115	S0-12A	NPN	30	50	5	30	145	40 @ 1mA	230	AM/FM
M	BF167	S0-12A	NPN	30	40	4	25	130	45 @ 1mA	600	TV video IF. Has very low feedback capacitance
C	BF180	T072	NPN	20	30	3	20	150	f124dB @ 200MHz	675	UHF TV r.f. amps, tuners
D	8F194	Lokfit b	NPN	20	30	5	30	220	115 @ 1mA	260	AM/FM and TV sound IF stages
D	8F195	Lokfit b	NPN	20	30	5	30	220	67 @ 1mA	200	AM/FM input stages and mixer/IF stages of battery sets
D	BF196	Lokfit b	NPN	30	40	4	25	250	f139dB @ 45MHz	400	TV IF amp. Has very low feedback capacitance
C	BF200	T072	NPN	20	30	3	20	150	f128dB @ 100MHz	270	TV VHF and FM tuners
D	BSX20	T018	NPN	15	40	4.5	500	360	80 @ 10mA	500	High speed saturated switch and h.f. amps
D	ZTX326	E-line	NPN	12	25		50	200	>20 @ 25mA	1000	Very high frequency
D	ZTX327	E-line	NPN	30	55		400	500	>55 @ 5mA	800	Very high frequency
D	2N2369A	T018	NPN	15	40	4.5	200	360	~40 @ 10mA	500	High speed saturated switch and h.f. amps

f1 G<sub>UM</sub> Maximised unilateralised power gain.

**Table 8 Medium And High Power High Frequency Silicon Transistors**

Status	Type No.	Case Style	Material	V <sub>CEO</sub> (max) V	V <sub>CBO</sub> (max) V	V <sub>EBO</sub> (max) V	I <sub>C</sub> (max) mA	P <sub>TOT</sub> (max) mW	Typ h <sub>FE</sub> @ I <sub>C</sub> (mA)	Typ f <sub>T</sub> (MHz)	Application
D	BF258	T05	NPN	250	250	5	100	800	>25 @ 30mA	90	High voltage video output amp
D	BF259	T05	NPN	300	300	5	100	800	>25 @ 30mA	90	High voltage video output amp
D	BF337	T039	NPN	200	250	5	100	800	60 @ 30mA	80	R-G-B and colour difference outputs in colour TV's
D	BU204	T03	NPN	11300		7	2.5A	10W	2 @ 2A	7.5	Line output stages in TV's
D	BU205	T03	NPN	11500		7	2.5A	10W	2 @ 2A	7.5	Line output stages in TV's
D	8U206	T03	NPN	11700		7	2.5A	10W	1.8 @ 2A	7.5	Line output stages in TV's
D	BU208	T03	NPN	11500		7	5A	12.5W	2.25 @ 4.5A	7	Line output stages in colour TV's
D	R2008B	T03	NPN	*650			8A	85W			Replacement for TV's
D	R2010B	T03	NPN				10A	75W	>6		Replacement for TV's
D	2N3866	T05	NPN	30	55	3.5	400	5W	105 @ 50mA	700	UHF amp

† Non repetitive peak voltage

\* The maximum allowable continuous collector to emitter voltage with a small reverse bias applied to the emitter base junction.

**Table 9 N Channel Field Effect Transistors**

Type No.	Case Style	P <sub>TOT</sub> (max) mW	V <sub>DS</sub> (max) V	V <sub>DG</sub> (max) V	V <sub>GS</sub> (max) V	I <sub>GSS</sub> (max) nA	Y <sub>FS</sub> (typical) μmhos (V <sub>GS</sub> = 0V)	Max input capacitance (pF)	I <sub>DSS</sub> (max) mA	Application
BF244	T092d	360	30	30	30	7	4500	4	25	DC, low and high frequency amps
BFW 10	TO12	300	30	30	30	0.1	3200	4	20	Very low noise at low frequency, wideband amps up to 300MHz
MEF4220	TO106f	200	30	30	30	0.1	2500	6	3	General purpose
MPF102	T092c	200	25	25	25	2	1600 @ 100MHz	7	20	R.F. amps
2N3819	TO106f	200	25	25	25	2	4000	8	20	General purpose
2N3823	T072g	300	30	30	30	0.5	>3200 @ 200MHz	6	20	VHF amps, mixers
2N5458	T092c	310	25	24	25	0.1	3500	7	9	General purpose
2N5459	T092c	310	25	25	25	0.1	4000	7	16	General purpose
3N140	T072f	330	20	20	20	1	10,000	5.5	30	Dual insulated gate tetrode MOS R.F. amplifier
3N141	T072f	330	20	20	20	1	10,000	5.5	30	Dual insulated gate tetrode MOS Mixer
40673	T072f	330	20	20	6	50	12,000	6	35	Dual insulated gate tetrode MOS R.F. amplifier

**Table 10 VMOS Power FET's**

Type No.	Case Style	P <sub>TOT</sub> (max) W	V <sub>DS</sub> (max) V	V <sub>DG</sub> (max) V	V <sub>GS</sub> (max) V	Gate Threshold Voltage (min to max) V	I <sub>GSS</sub> (max) μA	Forward Transconductance mS (typical)	I <sub>D</sub> (max) A	I <sub>DSS</sub> (max) μA	Max Input capacitance pF	Typical max frequency MHz	Material
VN46AF	P1c	12.5	40	40	15*	0.8 to 2	10	250	2	10	50	600	N-channel
VN66AF	P1c	12.5	60	60	15*	0.8 to 2	10	250	2	10	50	600	N-channel
VN88AF	P1c	12.5	80	80	15*	0.8 to 2	10	250	2	10	50	600	N-channel
†2SJ50	T03v	100	-160	-160	±14	-0.8 to -1.5	1000	1000	7	7	900	600	P-channel
†2SK135	T03v	100	160	160	±14	1 to 1.5	1000	1000	7	7	600	600	N-channel

\* Internal zener diode

† Complementary pair

**Table 11 Unijunction Transistors**

Type No.	Case Style	P <sub>TOT</sub> (max) mW	V <sub>EB20</sub> V	I <sub>E</sub> A	I <sub>EB2</sub> (max)	Peak point I <sub>p</sub> (max) μA	Valley point I <sub>v</sub> (mA)	Intrinsic stand-off off ratio	Max static interbase resistance Ω	V <sub>B2-B1</sub> V (max)
TIS43	T092e	300	30	1.5	10nA	5		0.55 to 0.82	4k to 9k1	35
2N2646	T018u	300	30	2	12μA	5	4	0.56 to 0.75		35
2N2647	T018u	300	30	2	200nA	2	8	0.68 to 0.82		35
2N4871	T092g	300	30	1	1μA	5	4	0.7 to 0.85	4k to 9k1	35

**Table 12 Programmable Unijunction Transistor, S.C.S. and Thyristor Tetrode**

BRY39 (equivalent to 2N6027 and D13T1) may be used in any of three modes

1. **Programmable Unijunction Transistor.** Applications include motor control, oscillators, relay replacement, timers, pulse shaper, trigger device and other switching applications. When used as a P.U.T. the cathode gate (G<sub>K</sub>) is not used.

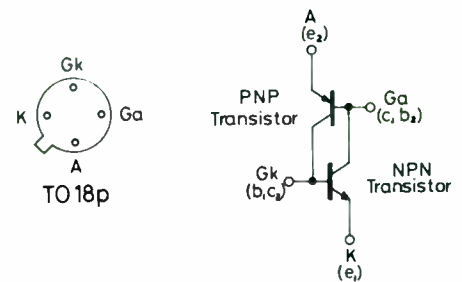
V <sub>GaA</sub> (max)	Anode gate to anode voltage.	70V
I <sub>A</sub> (max)	Anode current d.c.	250mA
I <sub>p</sub>	Peak point current (V <sub>S</sub> = 10V, R <sub>G</sub> = 10kΩ).	5μA
I <sub>v</sub>	Valley point current (V <sub>S</sub> = 10V, R <sub>G</sub> = 10kΩ).	50μA
I <sub>ARM</sub> (max)	Repetitive peak anode current.	2.5A
I <sub>GaAO</sub> (max)	Anode gate to anode leakage current @ V <sub>GaA</sub> 70V	10nA
I <sub>GaKS</sub> (max)	Anode gate to cathode leakage current @ V <sub>GaK</sub> 70V	100nA

2. **Silicon Controlled Switch.** It is an integrated PNP NPN transistor pair, with all electrodes accessible. Applications include driver for numerical indicator tubes and other switching applications

	PNP transistor	NPN transistor
V <sub>CEO</sub> (max)	70V	70V*
V <sub>CBO</sub> (max)	70V	70V*
V <sub>EBO</sub> (max)	70V*	5V*

\* Higher voltages are permissible in numerical indicator tube driver circuits.

I <sub>E</sub> (max)	D.C. Emitter current	175mA
I <sub>ERM</sub>	Max repetitive peak emitter current:	2.5A
P <sub>TOT</sub>	Max total dissipation	275mW
V <sub>AK</sub>	Forward on-state voltage:	< 1.4V
I <sub>H</sub>	Holding current:	< 1mA
t <sub>on</sub>	Turn on time	< 0.25μs
t <sub>off</sub>	Turn off time	< 5μs
h <sub>FE</sub>		> 0.25 @ I <sub>E</sub> = 1mA; > 50 @ I <sub>C</sub> = 10mA
f <sub>T</sub>		300MHz (typ)
V <sub>AK</sub>	Forward on-state voltage:	< 1.4V
I <sub>H</sub>	Holding current:	< 1mA
t <sub>on</sub>	Turn on time	< 0.25μs
t <sub>off</sub>	Turn off time	< 5μs
h <sub>FE</sub>		> 0.25 @ I <sub>E</sub> = 1mA; > 50 @ I <sub>C</sub> = 10mA
f <sub>T</sub>		300MHz (typ)



3. **Thyristor Tetrode** Applications include relay and lamp drivers, sensing network for temperature and other switching applications.

Anode to cathode d.c. off-state voltage (V<sub>D</sub>) and instantaneous total value of reverse voltage (V<sub>R</sub>): 70V max.

Max d.c. on-state current:	250mA
On-state voltage:	1.4V
Peak reverse current @ V <sub>R</sub> 70V	1nA (typ); 100nA (max)
Holding current (max):	250μA

	Cathode gate to cathode	Anode gate to anode
V <sub>GkT</sub>	0.5V (min)	V <sub>GaT</sub> : 1V (min)
V <sub>GkM</sub>	5V (max)	V <sub>GaM</sub> : 70V (max)
I <sub>GkT</sub>	1μA (min)	I <sub>GaT</sub> : 100μA (min)
I <sub>GkM</sub>	100mA (max)	I <sub>GaM</sub> : 100mA (max)

## MATCHED PAIRS

Some of the transistors we supply are available in matched pairs. They are matched by the manufacturer and in general the ratio of the gains h<sub>FE2</sub> does not exceed 1.25 (usually it is

much closer). To achieve this the manufacturer chooses a suitable range of gain groups into which the transistors after automatic testing are grouped. Now any transistor of a particular group will be a match (within the above tolerance) with any other transistor in that group.

Thus if we supply several matched pairs to you (in one batch) and they are not joined in pairs, then any transistor in that batch will make a pair with any other transistor in that batch. Sometimes, however, they will be supplied joined in pairs, usually because we have in stock transistors from several different batches and therefore we have put them into pairs before mixing them.

## Status

- D Design type. For use in any new design.
- C Current type. Still in common use, but not recommended for new designs.
- M Maintenance type. Most of these types are no longer in quantity production and it is becoming increasingly difficult to obtain regular supplies.

## GAIN GROUPS (BC107, BC108, BC109, BC168, BC169, BC209)

The above transistor types are all available in different gain (h<sub>FE</sub>) groups. For example, say the design parameter calls for the transistor to have a gain of between 110 and 800, this will be divided into groups e.g. group A-110 to 220; group B-200 to 450; group C-420 to 800. The transistors are then marked with their gain group after the type number (e.g. BC108C). Transistors of the above types that have no suffix letter are ungraded and therefore where the plain-numbered device is specified a graded transistor will always, without qualification, do exactly the same job. Maplin only stock these transistors in the highest gain group and they are therefore the best possible example of that transistor. Where a particular gain group is specified and it is not the highest gain group, a transistor capable of a higher gain will do exactly the same job in all practical commercial applications that we have ever seen. Therefore, for example our BC108C can be used with complete confidence where a BC108, BC108A, or BC108B is specified. (These latter types are often specified in manufacturers' data because the lower gain would suffice and they are marginally cheaper than the 'C' version and on large production runs, many thousands of pounds can be saved, although the price difference on just one transistor will probably be of the order of tenths of a penny.)



**Table 13 Signal Diodes**

Type No.	Construction	Case Style	PIV V	Max I <sub>F</sub> (average) mA	Max reverse current I <sub>R</sub> (μA @ V)	Application
AA119 BAX13	Ge point contact Si diffused whiskerless	D07 D035*	45V 50V	35mA 75mA	<350μA @ 45V <200nA @ 50V	A.M. detector. In pairs as a ratio detector Fast logic
BAX16 BY206	Si diffused whiskerless Si double diffused	D035* D014	150V 350V	200mA 400mA	<100nA @ 150V <2μA @ 300V	General purpose Top level detector and scan rectifier and for h.f. power supplies. Soft recovery.
HSCH 1001	Schottky barrier	D035	60V	15mA	<200nA @ 50V	Low forward voltage (V <sub>F</sub> = 410mV at 1mA), suitable replacement for germanium, very fast >100GHz
0A47 0A90 0A91	Ge gold bonded Ge point contact Ge point contact	D07 D07 D07	25V 30V 115V	110mA 10mA 50mA	<100μA @ 25V <1.1mA @ 30V <275μA @ 100V	High speed switch High frequency detector General purpose
0A95 0A200	Ge point contact Si alloy junction	D07 D07	115V 50V	50mA 80mA	<250μA @ 100V <100nA @ 50V	General purpose General purpose
0A202	Si alloy junction	D07	150V	40mA	<100nA @ 150V	General purpose
ZS120 1N914	Si alloy junction Si whiskerless	D07 D035	50V 100V	250mA 75mA	<5μA @ 50V <25nA @ 20V	General purpose Fast logic
1N916 1N4148	Si whiskerless Si whiskerless	D035 D035	100V 100V	75mA 75mA	<25nA @ 20V <25nA @ 20V	Low capacitance 1N914 Fast logic
1S921	Si diffused	S06	100V	200mA	<100nA @ 100V	General purpose

\*Sometimes supplied in SOD17 package.

**Table 14 Varicaps**

Type No.	Case Style	V <sub>R</sub> (max)	I <sub>R</sub> (typ)	Capacitance ratio	Capacitance at various voltages between (limits) typical	typical	typical	typical	typical	Application
BA102B	D07	20V	10nA	1.4 (V <sub>R</sub> =4V to 10V)	23 and 31pF @ V <sub>R</sub> =4V	43pF @ 1V	27pF @ 4V	17pF @ 10V	13pF @ 20V	Automatic frequency control in TV's and general
BB110G	VC1	30V	20nA	2.65 (typ V <sub>R</sub> =3V to 30V)	29 and 33pF @ V <sub>R</sub> =3V	53pF @ 0.3V	42pF @ 1V	19pF @ 10V	13pF @ 30V	Electronic tuning in band II f.m. and r.f. and interstage circuits
MVAM 115	T092j	18V	100nA	1.5 (V <sub>R</sub> = 1V to 13V)	440pF and 560pF @ V <sub>R</sub> = 1V	300pF @ 3V	150pF @ 6V	75pF @ 9V	27pF @ 15V	Electronic tuning of AM receivers

**Table 15 Rectifier Diodes**

Type No.	Case Style	PIV	I <sub>F</sub> (av) A	Max V <sub>F</sub> drop (V @ A)	Max I <sub>R</sub> (μA @ V)
BY126 BY127	D015 D015	650V 1250V	1A 1A	- 1.1V @ 1A - 1.1V @ 1A	<10μA @ 650V <10μA @ 1250V
1N4001 1N4002	D041 D041	50V 100V	1A 1A	- 1.1V @ 1A - 1.1V @ 1A	<10μA @ 50V <10μA @ 100V
1N4003 1N4004	D041 D041	200V 400V	1A 1A	- 1.1V @ 1A - 1.1V @ 1A	<10μA @ 200V <10μA @ 400V
1N4005 1N4006 1N4007	D041 D041 D041	600V 800V 1000V	1A 1A 1A	- 1.1V @ 1A - 1.1V @ 1A - 1.1V @ 1A	<10μA @ 600V <10μA @ 800V <10μA @ 1000V
1N5400 1N5401	D027 D027	50V 100V	3A 3A	- 1.1V @ 3A - 1.1V @ 3A	<10μA @ 50V <10μA @ 100V
1N5402 1N5404	D027 D027	200V 400V	3A 3A	- 1.1V @ 3A - 1.1V @ 3A	<10μA @ 200V <10μA @ 400V
1N5406 1N5407 1N5408	D027 D027 D027	600V 800V 1000V	3A 3A 3A	- 1.1V @ 3A - 1.1V @ 3A - 1.1V @ 3A	<10μA @ 600V <10μA @ 800V <10μA @ 1000V

**Table 16 Bridge Rectifiers**

Type No.	Case Style	PIV	I <sub>F</sub> (av) A	Max r.m.s. input voltage	Max capacitive load (μF)	Max V <sub>F</sub> per diode	Max reverse current at PIV per diode
BY164 W005 W01 W02 W04 S005 S04	B1 B2 B2 B2 B2 B3 B3	60 50 100 200 400 50 400	1.4A 1.5A 1.5A 1.5A 1.5A 2A 2A	42V 35V 70V 140V 280V 35V 280V	4000μF 5000μF 2500μF 1250μF 625μF 5000μF 625μF	1.1V @ 1A 1.1V @ 1A 1.1V @ 1A 1.1V @ 1A 1.1V @ 1A 1.1V @ 1A 1.1V @ 1A	10μA 10μA 10μA 10μA 10μA 10μA 10μA
PW01 PW06 J005 J02 J04 K01 K04	B4 B4 B5 B5 B5 B5 B5	100 600 50 200 400 100 400	6A 6A 10A 10A 10A 25A 25A	70V 420V 35V 140V 280V 70V 280V	5000μF 800μF - - - - -	1.3V @ 3A 1.3V @ 3A 1.1V @ 5A 1.1V @ 5A 1.1V @ 5A 1.2V @ 12.5A 1.2V @ 12.5A	10μA 10μA 10μA 10μA 10μA 10μA 10μA

**Table 17 Zener Diodes**

	<b>BZY88C</b>	<b>BZX61C</b>	<b>5W ZENER</b>
Selection tolerance:	5%	5%	5%
Max dissipation:	400mW	1.3W	5W
Case style:	D07	D015	ZD1
Values available:	2.7V; 3V; 3.3V; 3.6V; 3.9V; 4.3V; 4.7V; 5.1V; 5.6V; 6.2V; 6.8V; 7.5V; 8.2V; 9.1V; 10V; 11V; 12V; 13V; 15V; 16V; 18V; 20V; 22V; 24V; 27V; 30V	4.7V; 5.1V; 5.6V; 6.2V; 6.8V; 7.5V; 8.2V; 9.1V; 10V; 11V; 12V; 13V; 15V; 16V; 18V; 20V; 22V; 24V; 27V; 30V; 33V; 36V; 39V; 43V; 47V; 51V; 56V; 62V; 68V; 75V	5.6V; (Diode marked: 5ZS5.6B or 1N5339B) 8.2V; (Diode marked: 5ZS8.2B or 1N5344B)

**Table 18 Thyristors (Silicon Controlled Rectifiers)**

Type No.	Case Style	PIV	$I_T$ (rms) A	$I_T$ (av) A	$V_{GT}$ (max) V	$I_{GT}$ (max) mA	$I_H$ (max) mA
MCR102	T092f	30V	0.8A	0.5A	0.8V	0.2mA	5mA
TAG1/100	T05a	100V	1A	0.64A	2.5V	10mA	25mA
TAG1/600	T05a	600V	1A	0.64A	2.5V	10mA	25mA
C106D	P1a	400V	4A	2.5A	0.8V	0.2mA	3mA
2N3525	T066t	400V	5A	3.2A	2V	15mA	20mA
BT109	P3b	500V	6.5A	4A	2V	10mA (min)	3mA
IR122A	P1a	100V	8A	5A	1.5V	25mA	30mA
IR122D	P1a	400V	8A	5A	1.5V	25mA	30mA
C116D	P1a	400V	8A	5A	1.5V	20mA	35mA
C126M	P1a	600V	12A	7.5A	1.5V	30mA	35mA

Note: In most cases a thyristor having a higher PIV than the one specified can be used. Many thyristors use a suffix letter to indicate the PIV and the international standard is as follows: A = 100V, B = 200V, C = 300V, D = 400V, F = 50V, M = 600V, N = 800V, P = 1000V, Y = 30V.

**Table 19 Triacs (Bi-directional Silicon Controlled Rectifiers)**

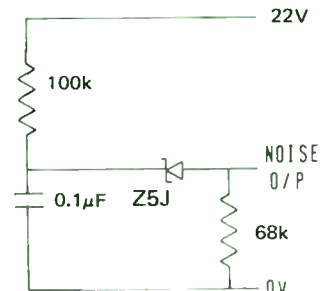
Type No.	Case Style	PIV	$I_T$ (rms) A	$V_{GT}$ (max) V	$I_{GT}$ (max) mA	$I_H$ (max) mA
C206D	P2	400V	3A	2V	5mA	30mA
2N6073	P2	400V	4A	2.5V	30mA	70mA
C226D	P2	400V	8A	2.5V	50mA	60mA
SC146D	P2	400V	10A	2.5V	50mA	75mA
TIC246D	P2	400V	15A	2.5V	50mA	50mA

**Table 20 Diac (Bi-directional Trigger Diode) ST2**

$V_{BO}$ Breakover voltage:	32V - 4V
$V_{BO1}$ Breakover voltage symmetry:	- 3V
PTOT (max) Total power dissipation:	150mW
$I_{TRM}$ (max) Repetitive peak current:	2A
$I_{BO}$ (max) Breakover current:	200mA
Case Style:	D07 or D014
Equivalents:	BR100, D32, D3202Y; GT32, MPT32, 1N5761, 133

**Table 21 Noise Generator Diode Z5J**

Noise output: 50mV peak to peak (min).  
Noise quality: Fine grass, no low frequency streaks.  
The mean level remaining steady over the supply range 19 - 25V

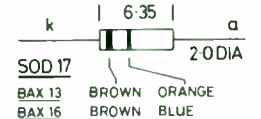
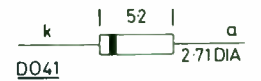
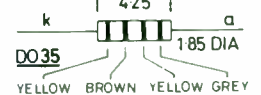
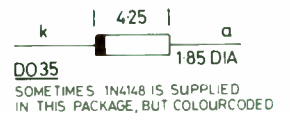
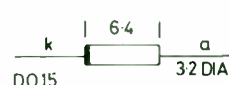


## Diode Equivalents

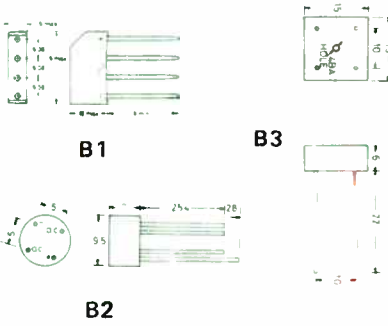
The diode type listed on the right is a direct replacement for the diode in the left-hand column.

BA100	BAX16	OA85	OA95
BA145	BY206	ZS170	IN4001
BA148	BY206	ZS171	IN4002
BAY38	BAX16	ZS172	IN4003
BY100	IN4006	ZS174	IN4004
DD000	IN4001	ZS175	IN4005
DD001	IN4002	ZS178	IN4006
DD003	IN4003	ZS270	IN5400
DD006	IN4004	ZS271	IN5401
IGP7	OA90	ZS272	IN5402
ISJ50	OA200	ZS274	IN5404
ISJ150	OA202	ZS276	IN5406
OA70	OA90		
OA73	OA90		
OA79	AA119		
OA81	OA91		

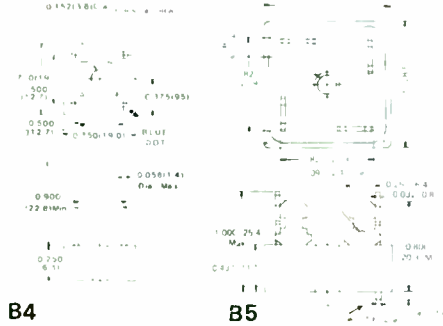
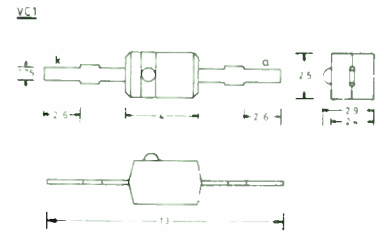
## Diode Cases



**Rectifier Bridge Cases**



**Varicap Case**



**TRANSISTOR CASES (All viewed from below)**

 TO1a	 TO1b	 7D3V	 TO3	 TO5	 TO5a
 TO7	 TO12	 TO18	 TO18u	 TO39	
 TO66	 TO66t	 TO72g	 TO72	 TO92	
 TO92a	 TO92b	 TO92c	 TO92d	 TO92e	
 TO92f	 TO92g	 TO92h	 TO92j	 TO98	
 TO106	 TO106f	 TO126	 SO12a	 SO55	
 E-line	 Lokfit	 P1	 P2	 P3	

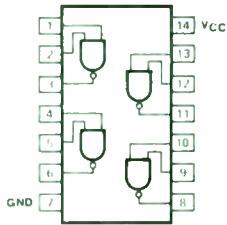




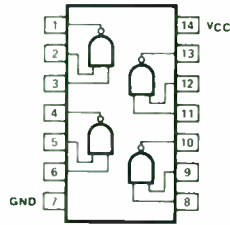
parameters to suit the particular application. In particular you will frequently find that case styles are different and a careful check should be made in our lead connection chart to ensure correct polarity before fitting the alternative transistor.

Where transistors are listed e.g.: BC389-91 = BC109C, we mean to indicate that BC389 = BC109C, BC390 = BC109C, and BC391 = BC109C.

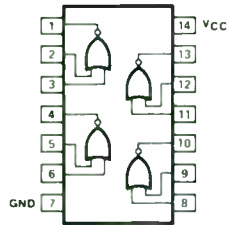
Table listing various transistor models and their specifications, organized in columns. The table includes model numbers, case styles, and other technical details.



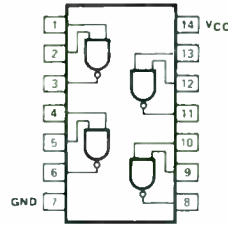
**7400, 74LS00**  
Quad 2-input  
NAND gate



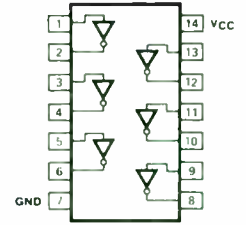
**7401, 74LS01**  
Quad 2-input  
NAND gate  
Open collector  
outputs



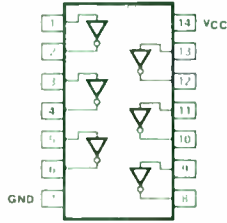
**7402, 74LS02**  
Quad 2-input  
NOR gate



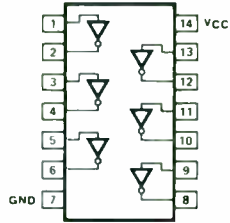
**7403, 74LS03**  
Quad 2-input  
NAND gate  
Open collector  
outputs



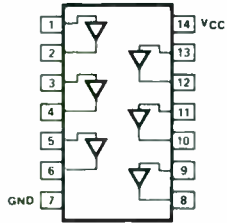
**7404, 74LS04**  
Hex inverter



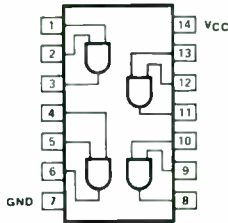
**7405, 74LS05**  
Hex inverter  
Open collector  
outputs



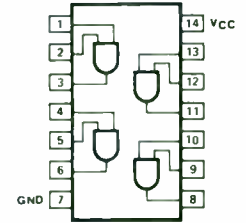
**7406**  
Hex inverter buffer/  
driver  
Open collector outputs



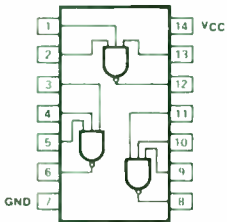
**7407**  
Hex buffer/driver  
Open collector outputs



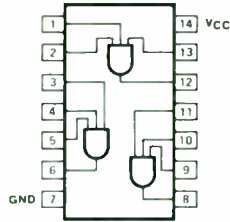
**7408, 74LS08**  
Quad 2-input AND gate



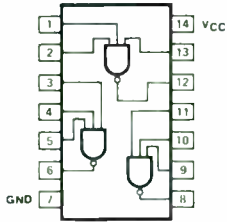
**7409, 74LS09**  
Quad 2-input AND gate  
Open collector outputs



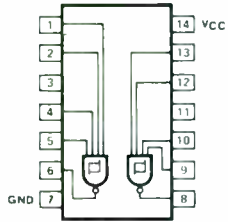
**7410, 74LS10**  
Triple 3-input NAND  
gate



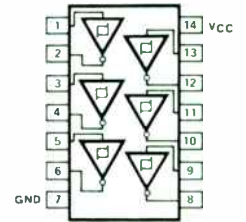
**7411, 74LS11**  
Triple 3-input AND  
gate



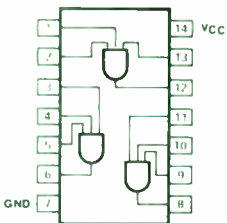
**74LS12**



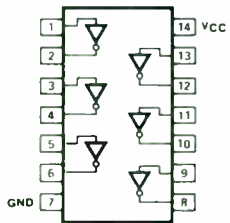
**7413, 74LS13**  
Dual Schmitt Trigger



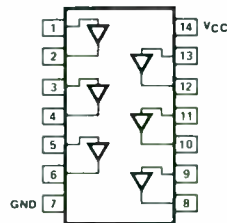
**7414, 74LS14**  
Hex Schmitt Trigger



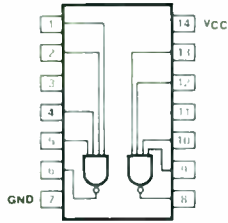
**74LS15**



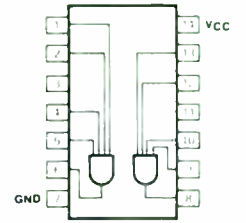
**7416**  
Hex inverter buffer/  
driver  
Open collector outputs



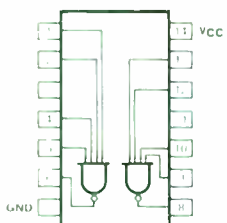
**7417**  
Hex buffer/driver  
Open collector outputs



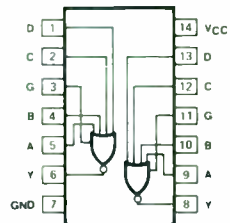
**7420, 74LS20**  
Dual 4-input NAND  
gate



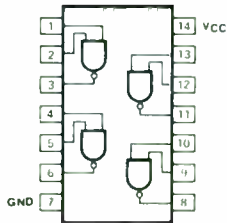
**7421, 74LS21**  
Dual 4-input AND gate



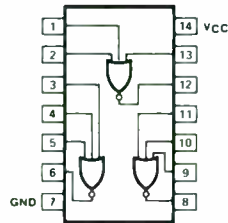
**74LS22**



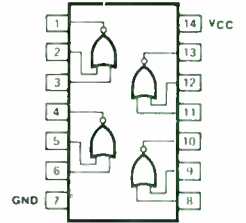
**7425**  
Dual 4-input NOR gate  
with strobe



**7426, 74LS26**  
Quad 2-input NAND gate  
Open collector outputs

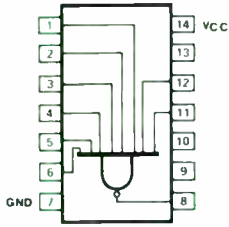


**7427, 74LS27**  
Triple 3-input NOR  
gate

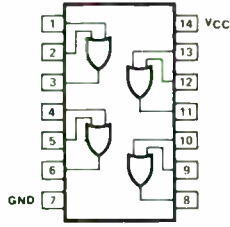


**74LS28**

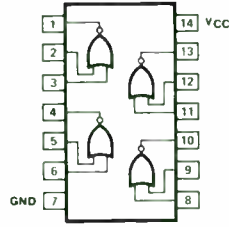




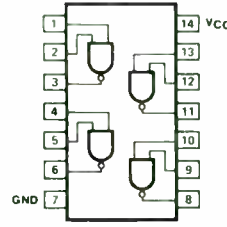
7430, 74LS30  
8-input NAND gate



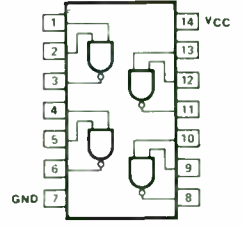
7432, 74LS32  
Quad 2-input OR gate



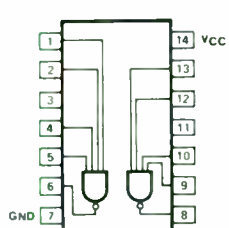
74LS33



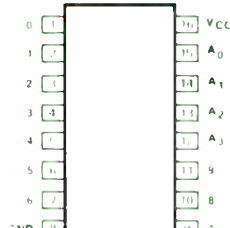
7437, 74LS37  
Quad 2-input NAND  
buffer



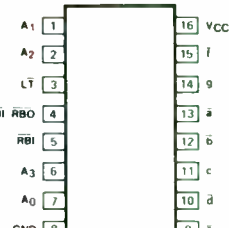
7438, 74LS38  
Quad 2-input NAND  
buffer  
Open collector outputs



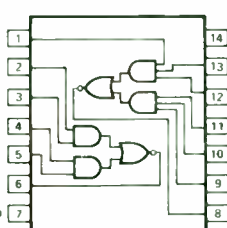
7440, 74LS40  
Dual 4-input NAND  
buffer



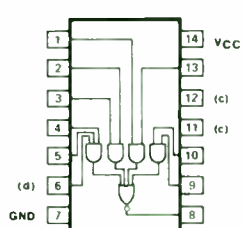
7442, 74LS42  
BCD to decimal  
decoder  
(1 of 10)



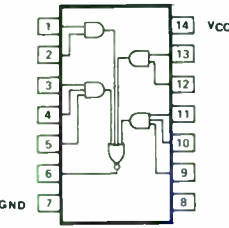
7447A  
BCD to 7-segment  
decoder/driver



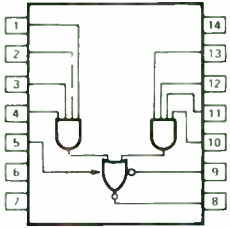
7451, 74LS51  
Dual 2-wide 2-input  
AND-OR-invert gate



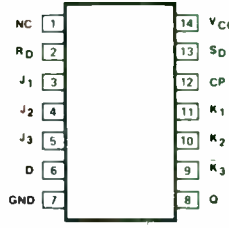
7454  
4-wide, 2 & 3-input  
AND-OR-invert gate



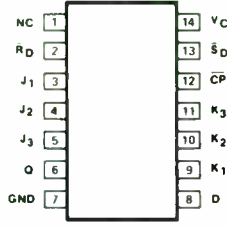
74LS54



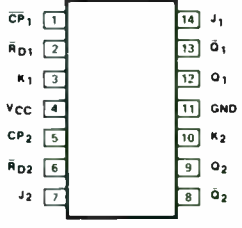
74LS55



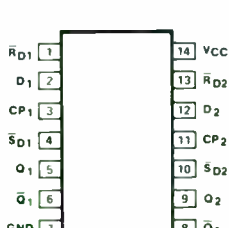
7470  
JK edge-triggered  
flip-flop



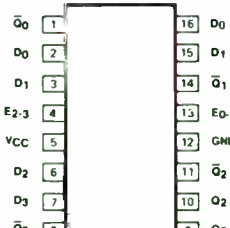
7472  
JK pulse-triggered  
flip-flop



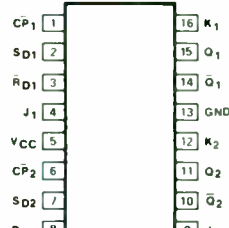
7473, 74LS73  
Dual JK flip-flop



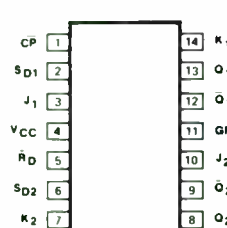
7474, 74LS74  
Dual D-type flip-flop



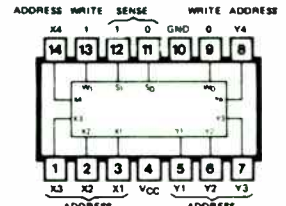
7475, 74LS75  
Dual 2-bit transparent  
latch



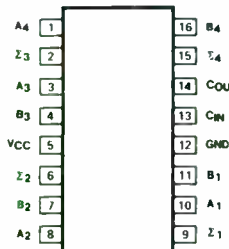
7476, 74LS76  
Dual JK flip-flop



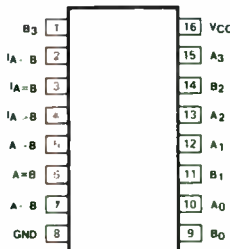
74LS78



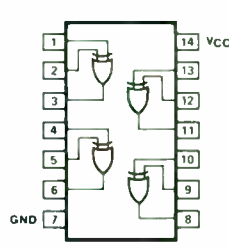
7481  
16-bit random access  
memory



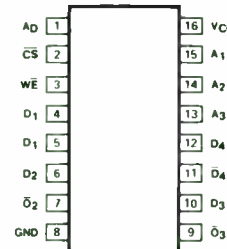
7483  
4-bit full adder



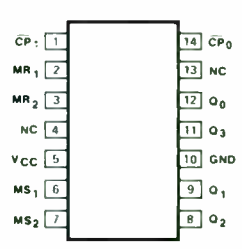
7485, 74LS85  
4-bit magnitude  
comparator



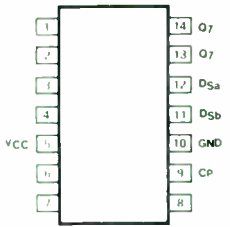
7486, 74LS86  
Quad 2-input  
exclusive-or gate



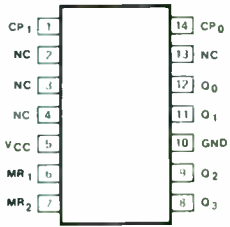
7489, 74LS89  
64-bit random access  
memory



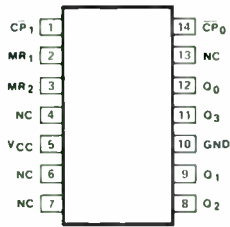
7490, 74LS90  
Decade counter



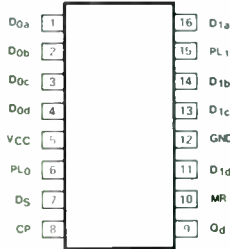
**7491**  
8-bit shift register



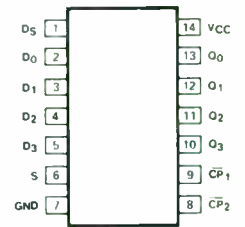
**7492, 74LS92**  
Divide by twelve counter



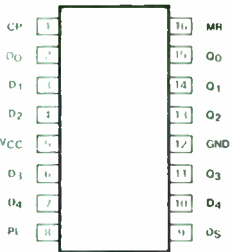
**7493, 74LS93**  
4-bit binary ripple counter



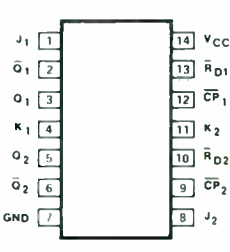
**7494**  
4-bit shift register



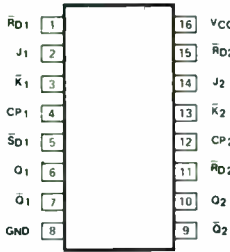
**7495, 74LS95**  
4-bit shift register



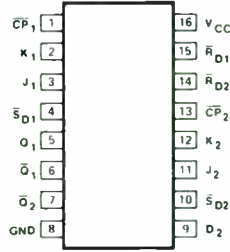
**7496, 74LS96**  
5-bit shift register



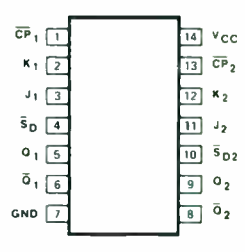
**74107, 74LS107**  
Dual JK flip-flop



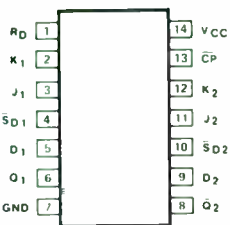
**74109, 74LS109**  
Dual JK flip-flop



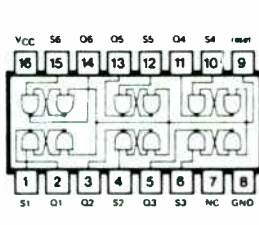
**74LS112**



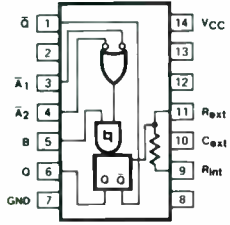
**74LS113**



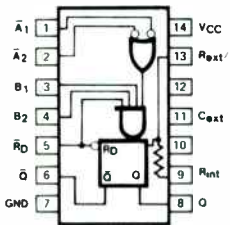
**74LS114**



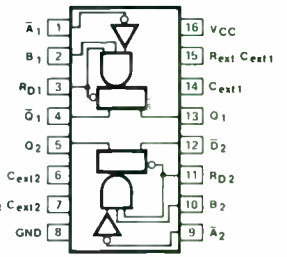
**74118**  
Hex set-reset latch



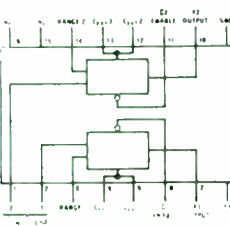
**74121**  
Monostable multi-vibrator



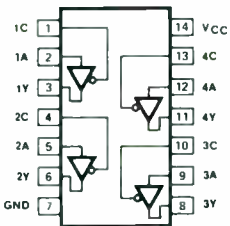
**74122**  
Retriggerable mono-stable multivibrator



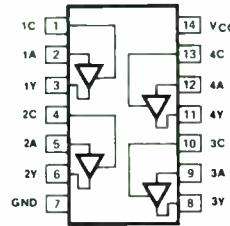
**74123, 74LS123**  
Dual retriggerable monostable multivibrator



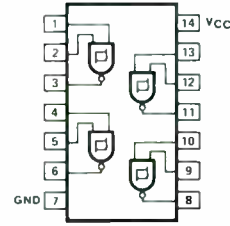
**74LS124**



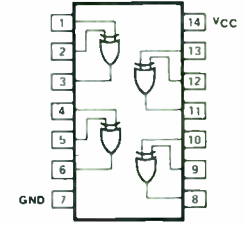
**74LS125**



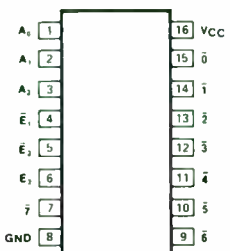
**74LS126**



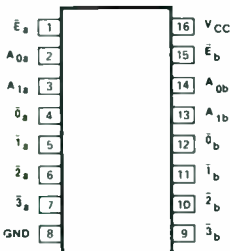
**74132, 74LS132**  
Quad 2-input NAND Schmitt trigger



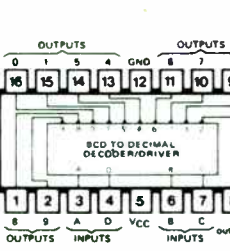
**74LS136**



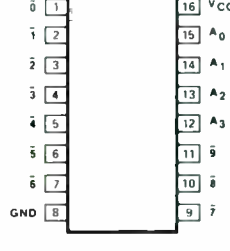
**74LS138**



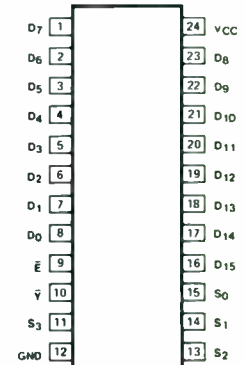
**74LS139**



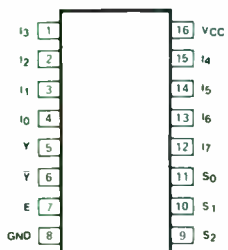
**74141**  
BCD-to-decimal decoder/driver



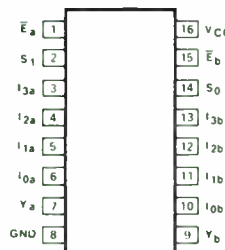
**74145, 74LS145**  
BCD-to-decimal decoder/driver  
Open collector outputs



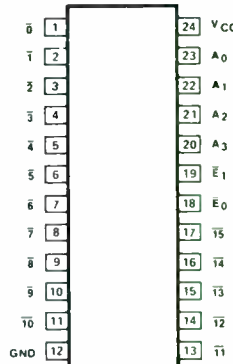
**74150**  
16-input multiplexer



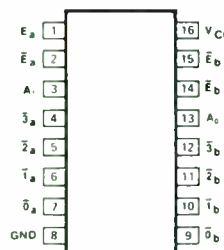
**74151, 74LS151**  
8-input multiplexer



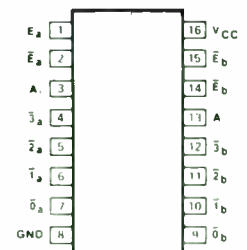
**74LS153**



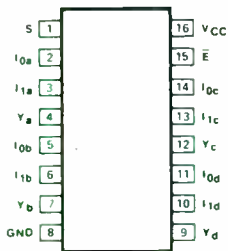
**74154, 74LS154**  
1-of-16 decoder/  
demultiplexer



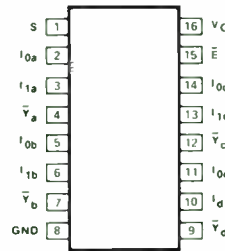
**74LS155**



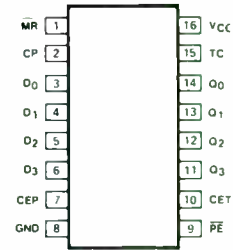
**74LS156**



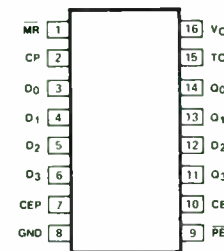
**74LS157**



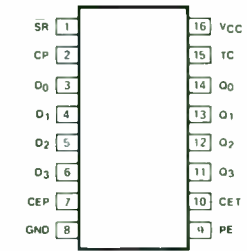
**74LS158**



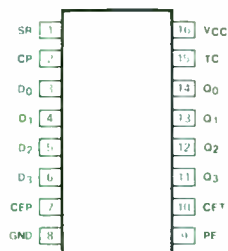
**74160, 74LS160**  
BCD decade counter



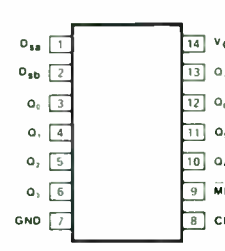
**74LS161**



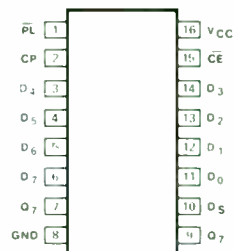
**74LS162**



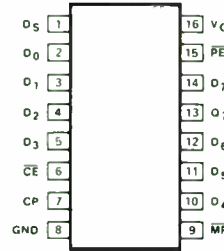
**74LS163**



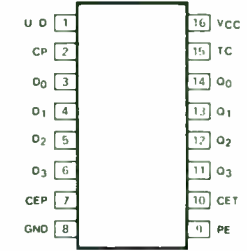
**74164, 74LS164**  
8-bit serial-in parallel-  
out shift register



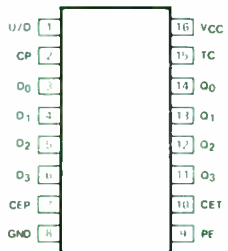
**74LS165**



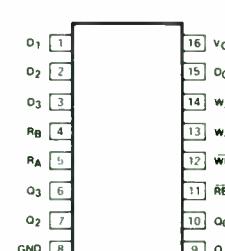
**74LS166**



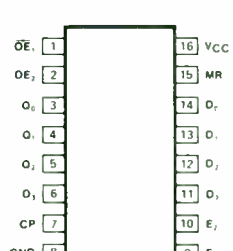
**74LS168**



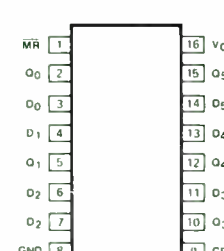
**74LS169**



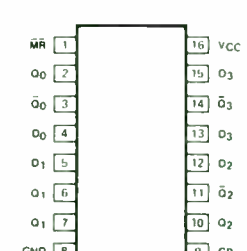
**74LS170**



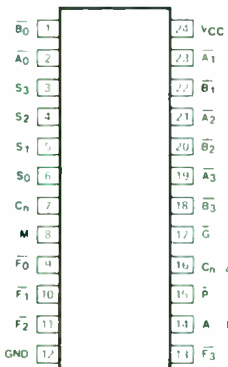
**74LS173**



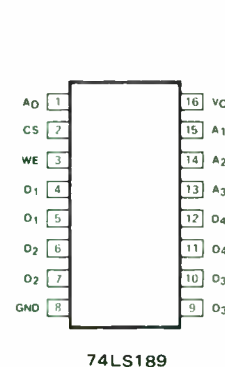
**74174, 74LS174**  
Hex D-type flip-flop



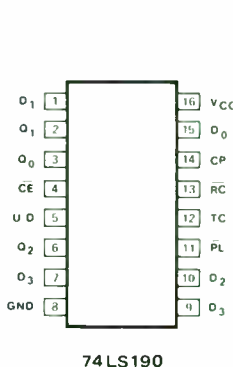
**74LS175**



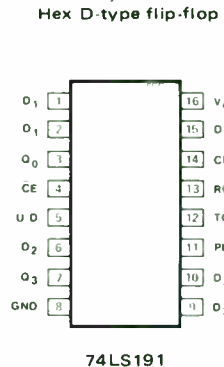
**74LS181**



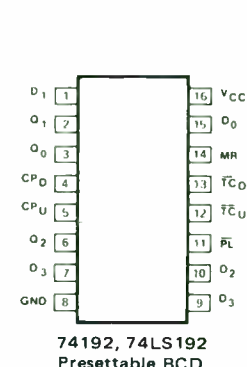
**74LS189**



**74LS190**

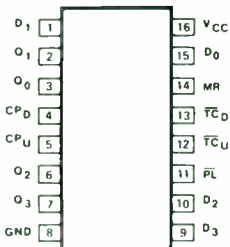


**74LS191**

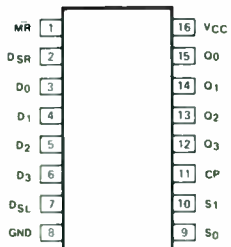


**74192, 74LS192**  
Presettable BCD  
decade up/down  
counter

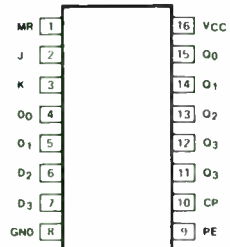




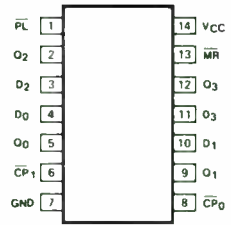
74193, 74LS193  
Presettable 4-bit  
binary up/down  
counter



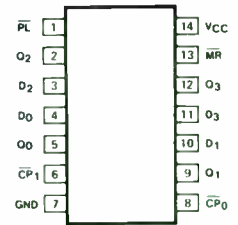
74194, 74LS194  
4-bit bidirectional  
universal shift register



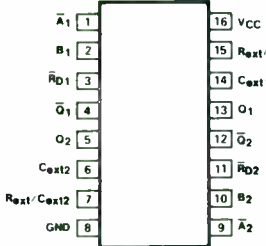
74LS195



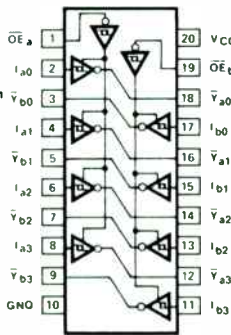
74196, 74LS196  
Presettable decade  
ripple counter



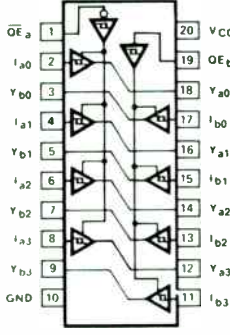
74LS197



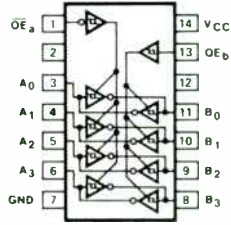
74LS221



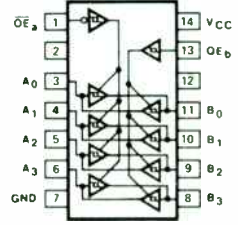
74LS240



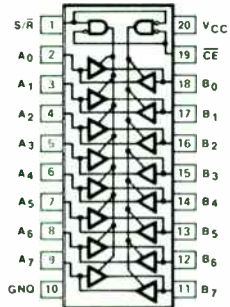
74LS241



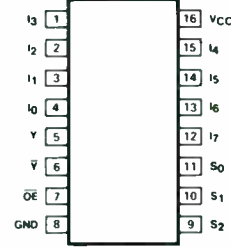
74LS242



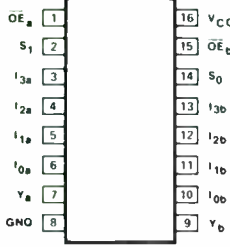
74LS243



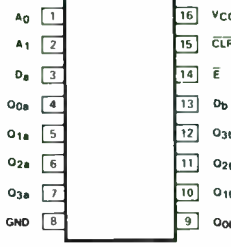
74LS245



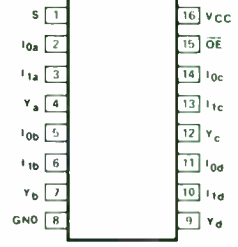
74LS251



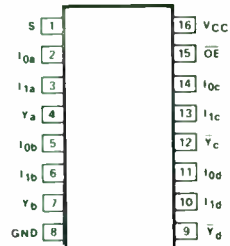
74LS253



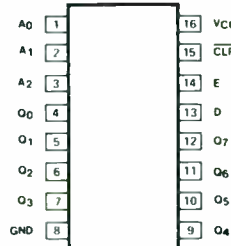
74LS256



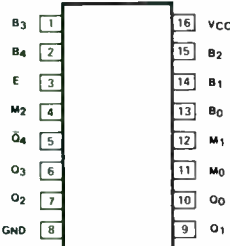
74LS257



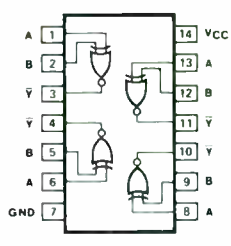
74LS258



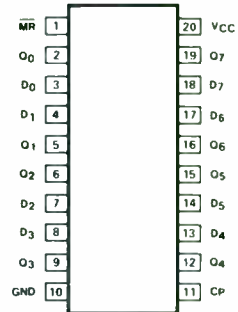
74LS259



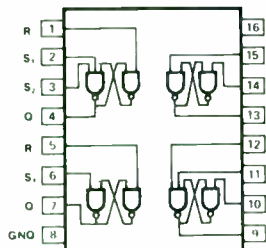
74LS261



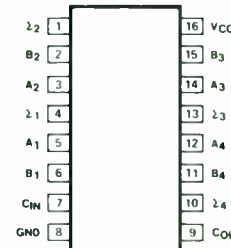
74LS266



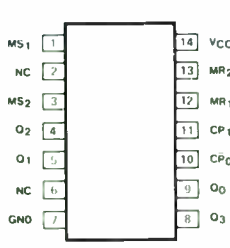
74LS273



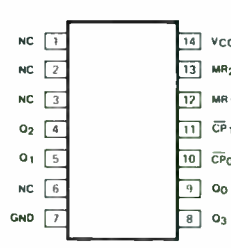
74LS279



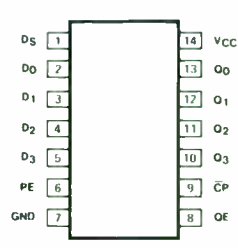
74LS283



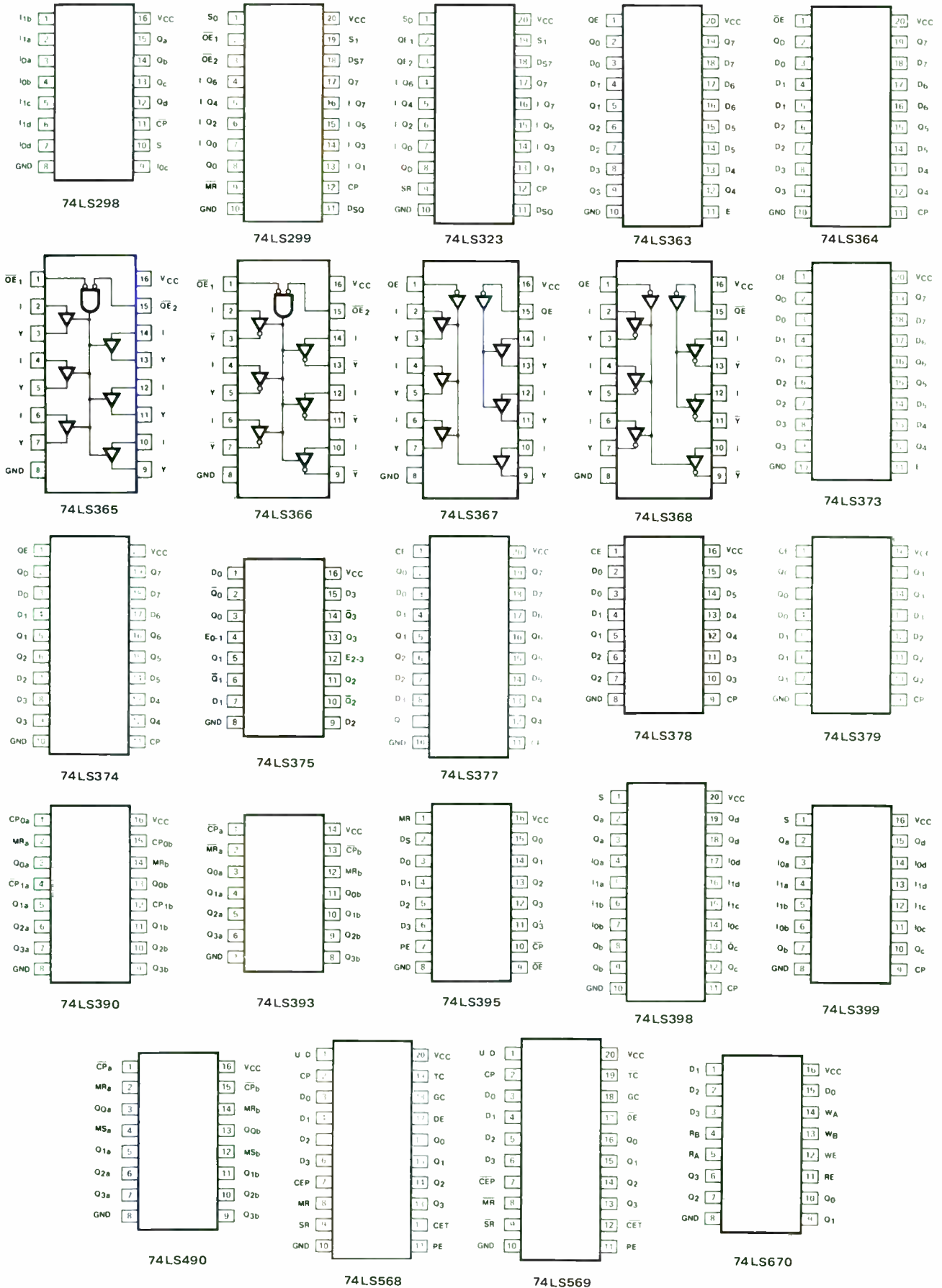
74LS290



74LS293



74LS295



Two ranges of TTL integrated circuits are available: the standard range 7400 etc. and the newer low-power Schottky range: 74LS00 etc. For new designs we recommend the exclusive use of LS series IC's. In almost every case they are directly pin-for-pin compatible with standard TTL yet they offer far lower power consumption resulting in cost savings in power supplies and increased speed whilst all other parameters are either better or virtually identical. However, in circuits where series are mixed check the fan-out table below. All inputs have clamping diodes which stop voltages exceeding -1.5V, providing current into the input does not exceed -12mA (74 series) or -18mA (74LS series).

Unused inputs should be connected to Logic '1' level (Vcc) via a 1k resistor. Up to 25 unused inputs may be connected to the one resistor.

An 0.1µF ceramic capacitor should be connected between Vcc and ground close to the IC. If several IC's are in use one capacitor is required for every five IC's approx. and they should be distributed evenly amongst the IC's. Counters and shift registers should have one 0.1µF capacitor for every two IC's connected very close to the IC's. Buffers and line drivers may require even more decoupling.

Fan-out

Driving Device	Number of IC's that can be driven					
	74	74LS	74L	74S	74H	82S
74LS	5	20	40	4	4	20
74LS Buffers	15	60	120	12	12	60
74	10	40	80	8	8	40
74 Buffers	30	60	120	24	24	120

General Parameters

	74 Series		74LS Series	
	Max.	Typical	Max.	Typical
Supply voltage (Vcc)	+7V	+5V	+7V	+5V
Input voltage	+5.5V	+5V	+5.5V	+5V
Low voltage = Logical '0'		OV		OV
High voltage = Logical '1'		+5V		+5V
Input current at logical '0'	-1.6mA		-0.4mA	
Input current at logical '1'	40µA		20µA	
Output current at logical '0'	16mA (buffers 48mA)		8mA (buffers 24mA)	
Output current at logical '1'	-800µA (buffers -2.4mA)		-400µA (buffers -1.2mA)	
Output current logic 1 open collector	250µA		100µA	
Max output voltage logic '0' at max output current	see tables 20 to 25		0.5V	0.35V
Min output voltage logic '1' at max output current	see tables 20 to 25		2.7V (min)	3.4V
Output 'off' current logic '1' (3 state)			20µA	
Output 'off' current logic '0' (3 state)			-20µA	
Output short circuit current	-55mA		-100mA	
Propagation delay time*		10ns		9.5ns
Power dissipation*		10mW		2mW
Frequency range*		DC to 35MHz		OC to 45MHz

\* These parameters are given as a comparison guide between the two series and do not represent any particular IC.

Table 22 TTL Gates

Type No	Max input voltage for logic '0'	Min input voltage for logic '1'	Max output voltage logic '0' I <sub>OL</sub> 16mA	Min output voltage logic '1' I <sub>OH</sub> 400µA	Short circuit output current (max)	Supply Currents				Typical Propagation Delay Time		
						Total with outputs high		Total with outputs low		Low to High Level Output	High to Low Level Output	
						Typical	Max	Typical	Max			
7400N	0.8V	2V	0.4V	2.4V	55mA	4mA	8mA	12mA	22mA	11ns	7ns	
7401N	0.8V	2V	0.4V	5.5V (max)		4mA	8mA	12mA	22mA	35ns	8ns	
7402N	0.8V	2V	0.4V	2.4V	55mA	8mA	16mA	14mA	27mA	12ns	8ns	
7403N	0.8V	2V	0.4V	5.5V (max)		4mA	8mA	12mA	22mA	35ns	8ns	
7404N	0.8V	2V	0.4V	2.4V	55mA	6mA	12mA	18mA	33mA	12ns	8ns	
7405N	0.8V	2V	0.4V	5.5V (max)		6mA	12mA	18mA	33mA	40ns	8ns	
7406N	0.8V	2V	0.4V	30V (max)		30mA	42mA	27mA	38mA	10ns	15ns	
7407N	0.8V	2V	0.4V	30V (max)		29mA	41mA	21mA	30mA	6ns	20ns	
7408N	0.8V	2V	0.4V	2.4V (I <sub>OH</sub> )	800µA	55mA	10mA	15mA	18mA	26mA	17.5ns	12ns
7409N	0.8V	2V	0.4V	5.5V (max)		11mA	21mA	20mA	33mA	21ns	16ns	
7410N	0.8V	2V	0.4V	2.4V	55mA	10mA	15mA	18mA	26mA	11ns	7ns	
7411N	0.8V	2V	0.4V	2.4V (I <sub>OH</sub> )	800µA	55mA	7.5mA	12mA	13.5mA	20mA	17.5ns	12ns
7413N	See Note 2	See Note 1	0.4V	2.4V (I <sub>OH</sub> )	800µA	55mA	14mA	23mA	20mA	32mA	18ns	15ns
7414N	See Note 2	See Note 1	0.4V	2.4V (I <sub>OH</sub> )	800µA	-55mA	22.2mA	36mA	39mA	60mA	15ns	15ns
7416N	0.8V	2V	0.4V	15V (max)		30mA	42mA	27mA	38mA	10ns	15ns	
7417N	0.8V	2V	0.4V	15V (max)		29mA	41mA	21mA	30mA	6ns	20ns	
7420N	0.8V	2V	0.4V	2.4V	-55mA	2mA	4mA	6mA	11mA	12ns	8ns	
7421N	0.8V	2V	0.4V	2.4V (I <sub>OH</sub> )	800µA	55mA	5mA	8mA	9mA	13mA	17.5ns	12ns
7425N	0.8V	2V	0.4V	2.4V	-55mA	8mA	16mA	10mA	19mA	13ns	8ns	
7426N	0.8V	2V	0.4V	15V (max)		4mA	8mA	12mA	22mA	16ns	11ns	
7427N	0.8V	2V	0.4V	2.4V (I <sub>OH</sub> )	800µA	55mA	10mA	16mA	16mA	26mA	7ns	10ns
7430N	0.8V	2V	0.4V	2.4V	55mA	1mA	2mA	3mA	6mA	13ns	8ns	
7432N	0.8V	2V	0.4V	2.4V (I <sub>OH</sub> )	800µA	55mA	15mA	22mA	23mA	38mA	10ns	14ns
7437N	0.8V	2V	0.4V	2.4V (I <sub>OH</sub> )	-1.2mA	55mA	9mA	15.5mA	34mA	54mA	9ns	34ns
7438N	0.8V	2V	0.4V	5.5V (max)		5mA	8.5mA	34mA	54mA	14ns	11ns	
7440N	0.8V	2V	0.4V	2.4V (I <sub>OH</sub> )	1.2mA	-70mA	4mA	6.8mA	17mA	27mA	4ns	17ns
7451N	0.8V	2V	0.4V	2.4V	-55mA	4mA	8mA	7.4mA	14mA	13ns	8ns	
7454N	0.8V	2V	0.4V	2.4V	-55mA	4mA	8mA	5.1mA	9.5mA	13ns	8ns	
7486N	0.8V	2V	0.4V	2.4V (I <sub>OH</sub> )	-800µA	-55mA	30mA	50mA	57mA	18ns	13ns	
74132N	See Note 2	See Note 1	0.4V	2.4V (I <sub>OH</sub> )	800µA	55mA	14.8mA	24mA	26mA	40mA	15ns	15ns

Note 1 Positive-going threshold voltage 1.7V (typ).  
 Note 2 Negative-going threshold voltage 0.9V (typ).

Table 23 TTL Flip-Flops and Latches

All types (except 74121): Maximum input voltage for logic '0': 0.8V (74121: 0.8V min).  
 Minimum input voltage for logic '1': 2V (74121: 2V max).  
 All types (except 74122, 74123): Maximum output voltage logic '0' (I<sub>OL</sub> = 16mA): 0.4V (74122, 74123 (I<sub>OL</sub> = 16mA): 0.4V)  
 Minimum output voltage logic '1' (I<sub>OH</sub> = -400µA): 2.4V (74122, 74123 (I<sub>OH</sub> = -800µA): 2.4V)

Type No.	Short circuit output current (max)	Supply current Average per flip-flop (Typical)	Max Clock Frequency	Typical Propagation Delay Time				Pulse width (min)			Input Setup Time (min)	Input Hold Time (min)		
				From Preset i/p to Q	From Clear i/p to Q	From Clock i/p to Q or Q̄	From Clock i/p to Q or Q̄	Clock high	Clock low	Preset or Clear low				
7470	-57mA	13mA	35MHz	50ns	50ns	50ns	50ns	27ns	18ns	20ns	30ns	25ns	20ns	5ns
7472	-55mA	9mA	20MHz	16ns	25ns	16ns	25ns	16ns	25ns	20ns	47ns	25ns	0	0
7473	-55mA	9mA	20MHz	16ns	25ns	16ns	25ns	16ns	25ns	20ns	47ns	25ns	0	0
7474	-55mA	8.5mA	25MHz	25ns	40ns	25ns	40ns	14ns	20ns	30ns	37ns	30ns	20ns	5ns
7475	-55mA	32mA	-	16ns	14ns	24ns	7ns	16ns	7ns	20ns (enabling pulse)		20ns	5ns	
7476	-55mA	9mA	20MHz	16ns	25ns	16ns	25ns	16ns	25ns	20ns	47ns	25ns	0	0
74107	-55mA	9mA	20MHz	16ns	25ns	16ns	25ns	16ns	25ns	20ns	47ns	25ns	0	0
74109	-85mA	10mA	40MHz	9ns	18ns	9ns	17ns	12ns	19ns	20ns	20ns	20ns	15ns	10ns
74118														
74121	-55mA	13mA (Triggered: 23mA)	-	45ns (from A <sub>1</sub> or A <sub>2</sub> )	50ns (from A <sub>1</sub> or A <sub>2</sub> )	(to Q̄) N/A	(to Q) N/A	35ns (from B)	40ns (from B)	-	-	-	-	-

Continued on next page



Table 23 continued

Type No.	Short circuit output current (max)	Supply current Average per flip-flop (Typical)	Max Clock Frequency	Typical Propagation Delay Time						Pulse width (min)		Input Setup Time (min)	Input Hold Time (min)	
				From Preset i/p to Q t <sub>PLH</sub>	i/p to Q t <sub>PHL</sub>	From Clear i/p to Q t <sub>PLH</sub>	i/p to Q t <sub>PHL</sub>	From Clock i/p to Q or Q t <sub>PLH</sub>	i/p to Q t <sub>PHL</sub>	Clock high	Clock low			Preset or Clear low
74122	-40mA	23mA	—	22ns (from A <sub>1</sub> or A <sub>2</sub> )	30ns (from A <sub>1</sub> or A <sub>2</sub> )	(to $\bar{Q}$ ) 30ns	(to Q) 18ns	19ns (from B <sub>1</sub> or B <sub>2</sub> )	27ns (from B <sub>1</sub> or B <sub>2</sub> )	—	—	—	—	
74123	-40mA	46mA	—	22ns (from A)	30ns (from A)	(to $\bar{Q}$ ) 30ns	(to Q) 18ns	19ns (from B)	27ns (from B)	—	—	—	—	
74174	57mA	45mA	40MHz	—	—	—	20ns	14ns	17ns	20ns	20ns	20ns (clear low or high)	30ns	0

t<sub>PLH</sub> = Propagation delay low to high. t<sub>PHL</sub> = Propagation delay high to low.

Additional information.

74121, A<sub>1</sub> and A<sub>2</sub> are negative-edge triggered logic inputs, and will trigger the one shot when either or both go to logical '0' with B at logical '1'. B is a positive Schmitt trigger input for slow edges or level detection and will trigger the one shot when B goes to logical '1' with A<sub>1</sub> or A<sub>2</sub> at logical '0'. An external timing capacitor (C<sub>T</sub>) may be connected between pin 10 (positive) and pin 11. With no external capacitor pulse width is 30ns. To use the internal timing resistor (R<sub>T</sub>) 2kΩ nominal, connect pin 9 to pin 14. To obtain variable pulse width connect external variable resistance between pin 9 and pin 14. (External resistance 1.4kΩ min to 40kΩ max.) (Output pulse width = 0.695R<sub>T</sub>C<sub>T</sub> where R<sub>T</sub> is in ohms, and C<sub>T</sub> is in farads.) For non-variable, accurate pulse widths connect external resistor between pin 11 and 14 and leave pin 9 open circuit.

74122/74123. Pulse width is given by  $0.32R_T C_{EXT} \left(1 + \frac{0.7}{R_T}\right)$  where R<sub>T</sub> is between 5kΩ and 50kΩ in ohms and C<sub>EXT</sub> is any value in farads. To use internal resistor (10kΩ : only in 74122)

connect pin 9 to pin 14. C<sub>EXT</sub> should be connected between R<sub>EXT</sub>/C<sub>EXT</sub> (positive) and C<sub>EXT</sub>.

Table 24 TTL Counters

All types: Maximum input voltage for logic '0': 0.8V  
 Minimum input voltage for logic '1': 2V  
 Maximum output voltage logic '0' (I<sub>OL</sub> = 16mA): 0.4V  
 Minimum output voltage logic '1' (I<sub>OH</sub> = -800μA): 2.4V

Type No.	Short circuit O/P current (max)	Supply current (typ)	Max clock frequency A to B to Q <sub>A</sub> Q <sub>B</sub>	Propagation Delay Time (typical)												Pulse width			Reset	Reset inactive State set-up time		
				t <sub>PLH</sub>	t <sub>PHL</sub>	t <sub>PLH</sub>	t <sub>PHL</sub>	t <sub>PLH</sub>	t <sub>PHL</sub>	t <sub>PLH</sub>	t <sub>PHL</sub>	t <sub>PLH</sub>	t <sub>PHL</sub>	t <sub>PLH</sub>	t <sub>PHL</sub>	i/p	i/p	i/p				
7490A	57mA	29mA	42MHz 16MHz	10ns	12ns	32ns	34ns	10ns	14ns	21ns	23ns	21ns	23ns	—	26ns	20ns	26ns	15ns	30ns	15ns	25ns	
7492A	-57mA	26mA	42MHz 16MHz	10ns	12ns	32ns	34ns	10ns	14ns	10ns	14ns	21ns	23ns	—	26ns	—	—	15ns	30ns	15ns	25ns	
7493A	-57mA	26mA	42MHz 16MHz	10ns	12ns	46ns	46ns	10ns	14ns	21ns	14ns	21ns	23ns	—	26ns	—	—	15ns	30ns	15ns	25ns	
				Clock to Ripple Carry		Clock high to any Q		Clock low to any Q		Enable T to any Q		Clear (5) to any Q								Set-up Time		
74160A	-57mA	63mA	35MHz	18ns	16ns	14ns	16ns	14ns	18ns	10ns	12ns	—	24ns					25ns		25ns		
				Count up to Carry		Count down to Borrow		Either count to Q		Load to Q		Clear to Q										
74192	-55mA	65mA	25MHz	17ns	16ns	16ns	16ns	25ns	31ns	27ns	29ns	—	22ns					25ns		20ns		
74193	-65mA	65mA	25MHz	17ns	16ns	16ns	16ns	25ns	31ns	27ns	29ns	—	22ns					25ns		20ns		
				Clock 1 to Q <sub>A</sub>		Clock 2 to Q <sub>B</sub>		Clock 2 to Q <sub>C</sub>		Clock 2 to Q <sub>D</sub>		A, B, C, D, to Q <sub>A</sub> , Q <sub>B</sub> , Q <sub>C</sub> , Q <sub>D</sub>		Load to Any		Clear to Any		Clock i/p		Clear Load 2 i/p		
74196	-57mA	39mA	50MHz	9ns	11ns	12ns	14ns	24ns	28ns	14ns	16ns	16ns	25ns	22ns	24ns	—	25ns	14ns	28ns	25ns	20ns	15ns

t<sub>PLH</sub> = Propagation delay low to high. t<sub>PHL</sub> = Propagation delay high to low.

Additional information.

7490A, 7492A, 7493A: For maximum count length connect B input to Q<sub>A</sub> and apply pulses to be counted to A. On 7490A only a symmetrical divide by ten count can be obtained by connecting Q<sub>D</sub> to A and applying pulses to B. Output is at Q<sub>A</sub>.

Table 25 TTL Shift Registers

All types: Maximum input voltage for logic '0': 0.8V  
 Minimum input voltage for logic '1': 2V  
 Maximum output voltage logic '0' (I<sub>OL</sub> = 16mA): 0.4V  
 Minimum output voltage logic '1' (I<sub>OH</sub> = -400μA): 2.4V (7495: I<sub>OH</sub> = -800μA)

Type No.	Short circuit O/P current max	Supply current (typ)	Clock frequency	Propagation delay time (typical)		Width of clock pulse (min)	Width of clear and preset pulse	Input set-up time	Input hold time	Time to enable		Time to inhibit	
				t <sub>PLH</sub> Clock to output	t <sub>PHL</sub> Preset & Clear to output					Clock 1	Clock 2	Clock 1	Clock 2
7491	-57mA	35mA	22MHz	18ns	27ns	—	—	25ns	0	—	—	—	—
7494	57mA	28mA	10MHz	25ns	25ns	35ns	40ns	35ns	0	—	—	—	—
7495	57mA	50mA	36MHz	25ns	25ns	—	—	15ns	0	20ns	15ns	10ns	10ns
7496	-57mA	48mA	10MHz	25ns	25ns	25ns	55ns (max)	35ns	30ns	30ns	0	—	—
74164	-27.5mA	37mA	36MHz	20ns	25ns	—	28ns	20ns	20ns	15ns	5ns	—	—
74194	-57mA	39mA	36MHz	14ns	14ns	—	19ns	20ns	20ns	30ns	0	—	—

t<sub>PLH</sub> = Propagation delay low to high. t<sub>PHL</sub> = Propagation delay high to low.

**Table 26 TTL Decoders**

Type No.	Max O/P voltage logic '0' at I <sub>OL</sub> (max)	Min output voltage logic '1' at I <sub>OH</sub> (max)	Short circuit O/P current (max)	Supply current (typ)	Propagation delay time (typical)			
					t <sub>PLH</sub> A,B,C,D to output through 2 levels of logic	t <sub>PHL</sub> to Any output	t <sub>PLH</sub> A,B,C,D to output through 3 levels of logic	t <sub>PHL</sub> to Any output
7442	0.4V @ 16mA	2.4V @ 800μA	55mA	28mA	10ns	14ns	17ns	17ns
7447A	0.4V @ 8mA	2.4V @ 200μA	-4mA	60mA	100ns	100ns		
74141	60V @ 0.5mA	2.5V @ 7mA		11mA				
74145	0.4V @ 20mA 0.9V @ 80mA	-	-	43mA	Any 50ns	Any 50ns		
74154	0.4V @ 16mA	2.4V @ 800μA	57mA	34mA	Strobe to Output 17ns	18ns	18ns	21ns

t<sub>PLH</sub> Propagation delay low to high. t<sub>PHL</sub> Propagation delay high to low.

**Table 27 TTL Various Functions**

All functions: Maximum input voltage for logic '0': 0.8V  
Minimum input voltage for logic '1': 2V

Type No.	Function	Max O/P voltage logic '0' at I <sub>OL</sub> (max)	Min O/P voltage logic '1' at I <sub>OH</sub> (max)	Short circuit O/P current (max)	Supply current (min)
7481	Memory	0.4V @ 40mA	5.5V @ 250μA		55mA
7483	Adder	0.4V @ 16mA	2.4V @ -800μA	-55mA	79mA
7485	Arithmetic	0.4V @ 16mA	2.4V @ 800μA	-55mA	55mA
7489	Memory	0.4V @ 12mA	5.5V @ 20μA		80mA
74150	Multiplexer	0.4V @ 16mA	2.4V @ -800μA	-55mA	40mA
74151	Data Selector	0.4V @ 16mA	2.4V @ 800μA	55mA	27mA
74LS124	V.C.O.	0.35V @ 24mA	3.4V @ -1.2mA	150mA	22mA

Additional information: 74LS124. Two fully independent voltage controlled oscillators in one I.C. To use, connect ordinary 5V supply to pin 16 and pin 15 (for more stable frequency output a stabilised 5V should be connected to pin 15). Similarly the earth pins 8 and 9 can be separated. The enable input inhibits the output of the oscillator when 5V (logic '1') is connected to pin 6 (11) and output goes high. With enable input at logic '0', output runs normally (oscillator runs internally all the time and the first pulse is always perfect owing to a pulse synchroniser) and duty cycle is 50%. The output frequency is determined by a single capacitor connected between pins 4 and 5 (12 and 13) (or crystal for high stability) and the voltage on pins 2 and 3 (1 and 14). The frequency will be approx  $f_0 = 500 / C_{EXT}$  where  $f_0$  = frequency in MHz and  $C_{EXT}$  = capacitance in pF. The voltage on pins 2 and 3 (1 and 14) can be varied between 0 and 5V.

The greater the voltage on "Range", the greater the frequency change when the voltage is varied on "Frequency". These highly stable oscillators will operate at any frequency between 0.12Hz and 30MHz.

## 74LS Series

The following types are stock ed

**Table 28 Gates**

74LS00	Quad 2 input NAND gate
74LS01	Quad 2 input NAND gate with open collector outputs and pins different from 74LS00
74LS02	Quad 2 input NOR gate
74LS03	Quad 2 input NAND gate with open collector outputs and pins as 74LS00
74LS04	Hex inverter
74LS05	Hex inverter with open collector outputs
74LS08	Quad 2 input AND gate
74LS09	Quad 2 input AND gate with open collector outputs
74LS10	Triple 3 input NAND gate
74LS11	Triple 3 input AND gate
74LS12	Triple 3 input NAND gate with open collector outputs
74LS13	Dual 4 input NAND Schmitt trigger
74LS14	Hex inverter Schmitt trigger
74LS15	Triple 3 input AND gate with open collector outputs
74LS20	Dual 4 input NAND gate
74LS21	Dual 4 input AND gate
74LS22	Dual 4 input NAND gate with open collector outputs
74LS26	Quad 2 input NAND gate with open collector outputs is 74LS03 but for high voltage interface.
74LS27	Triple 3 input NOR gate
74LS28	Quad 2 input NOR buffer
74LS30	8 input NAND gate
74LS32	Quad 2 input OR gate
74LS33	Quad 2 input NOR buffer with open collector outputs
74LS37	Quad 2 input NAND buffer
74LS38	Quad 2 input NAND buffer with open collector outputs
74LS40	Dual 4 input NAND buffer
74LS51	Dual 2 wide 2 input AND OR invert gate
74LS54	4 wide 2 and 3 input AND OR invert gate
74LS55	2 wide 4 input AND OR invert gate
74LS86	Quad 2 input exclusive OR gate
74LS132	Quad 2 input NAND Schmitt trigger
74LS136	Quad 2 input exclusive OR gate with open collector outputs
74LS266	Quad 2 input exclusive NOR gate with open collector outputs

Not pin compatible with 74 series type

**Table 29 Flip-Flops and Latches**

74LS73	Dual JK flip flop with clear (positive pulse triggered)
74LS74	Dual D type flip flop (positive edge triggered)
74LS75	Dual 2 bit transparent latch
74LS76	Dual JK flip flop with preset and clear (positive pulse triggered)
74LS78	Dual JK flip flop with preset, common clear and common clock (negative edge triggered)
74LS107	Dual JK master slave flip flop with clear (positive pulse triggered)
74LS109	Dual JK flip flop with preset and clear (positive edge triggered)
74LS112	Dual JK flip flop with preset and clear (negative edge triggered)
74LS113	Dual JK flip flop with preset (negative edge triggered)
74LS114	Dual JK flip flop with preset, common clear and common clock (negative edge triggered) pins different from 74LS78.

**Table 30 Counters**

74LS90	Decade counter
74LS92	Divide by twelve counter
74LS93	4 bit binary ripple counter
74LS160	BCD decade counter synchronous
74LS161	4 bit binary counter synchronous
74LS162	BCD decade counter synchronous with clear
74LS163	4 bit binary counter synchronous with clear
74LS168	4 bit up/down synchronous counter decade
74LS169	4 bit up/down synchronous counter binary
74LS190	Presetable BCD/decade up/down counter synchronous
74LS191	Presetable 4 bit binary up/down counter synchronous
74LS192	Presetable BCD/decade up/down counter synchronous dual clocks
74LS193	Presetable 4 bit binary up/down counter synchronous dual clocks
74LS196	Presetable decade ripple counter
74LS197	Presetable 4 bit binary ripple counter
74LS290	Decade counter pins different from 74LS90
74LS293	4 bit binary ripple counter pins different from 74LS93
74LS390	Dual decade ripple counter
74LS393	Dual 4 bit binary ripple counter
74LS490	Dual BCD/decade ripple counter

**Table 31 Shift Registers**

74LS95	4 bit shift register
74LS96	5 bit shift register
74LS164	8 bit serial in parallel out shift register
74LS165	8 bit serial/parallel in serial out shift register asynchronous parallel load
74LS166	8 bit serial/parallel in serial out shift register synchronous parallel load
74LS194	4 bit bidirectional universal shift register
74LS195	4 bit parallel access shift register
74LS298	Quad 2 port register with true and complement outputs negative edge triggered
74LS299	Quad 2 port register single rail output negative edge triggered
74LS323	8 bit universal shift/storage register
74LS398	Quad 2 port register with true and complement outputs positive edge triggered
74LS399	Quad 2 port register single rail output positive edge triggered
74LS123	Dual triggerable monostable multivibrator
74LS174	Hex D type flip flop (edge triggered)
74LS175	Quad D type flip flop (edge triggered)
74LS221	Dual monostable multivibrator
74LS256	Dual 4 bit addressable latch
74LS259	8 bit addressable latch
74LS273	Octal D type flip flop (positive edge triggered)
74LS279	Dual set/reset latch
74LS325	Dual 2 bit transparent latch and pins different from 74LS75
74LS377	Octal D type flip flop with clock enable (positive edge triggered)
74LS378	Hex D type flip flop with clock enable (edge triggered)
74LS379	Dual D type flip flop with clock enable (edge triggered)

**Table 32 Decoders**

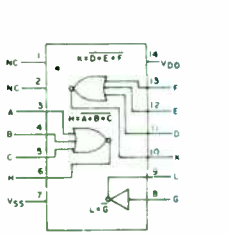
74LS42	BCD to Decimal Decoder (1 of 10)
74LS138	1 of 8 decoder/demultiplexer
74LS139	Dual 1 of 4 decoder/demultiplexer
74LS145	BCD to decimal decoder/driver with open collector outputs
74LS154	1 of 16 decoder/demultiplexer
74LS155	Dual 2 line to 4 line decoder/demultiplexer
74LS156	Dual 2 line to 4 line decoder/demultiplexer with open collector outputs
74LS261	Multiply decoder

**Table 33 Various**

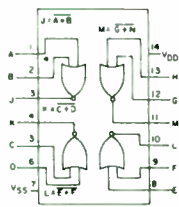
74LS85	4 bit magnitude comparator
74LS89	64 bit random access memory with open collector outputs
74LS124	Dual voltage controlled oscillators
74LS151	8 input multiplexer
74LS153	Dual 4 line to 1 line multiplexer
74LS157	Quad 2 input data selector/multiplexer (non inverted)
74LS158	Quad 2 input data selector/multiplexer (inverted)
74LS170	4 x 4 register file (open collector)
74LS181	4 bit arithmetic logic unit
74LS283	4 bit full adder with fast carry

**Table 34 Three-State Output Types**

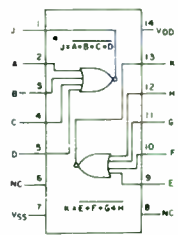
74LS125	Quad 3 state buffer (Output off when 'C' is high)
74LS126	Quad 3 state buffer (Output off when 'C' is low)
74LS173	Dual D type flip flop with 3 state outputs
74LS189	64 bit random access memory (3 state)
74LS240	Octal inverter buffer (3 state)
74LS241	Octal buffer (3 state)
74LS242	Quad inverting transceivers (3 state)
74LS243	Quad transceivers (3 state)
74LS245	Hex inverter buffer (3 state)
74LS251	8 input multiplexer (3 state)
74LS253	Dual 4 input multiplexer (3 state)
74LS257	Quad 2 line to 1 line data selector/multiplexer non inverting (3 state)
74LS258	Quad 2 line to 1 line data selector/multiplexer inverting (3 state)
74LS295	4 bit shift register with 3 state outputs
74LS363	Octal transparent latch with 3 state outputs MOS compatible
74LS364	Octal D type flip flop with 3 state outputs MOS compatible
74LS365	Hex buffer/driver (3 state) gated enable inputs
74LS366	Hex inverter buffer (3 state) gated enable inputs
74LS367	Hex buffer/driver (3 state) 4 line to 2 line enable inputs
74LS368	Hex inverter buffer (3 state) 4 line to 2 line enable inputs
74LS373	Octal transparent latch with 3 state outputs
74LS374	Octal D type flip flop with 3 state outputs
74LS395	4 bit cascaded shift register with 3 state outputs
74LS568	BCD decade up/down synchronous counter (3 state)
74LS569	4 bit binary up/down synchronous counter (3 state)
74LS670	4 x 4 register file (3 state)



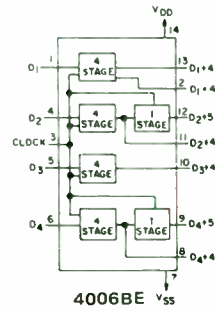
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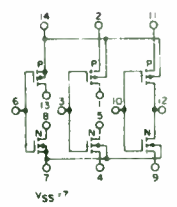
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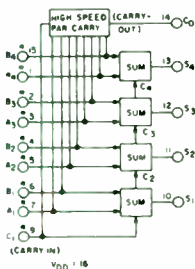
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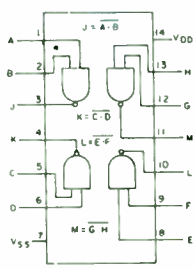
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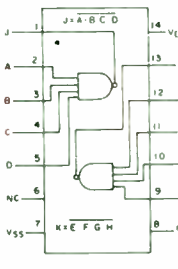
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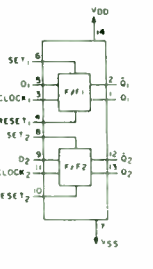
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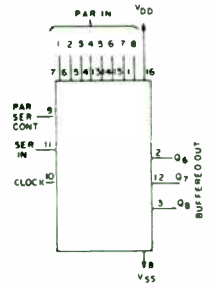
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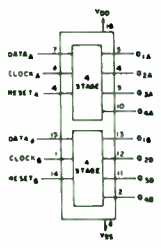
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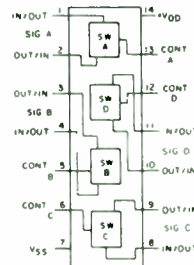
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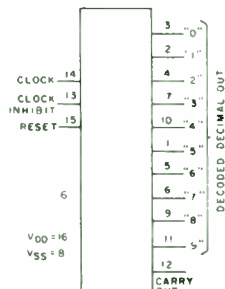
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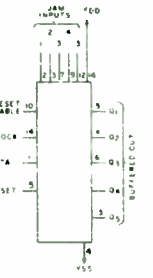
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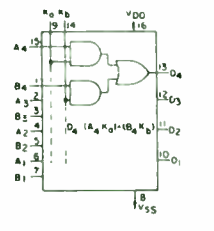
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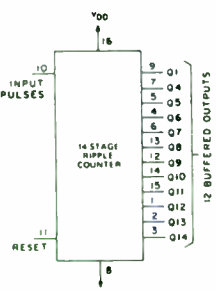
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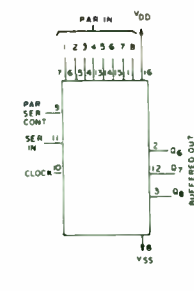
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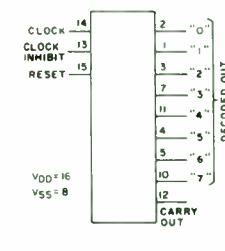
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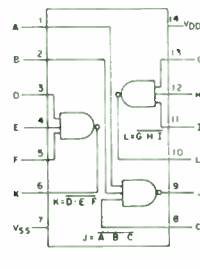
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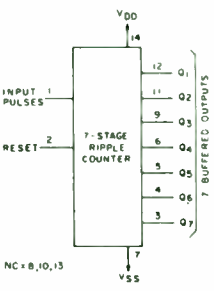
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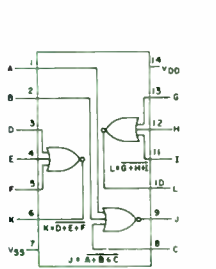
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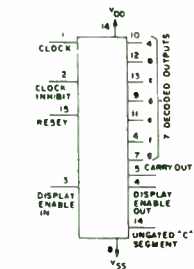
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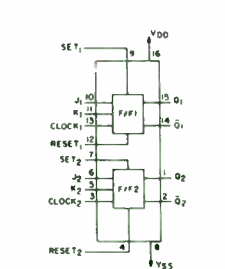
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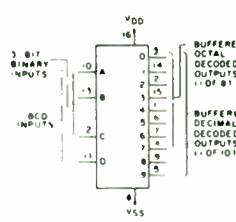
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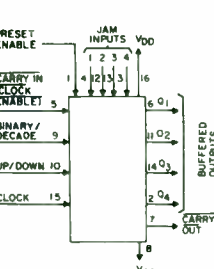
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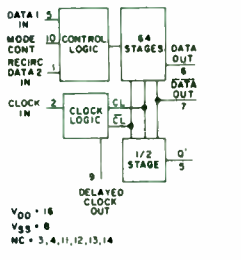


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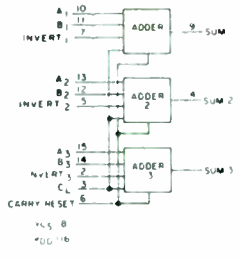


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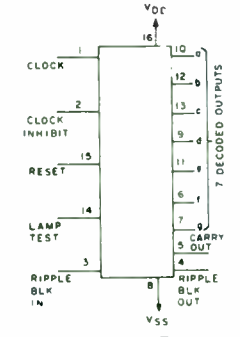




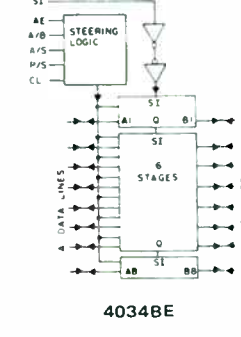
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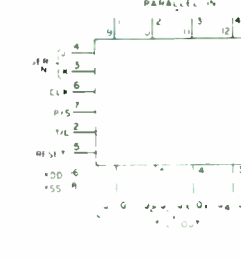
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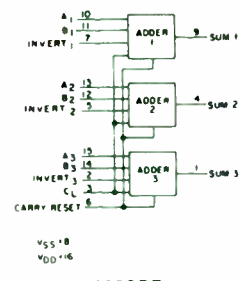
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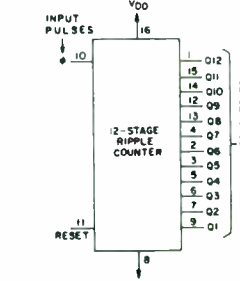
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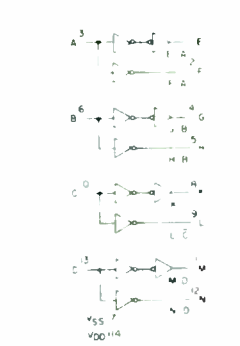
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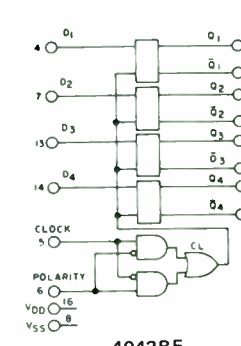
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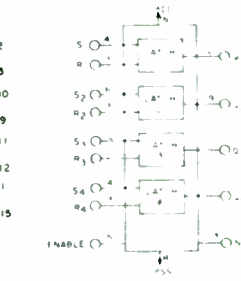
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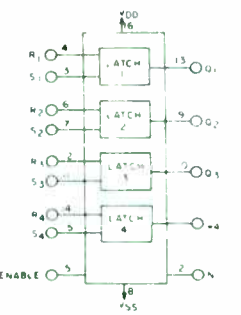
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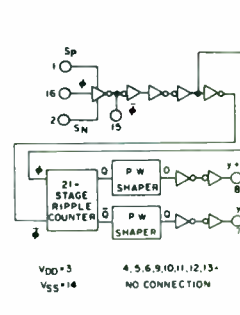
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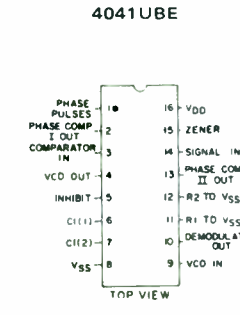
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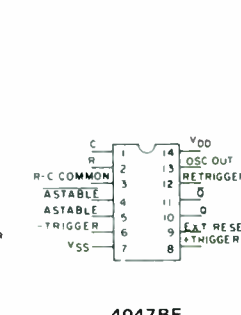
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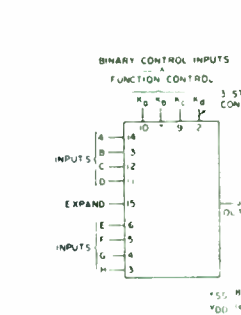
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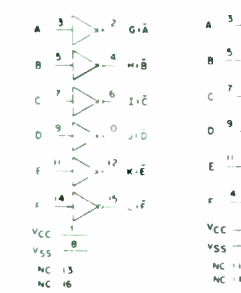
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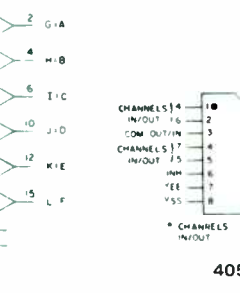
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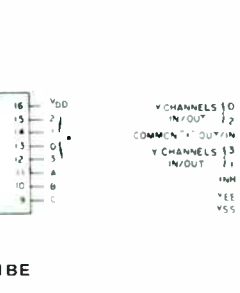
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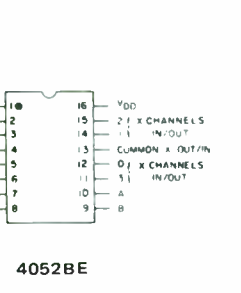
4049UBE



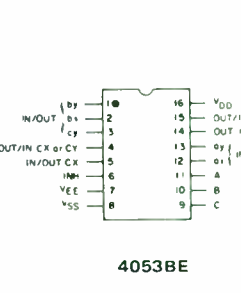
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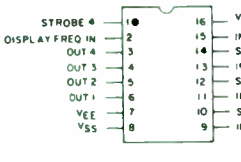
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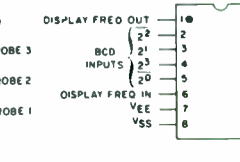
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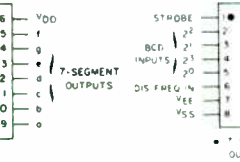
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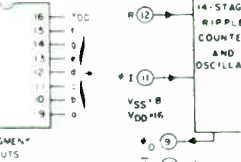
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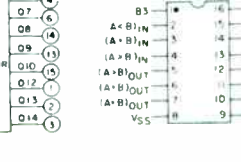
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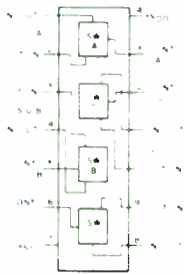
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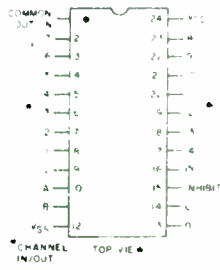
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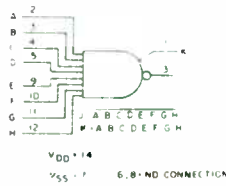
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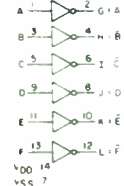
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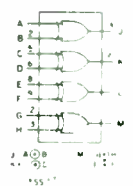
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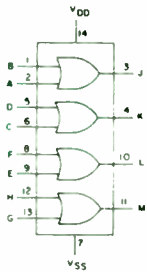
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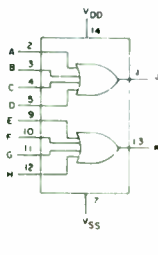
4069UBE



4070BE



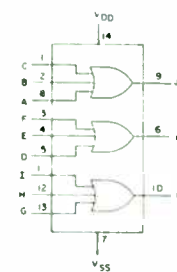
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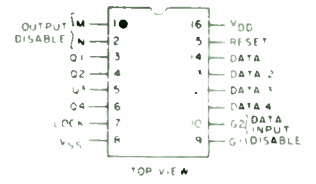
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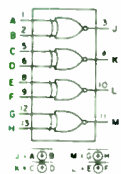
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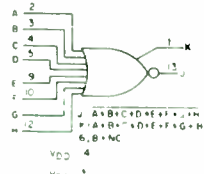
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4076BE



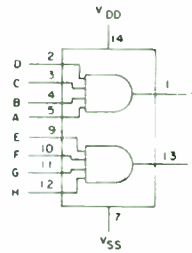
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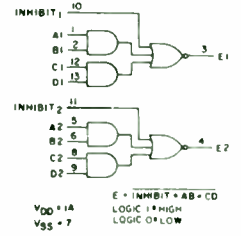
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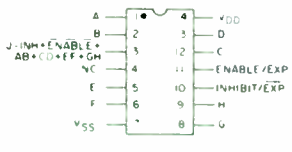
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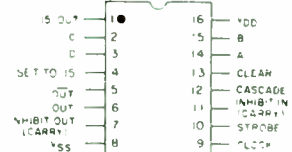
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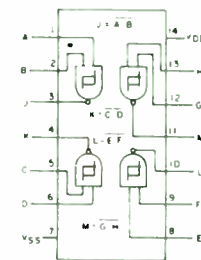
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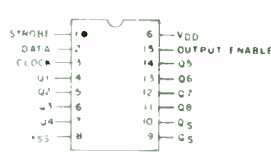
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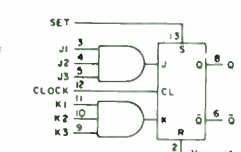
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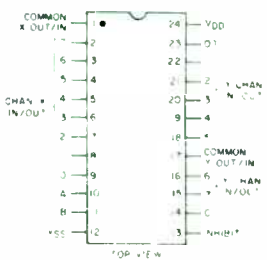
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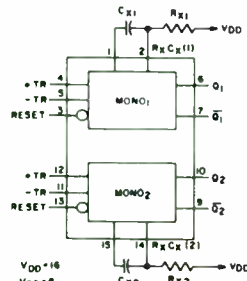
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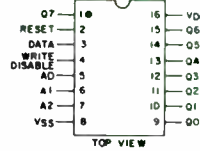
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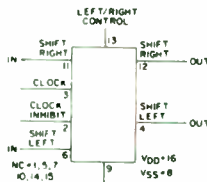
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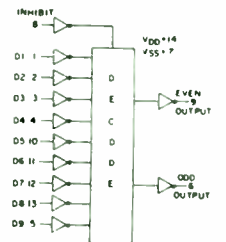
4098BE



4099BE



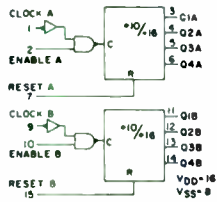
40100BE



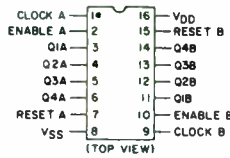
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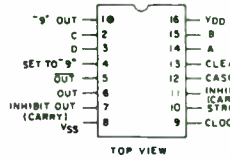




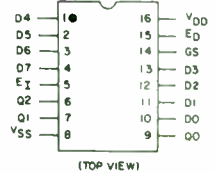
**4518BE**



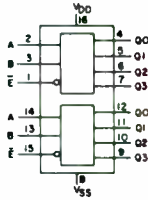
**4520BE**



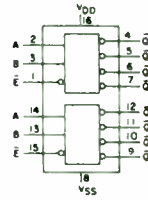
**4527BE**



**4532BE**



**4555BE**



**4556BE**

**COMPLEMENTARY METAL-OXIDE-SEMICONDUCTOR (CMOS)**

**General Information**

**Handling**  
 Although all CMOS devices have input protection diodes the protection only operates up to around 4000V (800V for 4016, 4066 and 4416) and since for example the static voltage generated in the human body by walking on a nylon carpet can easily exceed 10,000V, it is obvious that it is still extremely easy to totally destroy CMOS devices just by touching the pins.  
 Therefore never remove the short circuit on the pins of the device as delivered to you until it is to be used, then work on a metal tray with the tray connected to earth and put a metal strap on your wrist and connect this to earth. Do not wear nylon clothing when handling CMOS. Always use DIL sockets, never solder directly to the IC.

**Ratings 'BE' Types**  
 Supply voltage (V<sub>DD</sub>) +3V to +18V (+20V absolute max)  
 Input voltage must not exceed 0.5V above V<sub>DD</sub> or 0.5V below V<sub>SS</sub>. Unused inputs must be connected to V<sub>DD</sub> or V<sub>SS</sub> depending on logic function and not left floating.

**Fanout** -50  
**Input capacitance** 50pF typical  
**Power dissipation per package** 500mW  
**Output voltage (logical '0')** 0.05V max  
**Output voltage (logical '1')** V<sub>DD</sub> - 0.05V min  
**Quiescent supply current:** 0.01µA (gates and inverters)  
 0.02µA (flip flops, latches and multi-level gates)  
**Output current (V<sub>O</sub> = output voltage)**

V <sub>O</sub> (V)	V <sub>DD</sub> (V)	Typical
0.4	5	1mA
0.5	10	2.6mA
1.5	15	6.8mA
4.6	5	-1mA
2.5	5	3.2mA
9.5	10	2.6mA
13.5	15	-6.8mA

**Max input voltage for logical '0'**  
 1.5V (V<sub>DD</sub> = 5V)  
 3V (V<sub>DD</sub> = 10V)  
 4V (V<sub>DD</sub> = 15V)

**Min input voltage for logical '1'**  
 3.5V (V<sub>DD</sub> = 5V)  
 7V (V<sub>DD</sub> = 10V)  
 11V (V<sub>DD</sub> = 15V)

**Input current typical:** 10pA  
**3 State output leakage current:** 100pA  
**Speed:** up to 10MHz  
**AC gain (gates):** 68dB approx  
**AC bandwidth (gates):** 230kHz (V<sub>DD</sub> = 5V)  
 280kHz (V<sub>DD</sub> = 10V)  
 295kHz (V<sub>DD</sub> = 15V)

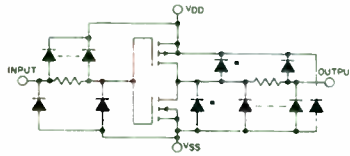
**Ratings 'UBE' Types**  
 As above except  
**Max input voltage for logical '0'**  
 1V (V<sub>DD</sub> = 5V)  
 2V (V<sub>DD</sub> = 10V)  
 2.5V (V<sub>DD</sub> = 15V)

**Min input voltage for logical '1'**  
 4V (V<sub>DD</sub> = 5V)  
 8V (V<sub>DD</sub> = 10V)  
 12.5V (V<sub>DD</sub> = 15V)

**Input capacitance:** 10pF  
**AC gain:** 28dB (V<sub>DD</sub> = 5V)  
 23dB (V<sub>DD</sub> = 10V)  
 18dB (V<sub>DD</sub> = 15V)  
**AC bandwidth:** 710kHz (V<sub>DD</sub> = 5V)  
 885kHz (V<sub>DD</sub> = 10V)  
 2.8MHz (V<sub>DD</sub> = 15V)

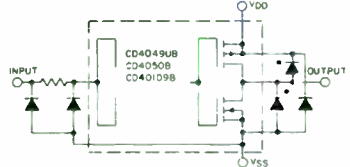
In addition 'UBE' (unbuffered output) gates have lower propagation delay times than 'BE' types. They have a slightly worse noise immunity margin, but they do not suffer from output oscillations when the input is a slow ramp voltage unlike the 'BE' types.

*Gate-oxide protection networks used in COS/MOS integrated circuits.*



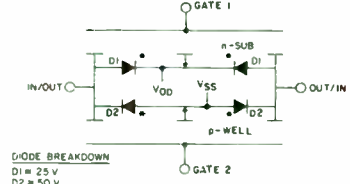
\* THESE DIODES ARE INHERENTLY PART OF THE MANUFACTURING PROCESS

**B-series COS/MOS**



\* THESE DIODES ARE INHERENTLY PART OF THE MANUFACTURING PROCESS

**CD4049UB, CD4050B, and CD40109B COS/MOS types.**



\* THESE DIODES ARE INHERENTLY PART OF THE MANUFACTURING PROCESS

**COS/MOS transmission gates.**

**Table 35 Gates**

4000BE	Dual 3 input NOR gate plus inverter
4001BE	Quad 2-input NOR gate with buffered outputs
40011BE	Quad 2-input NOR gate with unbuffered outputs
4002BE	Dual 4-input NOR gate
4011BE	Quad 2-input NAND gate with buffered outputs
40111BE	Quad 2-input NAND gate with unbuffered outputs
4012BE	Dual 4-input NAND gate
4019BE	Quad AND/OR select gate
4023BE	Triple 3-input NAND gate
4025BE	Triple 3-input NOR gate
4030BE = 4030BE	
4048BE	Multifunction expandable 8 input gate
4068BE	8 input NAND/AND gate
4070BE	Quad exclusive OR gate
4071BE	Quad 2-input OR gate
4072BE	Dual 4 input OR gate
4073BE	Triple 3-input AND gate
4075BE	Triple 3-input OR gate
4077BE	Quad exclusive NOR gate
4078BE	8 input NOR/OR gate
4081BE	Quad 2-input AND gate
4082BE	Quad 4-input AND gate
4085BE	Dual 2-wide 2 input AND OR invert gate
4086BE	Expandable 4 wide 2 input AND OR invert gate
4093BE	Quad 2-input NAND Schmitt trigger
40106BE	Hex Schmitt triggers
40107BE	Dual 2-input NAND buffer driver

**Notes:** 40107BE has output sink current capability of 68mA at V<sub>DD</sub> = 5V and -136mA at V<sub>DD</sub> = 10V, but there is

no internal pull up device, thus at logic 1 output is open circuit  
 4048BE is an extremely versatile logic unit. By altering the logic state on pins 7,9 and 10 the function of the gate may be altered thus

Kalpin 10	K16pin 71	Kc16in 91	Function	Unused inputs
0	0	0	NOR	VSS
0	0	1	OR	VSS
0	1	0	OR AND	VSS
0	1	1	OR NAND	VSS
1	0	0	AND	VDD
1	0	1	NAND	VDD
1	1	0	AND/NOR	VDD
1	1	1	AND OR	VDD

In addition pin 2(Kd) should be connected to logic 1. The output may be made high impedance by connecting pin 2 to logic 0. Pin 15 is an expanding input, normally held at logic 0 or connected to the output of any other gate & another 4048BE could be connected to create a 16 input multifunction gate and so on.

**Table 36 Buffers and Inverters**

4007UBE	Dual complementary pair plus inverter
4009UBE = 4049UBE	
4010BE	4050BE
4041UBE	Quad true/complement buffer
4049UBE	Hex buffer/converter (inverting)
4050BE	Hex buffer/converter (non inverting)
4069UBE	Hex inverter
40109BE	Quad low to high voltage level shifter
4502BE	Strobed hex inverter/buffer

**Notes:** 4041UBE has output source and sink capability of typically +12mA at V<sub>DD</sub> 5V, -50mA at V<sub>DD</sub> 10V, and -65mA at V<sub>DD</sub> = 15V.  
 4049UBE and 4050BE differ from other CMOS devices in that input voltage for logic 1 can exceed V<sub>CC</sub> without harm up to +20V and output sink and source currents are higher.

Output current	V <sub>O</sub> (V)	V <sub>DD</sub> (V)	Typical
	0.4	5	6.4mA
	0.5	10	16mA
	1.5	15	48mA
	4.6	5	1.6mA
	2.5	5	6.4mA
	9.5	10	3.6mA
	13.5	15	12mA

4069UBE is a 4049UBE with standard CMOS input and output characteristics.  
 40109BE. Connect input device's logic 1 level to V<sub>CC</sub> and output device's logic 1 level to V<sub>DD</sub>. Either can be any voltage up to +20V. For high impedance output, connect enable inputs to logic 0.

4502BE. Connect pin 4 (output disable) to logic 1 for high impedance output. If pin 4 at logic 0, a logic 1 on pin 12 (inhibit) switches all outputs to logic 0. This device has higher logic 0 output drive capability than standard CMOS.  
 Output current V<sub>O</sub> (V) V<sub>DD</sub> (V) Typical  
 0.4 5 6.4mA  
 0.5 10 15.6mA  
 1.5 15 48.0mA  
 Thus it will drive two 74 series TTL loads

**Table 37 Registers**

4006BE	18 stage static shift register
4014BE	8 stage static shift register synchronous parallel or serial in serial out
4015BE	Dual 4 stage static shift register serial in parallel out
4021BE	8 stage static shift register asynchronous parallel or synchronous serial in/serial out
4031BE	64 stage static shift register
4034BE	8 stage static bidirectional parallel/serial input output bus register
4035BE	4 stage parallel in/parallel out shift register
4094BE	8 stage shift and store bus register
40100BE	32 stage static left/right shift register
40104BE	4 bit bi directional universal register
40105BE	4 x 16 bit FIFO register
40194BE	4 bit bi directional universal register with reset

**Notes:** 4034BE, 4048BE, 40104BE and 40105BE types have 3 state outputs

**Table 38 Flip Flops and Latches**

4013BE	Dual D type flip flop
4027BE	Dual J-K master slave flip flop
4042BE	Quasi clocked 'D' latch
4043BE	Quasi NOR reset set latch 3 state

4044BE	Quad NAND reset/set latch 3 state
4047BE	Low power monostable/astable multivibrator
4076BE	4 bit D type register with 3 state outputs
4095BE	Non inverting J-K input gated master slave flip flop
4098BE	Dual monostable multivibrator

4099BE	8-bit addressable latch
40174BE	Hex D type flip flop
4508BE	Dual 4 bit latch with 3 state outputs
*4098BE	is a direct replacement for MC14528

**Notes:**

4047AE To obtain the various functions available with this device make connections as follows:

Function	Connect these pins to V <sub>DD</sub>	Connect these pins to V <sub>SS</sub>	Connect input pulse to	Output pulses available at pins	Output period/pulse width
<b>Astable multivibrator:</b>					
Free running	4,5,6,14	7,8,9,12	—	10,11,13	4.4RC*secs
True gating	4,6,14	7,8,9,12	5	10,11,13	4.4RC*secs
Complement gating	6,14	5,7,8,9,12	4	10,11,13	4.4RC*secs
<b>Monostable multivibrator:</b>					
Positive-edge triggered	4,14	5,6,7,9,12	8	10,11	2.48RC*secs
Negative-edge triggered	4,8,14	5,7,9,12	6	10,11	2.48RC*secs
Retriggerable	4,14	5,6,7,9	8,12	10,11	2.48RC*secs
External countdown†	14	5,6,7,8,9,12	—†	10,11	2.48RC*secs

**Notes:**

† Connect input pulse to reset of a C-MOS counter (e.g. 4017AE) and output of counter to pin 4 of 4047AE.

\* Frequency shown is available from pin 10, and the inversion of that frequency is available from pin 11. Double the frequency of pin 10 is available at pin 13 (astable mode only).

In astable mode the time for one cycle (pin 10/11) is 4.4RC seconds where R is any value between 10kΩ and 1MΩ in ohms connected between pins 2 and 3 and C is any practical value over 100pF in farads connected between pins 1 and 3 (non-polarised only). In monostable mode the output-on time is given by 2.48RC seconds where R is as for astable mode and C is as for astable mode, but not less than 1000pF.

4098BE To obtain the various functions available with this device make connections as follows:

Function	Connect V <sub>DD</sub> to pins Mono 1	Connect V <sub>SS</sub> to pins Mono 2	Connect input pulse to Mono 1	Connect V <sub>SS</sub> to pins Mono 2	Connect input pulse to Mono 2	Also join together Mono 1	Also join together Mono 2
Trigger on leading-edge and retriggerable	3,5	11,13	—	—	4	12	—
Trigger on leading-edge and not retriggerable	3	13	—	—	4	12	5 to 7
Trigger on trailing-edge and retriggerable	3	13	4	12	5	11	11 to 9
Trigger on trailing-edge and not retriggerable	3	13	—	—	5	11	—
One section unused: unused section	5	11	3,4	12,13	—	—	4 to 6

**Notes:**

V<sub>DD</sub> must also be connected to pin 16 and V<sub>SS</sub> to pin 8 for all applications.

The output-on time is given by R<sub>X</sub>C<sub>X</sub> seconds, where R<sub>X</sub> is typically between 4kΩ and 10MΩ in ohms connected between pin 16 and pin 2 (14) and C<sub>X</sub> is greater than 0.01μF in farads and

connected between pin 2 (14) and pin 1 (15) (non-polarised only). Values of capacitance less than 0.01μF may be used but under these conditions the on time is not a linear function with change of capacitance.

An unused +TR input should be connected to V<sub>SS</sub>. An unused -TR input should be connected to V<sub>DD</sub>. A Reset (on low level) is provided for immediate termination of the output pulse or to prevent output pulses when power is turned on. An unused Reset input should be connected to V<sub>DD</sub>, unless an entire monostable is unused in which case it should be connected to V<sub>SS</sub>.

**Table 39 Counters, Decoders and Display Drivers**

4017BE	Decade counter/divider with ten decoded outputs
4018BE	Presetable divide by 'N' counter
4020BE	14 stage ripple carry binary counter/divider
4022BE	Octal counter/divider with eight decoded outputs
4024BE	7 stage ripple carry binary counter/divider
4026BE	Decade counter/divider with 7 segment display output and display enable input
4028BE	BCD to decimal decoder
4029BE	Presetable up/down counter binary or BCD decade
4033BE	Decade counter/divider with 7 segment display output and ripple blanking and lamp test
4040BE	12 stage ripple carry binary counter/divider
4045BE	21 stage counter for crystal oscillators
4045BE	4 output liquid crystal display driver for decimal point, colon etc
4055BE	BCD to 7 segment liquid crystal display driver with display frequency output
4056BE	BCD to 7 segment liquid crystal display driver with strobed latch function
4060BE	14 stage ripple carry binary counter/divider and oscillator
401029BE	8 stage presetable synchronous down counter, 2 decade BCD type
40103BE	8 stage presetable synchronous down counter, 8 bit binary type
40110BE	Decade up/down counter/decoder/latch/divider with 7 segment display output

40160BE	Synchronous programmable 4 bit decade counter with asynchronous clear
40161BE	Synchronous programmable 4 bit binary counter with asynchronous clear
40162BE	Synchronous programmable 4 bit decade counter with synchronous clear
40163BE	Synchronous programmable 4 bit binary counter with synchronous clear
40192BE	Presetable up/down BCD counter with dual clock and reset
40193BE	Presetable up/down binary counter with dual clock and reset
4510BE	Presetable up/down BCD counter
4511BE	BCD to 7 segment latch decoder driver
4514BE	4 bit latch/4 to 16 line decoder, output 'high' on select
4515BE	4 bit latch/4 to 16 line decoder, output 'low' on select
4516BE	Presetable up/down binary counter
4519BE	Dual BCD up counter
4520BE	Dual binary up counter
Notes	40110BE and 4511BE devices have NPN bipolar transistors built in to the output stages so that they may directly drive LED displays since they will source up to 25mA

4038BE	Triple serial negative logic adder
4063BE	4 bit magnitude comparator
4089BE	Binary rate multiplier
40101BE	9 bit parity generator/checker
40108BE	4 x 4 multiplex registers with two 3 state output buses
40181BE	4 bit arithmetic logic unit
40182BE	Look ahead carry generator
4527BE	BCD rate multiplier
Notes:	40108BE is a direct equivalent to MC14580 40181BE is a direct equivalent to MC14581 40182BE is a direct equivalent to MC14582

**Table 41 Multiplexers and Demultiplexers**

4051BE	Single 8 channel analogue multiplexer/demultiplexer
4052BE	Differential 4 channel analogue multiplexer/demultiplexer
4053BE	Triple 2 channel analogue multiplexer/demultiplexer
4067BE	Single 16 channel analogue multiplexer/demultiplexer
4097BE	Differential 8 channel analogue multiplexer/demultiplexer
40257BE	Quad 2 line to 1 line data selector/multiplexer with 3 state outputs
4512BE	8 channel data selector with 3 state outputs
4555BE	Dual binary to 1 of 4 decoder/demultiplexer outputs high on select
4556BE	Dual binary to 1 of 4 decoder/demultiplexer outputs low on select

**Table 40 Arithmetic Circuits**

4008BE	4 bit full adder
4032BE	Triple serial positive logic adder

**Table 42 Quad Bilateral Switches**

4016BE	Especially suitable for sample and hold applications
--------	--

4066BE	Low on resistance replacement for 4016BE except for above
--------	---

4416BE	DPDT switch
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**Notes:**

Characteristic	4016AE/4416AE	4066AE
Quiescent typical power supply current at V <sub>DD</sub> = 10V	0.5μA (max)	0.25μA
Effective 'off' resistance V <sub>DD</sub> = 10V	10TΩ (10 <sup>13</sup> Ω)	10TΩ (10 <sup>13</sup> Ω)
Sine wave response (distortion)	<0.5%	<0.5%
Crosstalk between switches (typical)	-50dB	-50dB
Frequency response (sine wave input)	40MHz (-3dB)	40MHz (-3dB)
Max allowable control input repetition rate	10MHz	10MHz
Difference in resistance between any 2 of the 4 switches in any one package	15Ω	15Ω

Typical	200Ω	V <sub>DD</sub> +15V	V <sub>SS</sub> OV	80Ω
'ON'	250Ω	+10V	OV	120Ω
	470Ω	+5V	OV	270Ω
resistances	200Ω	+7.5V	7.5V	80Ω
	250Ω	+5V	5V	120Ω
	450Ω	+2.5V	2.5V	270Ω

at various V<sub>DD</sub>/V<sub>SS</sub>

(load resistance = 10kΩ)

The 4016AE switches turn on (go low resistance) when a high (logical 1) voltage is applied to the appropriate control wire. Thus if the same control signal is used for all four switches then at any one time the switches will be either all on or all off. With the 4416AE, if the same control signal is used for all four switches then at any one time two switches are on and two are off giving a true DPDT action. Switches 'A' and 'D' are low resistance with logical '1' on their control wires, while switches 'B' and 'C' are low resistance with logical '0' on their control wires.

The 4066AE is a pin for pin replacement for the 4016AE, but it features much lower 'on' resistances. However it is recommended with this switch that when switch current flows into terminals 1,4,8 or 11, the voltage drop across the switch should not exceed 0.8V. There is no similar restriction if the switch current flows into terminals 2,3,9 or 10.

With all the switches the maximum peak voltage being switched should not exceed V<sub>DD</sub> - V<sub>SS</sub>.

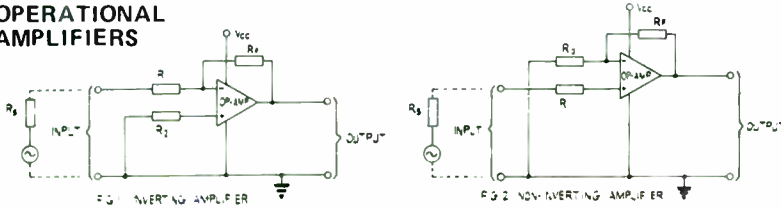
**Table 43 Encoder**

4532BE	8 bit priority encoder
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**Table 44 Phase Locked Loop**

4046BE	
--------	--

**OPERATIONAL AMPLIFIERS**



For Fig. 1:  $Gain = \frac{R_F}{R_S + R_1}$       $R_2 = R_F \frac{R_S + R_1}{R_F + R_S + R_1}$

For Fig. 2:  $Gain = \frac{R_F + R_2}{R_2}$       $R_1 = \frac{R_F R_2}{R_F + R_2} - R_S$

**BIPOLAR TYPES**

Absolute max. ratings	LM301A	LM308	NE531	$\mu$ A709C	$\mu$ A741C	$\mu$ A747C	$\mu$ A748C	1458C	3403	4136
Voltage supply range (V <sub>CC</sub> )	+5V to +18V	$\pm$ 5V to $\pm$ 18V	+5V to +22V	+9V to +18V	$\pm$ 3V to $\pm$ 18V	+5V to +18V	+5V to +22V	$\pm$ 3V to +18V	$\pm$ 1.25V to $\pm$ 18V or 2.5V to 36V	+2.5V to +18V
Power dissipation	500mW	500mW	500mW	250mW	500mW	800mW	500mW	500mW	500mW	800mW
Differential input voltage (max)	30V	30V	15V	5V	30V	30V	30V	30V	36V	30V
Max input voltage, one input earthed	15V	15V	15V	10V	15V	15V	15V	15V	36V	15V
<b>Typical ratings at 25°C with 2k<math>\Omega</math> load</b>										
Input offset voltage	2mV	2mV	2mV	2mV	1mV	1mV	1mV	1mV	2mV	0.5mV
Input offset current	3nA	0.2nA	50nA	100nA	30nA	80nA	40nA	80nA	30nA	5nA
Input bias current	70nA	1.5nA	400nA	300nA	200nA	200nA	120nA	200nA	150nA	40nA
Input resistance	2M $\Omega$	40M $\Omega$	20M $\Omega$	250k $\Omega$	1M $\Omega$	1M $\Omega$	800k $\Omega$	1M $\Omega$	1M $\Omega$	5M $\Omega$
Common mode rejection ratio	90dB	100dB	100dB	90dB	90dB	90dB	90dB	90dB	90dB	100dB
Supply voltage rejection ratio	96dB	96dB	100dB	92dB	96dB	96dB	96dB	96dB	96dB	100dB
Large signal voltage gain	104dB	110dB	96dB	93dB	104dB	104dB	104dB	104dB	100dB	110dB
Output voltage swing	+13V	+14V	+13V	+13V	+13V	+13V	+13V	+13V	+14V	+13V
Slew rate	0.4V/ $\mu$ s	0.2V/ $\mu$ s	35V/ $\mu$ s	0.25V/ $\mu$ s	0.5V/ $\mu$ s	0.5V/ $\mu$ s	0.5V/ $\mu$ s	0.5V/ $\mu$ s	1.2V/ $\mu$ s	1V/ $\mu$ s
Unity gain bandwidth	1MHz	1MHz	1MHz	5MHz	1MHz	1MHz	1MHz	1MHz	1MHz	3MHz
Full power bandwidth	10kHz	10kHz	500kHz	up to 200kHz	10kHz	10kHz	10kHz	10kHz	40kHz	25kHz
Supply current	1.8mA	0.3mA	5.5mA	2.5mA	1.7mA	3mA	1.75mA	3mA	3mA	7mA

**LM301A**

A general purpose op-amp featuring low input currents and low temperature drift on input currents. The amp is overload protected on input and output with no latch-up when the common mode range is exceeded. External compensation capacitor (33pF approx) is required for stability, but this value can be varied depending on application such that slew rates of 10V/ $\mu$ s and bandwidths of 10MHz can be achieved. (Table gives spec with 30pF cap).  
Order As QH36P (LM301A)

**LM308**

A precision op-amp featuring extremely low input currents. The circuit is directly interchangeable with the LM301A in low frequency circuits and incorporates the same protective features. In addition it has very low power consumption making it suitable for battery operation and owing to its very high input resistance operates with less error on 10M $\Omega$  sources than a 709C with 10K $\Omega$  source.  
Order As QH37S (LM308)

**NE531**

A high performance op-amp with a very high slew rate capability yet keeping the OC performance of the  $\mu$ A741. External compensation capacitor (100pF) is required for stability, but this can be reduced to very low values (1.8pF) to give wide flat frequency responses at very high gains.  
Order As WQ54J (NE531)

**$\mu$ A709C**

A general purpose op-amp featuring wide flat frequency response capabilities at reasonably high gains owing to the input and output compensation capacitors being able to be varied.  
Order As QL20W ( $\mu$ A709C)

**$\mu$ A741C**

The industry standard general purpose op-amp featuring internal frequency compensation. The amp is overload protected on input and output with no latch-up if common mode range is exceeded.  
Order As QL22Y ( $\mu$ A741C 8-pin OIL) QL23A ( $\mu$ A741C 14-pin OIL)

**$\mu$ A747C**

Two  $\mu$ A741C op-amps in one 14-pin OIL package. The two amps share a common bias network and power supply leads, but otherwise are completely separate. Channel separation: 98dB at 1kHz.  
Order As QL24B ( $\mu$ A747C)

**$\mu$ A748C**

A general purpose op-amp very similar to the  $\mu$ A741C, but with external frequency compensation required allowing best high frequency performance to be achieved for any gain.  
Order As QL25C ( $\mu$ A748C)

**1458C**

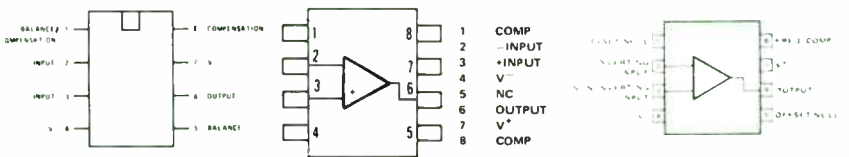
Two  $\mu$ A741C op-amps in one 8-pin OIL package. The two amps share a common bias network and power supply leads, but otherwise are completely separate. Channel separation: 98dB at 1kHz.  
Order As QH46A (1458C)

**3403**

A high performance circuit containing four op-amps in one 14-pin OIL package. The amp features a wide full power bandwidth and slew rate better than  $\mu$ A741C. The outputs are class AB with no crossover distortion. Channel separation: 120dB at 1kHz to 20kHz.  
Order As QH51F (3403)

**4136**

A high performance circuit containing four op-amps in one 14-pin OIL package. The amp features low noise input transistors making it specially suitable for use in audio preamplifiers and signal processing applications. The outputs are class AB with very low crossover distortion. Channel separation: 123dB at 1kHz, >100dB at 20Hz to 25kHz. Total harmonic distortion typically <0.5%.  
Order As XX01B (4136)

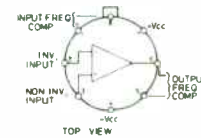


LM301A

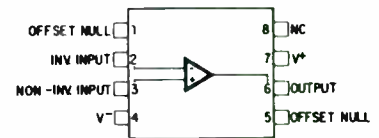
LM308

NE531

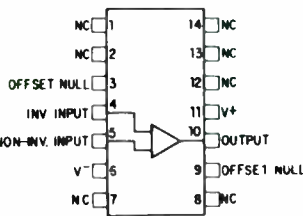
**PIN CONFIGURATIONS (TOP VIEW)**



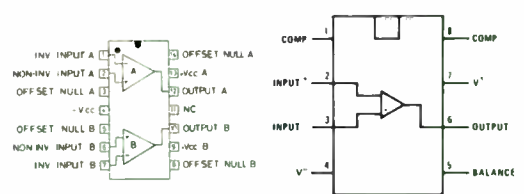
$\mu$ A709C



$\mu$ A741C 8-pin DIL

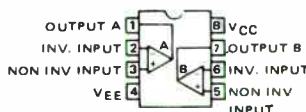


$\mu$ A741C 14-pin DIL

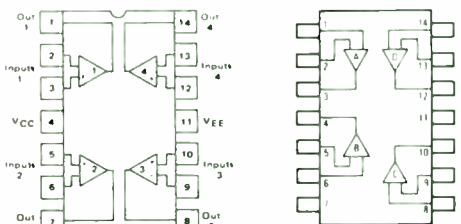


$\mu$ A747C

$\mu$ A748C



1458C



3403

4136



## FET INPUT TYPES

	CA3130T	CA3140T	CA3240E	LF347	LF351	LF353	LH0042C
<b>Absolute max ratings</b>							
Voltage supply range $V_{CC}$	+2.5V to +8V or 5V to 16V	+2V to +18V or 4V to 36V	+2V to +18V or 4V to 36V	+5V to +18V	+5V to +18V	+5V to +18V	+5V to +22V
Power dissipation	630mW	630mW	630mW	500mW	500mW	500mW	500mW
Differential input voltage (max)	+8V	+8V	+8V	+30V	+30V	+30V	+30V
Max input voltage, one input earthed	+ $V_{CC}$	+ $V_{CC}$	+ $V_{CC}$	+15V	+15V	+15V	+15V

## Typical ratings at 25°C

	CA3130T	CA3140T	CA3240E	LF347	LF351	LF353	LH0042C
Input offset voltage	8mV	5mV	5mV	5mV	5mV	5mV	6mV
Input offset current	0.5pA	0.5pA	0.5pA	25pA	25pA	25pA	2pA
Input bias current	5pA	10pA	10pA	50pA	50pA	50pA	15pA
Input resistance	1.5T $\Omega$	1.5T $\Omega$	1.5T $\Omega$	1T $\Omega$	1T $\Omega$	1T $\Omega$	1T $\Omega$
Common mode rejection ratio	90dB	90dB	90dB	100dB	100dB	100dB	80dB
Supply voltage rejection ratio	90dB	80dB	80dB	100dB	100dB	100dB	80dB
Large signal voltage gain	110dB	100dB	100dB	88dB	88dB	88dB	100dB
Output voltage swing	13.3V ( $V_{CC} = 15V$ )	13V ( $V_{CC} = 15V$ )	13V ( $V_{CC} = 15V$ )	+13.5V	+13.5V	+13.5V	+12V
Steady state slew rate	10V/ $\mu$ s	9V/ $\mu$ s	9V/ $\mu$ s	13V/ $\mu$ s	13V/ $\mu$ s	13V/ $\mu$ s	3V/ $\mu$ s
Unity gain bandwidth	15MHz	4.5MHz	4.5MHz	4MHz	4MHz	4MHz	1MHz
Full power bandwidth	100kHz	100kHz	100kHz	100kHz	100kHz	100kHz	40kHz
Supply current	2mA	4mA	8.4mA	7.2mA	1.8mA	3.6mA	2.8mA

### CA3130T

A MOS-FET input, C-MOS output op-amp that will operate from a single or dual power supply, and input terminals can be swung up to 0.5V below negative rail. An external compensation capacitor between pins 1 and 8 permits adjustment of frequency/gain characteristic (typically 47pF). Offset null is achieved with 100k $\Omega$  pot between pins 1 and 5 with slider to pin 4. Max input-terminal current is 1mA. The output can be strobed.

Order As OH28F (CA3130T)

### CA3140T & CA3240E

A MOS-FET input, bipolar output op-amp that will directly replace the  $\mu$ A741 in most applications. It will operate from single or dual supply rails and input terminals can be swung up to 0.5V below negative rail. Internally compensated. Max input terminal current is 1mA. The output can be strobed. CA3140T is supplied in an 8-pin TO5 metal can and CA3240E which is a dual version of CA3140T is in an 8-pin DIL package.

Order As OH29G (CA3140T)  
WO21X (CA3240E)

### LF351, LF353 & LF347.

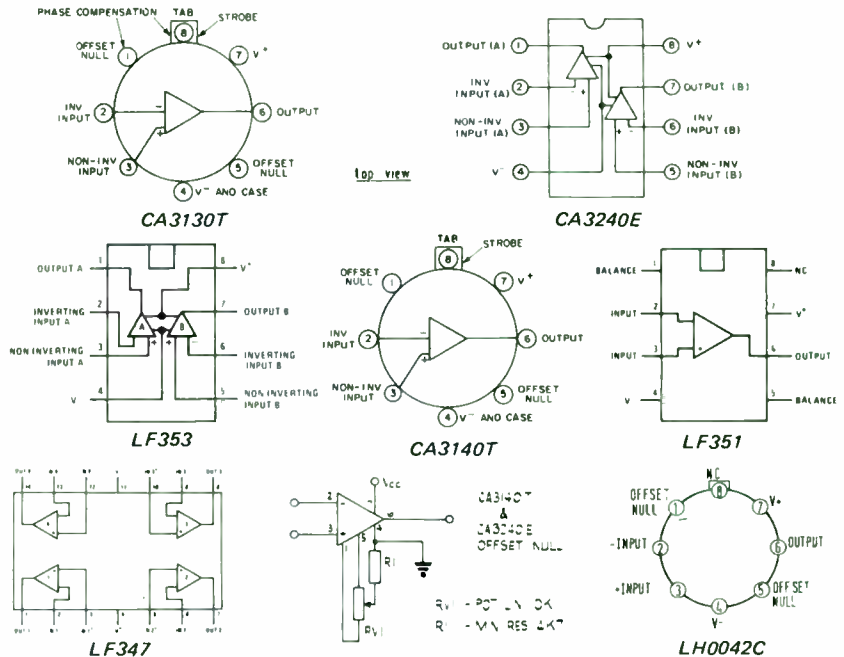
Low-cost high performance J-FET input op-amps that will directly replace the  $\mu$ A741 in most applications. The devices are low noise and have distortion figures of less than 0.02% over the audio band. It is most important that input voltages never go more negative than the negative supply voltage or the device will be destroyed. The LF351 is supplied in an 8-pin DIL package as is the LF353 which is a dual version and the LF347 is supplied in a 14-pin DIL package and is a quad version. Note that since the inputs are J-FET's not MOS-FET's no special handling is required.

Order As WO30H (LF351)  
WO31J (LF353)  
WO29G (LF347)

### LH0042C

A very high performance FET input op-amp featuring ultra low input currents, low noise and high gain. The device has internal 6dB per octave frequency compensation and is supplied in an 8-pin TO5 metal can.

Order As OH35O (LH0042C)



## POWER AMP IC's

	MC3360P	LM389	TBA820M	LM377	LM380	LM384	TBA810P	LM379	LM383	TDA2006	TDA2030
Gain (closed loop) typical	18dB	26dB	34dB	34dB	34dB	34dB	37dB	34dB	40dB	30dB	30dB
Input impedance		50k $\Omega$	5M $\Omega$	3M $\Omega$	150k $\Omega$	150k $\Omega$	5M $\Omega$	3M $\Omega$	5M $\Omega$	5M $\Omega$	5M $\Omega$
Output power into 8 $\Omega$	(350mW @ 9V <sup>+</sup> )	1325mW	1.6W	2.5W channel	3W	5.5W	6W	7W/channel	7W	12W	18W
Quiescent supply current	3mA	6mA	4mA	15mA	7mA	8.5mA	12mA	15mA	45mA	40mA	40mA
Supply voltage min to max	5V to 12V	4V to 15V	3V to 16V	10V to 26V	8V to 22V	12V to 28V	4V to 20V	10V to 35V	5V to 25V	+6V to +15V	+6V to +18V
Recommended supply voltage	6V to 9V	6V to 12V	3V to 16V	10V to 26V	8V to 22V	12V to 26V	4V to 18V	10V to 28V	5V to 20V	+12V	+14V
Short circuit current	No	No	No	1.5A	1.3A	1.3A	3A	1.5A	3.5A	3A	3.5A
Short circuit protection**	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Thermal protection	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Power supply rejection ratio	50dB	42dB	70dB	38dB	31dB	48dB	70dB	40dB	40dB	50dB	50dB
Bandwidth	25Hz to 20kHz	50kHz	100kHz	450kHz	40kHz to 20kHz	50kHz	30kHz	10Hz to 150kHz	10Hz to 140kHz	10Hz to 150kHz	10Hz to 140kHz
Distortion into 8 $\Omega$	0.7% $V_{GS} = 9V$	0.2% $V_{GS} = 6V$	0.4% $V_{GS} = 9V$	0.1% $V_{GS} = 20V$	0.2% $V_{GS} = 18V$	0.25% $V_{GS} = 22V$	0.3% $V_{GS} = 14.4V$	0.2% $V_{GS} = 28V$	0.2% $V_{GS} = 14.4V$	0.1% $V_{GS} = 12V$	0.1% $V_{GS} = 14V$
Sensitivity	$P_o = 50mW$ 240mV	$P_o = 125mW$ 60mV	90W with 100mV	10W with 100mV	10W with 100mV	10W with 100mV	5W with 75mV	20W with 120mV	15W with 55mV	200mV	215mV
Power dissipation	1.2W	825mW	1W	14 C/W heatsink	12 C/W heatsink	12 C/W heatsink	12 C/W heatsink	12 C/W heatsink	12 C/W heatsink	4 C/W heatsink	4 C/W heatsink

\*Distortion 10% \*\*Into 16 $\Omega$  or greater e.g. 64 $\Omega$   $V_{GS}$  Supply voltage  $P_o$  Power output

\*\*Short circuit protection where provided operates up to supply voltages of approx. 75% of the max voltage shown

### MC3360P

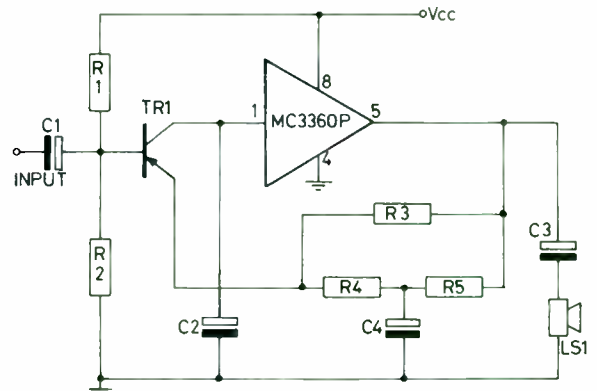
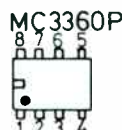
A 1/4W audio amplifier in an 8-pin DIL package designed primarily for battery operation as the quiescent current drain is very low. The IC should not be used with loads having a resistance or impedance of less than 16 $\Omega$ .

Order As QH50E (MC3360P)

The circuit shown below may be used in the Domestic Portable Receiver shown on page 240. Simply connect the negative of C1 to the wiper of VR1 and connect  $V_{CC}$  to +9V. C6 and C9 in ZN414 circuit are still necessary.

### Component List

- R1 Min Res 56k
- R2 Min Res 33k
- R3 Min Res 10k
- R4 Min Res 15 $\Omega$
- R5 Min Res 1k
- C1 Axial 4.7 $\mu$ F 63V
- C2 Mylar 0.0047 $\mu$ F
- C3 Axial 22 $\mu$ F 16V
- C4 Axial 100 $\mu$ F 25V
- TR1 2N3905



### LM389

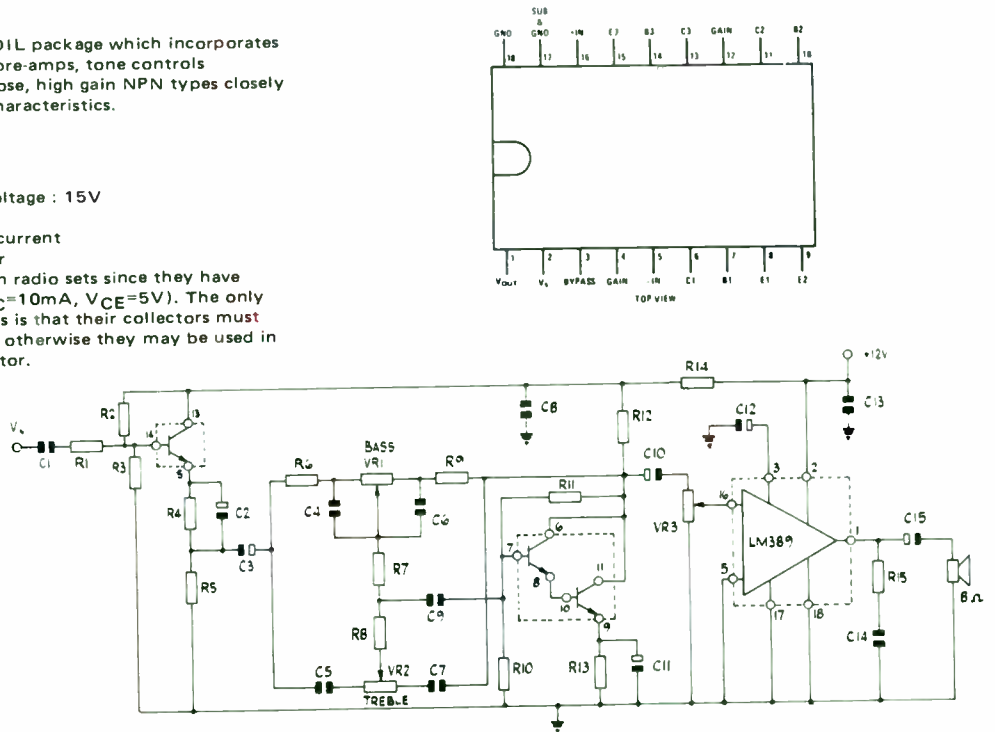
A ¼W audio amplifier in an 18-pin DIL package which incorporates three separate transistors for use in pre-amps, tone controls etc. The transistors are general purpose, high gain NPN types closely matched and having the following characteristics.

- V<sub>CEO</sub> 12V
- V<sub>CBO</sub> 15V
- V<sub>EB0</sub> 7.1V
- Collector to substrate breakdown voltage : 15V
- I<sub>C</sub> (max) 25mA
- Typical h<sub>FE</sub> 275 @ 1mA collector current
- P<sub>TOT</sub> (max) 150mW each transistor

The transistors are suitable for use in radio sets since they have typically gains of 5.5 at 100MHz (I<sub>C</sub>=10mA, V<sub>CE</sub>=5V). The only unusual point about these transistors is that their collectors must never be more negative than pin 17, otherwise they may be used in the same way as any discrete transistor.

#### Parts List

- R1: Min Res 820k
- R2: Min Res 82k
- R3: Min Res 120k
- R4,6,7,8,9 Min Res 10k
- R5 Min Res 2k2
- R10 Min Res 180k
- R11 Min Res 470k
- R12 Min Res 5k6
- R13 Min Res 470Ω
- R14 Min Res 1k2
- R15 Min Res 2.7Ω
- VR1 Pot Lin 100k
- VR2 Pot Lin 100k
- VR3 Pot Log 10k
- C1 Polyester 0.01µF
- C2,3,10 Axial 1µF 63V
- C4, 5, 6, 7 Polyester 0.033µF
- C8, 9, 13, Polyester 0.1µF
- C11 Axial 47µF 10V
- C12 Axial 10µF 25V
- C14 Polyester 0.047µF
- C15 Axial 470µF 16V



AMPLIFIER FOR CERAMIC PICK-UP CARTRIDGE

For stereo, double above except VR1 and 2 which should be Dual Lin Pots and VR3 should be changed to Pot Log 22k, if a balance control is added. Use a Pot Lin 22k for the balance with the wiper connected to earth and the ends of the track connected to the negative of C10 on each channel.

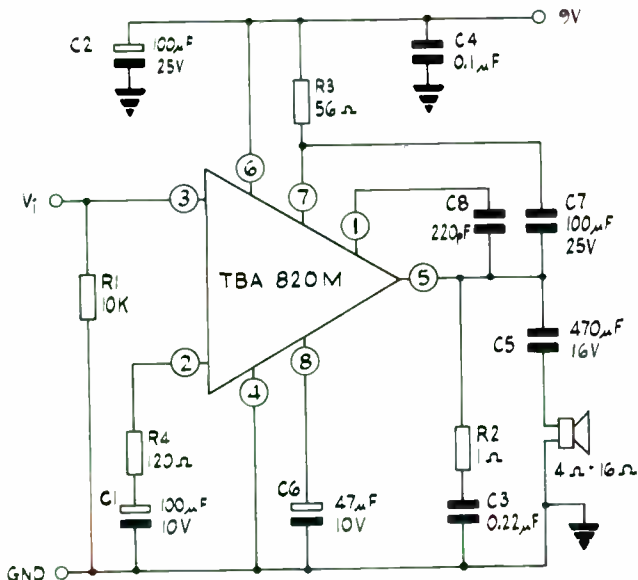
Order As WQ36P (LM389)

### TBA820M

A very useful audio amp in an 8-pin DIL package. The IC features a very low minimum working supply voltage of 3V, low quiescent current, good ripple rejection, no crossover distortion and low power dissipation. Max supply voltage is 16V into 16Ω speaker, 12V into 8Ω and 9V into 4Ω.

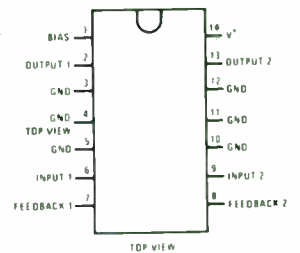
- R1 to R4: Min Res
- C1, 2, 5, 6, 7: Axial or PC Elect
- C3, 4: Polyester
- C8: Polystyrene

- |                    |   |   |                |
|--------------------|---|---|----------------|
| FREQ. COMPENSATION | 1 | 8 | REJECTION      |
| GAIN SETTING       | 2 | 7 | BOOTSTRAP      |
| INPUT              | 3 | 6 | SUPPLY VOLTAGE |
| GROUND             | 4 | 5 | OUTPUT         |
- Order As WQ63T (TBA820M)



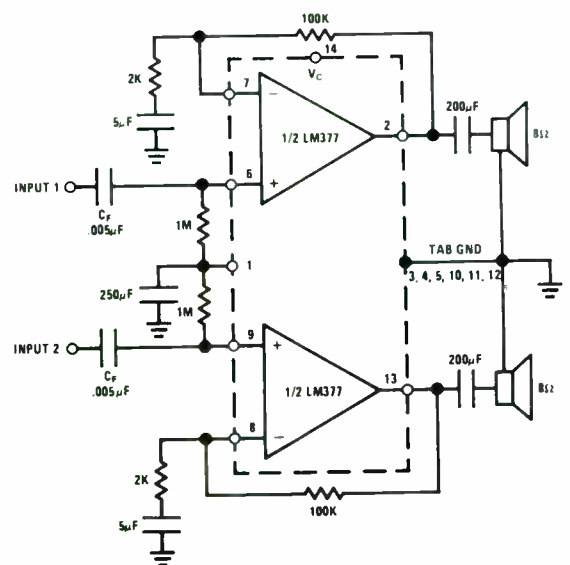
### LM377

A stereo amplifier in a 14-pin DIL package that requires very few external components to make a complete 2W per channel power amplifier. The IC is suitable for use with 8Ω or 16Ω speakers.



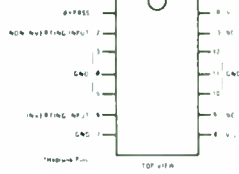
Order As QH38R (LM377)

Simple Stereo Amplifier



## LM380

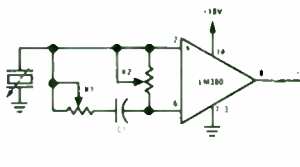
An audio amp in a 14-pin DIL package that requires very few external components to make a complete 2.5W power amplifier. In most cases, however, it is advisable to add a Min Res 2.7Ω and Polyester 0.1μF in series from pin 8 to ground and an Axial 4.7μF from pin 1 to ground.



Order As QH40T (LM380)

## High-Output-Crystal-Cartridge Power Amp

A 2.5W rms power amp the LM380 is shown in the circuit below driven by a high output crystal pickup. The IC requires only 4 other components (without tone control only two other components! – simply omit C1 and K1).



### Component List

- K1: Pot Lin 2M
- K2: Pot Log 2M
- C1: Polystyrene 3300pF
- C0: Axial 470μF 25V
- IC: LM380

## LM384

An audio amp in a 14-pin DIL package and is a high voltage version of the LM380. To make a simple 5W amplifier use the circuit shown for the LM380, but with a supply voltage of 22V, and a Polyester 0.1μF between pin 14 and ground.

Order As WQ34M (LM384)

## TBA810P

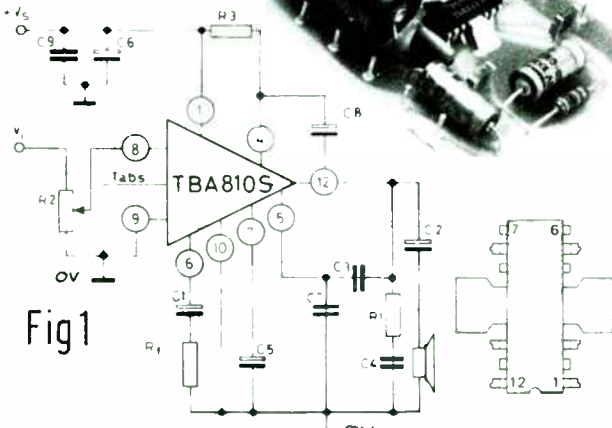
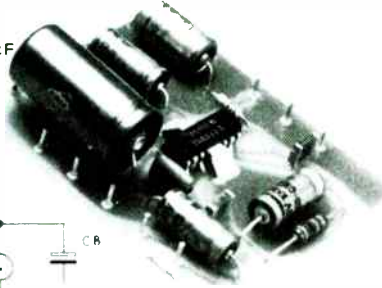
An audio amp IC which is an updated version of the TBA810S having a higher power output, lower noise, protection against polarity inversion, higher supply voltage rejection. It can provide 7W into a 2Ω load at 14.4V supply voltage with very low harmonic and crossover distortion.

### Parts List

- R1 Std Res 1Ω
- R2 Pot Log 470k
- R3 Std Res 100Ω
- Rf Min Res 68Ω
- C1 Axial 100μF 10V
- C2 Axial 1000μF 16V
- C3 Polycarbonate 0.001μF
- C4 Polyester 0.1μF
- C5,6 Axial 100μF 25V

### Order As QL13P (TBA810P)

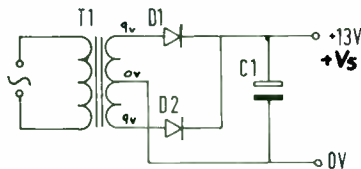
- C7 Polycarbonate 0.0047μF
- C8 Axial 100μF 25V
- C9 Polyester 0.1μF



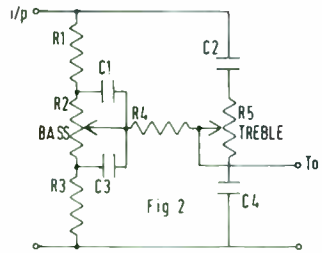
### POWER SUPPLY

#### Component List

- T1: Min TR 9V
- D1,2: IN4001
- C1: Axial 4700μF 25V



## COMPONENT LIST FOR PASSIVE TONE CONTROL CIRCUIT



- R1: Min Res 22k
- R2: Pot Log 100k
- R3: Min Res 1k
- R4: Min Res 5k6
- R5: Pot Log 100k
- C1: Polyester 0.015μF
- C2: Polystyrene 1000pF
- C3: Polyester 0.15μF
- C4: Polyester 0.01μF

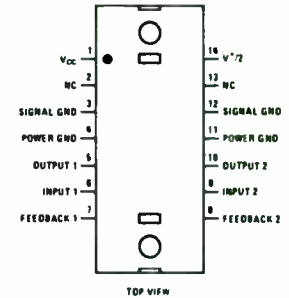
When using this tone control change R2 in Fig 1 to a Pot Log 100k

A printed circuit board is available with component designations marked on it.

Order As BR02C (5W Amp PCB)

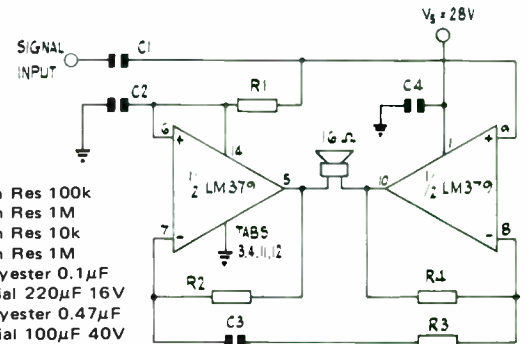
## LM379

A stereo amplifier in a 14-pin DIL package with heatsink attached. The device will deliver up to 6W per channel into an 8Ω load. The IC is suitable for 8Ω or 16Ω loads.



Order As QH39N (LM379)

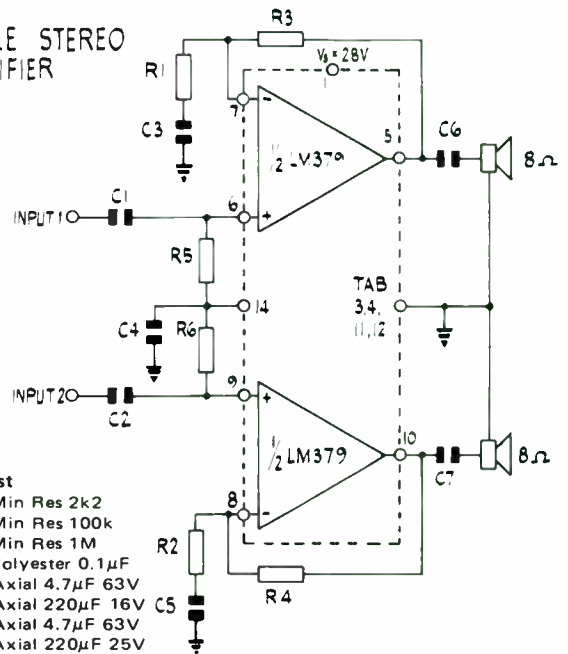
## 2W BRIDGE AMPLIFIER



### Parts List

- R1 Min Res 100k
- R2 Min Res 1M
- R3 Min Res 10k
- R4 Min Res 1M
- C1 Polyester 0.1μF
- C2 Axial 220μF 16V
- C3 Polyester 0.47μF
- C4 Axial 100μF 40V

## SIMPLE STEREO AMPLIFIER



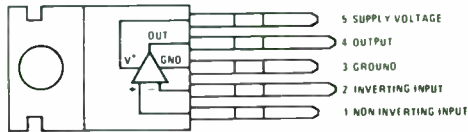
### Parts List

- R1,2 Min Res 2k2
- R3,4 Min Res 100k
- R5,6 Min Res 1M
- C1,2 Polyester 0.1μF
- C3 Axial 4.7μF 63V
- C4 Axial 220μF 16V
- C5 Axial 4.7μF 63V
- C6,7 Axial 220μF 25V



**LM383 (TDA2002A)**

A high quality audio op amp that is pin for pin compatible with the TDA2002A, but offering lower noise and improved frequency response. The amp is supplied in a 5-pin T0220 package that does not require insulating washers between the metal tab and the heatsink. To mount correctly simply smear with silicone grease and bolt directly to the heatsink. The IC will supply up to 11W into 1.6Ω loads with  $V_S = 14.4V$  and nearly 17W into 2Ω loads at  $V_S = 20V$ , but take care that power dissipation limits are not exceeded and that transients on the supply do not take  $V_S$  above 25V.



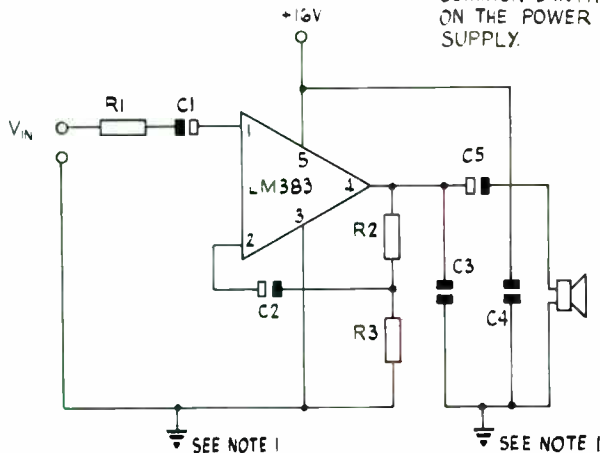
**Parts List**

- R1 Min Res 18k
- R2 Min Res 220Ω
- R3 Min Res 5.6Ω

- C1 PC Elect 10μF 40V
- C2 PC Elect 470μF 16V
- C3,4 Polyester 0.22μF
- C5 PC Elect 1000μF 16V

**Order As WQ33L (LM383)**

**NOTES -** 1. THESE EARTHS SHOULD BE CONNECTED BY TWO SEPARATE WIRES TO THE COMMON EARTH ON THE POWER SUPPLY.



SEE NOTE 1

**TDA 2030**

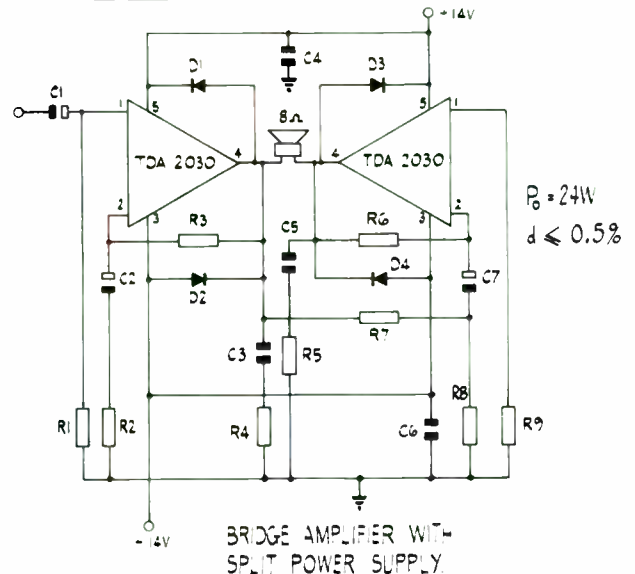
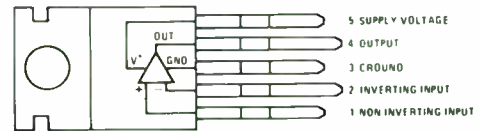
A high quality audio amp in a 5-pin T0220 package that does not require insulating washers between the metal tab and the heatsink. To mount correctly simply smear the metal tab with silicone grease and bolt directly to the heatsink. The amp will operate with single or split supplies. The distortion up to 12W into 4Ω is less than 0.2% typically (less than 0.5% up to 14W) and up to 8W into 8Ω is less than 0.1% (less than 0.5% up to 9W). The circuits shown for the TDA2006 are suitable for use with this IC, but the supply voltage should be increased to +14V and -14V (or 28V for the single supply circuit). In addition the bridge amplifier shown below will deliver 24W into 8Ω (or with TDA2006 and power supplies of +12V and -12V it will deliver 20W into 8Ω).

**Parts List**

- R1 Min Res 22k
- R2 Min Res 680Ω
- R3 Min Res 22k
- R4,5 Std Res 1Ω
- R6,7 Min Res 22k
- R8 Min Res 680Ω
- R9 Min Res 22k

- C1 Axial 1μF 63V
- C2 Axial 22μF 25V
- C3 Polyester 0.22μF
- C4 Polyester 0.1μF
- C5 Polyester 0.22μF
- C6 Polyester 0.1μF
- C7 Axial 22μF 25V
- D1,2,3,4 1N4001

**Order As WQ67X (TDA2030)**



BRIDGE AMPLIFIER WITH SPLIT POWER SUPPLY.

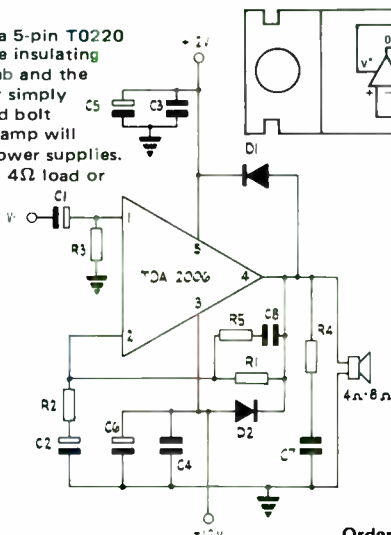
A printed circuit board is available – see page 262

**TDA2006**

A high quality audio amp in a 5-pin T0220 package that does not require insulating washers between the metal tab and the heatsink. To mount correctly simply smear with silicone grease and bolt directly to the heatsink. The amp will operate with single or split power supplies. The distortion up to 8W with 4Ω load or 4W with 2Ω load is less than 0.1% (typically).

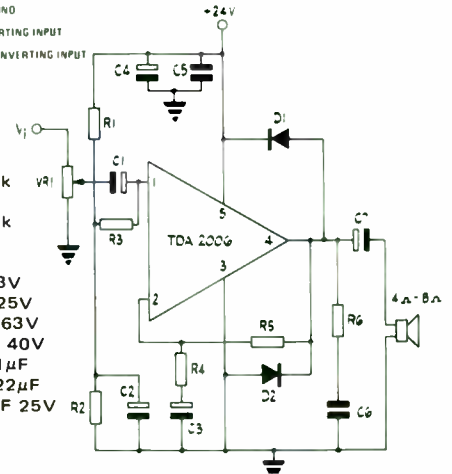
**Parts List**

- R1 Min Res 22k
- R2 Min Res 680Ω
- R3 Min Res 22k
- R4 Std Res 1Ω
- R5 Min Res 1k8
- C1 Axial 1μF 63V
- C2 Axial 22μF 25V
- C3,4 Polyester 0.1μF
- C5,6 Axial 100μF 25V
- C7 Polyester 0.22μF
- C8 Polystyrene 220pF
- D1,2 1N4001



**Parts List**

- R1,2,3 Min Res 100k
- R4 Min Res 4k7
- R5 Min Res 150k
- R6 Std Res 1Ω
- VR1 Pot Log 22k
- C1 Axial 1μF 63V
- C2 Axial 22μF 25V
- C3 Axial 2.2μF 63V
- C4 Axial 100μF 40V
- C5 Polyester 0.1μF
- C6 Polyester 0.22μF
- C7 Axial 2200μF 25V
- D1, 2 1N4001



**Order As WQ66W (TDA2006)**

## MC1303P LOW NOISE DUAL PREAMPLIFIER

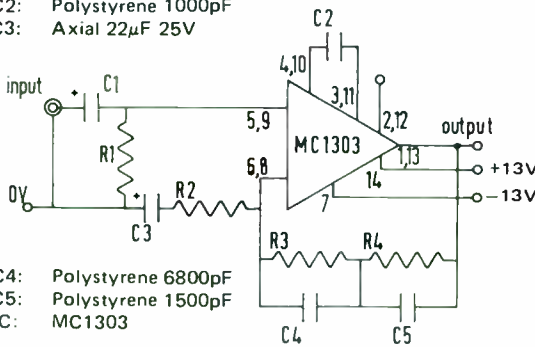
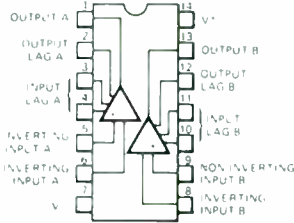
A stereo pre-amplifier for split rail power supplies up to  $\pm 15V$ . Features are large signal voltage gain of about 80dB, low noise input, short circuit protection, and channel separation of 70dB. Circuit shown has a 34dB gain and gives 250mV out with a 5mV input. At 100mV in and 5V out harmonic distortion is typically better than 0.1%.

Order As QH44X (MC1303)

Magnetic Pick-Up Stereo Pre-Amp

### Component List

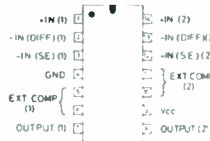
- R1: Min Res 820k
- R2: Min Res 1k
- R3: STD Res 750k
- R4: STD Res 51k
- C1: Axial  $1\mu F$  63V
- C2: Polystyrene 1000pF
- C3: Axial  $22\mu F$  25V



- C4: Polystyrene 6800pF
- C5: Polystyrene 1500pF
- IC: MC1303

## LM381 LOW NOISE DUAL PREAMPLIFIER

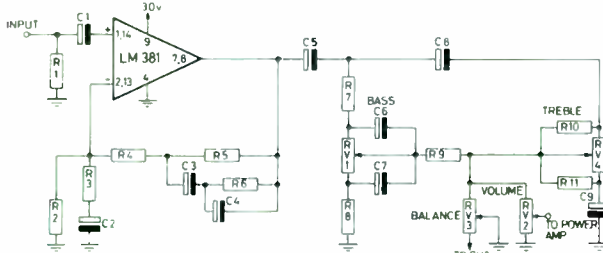
A stereo pre-amplifier for single rail power supplies from 9V to 40V. Features are large signal voltage gain of about 120dB, low noise input, wide power bandwidth 75kHz, and channel separation of 60dB. Circuit shows one channel of a stereo magnetic cartridge pre-amp with bass and treble controls giving 20dB boost and cut. Note that with the components shown a 30V power supply is required. The circuit is designed for magnetic input and has an RIAA response, for flat response remove R4 and R6 and replace both with links, change R5 to Min Res 100k, change C3 to polystyrene 330pF, and remove C4 and leave that position open circuit.



Order As QH41U (LM381)

### Component List

- R1: Min Res 47k
- R2: Min Res 100k
- R3: Min Res 220 $\Omega$
- R4: Min Res 2k2
- R5: Min Res 1M2
- R6: Min Res 100k
- R7: Min Res 5k6
- R8: Min Res 560 $\Omega$
- R9: Min Res 10k
- R10: Min Res 82k
- R11: Min Res 8k2
- C1: Polyester  $0.1\mu F$
- C2: Axial  $22\mu F$  25V
- C3: Polystyrene 3300pF
- C4: Polystyrene 1000pF
- C5: Axial  $1\mu F$  63V
- C6: Polyester  $0.068\mu F$
- C7: Polycarbonate  $0.56\mu F$
- C8: Mylar  $0.002\mu F$
- C9: Polyester  $0.022\mu F$
- RV1,4: Pot Lin 50k
- RV3: Pot Lin 100k
- RV2: Pot Log 50k
- IC: LM381

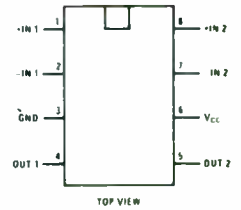


A printed circuit board is available.

Order As BR04E (LM381 PCB)

## LM387 LOW NOISE DUAL PREAMPLIFIER

A stereo pre-amplifier in an 8-pin DIL package similar to LM381, but it will only operate up to 30V and the input noise is slightly higher.



Order As WQ35Q (LM387)

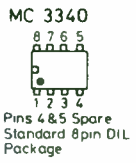
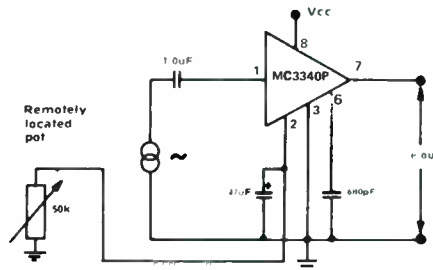
## MC3340P ELECTRONIC ATTENUATOR

The MC3340P is an electronic attenuator designed for use in DC operated volume controls, compression and expansion amplifiers. It may be used as a voice operated fader on discothèques. Control can be by external potentiometer or DC voltage.

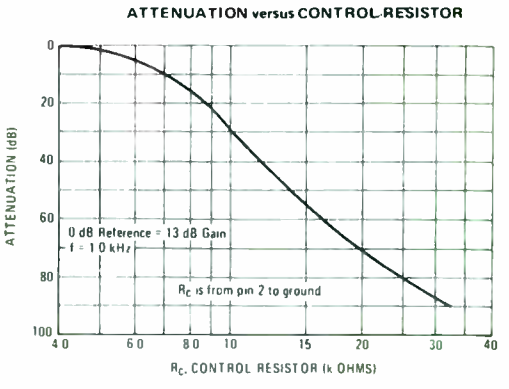
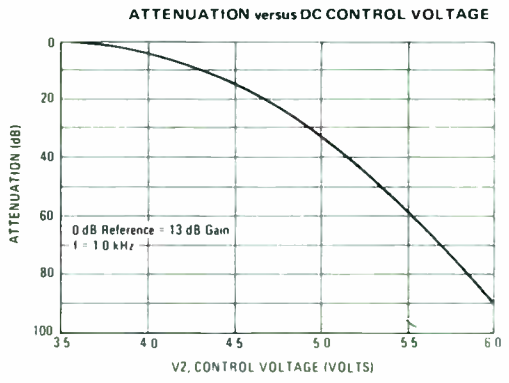
### Characteristics

Power supply voltage ( $V_{CC}$ )	+9V (min)	+18V (max)
Control pin sink current max	2mA	
Maximum input voltage	0.5V rms	
Voltage gain (typical)	13dB	
Attenuation range (typical)	90dB	
Total harmonic distortion (typical)	0.6%	

Order As QH49D (MC3340)



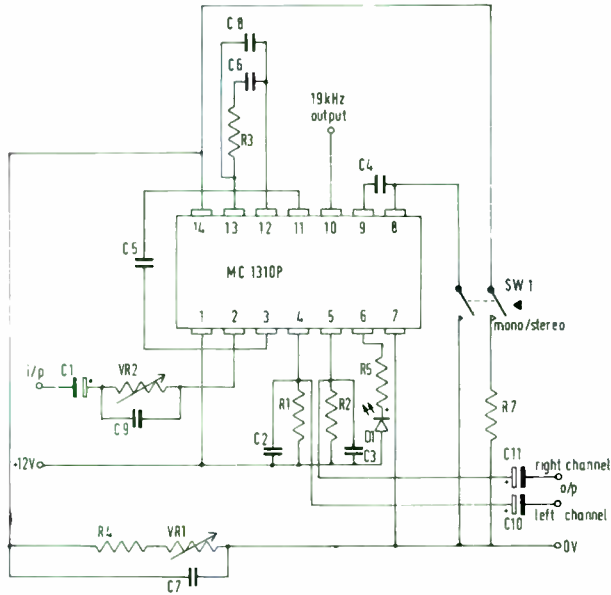
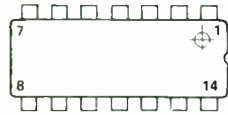
TYPICAL ELECTRICAL CHARACTERISTICS  
( $V_{CC} = 16V_{DC}$ ,  $T_A = +25^\circ C$  unless otherwise noted)



**MC1310P STEREO DECODER**

A stereo decoder for FM multiplex broadcasts. Stereo indicator output and distortion typically 0.3%. Circuit shows typical application and a printed circuit board is available. Max. supply voltage: 14V. Recommended supply voltage: 12V.

Order As QH45Y (MC1310P)

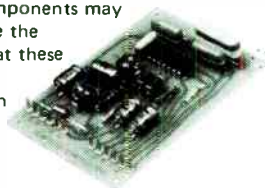


**Setting-up**

With no input signal applied adjust VR1 until the frequency on pin 10 is 19.00kHz. For those without access to a frequency counter adopt following procedure. Tune the receiver to a stereo broadcast and adjust VR1 until D1 lights. Now rotate VR1 back and forth until the centre of the lamp "on" range is found. Adjust VR2 for max. stereo separation.

Note: A significantly better aerial will be required for stereo reception than for mono. Even on stereo broadcasts the lamp will not light unless the aerial signal is strong enough to operate the switch in the MC1310P. In general an external roof-top aerial is to be preferred.

To connect the finished board to your existing mono tuner, it will be necessary to remove the de-emphasis components in your tuner. These will comprise a capacitor and resistor connected in parallel between the output and earth. If there is an output coupling capacitor the de-emphasis components may be either side of this component. Leave the coupling capacitor in position. Note that these de-emphasis components MUST be removed. The decoder will not function if they are still in circuit.



**Component list**

- |                               |                        |
|-------------------------------|------------------------|
| R1,2: Oxide 4k3               | C4: Polyester 0.22µF   |
| R3: Min Res 1k                | C5: Polyester 0.047µF  |
| R4: STD Res 16k               | C6: Polyester 0.47µF   |
| R5: Min Res 470Ω              | C7: Mica 470pF         |
| R7: Min Res 3k3               | C8: Polyester 0.22µF   |
| VR1: Sub-Min Horiz Preset 4k7 | C9: Polystyrene 4700pF |
| VR2: Sub-Min Horiz Preset 2k2 | C10,11: Axial 22µF 25V |
| C1: Axial 2-2µF 63V           | D1: Led Red            |
| C2,3: Polycarbonate 0.012µF   | SW1: STD Slide SW      |

On pcb leave position R6 open circuit.

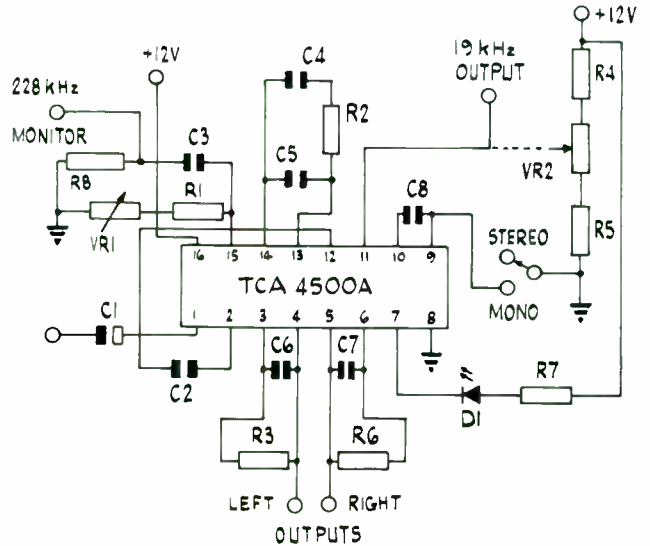
A printed circuit board is available for this project.

Order As BR03D (Decoder PCB).

**TCA4500A STEREO DECODER**

A stereo decoder for FM multiplex broadcasts. Excellent channel separation (better than 60dB at 1kHz possible) with a variable blend control for reduction of multiplex noise under poor signal conditions. Stereo indicator output and distortion typically better than 0.3%. See setting-up details for MC1310P for instructions on how to use circuit shown below.

Order As WQ64U (TCA 4500A)



**Parts List**

- |                          |                          |
|--------------------------|--------------------------|
| R1 Min Res 10k           | VR2 Pot Lin 1k           |
| R2 Min Res 1k            | C1 P.C. Elect. 2.2µF 63V |
| R3 Oxide 5k1             | C2 Carbonate 0.0068µF    |
| R4 Min Res 4k7           | C3 Ceramic 220pF         |
| R5 Min Res 270Ω          | C4 Carbonate 0.47µF      |
| R6 Oxide 5k1             | C5 Carbonate 0.22µF      |
| R7 Min Res 680Ω          | C6 Carbonate 0.01µF      |
| R8 Min Res 100Ω          | C7 Carbonate 0.01µF      |
| VR1 Hor S-Min Preset 4k7 | C8 Carbonate 0.22µF      |
|                          | D1 LED Red               |

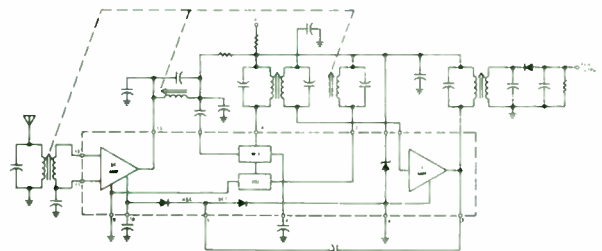
**LM1820 AM RADIO SUBSYSTEM**

An AM radio subsystem comprising RF amp, AGC, detector, mixer-oscillator, zener regulator and IF amp. Supply voltage 16V max. Zener voltage 7.1V.

Order As WQ37S (LM1820)

**Pin Functions**

- 1 Mixer input
- 2 Local oscillator frequency
- 3 Zener. Use resistor to supply voltage to set current at 18mA.
- 4 Decoupling
- 5 AGC
- 6 Output
- 7 IF amp input
- 8 Ground
- 9 Ground
- 10 Decoupling
- 11 RF input
- 12 RF input
- 13 RF amp output
- 14 Mixer output



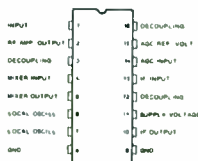


## TBA 651 AM RADIO SUBSYSTEM

An AM radio subsystem comprising RF amp, mixer, oscillator, IF amp and AGC control.

### Features

- \* Audio output voltage 0.6V
- \* Low noise and high gain
- \* Wide voltage supply range 4.5V to 18V
- \* High signal handling capability 1V.



### Characteristics

Max supply voltage ( $V_S$ ): 18V  
 Max power dissipation ( $P_{TOT}$ ): 250mW  
 The following are typical characteristics with  $V_S = 12V$   
 Quiescent drain current: 11.5mA

Order As BL35Q (TBA 651)

## ZN414 A.M. RADIO

### Summary of Parameters

- Supply voltage range: 1.2-1.6 volts (1.3 volts recommended)
- Supply current: 0.3mA typical (0.5mA under strong signal conditions)
- Frequency range: 150kHz-3MHz useful range
- Input resistance: 4M $\Omega$  typical
- Threshold sensitivity: 50 $\mu$ V with 1.3 volt supplies (dependence on 'Q' of coil)
- Audio distortion:  $\leq 2\%$  T.H.D. under correct operating conditions
- Selectivity: 4kHz bandwidth can be achieved
- Power gain: 72dB typical
- AGC range: 20dB typical (dependent on  $R_{AGC}$ )
- Output:  $\geq 30mV$  r.m.s. under correct operating conditions

Order As QL41U (ZN414)

### LAYOUT REQUIREMENTS

As with any high gain R.F. device, certain basic layout rules must be adhered to if stable and reliable operation is to be obtained. These are listed below —

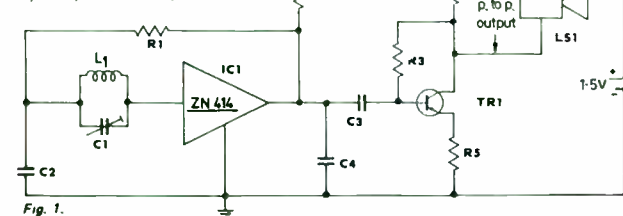
- 1 The output decoupling capacitor should be soldered as near as possible to the output and earth leads of the ZN414. Furthermore, its value together with the AGC resistor ( $R_{AGC}$ ) should be calculated to give a breakpoint at  $\sim 4kHz$ , i.e. —

$$C = \frac{1}{2 \cdot R_{AGC} \cdot 4 \cdot 10^3}$$

- 2 All leads should be kept as short as possible, especially those in close proximity to the ZN414.
- 3 The tuning assembly should be some distance from the battery, loudspeaker and their associated leads.
- 4 The 'earthy' side of the tuning capacitor should be connected to the junction of the 100k $\Omega$  resistor and the 0.01 $\mu$ F capacitor

## ZN414 APPLICATION CIRCUITS

If a volume control is required replace R4 with a Pot Log 10k (outer tags) and connect the crystal earpiece from +ve to wiper of potentiometer.



### Component list

- R1: Min Res 100k
- R2: Min Res 1k
- R3: Min Res 100k
- R4: Min Res 10k
- R5: Min Res 100 $\Omega$
- C1: Min Tuner
- C2: Polyester 0.01 $\mu$ F
- C3: Polyester 0.1 $\mu$ F
- C4: Polyester 0.1 $\mu$ F
- L1: 80 turns of EC Wire 30 s.w.g. wound side by side on a two to three inch length of RD Ferrite Rod or MW/LW Aerial.
- IC1: ZN414
- TR1: ZTX300
- LS1: Crystal Earpiece
- S1: Sub-Min Slide

### Component list

- R1: Min Res 10 $\Omega$
- R2: Std Res 1 $\Omega$
- R3: Std Res 1 $\Omega$
- R4: Min Res 1k
- R5: Min Res 10k
- R6: Min Res 27 $\Omega$
- R7: Min Res 100 $\Omega$
- R8: Min Res 4k7
- R9: Min Res 1k
- R10: Min Res 220k
- R11: Min Res 100k
- R12: Min Res 1k
- R13: Min Res 680 $\Omega$
- R14: Min Res 56k
- R15: Min Res 56k
- R16: Min Res 100k
- R17: Min Res 220k
- R18: Min Res 3k3
- VR1: Pot Log 10k
- C1: Polyester 0.01 $\mu$ F
- C2: Polyester 0.1 $\mu$ F
- C3: Axial 22 $\mu$ F 10V
- C4: Axial 4.7 $\mu$ F 63V
- C5: Ceramic 47pF
- C6: Axial 220 $\mu$ F 10V
- C7: Polyester 0.01 $\mu$ F
- C8: Axial 470 $\mu$ F 6.3V
- C9: Polyester 0.1 $\mu$ F
- VC1: Min Tuner
- D1: BZY88C4V7
- D2: ZS120
- IC1: ZN414
- TR1: ZTX300
- TR2: ZTX109
- TR3: ZTX500
- TR4: ZTX109
- TR5: 2N2219
- TR6: 2N2905
- LS1: 8 $\Omega$  Loudspeaker
- S1: Std Slide SW.

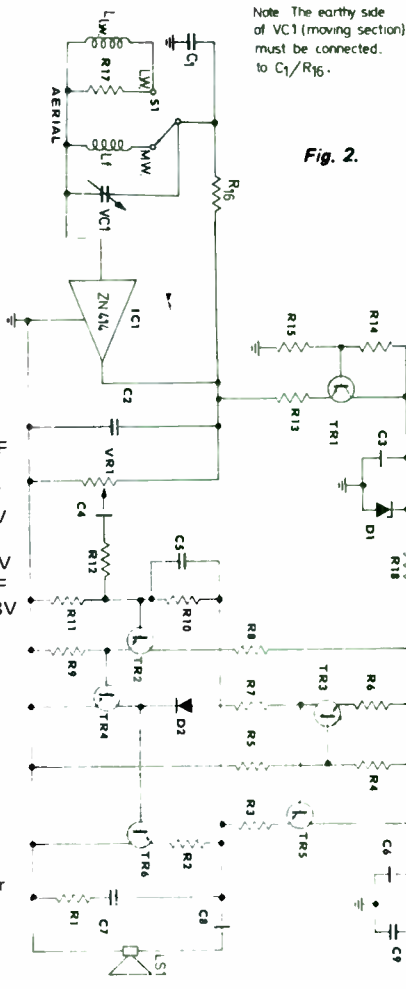


Fig. 2.

Aerial: 55 turns of EC Wire 30 s.w.g. wound side by side and 250 turns for long wave wound on a RD Ferrite Rod or MW/LW Aerial

Note: The long wave coil is wound bunched up on the Ferrite Rod.

Components shown in dotted line may be replaced by MC3360P.

See page 234 for details.

A simple power supply for mains operation of the MW/LW Radio is shown in Fig. 3.

### Component List

- T1: Sub-Min 6V TR
- D1-2: 1N4001
- C1: Axial 2200 $\mu$ F 10V
- S1: Toggle SW
- FS1: Fuseholder with Fuse 20 100mA

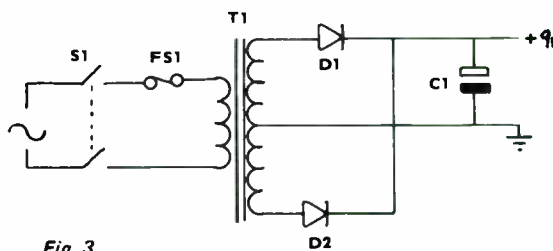
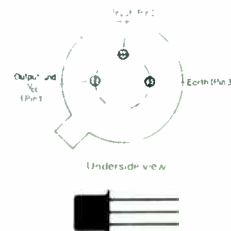


Fig. 3.

**CA3089E FM IF SUBSYSTEM**

**Features**

- Exceptional limiting sensitivity: 12µV (typical) at -3dB
- Low distortion: 0.1% (with double-tuned coil) typical
- Single-coil tuning capability
- High recovered audio: 400mV (typical)
- Provides specific signals for control of interchannel muting; direct drive of tuning meter
- Provides delayed AGC voltage for RF amp
- Provides a specific circuit for flexible AFC
- Internal supply-voltage regulators

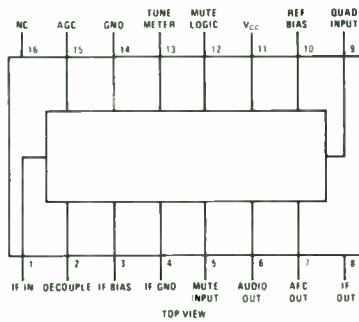
The CA3089E is a comprehensive FM-I.F. system designed for high fidelity FM tuners. It includes a three-stage FM-IF amplifier/limiter configuration with level detectors for each stage, a double-balanced quadrature FM detector and an audio amplifier that features the optional use of a muting circuit. The advanced circuit design includes desirable special features such as delayed AGC for the RF tuner, an AFC drive circuit, and an output signal to drive a tuning meter and/or provide stereo switching logic. In addition, internal power supply regulators maintain a nearly constant current drain over the voltage supply range of +8.5V to +16V. Distortion is primarily a function of the phase linearity characteristic of the external detector coil.

**Absolute maximum ratings**

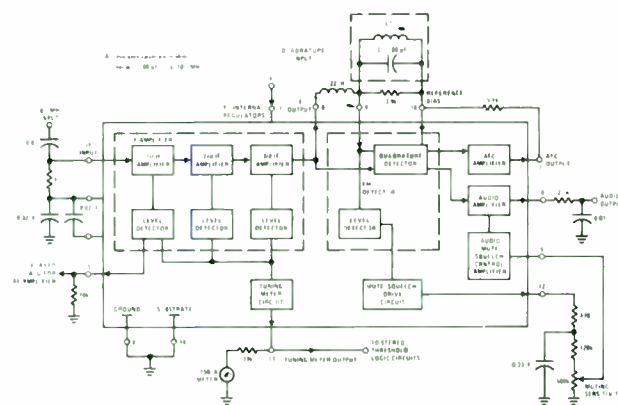
Supply voltage (Pin 11 to 4/14)	16V
DC current out of pin 15	2mA
Max dissipation	600mW

**Characteristics (typical at V<sup>+</sup> = 12V)**

Quiescent current drain:	23mA
DC voltage at pin 1 (IF input):	1.9V
at pin 2 (AC return to input):	1.9V
at pin 3 (DC bias to input):	1.9V
at pin 6 (Audio output):	5.6V
at pin 10 (DC reference):	5.6V



Order As QH27E (CA3089E)



**CA3189E FM IF SUBSYSTEM**

An improved version of the CA3089E with all the features of that chip and the following in addition: programmable audio level, deviation mute, programmable AGC threshold and voltage, typical signal plus noise/noise ratio: >70dB, meter drive voltage depressed at very low signal levels, on-channel step control voltage. Package pin functions are the same except that pin 16 is used to programme the AGC threshold.

Order As WQ20W (CA3189E)

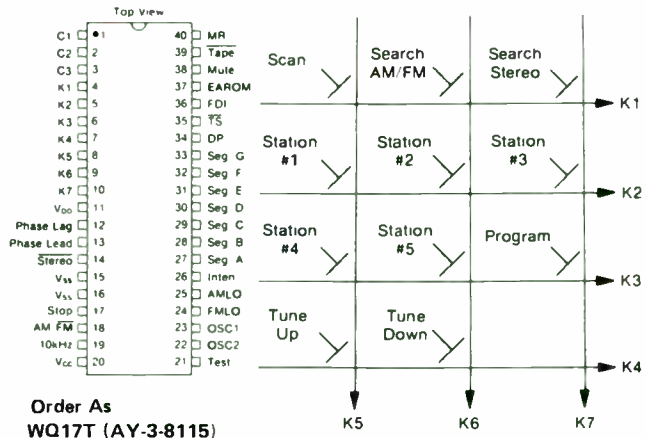
**AY-3-8115 DIGITAL TUNING SYSTEM**

A digital tuning system also requiring the ER1400 memory to function correctly. Together the chips provide full electronic control of a varicap tuned radio, covering the bands 88.1MHz to 107.9 MHz and 530kHz to 1610kHz (186 metres to 566 metres). Controlled by a keypad the chips can select a station held in the memory (memory is retained during power off), up to five can be pre-memorised for each band, they can sweep up or down the band (in approx. 30 seconds), they can search the band to find the first and successive stations and they can scan the band and will lock to each station present for about 8 seconds per station. In addition a display may be added which shows the centre frequency of the selected station, or the display may be switched to display time from a suitable clock IC, or in musicentric applications it may be switched to display tape track etc.

**Pin Functions**

- 1, 2, 3 For connection to pins 7, 8, 9 respectively on ER1400.
- 4, 5, 6, 7 Horizontal lines on keyboard matrix and digit select for multiplexed display.
- 8, 9, 10 Vertical lines on 3 x 4 keyboard matrix.
- 11 Supply voltage (+12V).
- 12, 13 Analogue voltage output to varicaps (3-state).
- 14 Connect to stereo beacon - in stereo search mode only stereo stations are selected.
- 15, 16 Ground
- 17 When taken high stops search operation.
- 18 Band select AM (high) or FM (low).
- 19 10kHz output to drive suitable clock IC.
- 20 Standby battery input +5V to +13V to keep time-keeping function operational when mains off.
- 21 For reset testing
- 22, 23 For connection to a 2.5MHz crystal
- 24 FM local oscillator ÷100 input.
- 25 AM local oscillator input.
- 26 Display brightness
- 27-34 Seven-segment outputs (3-state)
- 35 When low all 3-state outputs are high impedance
- 36 Frequency display inhibit
- 37 Connect to ER1400 pin 12
- 38 Output to mute radio during station changing
- 39 Tape channel display (requires additional logic)
- 40 Master reset

**KEYBOARD KEY ASSIGNMENT**

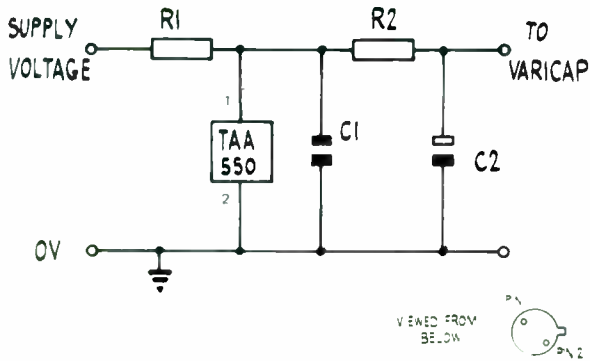


Order As WQ17T (AY-3-8115)

Push button or Switch Activated	Present Mode	
	Search	Scan
Tune up/down, Station, Program, Reset, AM/FM, TAPE (trailing edge)	Terminate	Terminate
Scan	Goes into Scan	Terminate as soon as a station is found
FDI	Stays in Search	1. Terminates as soon as a station is found. 2. Disables 8 second listening window
Search	Goes into appropriate Search Mode	Goes into appropriate Search Mode

## TAA550 VARICAP VOLTAGE STABILISER

A voltage stabiliser for varicap diodes. Stabilised voltage 33V ± 1V. Pin 1 is connected to case. Temperature coefficient: -0.13mV/°C. Supply current: 5mA. Differential internal resistance: 10Ω. Supply voltage must be greater than 34V. In circuit R1 is equal to the supply voltage minus 33V divided by 0.005, in ohms. E.g. for supply V = 40V, R1 = 1k5. R2 = 22Ω, C1 = Ceramic 1000pF, C2 = 4.7μF 63V.



Order As WQ62S (TAA 550)

## SH120A WIDEBAND RF AMP

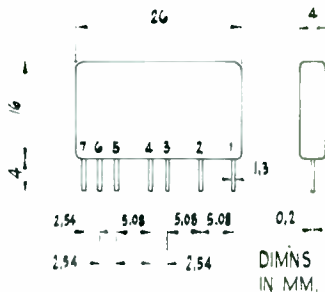
A two stage hybrid wide-band amplifier for aerial preamplifier applications in TV and general purpose in the band 30MHz to 900MHz.

### Ratings

Supply voltage:	12V (20V max.)
Supply current:	20mA
Gain:	17.5dB
Frequency response:	30MHz to 900 MHz ± 1.5dB
Impedance:	75Ω
VSWR:	1.5
Noise figure:	5dB

### Pin Functions

- 1 Input
- 2 Ground
- 3 Ground
- 4 Supply voltage
- 5 Ground
- 6 Ground
- 7 Output



Order As WQ61R (SH120A)

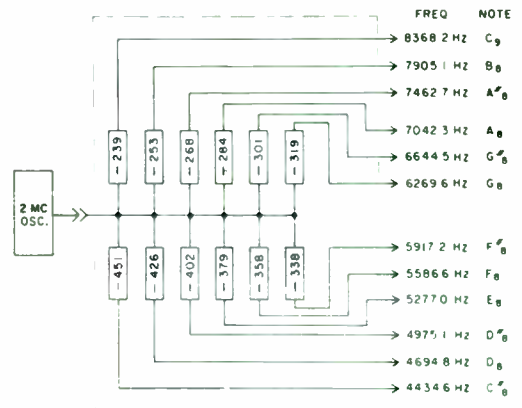
## AY-1-0212 FREQUENCY GENERATOR

This I.C. is a digital tone generator which produces from a single input frequency, a full octave of twelve frequencies on twelve separate output terminals. When used in conjunction with an oscillator and frequency dividers, a system may be configured which generates all the frequencies required by an electronic organ.

Characteristics (V<sub>DD</sub> = -14V, V<sub>GG</sub> = -28V, V<sub>SS</sub> = 0V).

- Input leakage: 10μA
- Input positive level: +0.3V to -2V
- Input negative level: -10V to V<sub>DD</sub>
- Supply current: I<sub>GG</sub> 16mA, I<sub>DD</sub> 20mA
- Input frequency: 250kHz to 2MHz
- Input pulse width +ve and -ve: >330ns
- Output rise/fall time: 1μs (typ)

The outputs are capable of sourcing or sinking up to 2.5mA



Top View



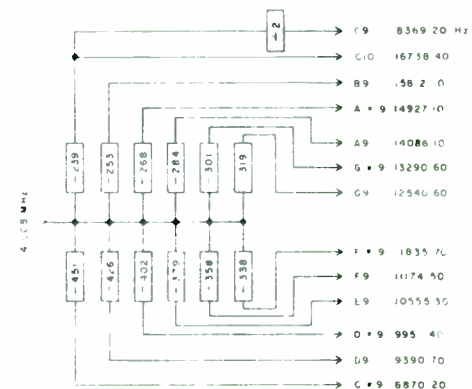
Order As QB21X (AY-1-0212)

## AY-3-0215 FREQUENCY GENERATOR

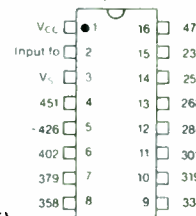
This IC produces from a single input frequency, 13 semitones on 13 different outputs which fully span the equal tempered scale. When used in conjunction with an oscillator and frequency dividers a system may be configured which generates all the frequencies required by an electronic organ.

Characteristics (V<sub>CC</sub> = +10V to +16V, V<sub>SS</sub> = 0V)

- Input negative level: 0V to 0.8V
- Input positive level: V<sub>CC</sub> - 3V to V<sub>CC</sub>
- Supply current: <120mA
- Input frequency: 100kHz to 4.5MHz
- Input rise/fall time: <30ns at 4.5MHz
- Input duty cycle: 40% to 60%
- Input capacitance: 10pF
- Output positive level: V<sub>CC</sub> - 1.5V to V<sub>CC</sub> at 0.25mA
- Output negative level: 0V to 0.5V at 0.7mA
- Rise/fall time at output: <2.5μs (20k and 500pF to 16V or 0V)
- Output duty cycle: 50%



Top View



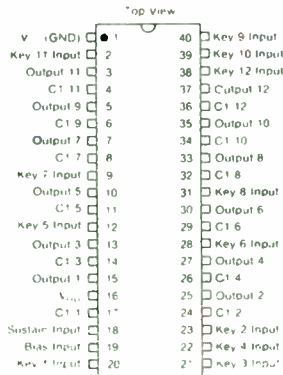
Order As QB22Y (AY-3-0215)



**AY-1-1320 ELECTRONIC PIANO**

An electronic piano IC having the circuitry for 12 notes on one IC. The chip is arranged so that the loudness of the notes is proportional to the velocity of the key as in an acoustical instrument. Additionally the notes are arranged to die away at a realistic rate. A sustain input is provided so that the operation of the loud pedal can be emulated. Five of these chips are required plus one AY-1-0212 and twelve AY-1-5050's to make up the total IC requirement of a 60-note electronic piano design (and our 61-note piano) and this set of 18 chips is available as a package at a special price.

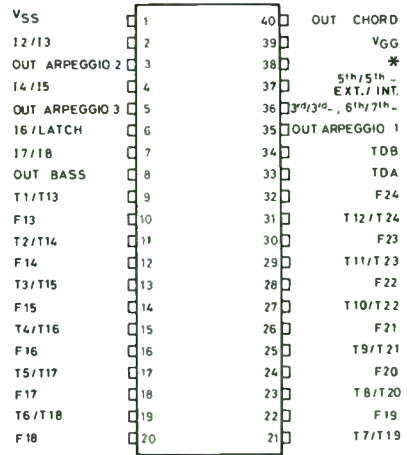
Order As HQ53H (Piano IC Kit)



Order As HQ52G (AY-1-1320)

**M251 AUTO CHORDING**

This IC is an arpeggio, chord and bass accompaniment generator. For full details see our Auto-Organ described on page 10. This IC is designed to be used with the M254 rhythm generator.

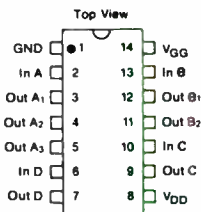


\* AUTOMATIC MODE/MANUAL, AUTOMATIC BASS/ALTERNATING, RESET

Order As HQ71N (M251)

**AY-1-5050 7-STAGE DIVIDER**

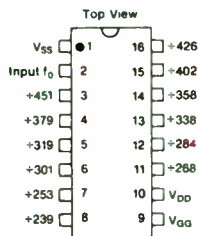
A 7-stage MOS divider. Frequency input range DC to 1MHz. Can be driven from sine or square waves.



Order As HQ51F (AY-1-5050)

**M087 TOP OCTAVE GENERATOR**

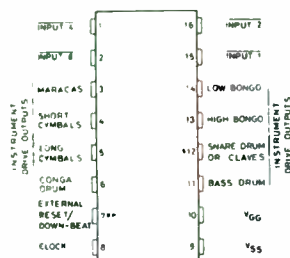
A digital tone generator that produces a full octave of 12 frequencies on 12 separate output terminals from a single high frequency input. The low impedance push-pull outputs are capable of sinking or sourcing up to 3mA.



Order As WH22Y (M087)

**M252 RHYTHM GENERATOR**

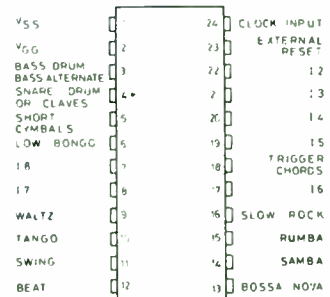
A rhythm generator IC. It forms the heart of our Drumsette kit. 15 rhythms are available which drive 8 instruments.



Order As QH64U (M252)

**M254 RHYTHM GENERATOR**

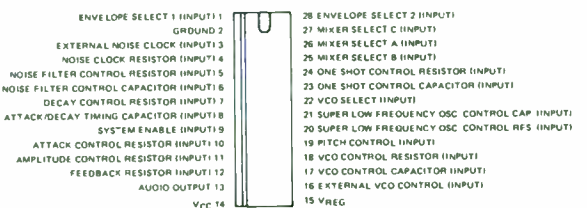
A rhythm generator IC designed primarily for use with the M251. It can generate 8 rhythms and drive up to 12 outputs which can be instruments or inputs of the M251.



Order As WH21X (M254)

**76477 SOUND GENERATOR**

A complex sound generator IC which can provide noise, tone and low-frequency based complex sounds. The sounds are programmed by adding external components and applications include video games, pinball games, toys, timers, alarms etc. The IC will operate on a supply voltage of 7.5V to 9V, and current drain is around 15mA. The IC comprises a super low frequency oscillator normally operated in the range 0.1Hz to 30Hz; a voltage controlled oscillator with a range of 10:1 that will operate anywhere in the audio band, a noise generator and filter, a mixer, system enable logic, monostable for gun-shots and explosive sounds, an envelope generator with variable attack and decay and an output amplifier with 100Ω output impedance.



Order As YH32K (76477)



Continued from page 244

**Component list**

- R1: Min Res 180k
- R2 to 5: Min Res 6k8
- R6 to 12: Min Res 680Ω
- C1: Mylar 0.01μF
- C2: Axial 2,200μF 25V
- C3: Polystyrene 470pF
- D1: 1N4001
- D2 to 4: 1N914
- TR1 to 4: 2N3904
- IC: AY-5-1224
- S1: Sub-Min Slide
- S2 to 4: Push SW
- T1: Min TR 12V

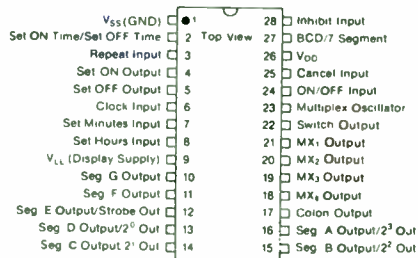


A printed circuit board is available for the IC and its components. Simply wire from the pcb to our 4-digit multiplex display.

Order As BB53H (4 Dig Clock PCB 'A')

**AY-5-1230 CLOCK TIMER**

This IC is a 4-digit clock which will drive 7-segment displays and has programmable switch-on and switch-off times for automatic on/off switching of tape recorders, TV's etc at any preset time up to 24 hours. Switching may be repeated every 24 hours or operate just once as selected. Display may be turned off (while count continues) and/or have automatic brightness control (LDR required). If switch-off time not set output remains on for only 10 minutes. Output-set states are indicated.



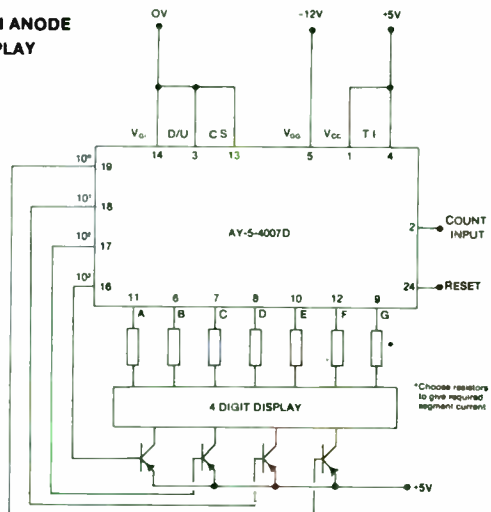
For application data see "Monitor Timer" construction details on page 265.

Order As QB25C (AY-5-1230)

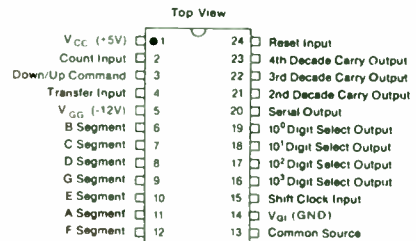
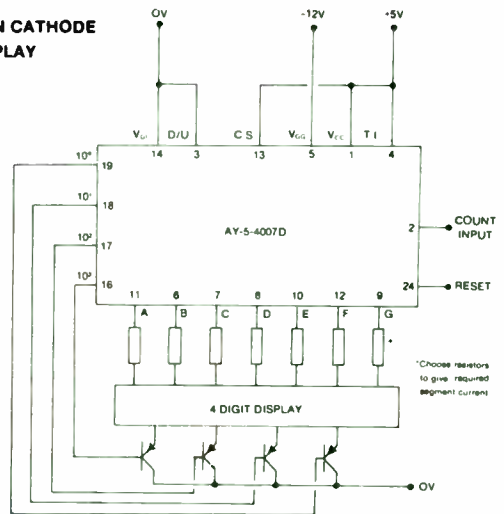
**AY-5-4007D FOUR DIGIT COUNTER/DISPLAY DRIVER**

With four transistors, seven resistors and four seven segment LED displays this I.C. will make a complete counter of any serial input (up to 600kHz), counting from 0 to 9999 or 9999 to 0. Outputs may be selected to drive either common anode or common cathode displays (pin 13). Inputs and outputs are compatible with TTL (or CMOS working at 5V).

**COMMON ANODE LED DISPLAY**



**COMMON CATHODE LED DISPLAY**

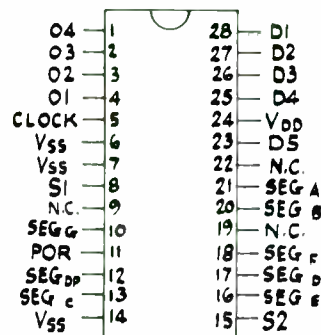


Order As QB26D (AY-5-4007D)

**MM57160 STANDARD TIMER AND CONTROLLER (STAC)**

An extremely versatile timer IC which can switch four separate outputs on and off at any set times. Timing is derived from 50Hz (or 60Hz) mains. Very few external components are needed: a 4-digit common cathode multiplex display which the IC will drive direct, 10 keys (push-to-make switches) to programme the set times, and one or two other resistors and capacitors. The chip operates from a single 9V supply, and the clock input requires an 8 to 9V 50Hz input, and this could be derived from our 3.2768MHz crystal, a 4060BE and a 4027BE CMOS chip.

The features of this IC are 24-hour clock with 4-digit display; may be programmed to skip days in a 7 or 8 day schedule; time of day reset to ease setting or, allow use as a sequence timer, high speed 'demonstration' mode for verification.



**TOP VIEW**

Continued on next page



## MM57160 (continued from page 245)

### Key Functions

Key No.	Key Name	Real-time Clock	Data Entry Mode	Day Mode	Function
1	Manual/Remote Transducer	Remote transducer input; forces output 1 on, outputs 2 to 4 off until next valid set point after switch is off.	Manual verification mode; allows data to be transferred to outputs 1 to 4	(None)	
2	Hold Status/Demo	Allows rapid demonstration of sequence by advancing clock by 1 hour/sec.	Holds output 'N' ON while programming advances to output N+1, N = 1-4	(None)	
3	8 Day	Specifies 8-day cycle in lieu of 7-day	Specifies 8-day cycle in lieu of 7-day	Specifies 8-day cycle in lieu of 7-day	
4	50Hz	Specifies 50Hz input	Specifies 50Hz input	Specifies 50Hz input	
5	Data Entry	Puts unit in data entry mode	Returns unit to real-time clock mode	(None)	
6	Advance Set-Point/Reset Time	Resets time of day to 00.00 without changing set points, but resets all days to valid	Advances display to the next set point for verification or alteration	(None)	
7	Day Mode	Puts unit in day mode	(None)	Returns unit to real-time clock	
8	Set Status	(None)	Controls programming of outputs; resets output N to 0 (unless preceded by Hold key) and advances to output N+1	Alternate action key. Changes day from valid : 1, to invalid : 0, and vice versa	
9	Set Minutes	Advances minutes display of real-time clock	Advances minutes display of selected set point	(None)	
10	Set Hours/Set Day	Advances hours display of real-time clock	Advances hours display of selected set point	Advances display to next day — must be set to current day before returning to real-time clock mode	

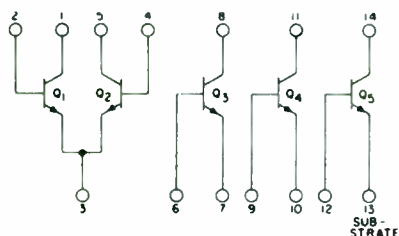
Order As WQ52G (MM57160)

## TRANSISTOR ARRAY CA3046

### Description

The CA3046 consists of five silicon NPN transistors on a common monolithic substrate in a 14-lead dual-in-line plastic package. Two transistors are internally connected to form a differential amplifier.

The transistors of the CA3046 are well suited to low noise general purposes and to a wide variety of applications in low power systems in the DC through VHF range. They may be used as discrete components in conventional circuits, in addition they provide the very significant inherent integrated circuit advantages of close electrical and thermal matching.



### Absolute Maximum Ratings

$V_{CBO}$ :	20V	Each transistor
$V_{CEO}$ :	15V	
$V_{CCIO}^*$ :	20V	
$V_{EBO}$ :	5V	
$I_C$ :	50mA	
$P_{TOT}$ :	300mW	Total power dissipation @ $T_A = 55^\circ C$
	(750mW total package)	

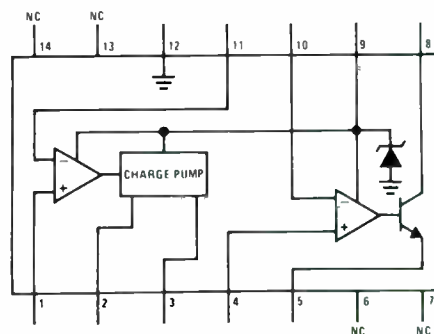
\*The collector of each transistor of the CA3046 is isolated from the substrate by an integral diode. The substrate (terminal 13) must be connected to the most negative point in the external circuit to maintain isolation between transistors and to provide for normal transistor action.

Order As QH26D (CA3046)

## LM2917 FREQUENCY TO VOLTAGE CONVERTER

This 14-pin DIL IC is extremely easy to use since  $V_{out} = f_{in} \times V_{cc} \times R1 \times C1$  where R1 is the resistor between pin 3 and ground and C1 is the capacitor (in Farads) between pin 2 and ground. Features include ground referenced tachometer whose input interfaces directly with magnetic variable reluctance pick-ups; op-amp comparator with floating transistor output; 50mA sink or source to operate relays, solenoids, meters or LED's etc.; frequency doubling with low ripple; tachometer with built-in hysteresis for either differential input or ground referenced input; built in zener for accurate and stable frequency to current conversion and linearity typically  $\pm 0.3\%$ .

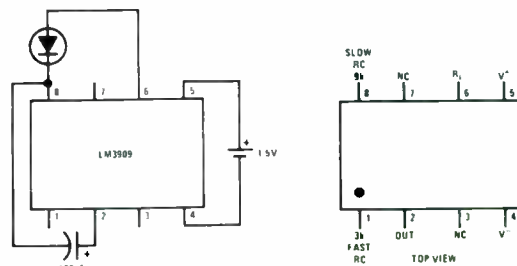
Applications include over/under speed sensing, tachometers, speedometers, breaker point dwell meters, hand-held tachometers, speed governors, cruise control, car door lock control, anti-skid control, clutch control, horn control, touch or sound switches etc.



Order As WQ38R (LM2917)

## LM3909 LED FLASHER/OSCILLATOR

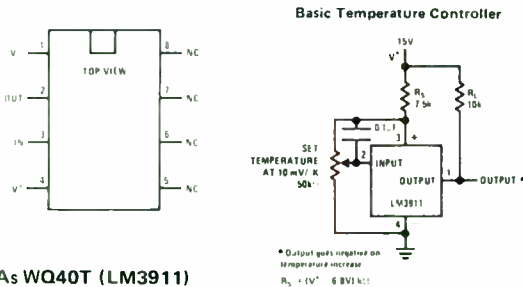
With the addition of a 1.5V battery and capacitor this IC will deliver pulses of over 2V to an LED to flash it brightly, with a current drain of less than 0.5mA. It has a powerful output and can directly drive an 8Ω speaker. Applications include flasher to locate torch or boat mooring floats at night, sales and advertising gimmicks, emergency locators e.g. for fire extinguishers, toys and novelties, trigger and sawtooth generators, siren for toy fire engine etc., warning indicators for 1.4V to 200V.



Order As WQ39N (LM3909)

**LM3911 TEMPERATURE CONTROLLER**

This IC is a highly accurate temperature measurement and/or control system having a temperature sensor, stable voltage reference and an op-amp all in the chip. The output voltage is directly proportional to the temperature at the rate 10mV/°C. Using the op-amp with external resistors, any temperature scale factor is easily obtained. By connecting the op-amp as a comparator, the output will switch as the temperature transverse the set-point making the device useful as an on-off temperature controller.

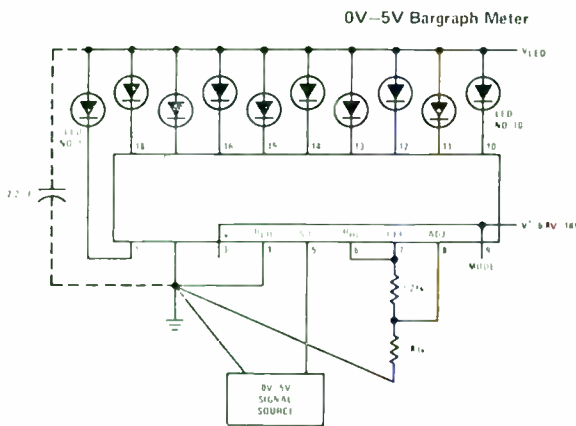


Order As WQ40T (LM3911)

**LM3914 BARGRAPH DISPLAY DRIVER**

An LED driver that will sequentially light ten LED's when a gradually increasing voltage is applied to pin 5, (dot mode) or in bar mode all LED's indicating voltages below input voltage are lit. In dot mode there is a slight overlap so that at no point are all LED's extinguished. A brightness control will set LED current between 2mA and 30mA.

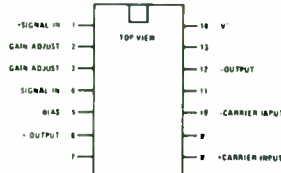
The drivers are stackable and displays with 100 or more LED's are possible. Supply voltage 3V to 18V. The divider that sets the indication points can be referenced to a wide range of voltages.



Order As WQ41U (LM3914)

**MC1496 DOUBLE-BALANCED MODULATOR**

The MC1496 is a double-balanced modulator/demodulator. The circuit produces an output voltage which is the product of an input voltage (signal) and a switching function (carrier). Communications applications include modulation and demodulation of AM, SSB, DSB, FSK, FM and phase encoded signals. Signal conditioning techniques possible include frequency doubling and halving, linear mixing and chopping, with additional uses as phase detectors in phase locked loops and as differentiators in NRZ and phase encoded digital tape and disc memories. A data sheet giving the electrical characteristics is available. Please send s.a.e. and ask for Leaflet MES D19.



Order As QH47B (MC1496)

**SG 1495 MULTIPLIER**

The SG1495 four quadrant analog multiplier is designed for applications where the output voltage required is a linear product of two input voltages. Excellent linearity and operation over a wide supply range and input voltage range. Applications include use as multipliers, dividers, squarers, phase detectors, frequency doublers and as balanced modulators.

- \* Excellent linearity
- \* Adjustable scale factor
- \* Excellent temperature stability
- \* Wide bandwidth
- \* High input voltage range
- \* Wide supply voltage operation

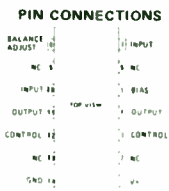


Order As QL06G (SG1495D)

**SG3402 WIDEBAND AMPLIFIER/MULTIPLIER**

The SG3402 monolithic four quadrant multiplier offering excellent frequency response and provision for use as a variable gain amplifier with both non-inverting and inverting outputs available. In addition to linear amplification, the device is also ideal for balanced modulation, pulse or gated amplification, and coincidence detection.

- \* Single power supply voltage
- \* Self-contained biasing
- \* 25dB voltage gain
- \* Differential or single ended inputs and outputs
- \* Large bandwidth
- \* Low power dissipation



Order As QL07H (SG3402)

**NE544 SERVO AMPLIFIER**

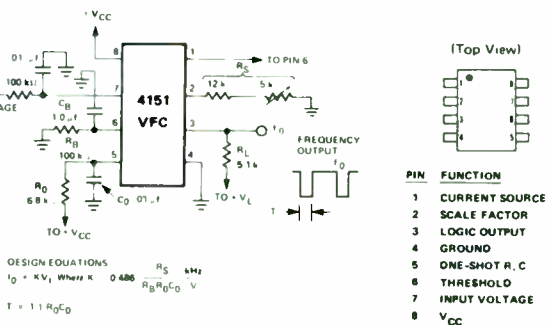
This IC is a servo amp and pulse width demodulator with internal motor drive transistors. It is intended for remote control applications in digital proportional systems, but can be used in many other closed loop applications. It incorporates a linear one shot for improved positional accuracy and outputs for external PNP motor drive transistors.

Features include 1/2A load current capability with bidirectional bridge output that needs only a single 4.8V (3.2V to 6V (max) ) supply voltage; standby power drain of only 5.5mA; adjustable deadband and trigger thresholds; high linearity: 0.5% error (max); and 20mA drive for two external PNP transistors.

Order As WQ55K (NE 544)

**4151 VOLTAGE-TO-FREQUENCY CONVERTER**

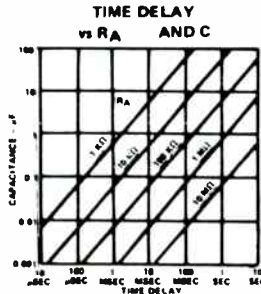
A simple analogue to digital (A/D) converter which is very low cost yet has a precision linearity typically ±0.05% with e.g. LF351 used as an integrator, or a linearity of typically 1% or its own. The output of the 4151 is a series of pulses of constant duration whose frequency is proportional to the applied input voltage. Supply voltage range is +8V to +22V, temperature stability is ±100ppm/°C and the device has a high noise rejection ratio. Max output sink current: 20mA, open collector output.



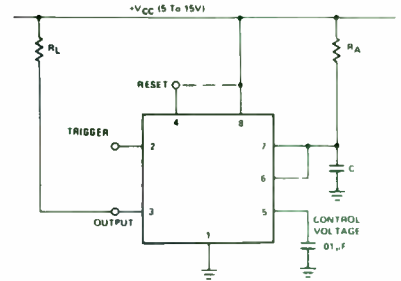
Order As QW80B (4151)

## NE555V TIMER

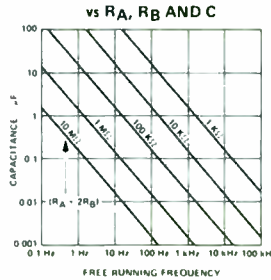
The NE555V is a highly stable device for generating accurate time delays or oscillation. Additional terminals are provided for triggering or resetting if desired. In the time delay (monostable) mode of operation, the time is precisely controlled by one external resistor and one capacitor. For stable operation as an oscillator, the free running frequency and the duty cycle are both accurately controlled with two external resistors and one capacitor. The circuit may be triggered and reset on falling waveforms, and the output structure can source or sink up to 200mA or drive TTL directly.



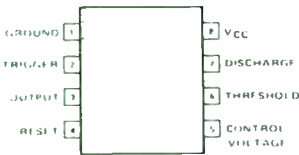
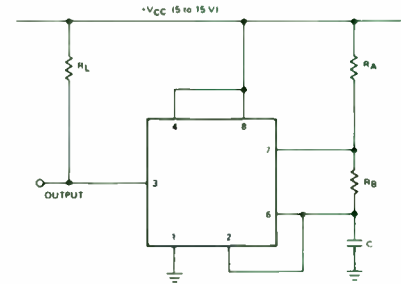
### Monostable Mode



### FREE RUNNING FREQUENCY vs RA, RB AND C



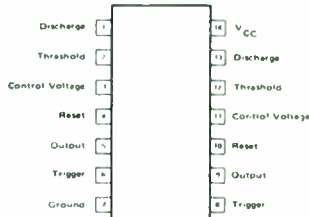
### Astable Mode



Order As QH66W (NE 555)

## NE 556 DUAL TIMER

The NE556 is a single 14-pin DIL package containing two NE555 timers.



Order As QH67X (NE 556)

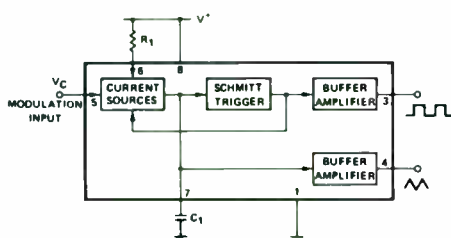
## NE 566 FUNCTION GENERATOR

### Features

- Wide range of operating voltage (10 to 24V or ±5V to ±12V)
- Very high linearity of modulation
- Extremely stable frequency (200ppm/°C typical)
- Highly linear triangle wave output
- High accuracy square wave output
- Frequency determined by resistor, capacitor, voltage or current
- Frequency adjustable over 10 to 1 range with same capacitor

### Applications

- Tone generators
- Frequency shift keying
- FM modulators
- Clock generators
- Signal generators
- Function generators

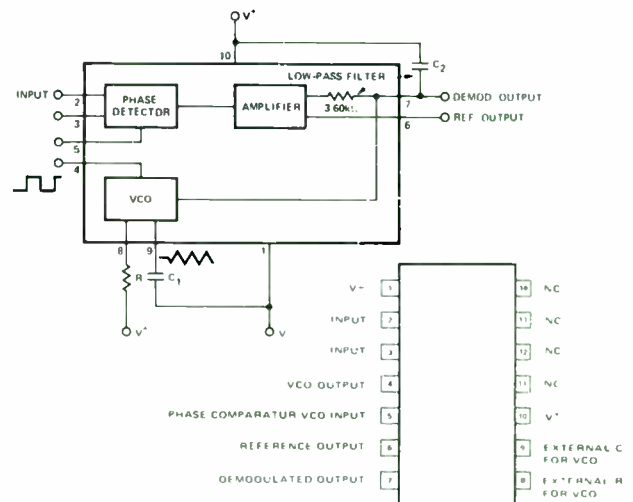


Order As QH68Y (NE 566)

## NE565 PHASE LOCKED LOOP

A 14-pin DIL IC containing a voltage controlled oscillator, phase detector and amplifier. The IC is very stable typically 200ppm/°C with high linearity: 0.2% and only 100ppm/% frequency drift with change of supply voltage which can be between ± 5V and ± 12V. Centre frequency set by resistor between pin 8 and V+ and capacitor between pin 9 and V- and  $f = \frac{1.2}{4RC}$  where R is in ohms, C is in Farads and f is in Hz. There is a TTL compatible square wave output, a very linear triangular wave output and a reference output for addition of comparator or frequency discriminator. Bandpass is adjustable from <math>\pm 1\%</math> to >math>\pm 60\%</math> and centre frequency is adjustable over a 10 to 1 range with the same capacitor.

Applications include frequency shift keying, modems, tone decoders, wideband FM discriminators, data synchronisers, tracking filters, signal restoration, and frequency multiplication and division.



The lock range will be  $\pm \frac{8f_0}{V_{CC}}$  Hz

where  $V_{CC}$  is the total supply voltage (i.e. if  $V^+$  is +6,  $V^-$  is -6 then  $V_{CC} = 12V$ ). Capture range =  $\pm \frac{1}{2\pi} \sqrt{\frac{2\pi f_L}{\tau}}$

where  $F_L$  is the lock range and  $\tau = 3600C_2$  where  $C_2$  is the capacitor between pin 7 and  $V^+$  in Farads.

Order As WQ56L (NE 565)



**NE567 TONE DECODER/PHASE LOCKED LOOP**

**Features**

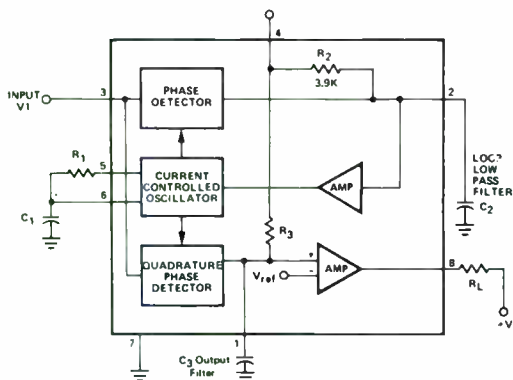
- Wide frequency range (0.01Hz to 500kHz)
- High stability of centre frequency
- Independently controllable bandwidth (0 to 14%)
- High out-band signal and noise rejection
- Logic-compatible output with 100mA current sinking capability
- Inherent immunity to false signals
- Frequency adjustment over a 20 to 1 range with an external resistor

**Applications**

- Carrier current remote controls
- Ultrasonic controls (remote TV, etc)
- Communications paging
- Frequency monitoring and control
- Wireless intercom
- Precision oscillator



Characteristics  
 Max operating voltage: 10V  
 Positive voltage at input: 0.5V above supply  
 Negative voltage at input: -10Vdc  
 Output voltage: 15Vdc  
 Operating voltage range: 4.75V to 9V  
 Quiescent supply current: 7mA (12mA activated)



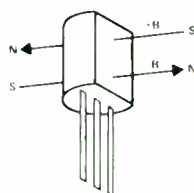
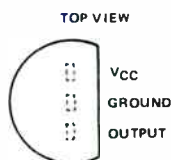
Order As QH69A (NE 567)

**TL170C HALL-EFFECT SWITCH**

A magnetically-operated zero-bounce electronic switch using the Hall effect to sense steady-state magnetic fields. The device contains an output transistor with open collector for use on voltages up to 30V. Either of the magnets shown on page 92 will operate the device when they are within a few millimetres of it. The IC requires a 5V supply (7V max) at 4mA (output high) to 6mA (output low).

Max output current (output low) : 20mA  
 (output high) : 20µA (max)  
 Output voltage (I = 16mA)  
 (output low) : 0.4V

Magnetic flux density needed to operate device:  
 22.5mT (25mT max) +10mT -2.5mT (0mT max)  
 to turn device off:  
 2.5mT (0mT min) -10mT -22.5mT (-25mT max)  
 Hysteresis (typical): 20mT  
 (Note 1mT = 1 weber/m<sup>2</sup> = 10 gauss)

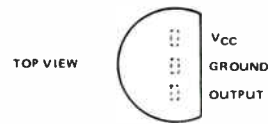


Order As WQ75S (TL170C)

**TL172C NORMALLY OFF HALL-EFFECT SWITCH**

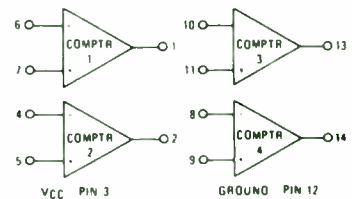
This device is identical to the TL170C with the following exceptions. Only a positive going magnetic field will switch the output to low impedance. Supply current (when on): 6mA.

Max output current (output low): 100µA (max)  
 Magnetic flux density needed  
 to operate device: 45mT (60mT max)  
 to turn device off: 22mT (10mT min)  
 Hysteresis (typical): 23mT



Order As WQ76H (TL172C)

**MC3302P QUAD COMPARATOR**



**Features**

- Four completely independent comparators
- Single supply operation from +2V to +28V
- Compare voltages at ground potential

**maximum ratings**

Power supply range (V<sub>CC</sub>): +2V to +28V  
 Output sink current: 20mA  
 Differential input voltage: ±V<sub>CC</sub>  
 Common-mode input voltage range: -0.3 to +V<sub>CC</sub>

Under no circumstances must any input be allowed to go more than 0.3V more negative than pin 12.

Order As QH48C (MC3302)

**74C917 6-DIGIT HEX DISPLAY**

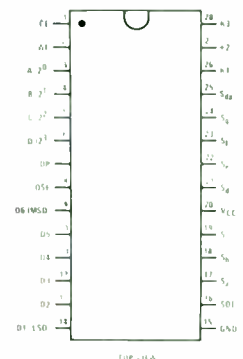
A display controller interface element with memory that will directly drive six 8-segment LED displays (i.e. 7-segment and decimal point). The controller receives data information through 5 data inputs (A, B, C, D and DP) and digit information through 3 address inputs (K1, K2, K3).

The input data is written into the register selected by the address information when "chip enable" (CE) and "write enable" (WE) are low and is latched when either (CE) or (WE) go high again. A self-contained oscillator sequentially presents the stored data to a decoder where four data bits control the displayed character and one bit controls the decimal point.

The oscillator is normally operational and tied low (OSE), but at high level this input prevents the automatic refresh of the display.

Segment outputs have up to 100mA capability and digit outputs have up to 20mA capability. Use three of our 2-digit common cathode displays with seven Min Res 68Ω in series with IC pins 17 to 19 and 21 to 25 for direct drive. The drivers are active when output enable (SOE) is low, and high impedance when SOE is high. This feature enables a brightness control to be used. Normally SOE and OSE are tied to ground.

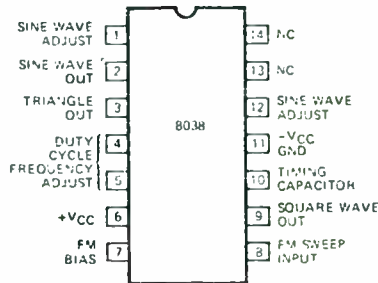
All inputs are TTL compatible and nominal supply voltage is 5V at 0.5 mA with output off (SOE high). The registers are addressed like ordinary RAM.



Order As YH30H (74C917)

## 8038 WAVEFORM GENERATOR

A 14-pin DIL IC capable of producing sine, square, triangular, sawtooth and pulse waveforms of high accuracy with the addition of a very few components. The frequency may be selected to be from 0.001Hz (i.e. 1 cycle per 16 minutes) to 1MHz, with high linearity (0.1%), low distortion (1%) and low frequency drift (<50ppm/°C). Frequency modulation and sweeping can be accomplished with an external voltage and the frequency can be programmed digitally by resistors or capacitors. Sweep range can be up to 40:1 or 1000:1 with some reduction of quality.



Order As YH38R (8038)

## 8069 VOLTAGE REFERENCE

A 1.2V temperature compensated voltage reference with excellent stability and reverse currents down to 50µA for use with A/D, D/A converters, threshold detectors etc. Stability of  $V_R$  with change in  $I_R$  from 50µA to 5mA is excellent, the change in  $V_R$  being <20mV. Reverse dynamic impedance is typically 1Ω.

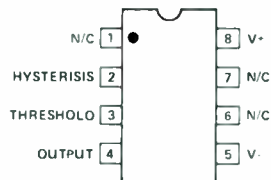


Order As YH39N (8069)

## 8211 VOLTAGE DETECTOR

A highly accurate micropower integrated circuit intended primarily for precise voltage detection and generation. The IC provides a 7mA current limited output sink when the voltage applied to 'Threshold' is less than 1.15V — the internal reference. A low current output 'Hysteresis' is also turned on at this point and may be used to provide positive and noise free output switching using a simple feedback network.

Applications include low battery indicators, power supply malfunction detectors for volatile memory systems etc. Supply voltage 2V to 30V at 22µA supply current.



Order As YH43W (8211)

## LM334Z ADJUSTABLE CURRENT SOURCE

This IC in a TO92 package is a 3-terminal adjustable current source with a 10,000 to 1 range in operating current, excellent current regulation and a wide dynamic voltage regulation of 1V to 40V. Current is established with one resistor and no other parts are required. The current is equal to 0.0677V divided by the resistor in ohms (i.e. for 1mA,  $R=68\Omega$ ) at 25°C. Currents may be set in the range 1µA to 10mA and regulation is 0.02% per volt. Initial current accuracy is ±3% typical. Reverse voltages of up to 20V will draw only a few microamps allowing the device to act as a rectifier and current source in AC applications.

The current is also directly proportional to the temperature at the rate +0.33% per °C. Zero drift operation can be obtained by adding one resistor and one diode. Applications include bias networks, surge protection, low power reference, ramp generation, LED driver, and temperature sensing.



Order As WQ32K (LM334)

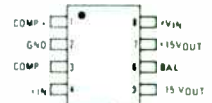
## 4195 ±15V DUAL-TRACKING REGULATOR

A dual polarity tracking regulator designed to provide balanced positive and negative 15V output voltages at currents up to 100mA per rail. The IC is fully protected against short circuit and shuts down if the internal temperature exceeds 175°C. For operation from the mains only six additional components are required. A centre-tapped 12V mains transformer, a bridge rectifier, two 1000µF 25V capacitors (one on each input to earth) and two 10µF 25V capacitors (one on each output to earth.)

In use take care to ensure that the power dissipation in the IC does not exceed 600mW. Power dissipation = (input V-15) X load current. Add both rails together. For instance with the components mentioned above the absolute max. current that could be drawn is 60mA per rail because with a 12V transformer the output of the bridge will be around 20V.

### Electrical Characteristics

Line regulation	2mV
Load regulation	5mV
O/p ut V temp stability	0.005%/°C
Standby current drain	+1.5mA
Input Voltage range	Min: 18V. Max: 30V
Output voltage tracking	+50mV
Ripple rejection	75dB
Input/Output V differential	Minimum 3V
Short-circuit current	220mA
Output noise voltage	60µV rms



Order As XX02C (4195)

A printed circuit board is available for use with this device, details below.

A fibre glass printed circuit board with component designations printed and designed to be used with our Min Tr 12V and providing a fully stabilised positive and negative 15V output at up to 50mA per rail. Each output must be decoupled by a 10µF25V to earth at the point of use. The centre tap of the transformer is connected to 0V on the board. The following components are also required

- BR1 Bridge W01
- C31, 32 Axial 1000µF 25V (2 required)
- C33, 34, 35, 36 Polyester 0.1µF (4 required)
- IC4 4195 8-pin DIL
- R30 Std Res 1k8

(R30 is provided so that an LED power on indicator can be provided — anode to resistor cathode to 0V).

Size: 87 x 40mm. Fixing centres: 80 x 30mm x 6BA.

### Important Note

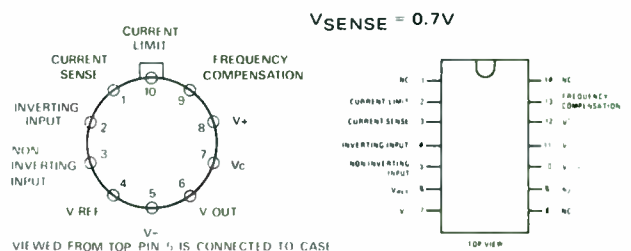
If the current to be drawn is around 100mA total, we recommend soldering the IC directly to the PCB without the use of a socket so that the thickened tracks on the PCB can assist in dissipating the heat generated in the IC.

Order As XX04E (15V Supply PCB)

## µA723C VARIABLE VOLTAGE REGULATOR

Formulae for Various Output Voltages.

<p>Outputs from +2 to +7 volts Figure 1</p> $V_{OUT} = V_{REF} \cdot \frac{R_2}{R_1 + R_2}$	<p>Current Limiting Figure 2</p> $I_{LIMIT} = \frac{V_{SENSE}}{R_{SC}}$
<p>Outputs from +7 to +37 volts Figure 2-4</p> $V_{OUT} = V_{REF} \cdot \frac{R_1 + R_2}{R_2}$	<p>Outputs from -6 to -250 volts Figure 3</p> $V_{OUT} = \frac{V_{REF}}{2} \cdot \frac{R_1 + R_2}{R_1} \cdot \frac{R_4}{R_3}$

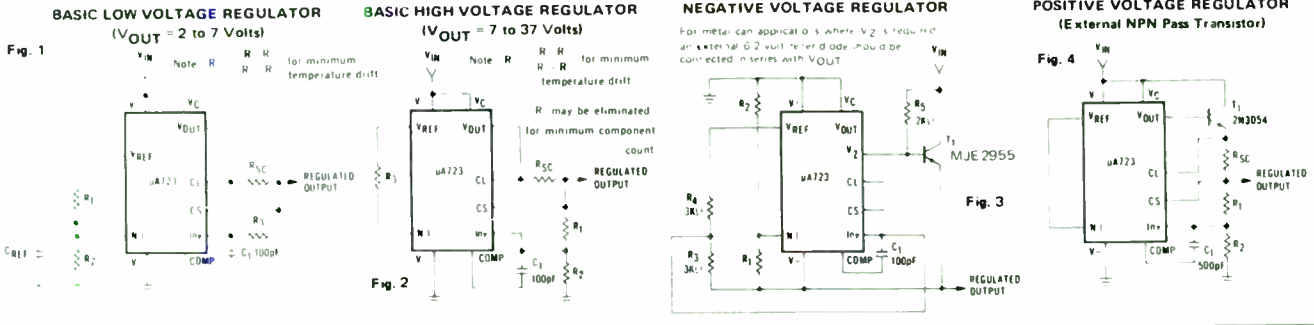


Order As BL227 (µA723C T099)

QL21X (µA723C 14-pin DIL)

Continued on next page

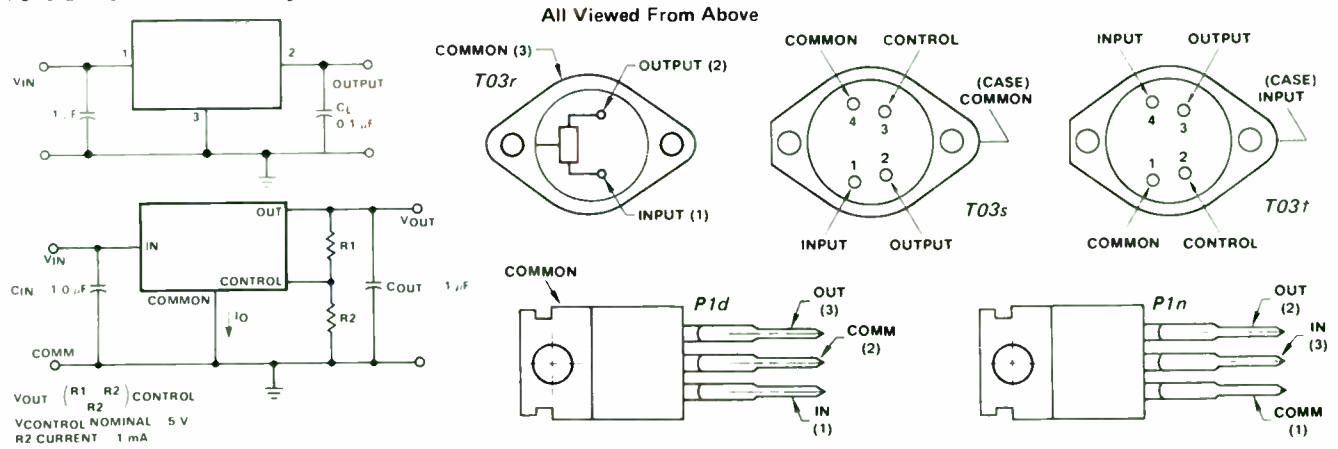
**μA723C continued**



**μA78 -- SERIES FIXED VOLTAGE REGULATORS**

Type No.	Output Current (max)	Output Voltage (typ)	Line Regulation (typ)	Load Regulation (typ)	Ripple Rejection (dB) (typ)	Quiescent Current (typ)	Input Voltage Range	Output Resistance	Output Noise Voltage	Short Circuit Current	Case Style
μA78L05AWC	100mA	+5V ± 4%	0.36%	0.4%	62dB	3mA	7V to 30V	0.25Ω	40μV	—	TO92r
μA78L12AWC	100mA	+12V ± 4%	0.25%	0.25%	54dB	3mA	14.5V to 35V	0.25Ω	80μV	—	TO92r
μA78L15AWC	100mA	+15V ± 4%	0.25%	0.25%	51dB	3.1mA	17.5V to 35V	0.25Ω	90μV	—	TO92r
μA78M05UC	500mA	+5V ± 4%	0.06%	0.4%	80dB	4.5mA	7V to 25V	0.05Ω	40μV	300mA	P1d
μA78M12UC	500mA	+12V ± 4%	0.07%	0.2%	80dB	4.8mA	14.5V to 30V	0.05Ω	75μV	240mA	P1d
μA78M15UC	500mA	+15V ± 4%	0.07%	0.17%	70dB	4.8mA	17.5V to 30V	0.05Ω	90μV	240mA	P1d
μA78MGU1C	500mA	+5V to 30V	1% (max)	1% (max)	62dB	5mA	7.5V to 40V	0.05Ω	50μV	—	P4a
μA7805UC	1A	+5V ± 4%	0.06%	0.2%	78dB	4.2mA	7V to 25V	0.017Ω	40μV	750mA	P1d
μA7812UC	1A	+12V ± 4%	0.085%	0.07%	71dB	4.3mA	14.5V to 30V	0.018Ω	75μV	350mA	P1d
μA7815UC	1A	+15V ± 4%	0.075%	0.055%	70dB	4.4mA	17.5V to 30V	0.019Ω	90μV	230mA	P1d
μA78GU1C	1A	+5V to 30V	1% (max)	1% (max)	62dB	5mA	7.5V to 40V	0.02Ω	50μV	—	P4a
μA7805KC	1.5A	+5V ± 4%	0.06%	0.3%	78dB	4.2mA	7V to 25V	0.017Ω	40μV	750mA	TO3r
μA7815KC	1.5A	+15V ± 4%	0.075%	0.08%	70dB	4.4mA	17.5V to 30V	0.019Ω	90μV	230mA	TO3r
μA78H05KC	5A	+5V ± 4%	0.2%	0.2%	60dB	10mA	8.5V to 25V	0.002Ω	40μV	7A	TO3r
μA78H12KC	5A	+12V ± 4%	0.17%	0.17%	60dB	10mA	15.5V to 25V	0.002Ω	75μV	7A	TO3r
μA78H15KC	5A	+15V ± 4%	0.2%	0.2%	60dB	10mA	18.5V to 25V	0.002Ω	90μV	7A	TO3r
μA78HGKC	5A	+5V to 20V	1% (max)	1% (max)	60dB	10mA	8.5V to 25V	0.002Ω	50μV	—	TO3s
μA78PO5C	10A	+5V ± 4%	0.5% (max)	1% (max)	60dB	10mA	7.5V to 40V	—	—	—	TO3r
μA79L05AWC	100mA	5V ± 5%	1%	0.2%	60dB	3mA	7V to 25V	—	40μV	—	TO92n
μA79L12AWC	100mA	12V ± 5%	1%	0.2%	55dB	3mA	-14.5V to -35V	—	80μV	—	TO92n
μA79L15AWC	100mA	-15V ± 5%	1.5%	0.3%	52dB	3mA	-17.5V to -35V	—	90μV	—	TO92n
μA79M05UC	500mA	5V ± 4%	0.14%	1.5%	60dB	1mA	7V to -25V	—	125μV	140mA	P1n
μA79M12UC	500mA	-12V ± 4%	0.075%	0.55%	60dB	1.5mA	-14.5V to -30V	—	300μV	140mA	P1n
μA79M15UC	500mA	15V ± 4%	0.06%	0.45%	59dB	1.5mA	-17.5V to -30V	—	375μV	140mA	P1n
μA79MGU1C	500mA	2.23V to 30V	1% (max)	1% (max)	50dB	2.5mA	-7V to -30V	—	—	—	P4b
μA7905UC	1A	5V ± 4%	0.06%	0.2%	60dB	1mA	-7V to -25V	—	125μV	750mA	P1n
μA7912UC	1A	12V ± 4%	0.085%	0.07%	60dB	1.5mA	-14.5V to -30V	—	300μV	350mA	P1n
μA7915UC	1A	15V ± 4%	0.075%	0.055%	60dB	1.5mA	-17.5V to -30V	—	375μV	230mA	P1n
μA79GU1C	1A	2.23V to 30V	1% (max)	2% (max)	50dB	2mA	-7V to -40V	—	—	—	P4b
μA79HGKC	5A	2.25V to 24V	1% (max)	1% (max)	50dB	5mA	-7V to -40V	—	—	—	TO3t

For order codes for 78-series regulators see page 206.



**Voltage Regulator Equivalents**

All equivalents shown are direct pin for pin replacements.

μA7805KC	LM7805KC	MC7805CK	LM340K-5.0
μA7815KC	LM7815KC	MC7815CK	LM340K-15
μA7805UC	LM340T-05	MC7805CP	SN72905
μA7812UC	LM340T-12	MC7812CP	SN72912
μA7815UC	LM340T-15	MC7815CP	SN72915
μA78M05UC	LM341P-05	MC78M05CP	
μA78M12UC	LM341P-12	MC78M12CP	
μA78M15UC	LM341P-15	MC78M15CP	
μA78L05WC	LM78L05CZ	MC78L05	
μA78L15WC	LM78L15CZ	MC78L15	
μA7915UC	LM320T-15	MC7915CP	



## MC6800P MICROPROCESSOR

An 8-bit microprocessor in a 40-pin DIL package. The device requires only one +5V supply and has a very simple bus interface. It can address up to 65kbytes of memory with its 16-bit address lines. The 8-bit data bus is bidirectional & 3-state. There are seven addressing modes: direct, relative, immediate, indexed, extended, implied and accumulator; there are 72 instructions of variable length in the instruction set; and there are six internal registers: two accumulators, index register, programme counter, stack pointer and condition code register.

A typical system using this microprocessor will require in addition to the MC6800P, the MC6875L clock generator and 1MHz crystal, one or two MC6821P peripheral interface adaptors so that a VDU, keyboards, displays etc may be added, the MC6850P asynchronous communications interface adaptor so that serial data may be input and output to the data bus for tape-recorder, modem interface for example and some memory e.g. the MC6830L7 monitor ROM, the MC6810AP RAM for use as scratch pads and other larger EPROMS, EAROMS or RAMS on which programmes may be written to and from tape for example.

Order As WQ43W (MC6800P)

## MC6802P MICROPROCESSOR

An 8-bit microprocessor in a 40-pin DIL package. This device contains virtually a complete MC6800P as well as an internal clock oscillator (requiring the addition of a 4MHz crystal) and driver, plus 128 bytes of RAM located between 0000H and 007FH. The first 32 bytes of RAM at 0000H to 001FH may be retained by applying a 4.5V battery to  $V_{CC}$  standby (pin 35) when power to the rest of the system is switched off. Standby current is around 5mA, whilst typical powered-up current is around 120mA. In most other respects the chip is the same as the MC6800P described above.

Order As WQ44X (MC6802P)

## MC6821P PERIPHERAL INTERFACE ADAPTOR (PIA)

The IC provides a universal means of interfacing parallel data to a microprocessor. One chip is capable of interfacing the 8-bit data bus of the MPU to two 8-bit peripheral buses. Data are able to flow in either direction to and from either peripheral buses under the control of the microprocessor. The two peripheral bus output/inputs are slightly different from one another in that i/o B will drive TTL or the base of a transistor up to 1mA at 1.5V in output mode and it has 3-state capability allowing interface with another MPU.

Order As WQ46A (MC6821P)

## MC6850P ASYNCHRONOUS COMMUNICATIONS INTERFACE ADAPTOR

This IC will interface the microprocessor data bus to serial asynchronous data, both for input and output. The parallel data of the MPU bus is serially transmitted and received by this IC with proper formatting and error checking. A programmable control register provides variable word lengths (8 or 9-bit), clock division ( $\div 16$ ;  $\div 64$ ), transmit, receive and interrupt control. The device has optional even or odd parity, and performs parity, overrun and framing error checking. Transmissions up to 500kbauds (kbps) are possible and three control lines are provided for control of a modem for line transmission (e.g. to cassette recorder or amateur radio transceiver).

Order As WQ48C (MC6850P)

## MC6852P SYNCHRONOUS SERIAL DATA ADAPTOR

Similar to MC6850P, but for synchronous peripheral data streams.

Order As WQ49D (MC6852P)

## MC6875 CLOCK GENERATOR

A non-overlapping two-phase clock generator which should be situated on the PCB within two inches of the MPU. It is driven by a crystal which should be four times the frequency at which you wish to run the MPU (e.g. 1MHz to 4MHz crystals are suitable for use with the MC6800P). Alternatively RC or LC networks may be used to drive the chip. Outputs are also provided for dynamic memory refresh clock, memory synchronisation inputs and outputs and external synchronisation input for connection to another MPU system.

Order As WQ50E (MC6875L)

## Z80-CPU MICROPROCESSOR

This 40-pin DIL IC is an extremely powerful 8-bit microprocessor having 158 instructions including all of the 8080 instructions giving total software compatibility. Thus programmes written for the 8080 may be run on the Z80 and later updated to make use of the powerful Z80 instruction set. Typically the Z80 requires 25% to 50% less memory space than the 8080, and gives 5 times the throughput of the 8080. There are 17 internal registers including two real index registers, and three modes of fast interrupt response. Static memories can be interfaced using only an external address decoder to provide the appropriate chip select signals. Another advantage of the Z80 is that it can provide all of the refresh control for dynamic memories up to 65kbytes directly, and will interface directly with most 18-pin and 22-pin 4k dynamic RAM's with virtually no additional external logic (16-pin types require only an external address multiplexer).

The Z80 requires only a single 5V supply as do all its support chips described below and a single-phase TTL clock operating from a 2.5MHz crystal.

This amazing MPU outperforms any other microcomputer in 4, 8 or 16-bit applications.

Order As QW00A (Z80-CPU)

## Z80-PIO PARALLEL INTERFACE CONTROLLER

This IC provides a universal means of interfacing parallel data to a microprocessor. It can interface the 8-bit data bus of the MPU to two 8-bit peripheral buses e.g. keyboard, VDU, printer, etc. Data are able to flow in either direction to and from the peripheral buses under the control of the microprocessor. Features include interrupt driven "handshake" for fast response; byte output, byte input, byte bidirectional bus (port 'A' only), and bit modes of operation; programmable interrupts on peripheral status conditions; daisy chain priority interrupt logic included to provide automatic interrupt vectoring without external logic; eight outputs capable of driving Darlington transistors ( $-1.5mA$  at 1.5V); and all inputs and outputs fully TTL compatible.

Order As QW03D (Z80-PIO)

## Z80-SIO SERIAL INTERFACE CONTROLLER

This IC will interface the microprocessor to one or two serial data lines for input and output. Two separate serial peripherals (e.g. cassette recorder, amateur radio transceiver, IBM BiSync, HDLC, SDLC etc.) may be connected simultaneously and the chip can generate CRC codes in any synchronous mode and can be programmed by the CPU for any asynchronous format. Features include speeds up to 550kbauds (kbps); receiver data registers quadruply buffered and transmitter doubly buffered; asynchronous operation with 5, 6, 7 or 8-bits per character, 1, 1½ or 2 stop bits, even, odd or no parity,  $\div 16$ ,  $\div 32$ ,  $\div 64$  clock modes and eight control inputs and outputs for modems, break generation and detection, and parity, overrun and framing error detection; HDLC or IBM SDLC operation with automatic zero insertion and deletion, automatic flag insertion, address field recognition, I-field residue handling, valid receive messages protected from overrun and CRC generation and checking; binary synchronous operation with internal or external character synchronisation, one or two sync characters in separate registers, automatic sync character insertion and CRC generation and checking; daisy chain priority interrupt logic included to provide for automatic interrupt vectoring without external logic; and all inputs and outputs fully TTL compatible.

Order As QW04E (Z80-SIO)

## Z80-DMA DIRECT MEMORY ACCESS

This IC is a programmable single-channel device which provides all address, timing and control signals to effect the transfer of blocks of data between two ports within a Z80 system. These ports may be either system main memory or any peripheral I/O device. The chip can also search a block of data for a particular byte with or without a simultaneous transfer.

Order As QW02C (Z80-DMA)

## Z80-CTC COUNTER TIMER CIRCUIT

This IC is a programmable four-channel device that provides counting and timing functions for the MPU. The channels may be selected to operate in either counter or timer mode with programmable interrupts. A readable down-counter is available which indicates how far there is to go until zero is reached. There is a selectable 16 or 256 clock prescaler for each timer channel. Three channels have zero count/timeout outputs capable of driving Darlington transistors ( $-1.5mA$  at 1.5V).

Order As QW01B (Z80-CTC)

## 8080A MICROPROCESSOR

This 40-pin DIL IC is an 8-bit microprocessor which is the most well-used of all the microprocessors available to date. As a result there is a large amount of software available for use with this chip, from various sources (e.g. magazines, books, etc.). The chip has a 16-bit address bus that can address up to 65kbytes of memory and up to 256 input and output devices. The chip has a 78 instruction set, and six general purpose registers and an accumulator.

The chip requires the 8224 clock generator and 8228 system controller to function.

Order As YH40T (8080A)

## 8085A MICROPROCESSOR

This IC is an 8-bit microprocessor which is virtually the 8080A, 8224 and 8228 all in one package. It is 100% software compatible with the 8080A. However the 8085A uses a multiplexed data bus with half of the 16-bit address bus. The IC runs directly from a 6-14.4MHz crystal and has a serial input and output port in addition to the parallel busses.

Order As YH41U (8085A)

## 8224 CLOCK GENERATOR

This IC is designed for use with the 8080A MPU and provides all the timing requirements for the system as well as power-up reset, advance status strobe and synchronisation of ready. The IC may be crystal controlled and an 18.432MHz crystal will be needed for maximum speed.

Order As YH46A (8224)

## 8228 SYSTEM CONTROLLER

This IC is designed for use with the 8080A MPU. It provides signals for the memory interface and I/O components. A bidirectional bus driver is included to provide high TTL fan-out, and isolation of the 8080A data bus from memory and I/O. Thus slower memory and I/O can be used.

A user selected single level interrupt vector is provided to simplify real time, interrupt driven, small system requirements. The chip also generates the correct control signals to allow the use of multiple byte instructions (e.g. CALL) in response to an interrupt acknowledge by the MPU. This feature permits large, interrupt driven systems to have an unlimited number of interrupt levels.

Order As YH47B (8228)

## 8255A PERIPHERAL INTERFACE ADAPTOR

A general purpose I/O device having 24 I/O pins which may be individually programmed in two groups of 12 and used in 3 major modes of operation. In mode 0 each group of 12 I/O pins may be programmed in sets of 4 to be input or output. In mode 1 each group may be programmed to have 8 lines of I/O, and of the remaining 4, three are used for handshaking and interrupt control signals. Mode 2 is a bidirectional bus mode which uses 8 lines for the bus and 5 lines (one borrowed from the other group) for handshaking.

Order As YH50E (8255A)

## 8251A PROGRAMMABLE COMMUNICATION INTERFACE

This USART chip is programmed by the MPU to operate using virtually any serial data transmission technique presently in use. It interfaces the MPU's parallel data bus with any peripheral requiring serial data (e.g. cassette recorder, modem, etc.). Features are: synchronous mode - 5 to 8-bit characters, internal or external character synchronisation and automatic sync insertion; asynchronous mode - 5 to 8-bit characters, clock rate (+16, +64), break character generation, 1, 1½ or 2 stop bits, false start bit detection, automatic break detect and handling; up to 64kbaud (kbps); full duplex double buffered transmitter and receiver; error detection - parity, overrun and framing; all inputs and outputs fully TTL compatible.

Order As YH49D (8251)

## 8250 ASYNCHRONOUS COMMUNICATIONS ELEMENT

This UART chip is designed to be easily interfaced to any MPU system where it allows serial data input to and output from the parallel data bus of the MPU. Features include adding or deleting standard asynchronous communication bits (start, stop and parity) to or from the serial data stream; full double buffering eliminating the need for precise synchronisation; independently controlled transmit, receive, line status and data set interrupts; programmable baud rate generator allows division of any clock input by 1 to 2<sup>16</sup>-1; independent receiver clock input; modem control functions; 5, 6, 7 or 8-bit characters; even, odd or no parity bit generation and detection; 1, 1½ or 2 stop bit generation; transmission rates up to 56kbaud (kbps); false start bit detection; complete status report capability; all inputs and outputs TTL compatible and 3-state;

line break generation and detection; loopback controls for communications link fault isolation; break, parity, overrun and framing error simulation; and full prioritised interrupt system controls.

Order As YH48C (8250)

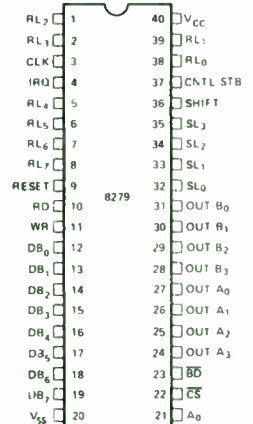
## 8279 KEYBOARD/DISPLAY INTERFACE

This IC is a general purpose keyboard and display I/O interface device for use with microprocessors. The IC will scan a 64-contact key matrix and perform 2-key lockout and N-key rollover. Keyboard entries are debounced and strobed in an 8-character FIFO and if more than 8 characters are entered, overrun status is set. Key entries set the interrupt output line to the MPU.

The display part of the IC provides a scanned interface for LED and other types of displays. Numeric and alphanumeric displays and simple indicators may be used. The IC has a 16x8 display RAM which can be organised into two 16x4. The RAM can be loaded or interrogated by the MPU. Right entry calculator and left entry typewriter display formats are possible. Both read and write of this RAM can be done with auto-increment of the RAM address.

### PIN NAMES

DIR <sub>0</sub>	↓	0	DATA BUS (BI DIRECTIONAL)
CLOCK	↑	1	CLOCK INPUT
RESET	↑	1	RESET INPUT
CS	↑	1	CHIP SELECT
RD	↑	1	READ INPUT
WR	↑	1	WRITE INPUT
A <sub>0</sub>	↑	1	BUFFER ADDRESS
INT	↑	0	INTERRUPT REQUEST OUTPUT
SL <sub>0</sub>	↑	0	SCAN LINES
RL <sub>0</sub>	↑	0	RETURN LINES
SHIFT	↑	0	SHIFT INPUT
CNTL STR	↑	0	CONTROL STROBE INPUT
OUT A <sub>0</sub>	↑	0	DISPLAY (A) OUTPUTS
OUT B <sub>0</sub>	↑	0	DISPLAY B OUTPUTS
BLK	↑	0	BLANK DISPLAY OUTPUT



Order As YH51F (8279)

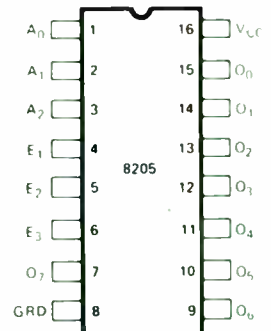
## 8205 1 OF 8 BINARY DECODER

This decoder IC can be used for the expansion of systems which utilise input ports, output ports and memory components with active-low chip-select input. When the IC is enabled, one of its 8 outputs goes low and a single row of memory is selected.

The 3 chip-enable inputs allow easy system expansion. The chip has a max delay of 18ns and is directly compatible with TTL. Input load current: 0.25mA, output sink current >10mA.

### PIN NAMES

A <sub>0</sub> A <sub>2</sub>	ADDRESS INPUTS
E <sub>1</sub> E <sub>3</sub>	ENABLE INPUTS
O <sub>0</sub> O <sub>7</sub>	DECODED OUTPUTS



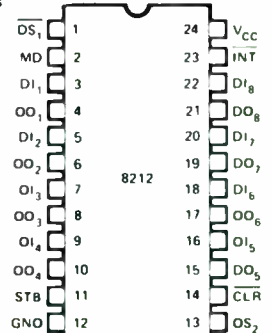
Order As YH42V (8205)

## 8212 8-BIT INPUT/OUTPUT PORT

A fully parallel 8-bit data register and buffer with 3-state outputs. The device has an 8-bit latch and output buffers with control and device selection logic. Also included is a service request flip-flop for the generation and control of interrupts to the microprocessor. Input load current: 0.25mA, output sink current 15mA.

### PIN NAMES

DI <sub>0</sub> DI <sub>7</sub>	DATA IN
DO <sub>0</sub> DO <sub>7</sub>	DATA OUT
DS <sub>0</sub> DS <sub>2</sub>	DEVICE SELECT
MD	MODE
STB	STROBE
INT	INTERRUPT (ACTIVE LOW)
CLR	CLEAR (ACTIVE LDW)



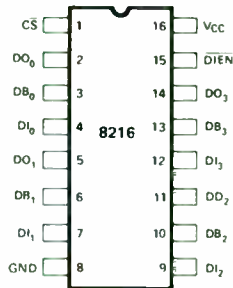
Order As YH44X (8212)

**8216 BUS DRIVER**

A 4-bit bidirectional bus driver/receiver that is LS TTL compatible. The DO outputs provide a high 3.65V for driving MOS while the DB outputs provide a high 50mA for high capacitance terminated bus structures. The buffers are non-inverting and have 3-state outputs.

**PIN NAMES**

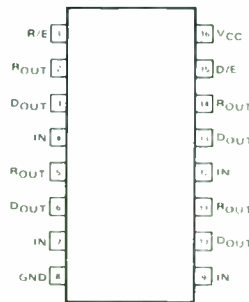
- DB<sub>0</sub> DB<sub>3</sub> DATA BUS BIDIRECTIONAL
- DI<sub>0</sub> DI<sub>3</sub> DATA INPUT
- DO<sub>0</sub> DO<sub>3</sub> DATA OUTPUT
- DIEN DATA IN ENABLE DIRECTION CONTROL
- CS CHIP SELECT



Order As YH45Y (8216)

**8T28 4-BIT BIDIRECTIONAL BUS TRANSCEIVER**

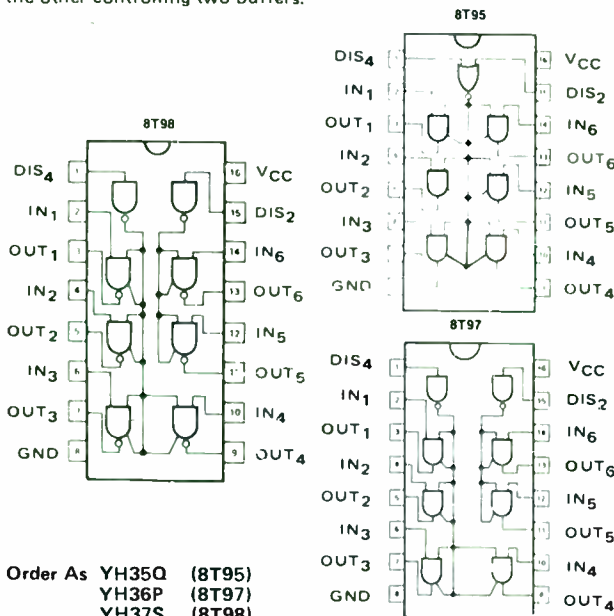
This IC consists of 4 pairs of 3-state logic elements configured as quad bus drivers/receivers with separate buffered receiver enable and driver enable lines. Driver output current > 50mA, receiver output current > 30mA, high level input current driver and receiver < 25µA.



Order As YH34M (8T28)

**8T95, 8T97, 8T98 HEX 3-STATE BUFFER INVERTERS**

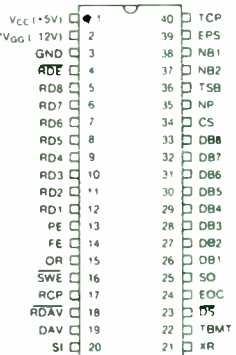
These buffers feature high impedance logic inputs so that the bus is not seriously loaded, very high speed operation (8nsec typical) and 3-state ports allowing buffers not being utilised to be effectively removed from the system. The 8T95 is a non-inverting buffer with a two-input enable controlling all six buffers. The 8T97 is a non-inverting buffer and the 8T98 is an inverting buffer both of which have two enable inputs; one controlling four buffers and the other controlling two buffers.



Order As YH35Q (8T95)  
 YH36P (8T97)  
 YH37S (8T98)

**AY-5-1013A UNIVERSAL ASYNCHRONOUS RECEIVER/ TRANSMITTER**

This UART accepts binary characters from either a terminal device or a computer and receives/transmits this character with appended control and error correcting bits. All characters contain a start bit, 5 to 8 data bits one or two stop bits and either odd, even or no parity. The baud rate, bits per word, parity mode and the number of stop bits are externally selectable. Speeds up to 40kbaud (kbps) are possible with 46% distortion immunity. Full duplex operation may be carried out at differing baud rates. The IC is fully double buffered to eliminate the need for system synchronisation and the 3-state outputs are TTL compatible.

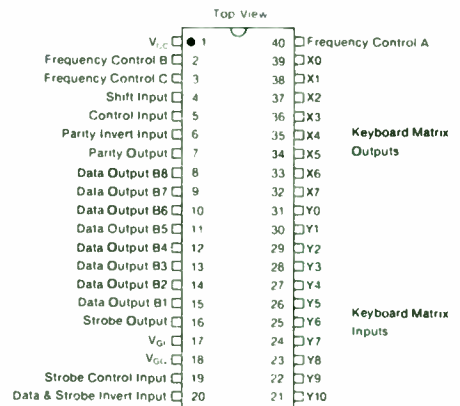


Order As WQ18U (AY-5-1013A)

**AY-5-2376 KEYBOARD ENCODER**

A read only memory (ROM) with all the logic necessary to encode single-pole single-throw keyboard switches into a usable 9-bit code. The ROM is arranged into three 88-word by 9-bit groups (2376 bits) and appropriate levels on the Shift and Control inputs selects one of the 88-word groups. The individual word locations are addressed by the two ring counters. Thus the ROM address is formed by combining the Shift and Control inputs with the ring counter.

Features include TTL and MOS compatible; external control for output polarity selection and selection of odd or even parity; two key roll-over; N-key lockout; self-contained oscillator circuit and contact bounce suppression.



Order As WQ19V (AY-5-2376)

**5018 DIGITAL TO ANALOGUE CONVERTER**

An 8-bit digital to analogue converter subsystem with ± 1/2 last significant bit accuracy. The inputs from the 8-bit data bus have input latches, controlled by a latch enable pin. These inputs are ultra-low loading for ease of interfacing with microprocessor buses. The latches are transparent when pin 10 is low. As pin 10 goes high the data on pins 2 to 9 are latched and retained until pin 10 goes low again. Supply voltage required is ± 15V at +8mA and -10mA. The chip has its own stable 5V reference and a high slew rate buffer output. The reference voltage may be externally trimmed with a potentiometer for easy adjustment of full scale while maintaining a low temperature coefficient.

Order As QW92A (5018)



**7106, 7107 ANALOGUE TO DIGITAL CONVERTER/DISPLAY DRIVERS**

These two IC's are high performance, low power 3½ digit A/D converters. The input requires about 1pA typically. Other features are guaranteed zero reading for 0 volts input on all scales; true polarity at zero for precise null detection; true differential input and reference; low noise; on-chip clock and reference; low supply current 0.8mA typical.

The output of the 7106 will drive LCD displays directly and a +9V supply is required at pin 1 and ground at pin 26. This IC is ideally suited for battery operation. The output of the 7107 will drive LED displays directly and a +5V supply is required at pin 1, -5V at pin 26 and ground at pin 21. Accuracy ±1 count in ±2000 counts guaranteed.

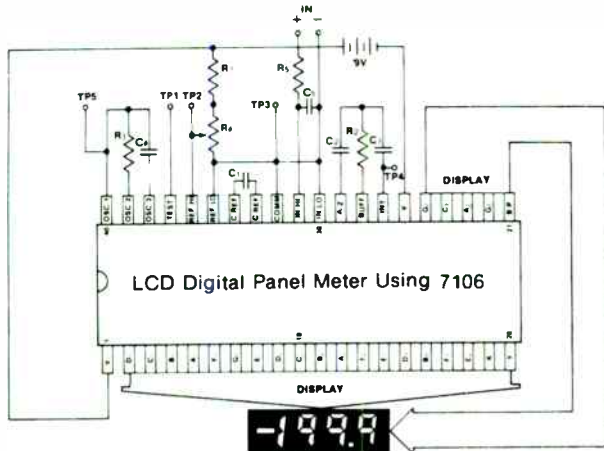
Order As QW94C (7106)  
QW95D (7107)

**Printed Circuit Boards**

PCB's are available for these IC's with component designations printed on them. The parts required are as follows:

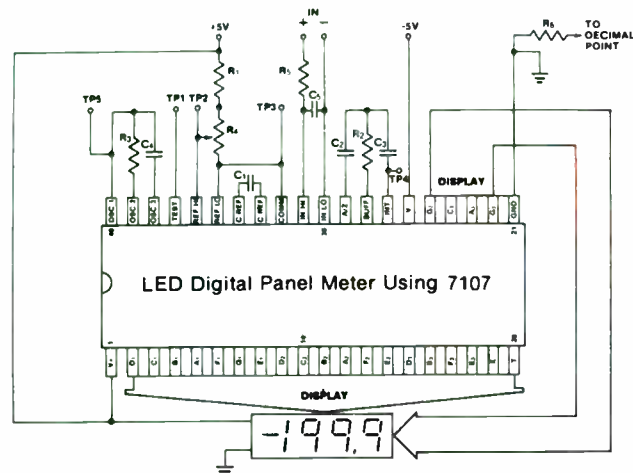
- |                              |     |                        |
|------------------------------|-----|------------------------|
| For liquid crystal displays: | C1  | Carbonate 0.1µF        |
| R1 Min Res 15kΩ              | C2  | Carbonate 0.047µF      |
| R2 Min Res 470kΩ             | C3  | Carbonate 0.22µF       |
| R3 Min Res 100kΩ             | C4  | Ceramic 100pF          |
| R4 15-Turn Cermet 10kΩ       | C5  | Carbonate 0.01µF       |
| R5 Min Res 1MΩ               | D1  | Liquid Crystal Display |
|                              | IC1 | 7106                   |
|                              | 1   | Printed circuit board  |

Order As BY76H (LCD 7106 PCB)



- |  |     |                       |
|--|-----|-----------------------|
| For LED displays:  | C1  | Carbonate 0.1µF       |
| R1 Min Res 15k   | C2  | Carbonate 0.047µF     |
| R2 Min Res 470k  | C3  | Carbonate 0.22µF      |
| R3 Min Res 100k  | C4  | Ceramic 100pF         |
| R4 15-Turn Cermet 10k                                      | C5  | Carbonate 0.01µF      |
| R5 Min Res 1M  | D1  | DD Display Type AF    |
| R6-9 Min Res 150Ω (one for each decimal point if required) | D2  | DD Display Type A     |
|  | IC1 | 7107                  |
|  | 1   | Printed circuit board |

Order As BY77J (LCD 7107 PCB)



**SFF96364 TV DISPLAY INTERFACE**

A TV interface IC that accepts ASCII encoded data in parallel form and converts it for display in a 16-line by 64-character format on a 625-line TV set. The chip provides all the necessary timing and synchronisation outputs. The chip will control random access memory to store up to four pages of data for display. Pages may be selected sequentially in either direction and are stored in a wrapped round form (i.e. the line after the 16th line on page 4 is the first line on page 1).

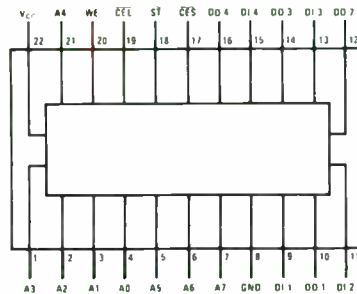
The chip allows full control of a cursor which enables writing to begin anywhere on the scroll, or single characters or lines etc. may be altered. The TV display may be fully controlled from the keyboard or directly by a microprocessor.

Order As WQ60Q (SFF96364)

**74C920 CMOS STATIC RANDOM ACCESS MEMORY**

A 1024-bit static random access read/write memory (RAM) organised as 256 x 4-bit words. The IC operates from a single 5V supply at very low current drains typically <50nA (100µA max), thus when the MPU system is powered down data may be retained in the CMOS RAM by initiating a small battery whose voltage can be between 2V and 7V (e.g. two NiCad AA cells in series would hold the data for several months before requiring charging).

Access time is typically 120ns (250ns max) and the outputs are 3-state, and all inputs and outputs are TTL compatible. Complete address decoding is performed on-chip and there are two chip select functions. This chip is suitable for use with all our microprocessors.



Order As YH31J (74C920)

**2102 STATIC RANDOM ACCESS MEMORY**

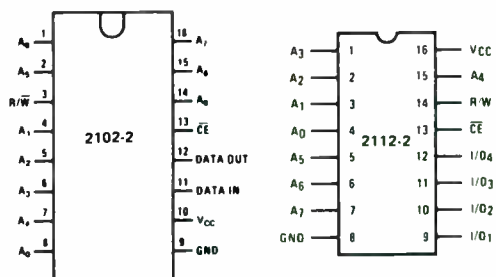
A 1024-bit static random access read/write memory (RAM) organised as 1024 x 1-bit words. The IC operates from a single 5V supply at typically 30mA. Access time is <650ns and thus this chip is suitable for use with all our microprocessors. The outputs are 3-state and all inputs and outputs are TTL compatible. Complete address decoding is performed on-chip and the chip-enable allows simple memory expansion.

Order As QW11M (2102)

**2112 STATIC RANDOM ACCESS MEMORY**

A 1024-bit static random access read/write memory (RAM) organised as 256 x 4-bit words. The IC operates from a single 5V supply at typically 30mA. Access time is <650ns and thus this chip is suitable for use with all our microprocessors. The inputs/outputs are 3-state and TTL compatible. Complete address decoding is performed on-chip and the chip-enable allows simple memory expansion.

Order As WH17T (2112)



## MC6810AP STATIC RANDOM ACCESS MEMORY

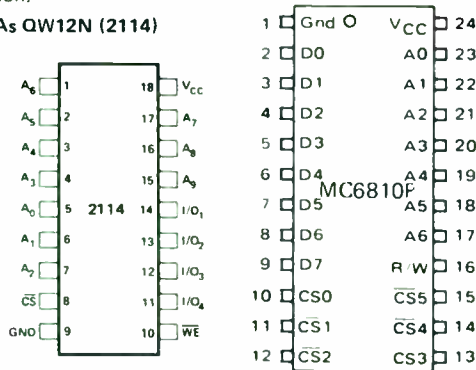
A 1024-bit static random access read/write memory (RAM) organised as 128 x 8-bit words. The IC operates from a single 5V supply at typically 40mA. Access time is <450ns and thus this chip is suitable for use with all our microprocessors. The inputs/outputs are 3-state and TTL compatible. Complete address decoding is performed on-chip and there are six chip-enable inputs (four are active-low and two are active-high) for absolute ease of memory expansion.

Order As WQ45Y (MC6810AP)

## 2114 STATIC RANDOM ACCESS MEMORY

A 4096-bit static random access read/write memory (RAM) organised as 1024 x 4-bit words. The IC operates from a single 5V supply at typically 80mA. Access time is <450ns and thus this chip is suitable for use with all our microprocessors. The inputs/outputs are 3-state and TTL compatible. Complete address decoding is performed on-chip and there is a chip-enable input for memory expansion.

Order As QW12N (2114)



## MCM4027 DYNAMIC RANDOM ACCESS MEMORY

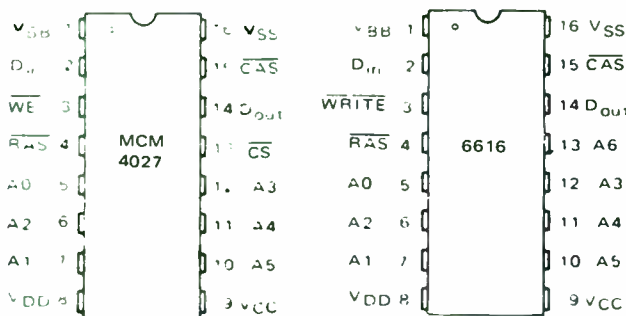
A 4096-bit dynamic random access read/write memory (RAM) organised as 4096 x 1-bit words. The IC operates from three voltage supplies:  $V_{DD} = +12V$  (at 35mA max),  $V_{CC} = +5V$  (the current depends on output load when chip is enabled and virtually nil at other times) and  $V_{BB} = -5V$  (at 150µA max). ( $V_{SS} = 0V$ ). When chip is not selected  $V_{DD}$  current falls to 2mA max. Access time is <250ns, and a refresh cycle is required every 2ms, thus this chip is directly suitable for use with the Z80 and indirectly with our other microprocessors. The output is 3-state to enable memory expansion. Complete address decoding is performed on-chip and there are on-chip latches for address, chip-select and data in. The IC has page-mode capability.

Order As WQ42V (MCM4027)

## 6616 DYNAMIC RANDOM ACCESS MEMORY

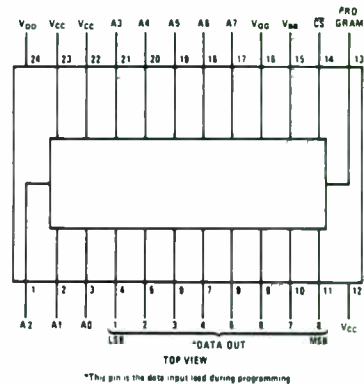
A 16,384-bit dynamic random access read/write memory (RAM) organised as 16,384 x 1-bit words. The IC operates from three voltage supplies:  $V_{DD} = +12V$  (at 45mA max),  $V_{CC} = +5V$  (the current depends on output load and is virtually nil when chip is not selected) and  $V_{BB} = -5V$  (at 200µA max) ( $V_{SS} = 0V$ ). When chip is not selected  $V_{DD}$  current falls to 2mA max. Access time is <300ns, and a refresh cycle is required every 2ms, thus the chip is directly suitable for use with the Z80 and indirectly with our other microprocessors. The output is 3-state to enable memory expansion. Complete address decoding is performed on-chip and there are on-chip latches for address and data-in.

Order As QW93B (6616)



## 1702 ERASABLE, PROGRAMMABLE READ ONLY MEMORY

A 2048-bit electrically programmable and ultra-violet erasable read only memory (EPROM) organised as 256 x 8-bit words. The pin functions of the IC vary according to whether it is in the programming mode or read mode.



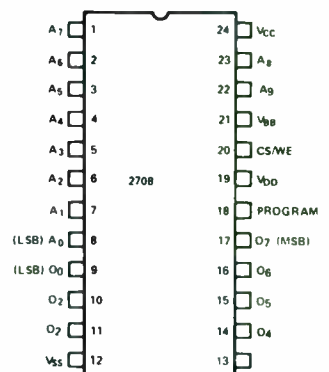
Pin No.	Read Mode	Programming Mode
1	Address Line 2	Address Line 2
2	Address Line 1	Address Line 1
3	Address Line 0	Address Line 0
4	Data Output 1 (LSB)	Data Input 1 (LSB)
5	Data Output 2	Data Input 2
6	Data Output 3	Data Input 3
7	Data Output 4	Data Input 4
8	Data Output 5	Data Input 5
9	Data Output 6	Data Input 6
10	Data Output 7	Data Input 7
11	Data Output 8 (MSB)	Data Input 8 (MSB)
12	+5V	OV
13	+5V	-48V Programme Pulse
14	Chip Select (Low to select)	OV
15	+5V	+12V
16	-9V	-35V Pulse
17	Address Line 7	Address Line 7
18	Address Line 6	Address Line 6
19	Address Line 5	Address Line 5
20	Address Line 4	Address Line 4
21	Address Line 3	Address Line 3
22	+5V	OV
23	+5V	OV
24	-9V	48V Pulse

Access time is 1µs and the IC is fully static. The outputs are 3-state and inputs and outputs are TTL compatible. Complete address decoding is performed on-chip and there is a chip-enable input for memory expansion. A transparent lid on the IC allows the user to erase the bit pattern by exposing the chip to ultraviolet light at 253.7nm (2537Å) with an incident energy of 6W-seconds/cm<sup>2</sup>. Thus with a 5.5mW/cm<sup>2</sup> UV tube and the device positioned one inch from it and with no intervening filter or glass the IC will be completely erased in about 20 minutes.

Order As QW05F (1702)

## 2708 ERASABLE, PROGRAMMABLE READ ONLY MEMORY

An 8192-bit electrically programmable and ultra-violet erasable read only memory (EPROM) organised as 1024 x 8-bit words. The pin functions of the IC vary according to whether it is in the programming mode or read mode.



Continued on next page

2708 (continued)

Pin No.	Read Mode	Programming Mode
1	Address Line 7	Address Line 7
2	Address Line 6	Address Line 6
3	Address Line 5	Address Line 5
4	Address Line 4	Address Line 4
5	Address Line 3	Address Line 3
6	Address Line 2	Address Line 2
7	Address Line 1	Address Line 1
8	Address Line 0	Address Line 0
9	Data Output 0	Data Input 0
10	Data Output 1	Data Input 1
11	Data Output 2	Data Input 2
12	OV	OV
13	Data Output 3	Data Input 3
14	Data Output 4	Data Input 4
15	Data Output 5	Data Input 5
16	Data Output 6	Data Input 6
17	Data Output 7	Data Input 7
18	OV	+26V Programme Pulse
19	+12V	+12V
20	Chip select (low to select)	+12V
21	-5V	-5V
22	Address Line 9	Address Line 9
23	Address Line 8	Address Line 8
24	+5V	+5V

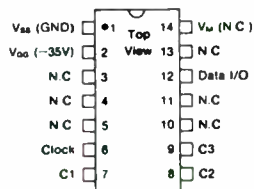
Access time is 450ns and the IC is fully static. The outputs are 3-state and inputs and outputs are TTL compatible. Complete address decoding is performed on-chip and there is a chip-enable input for memory expansion. A transparent lid on the IC allows the user to erase the bit pattern by exposing the chip to ultraviolet light at 253.7nm (2537Å) with an incident energy of 15W-seconds/cm<sup>2</sup>. Thus with a 5.5mW/cm<sup>2</sup> UV tube and the device positioned one inch from it and with no intervening filter or glass the IC will be completely erased in about 50 minutes.

Order As QW13P (2708)

**ER1400 ELECTRICALLY ALTERABLE READ ONLY MEMORY**

A 1400-bit electrically erasable and reprogrammable read only memory (EAROM) organised as 100 x 14-bit words. The IC operates from a single -35V supply at 8mA max. Write/Erase time is 20ms. Data and address are communicated in serial form via a one-pin bidirectional bus. The mode control pins C1, C2 and C3 may be set to put IC into one of seven different modes: standby; accept address; read; shift data out; erase; accept data; write. Addressing is by two consecutive one-of-ten codes.

A timing clock must be provided running at approx. 14kHz ± 20%. When unpowered the data stored by the IC will be retained for at least 10 years. It is important that no connection is made to pin 2.

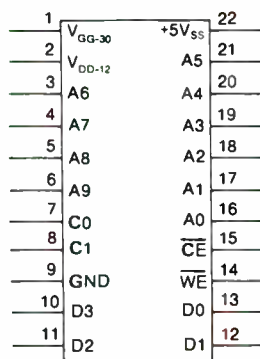


Order As WQ26D (ER1400)

**ER3401 ELECTRICALLY ALTERABLE READ ONLY MEMORY**

A 4096-bit electrically erasable and reprogrammable read only memory (EAROM) organised as 1024 x 4-bit words. Write time is 1ms and erase time 10ms approx. Access time is <900ns. The IC requires three voltage supplies:

V<sub>DD</sub> = -12V (at 25mA when chip selected, and 12mA when not selected); V<sub>GG</sub> = -30V (at 4mA) or +5V if reprogramming is not required and chip is to be used only in read mode; and V<sub>SS</sub> = +5V (at 31mA when chip selected, and 11.5mA when not selected). Complete address decoding is performed on-chip and there is a chip-enable input for memory expansion.

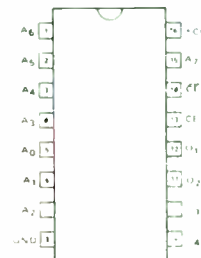


The mode control pins CO, C1 may be set to put the IC into one of four modes: block erase-erases entire IC; word erase-data at addressed location is erased; read mode; write mode. It is recommended that when power is connected to the chip V<sub>SS</sub> is connected before V<sub>GG</sub> and when power is disconnected V<sub>GG</sub> is removed before V<sub>SS</sub> is removed. Note that the IC may be permanently damaged if after a write or erase word cycle there is no dummy read operation or this cycle is significantly delayed.

Order As WQ27E (ER3401)

**82S126M1 PRE-PROGRAMMED PROM**

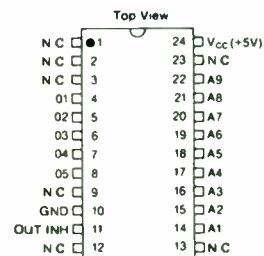
A 1024-bit pre-programmed programmable read only memory organised as 256 x 4-bit words. The IC operates from a +5V supply at about 105mA. The IC is preprogrammed with Maplin programme M1 for use in our TV interface and ASCII keyboard project.



Order As YH52G (82S126M1)

**RO-3-2513 CHARACTER GENERATOR ROM**

A 2560-bit read only memory (ROM) organised as 512 x 5-bit words, preprogrammed to give 64 characters of the ASCII code on a 5 x 7 dot matrix. Access time is <450ns and the chip requires a single +5V supply at 25mA approx. The IC has static operation and the outputs are 3-state. Inputs and outputs are TTL compatible and an output inhibit pin is provided for simple memory expansion. The IC is ideally suited for use in high speed raster scan CRT displays.



Order As WQ59P (RO-3-2513)

**MCM6830L7 MIKBUG / MINIBUG ROM**

An 8192-bit read only memory mask programmed with the Motorola Mikbug/Minibug programme. The IC is organised as 1024 x 8-bit words, operates from a single +5V supply and has a max. access time of 500ns. The outputs are 3-state and there are four chip-enable inputs for ease of memory extension.

**Pin Functions**

- 1 Ground
- 2 to 9 D0 to D7 respectively
- 10 CS1 (Chip-enable active high)
- 11 CS0 (Chip-enable active high)
- 12 +5V
- 13 & 14 CS2 & 3 respectively (Chip-enable inputs, active high)
- 15 to 24 A9 to A0 respectively.

The IC provides the user with an asynchronous communications programme ideal for use with keyboard inputs, and outputs which could be to an eight digit seven-segment display for example. The IC also contains a loader programme and a diagnostic programme for use with MC6800 or MC6802 MPU's. The programme is split into three parts; Mikbug which is a 512-byte programme whose main features are memory loader, print registers of target programme, print/punch dump, memory change, go to target programme, operates with PIA for the parallel-to-serial interface and restart/NMI/SWI interrupt vectors; Minibug which is a 256 byte programme whose main features are memory loader, memory change, print registers of target programme, go to target programme, assumes a UART for the parallel-to-serial interface; and a 256-byte test programme.

Order As WQ47B (MCM6830L7)



## MICROPROCESSOR SUPPORT LITERATURE

### M6800 Microprocessor Applications Manual

A 700 page book discussing all aspects of the M6800 system from components to programming and applications.

Order As RQ49D (M6800 Applications)

### M6800 Microcomputer System Design Data

Detailed technical specifications and data sheets for all semiconductor components in the M6800 series.

Order As RQ55K (M6800 Data)

### M6800 Programming Reference Manual

A 112 page book discussing all aspects of programming the M6800 and including a short description of firmware commands set.

Order As RQ56L (M6800 Programming)

### MC6850 Applications Information

Device operation and system implementation is described.

Order As RQ57M (MC6850 Applications)

### MC6875 Applications Information

Describes M6800 systems utilising the MC6875.

Order As RQ45Y (MC6875 Applications)

### 8080/8085 Assembly Language Users Manual

Order As RQ46A (8080 Assembly Language Manual)

### 8080 Microcomputer Systems Users Manual

Order As RQ47B (8080 Systems Manual).

### 8085 Microcomputer Systems Users Manual

Order As RQ48C (8085 Systems Manual)

### 8251 Applications Information

Order As RQ50E (8251 Applications)

### 8255A Applications Information

Order As RQ51F (8255 Applications)

### 8080 Introduction Brochure

Order As RQ52G (8080 Brochure)

### 8085 Introduction Brochure

Order As RQ53H (8085 Brochure)

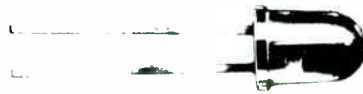
### Z80 IC's Data Sheets

A 77 page booklet containing data sheets for the five Z80 IC's.

Order As RQ54J (Z80 Data)

## LIGHT-EMITTING DIODES

### Sub-Miniature (TIL 209) Types



Available in three colours, Red, Green and Orange. Case size 3mm diameter (0.12in).

Colour	Cathode denoted by	Light output at $I_f = 20\text{mA}$	Forward voltage at $I_f = 20\text{mA}$
Red	Flat on package	500 $\mu\text{cd}$	1.6V
Green	Flat on package	1100 $\mu\text{cd}$	2.5V
Orange	Short lead	800 $\mu\text{cd}$	2V

Order As WL32K (TIL209 Red)  
 WL33L (TIL209 Green)  
 WL34M (TIL209 Orange)

### Standard Types

Available in four colours, Red, Green, Orange and Yellow. Case size standard 5mm diameter (0.2in).

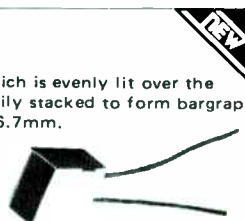
Colour	Cathode denoted by	Light output at $I_f = 20\text{mA}$	Forward voltage at $I_f = 20\text{mA}$
Red	Flat on package	2mcd	1.8V
Green	Flat on package	3mcd	2.2V
Orange	Flat on package	1.2mcd	2V
Yellow	Flat on package	10mcd	2.1V

Supplied complete with press-fit mounting clip. Cut-out required 0.25in diameter.

Order As WL27E (LED Red)  
 WL28F (LED Green)  
 WL29G (LED Orange)  
 WL30H (LED Yellow)

### Rectangular Type

A bright red rectangular shaped LED which is evenly lit over the area 5.6 x 3.2mm. The lamps may be easily stacked to form bargraph meters. Dimensions overall: 6.4 x 3.8 x 6.7mm. Cathode is denoted by the long lead. Light output at  $I_f = 20\text{mA}$ : 4 mcd. Forward voltage: 2V at  $I_f = 20\text{mA}$ .

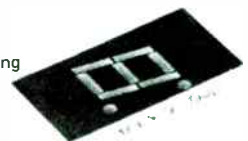


Order As QW96E (Square LED Red)

## SEVEN-SEGMENT LED DISPLAYS

### 0.3in Display

High brightness 0.3in LED display featuring highly legible, bold, solid segments, fast switching, low power consumption, and compatibility, with integrated circuits. Available in three types in Red only.



Type 1: Common anode, Right-hand decimal point.

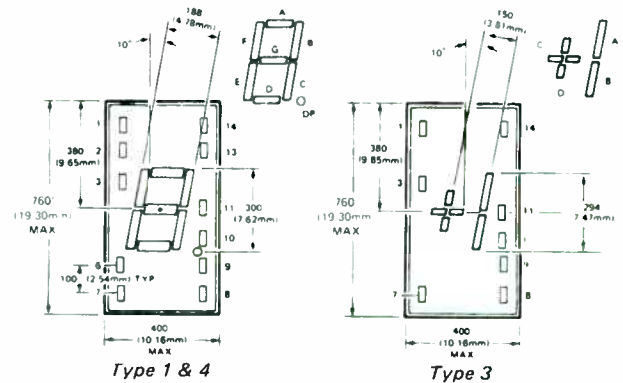
Luminous intensity: 300 $\mu\text{cd}$  at  $I_f = 20\text{mA}$  (per segment).

Forward voltage: 1.6V at  $I_f = 20\text{mA}$  (per segment).

Pins will fit a standard 14-pin DIL IC socket.

Type 3: Common anode, Overflow +1.

Type 4: Common cathode, Right-hand decimal point.



Pin No.	Type 1	Type 3	Type 4
1	Cathode A	Anode C,D	Anode F
2	Cathode F	No pin	Anode G
3	Anode*	Anode C,D	No pin
4	No pin	No pin	Cathode*
5	No pin	No pin	No pin
6	NC	No pin	Anode E
7	Cathode E	Cathode D	Anode D
8	Cathode D	Cathode C	Anode C
9	Cathode DP	NC	Anode DP
10	Cathode C	Cathode B	No pin
11	Cathode G	Cathode A	No pin
12	No pin	No pin	Cathode*
13	Cathode B	No pin	Anode B
14	Anode*	Anode A,B	Anode A

\*Signifies that the connection designated is internally connected to all other connections so noted.

Order As FR36P (7-Seg Red Type 1) FR37S (7-Seg Red Type 3)  
 FR38R (7-Seg Red Type 4)

**0.5in Display**

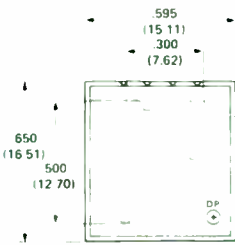
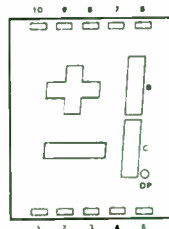
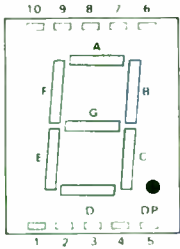
High brightness 0.5in LED display featuring highly legible, bold, solid segments, fast switching, low power consumption, and compatibility with integrated circuits.

Available in three types in Red only.

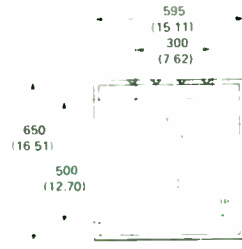
- Type 1: Common anode, Right-hand decimal point.
- Type 3: Common cathode, Overflow ±1.
- Type 4: Common cathode, Right-hand decimal point.

**Characteristics:**

Luminous intensity: 600µcd at I<sub>f</sub> = 20mA (per segment)  
 Forward voltage: 1.7V at I<sub>f</sub> = 20mA (per segment)



Type 1 & 4



Type 3

**Electrical Connections**

Pin No.	Type 1	Type 3	Type 4
1	Segment E	Minus	Segment E
2	Segment D	Cathode +	Segment D
3	Common Anode	Segment C	Common Cathode
4	Segment C	Cathode 1/DP	Segment C
5	DP	DP	DP
6	Segment B	Segment B	Segment B
7	Segment A	Cathode 1/DP	Segment A
8	Common Anode	Cathode +	Common Cathode
9	Segment F	Plus	Segment F
10	Segment G	No Connection	Segment G

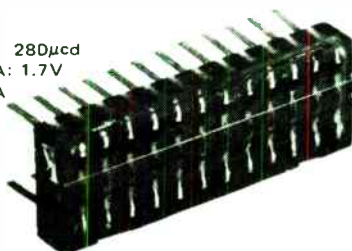
- Order As FR39N (½in. Display Type 1)
- FR40T (½in. Display Type 3)
- FR41U (½in. Display Type 4)

**BARGRAPH DISPLAY**

A 12-segment LED ladder encapsulated in a 24-pin package. Designed for use as solid state level indicators each LED is completely separate from the others in the package. The LED's are high brightness red with a wide viewing angle. Package size: 3D x 11 x 4mm. Pin spacing: 7 x 2.5mm.

**Ratings per LED**

Light output at I<sub>f</sub> = 20mA: 280µcd  
 Forward voltage at I<sub>f</sub> = 20mA: 1.7V  
 Max forward current: 20mA



Order As BY65V (Bargraph Display)

**MULTI-DIGIT DISPLAYS**

**Double Digit**

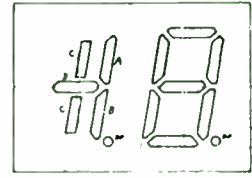
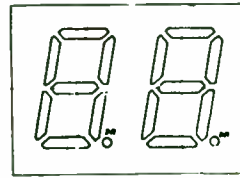
A red 2-digit display available in four types. Digits are 0.6 in. high with high contrast and wide viewing angle. All types have right-hand decimal point.

**Ratings per segment**

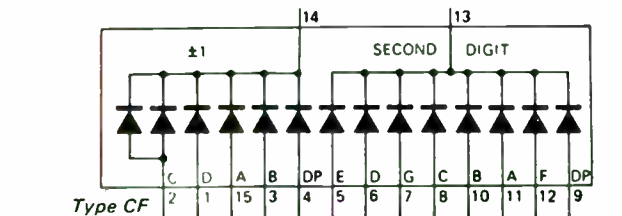
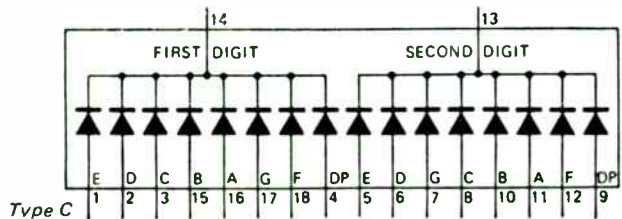
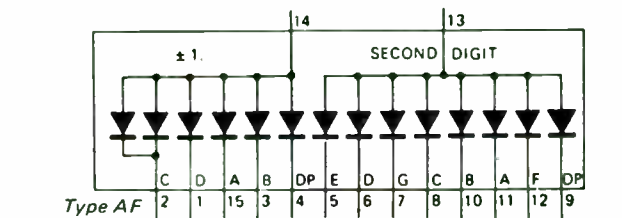
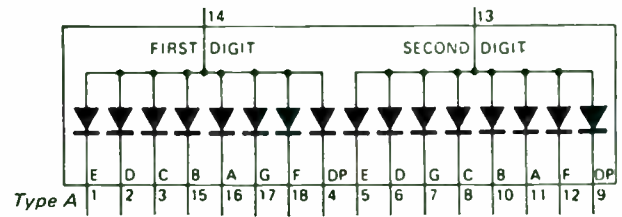
Luminous intensity at I<sub>f</sub> = 10mA: 200µcd  
 Forward voltage at I<sub>f</sub> = 10mA: 1.7V  
 Max forward current: 20mA

- Type 'A': 2-digit (8.8) Common anode
- Type 'AF': 1½-digit (±1.8) Common anode
- Type 'C': 2-digit (8.8) Common cathode
- Type 'CF': 1½-digit (±1.8) Common cathode

Overall dimensions: 3D x 22 x 8.5mm  
 Pin spacing: 18 x 2.5mm



**Electrical Connections**

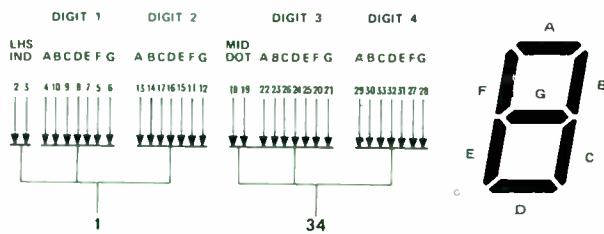
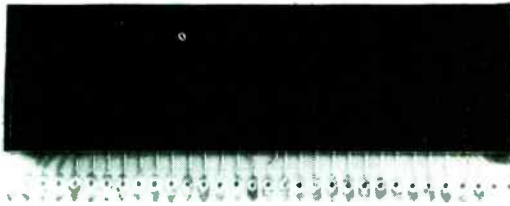


These displays may be used with direct drive or multiplexing type drivers.

- Order As BY66W (DD Display Type A)
- BY67X (DD Display Type AF)
- BY68Y (DD Display Type C)
- BY69A (DD Display Type CF)

**Four Digit Direct Drive**

A red four digit display suitable for direct drive only, and available in common anode and common cathode. Digits are 0.6 in high with high contrast and wide viewing angle. Has two additional indicators for e.g. AM and PM.



**Ratings per segment**  
 Luminous intensity at  $I_f = 10\text{mA}$  : 200 $\mu\text{cd}$   
 Forward voltage at  $I_f = 10\text{mA}$ : 1.7V  
 Max forward current : 20mA

Overall dimensions: 89 x 33 x 7.5mm  
 Front face: 78 x 23mm

Order As **XX08J** (4-Digit Display Common Cathode)  
**BY70M** (4-Digit Display Common Anode)

**Four Digit Multiplex**

A red four digit display suitable for multiplex drive only. The display requires a red filter for high contrast. Available only in common cathode type. Digits are 0.5 in high and the display has four additional indicators for e.g. AM, PM, alarm set etc.

**Ratings per segment**  
 Luminous intensity at  $I_f = 10\text{mA}$ : 800 $\mu\text{cd}$   
 Forward voltage at  $I_f = 20\text{mA}$ : 1.8V  
 Max forward current: 30mA

Overall dimensions: 81 x 33 x 8mm  
 Front face: 81 x 16.5mm



**Electrical Connections**

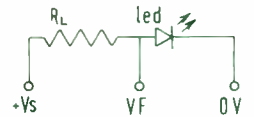
- Pin
- 1 Anode top left indicator
  - 2 Anode centre left indicator
  - 3 Anode lower left indicator
  - 4 Cathode digit 1 and l/h indicators
  - 5 Anode A
  - 6 Anode F
  - 7 Anode B
  - 8 Anode G
  - 9 Cathode digit 2 and colons
  - 10 Anode colon 1
  - 11 Anode colon 2
  - 12 Anode D
  - 13 Anode C
  - 14 Anode E
  - 15 Cathode digit 3
  - 16 Cathode digit 4 and r/h indicator
  - 17 Anode right-hand indicator



Order As **HQ36P** (Multiplex Common Cathode Display)

**Calculation of Series Resistor for LED's**

Connect a resistor in series with the LED. The correct resistance value is given by the formula:



$$R_L = \frac{V_s - V_f}{I_f} \quad \Omega \text{ (where } I_f \text{ is in Amps)}$$

where  $V_s$  is the applied voltage,  $V_f$  is the forward voltage shown in the tables above, and  $I_f$  is the forward current which gives the highest brightness at a safe dissipation and is approximately equal to 20mA (0.02A).

For AC operation connect a diode 1N4148 etc. in inverse parallel with the LED and halve the value of the resistor determined by the above formula.

**LED COVERS**

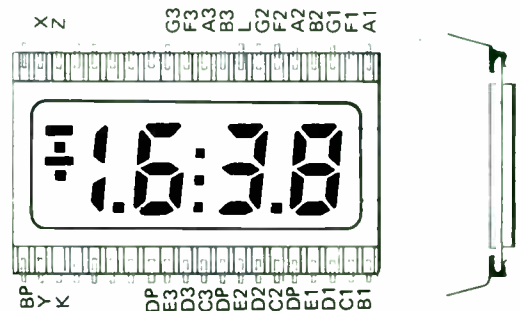


Attractive coloured covers for LED's which also serve to clip the LED on to the front panel. Suitable for use with 5mm dia. (0.2in.) LED's the covers increase the viewing angle up to 180° and give a finished appearance. The cover has a flat top marked with Fresnel rings and striated lines for maximum light dispersion. The covers simply clip into a 6.35mm (1/4in) panel cut-out and the LED then clips in from the rear. Suits panels 1.6mm to 3.2mm thick. Overall diameter: 7mm. Overall length: 11mm. Available in five colours: amber, clear, green, red and yellow.

Order As **YH53H** (Cliplite Amber) **YH56L** (Cliplite Red)  
**YH54J** (Cliplite Clear) **YH57M** (Cliplite Yellow)  
**YH55K** (Cliplite Green)

**LIQUID CRYSTAL DISPLAY**

A 3 1/2 digit field effect liquid crystal display suitable for use in panel meters, digital multimeters and 12-hour clocks. With all segments on the current is typically 10 $\mu\text{A}$  at 5V rms and the display is thus ideal for battery operation. The digits are 12.7mm (1/2in.) high and give a solid black appearance on a silvered, reflective background. The display has a centre colon for use in clocks, and decimal points, plus and minus signs and overflow indicator for use in panel meters. The device is supplied in a 40-pin DIL package 33 x 2.54 mm (1.3 x 0.1 in) spacing suitable for use with our Soldercon pins. The device is only guaranteed if it has not been soldered and the device will only be replaced for scratched front face if the protective coat has not been removed - (after checking that there is no damage the protective coat should be removed before use).



**Specification (at 25°C and 5Vrms)**

	Min	Typical	Max
Operating voltage ( $V_{rms}$ )	3	5	9
Allowable DC drive component (mV)			50
Operating frequency (Hz)	30	32	100
Current all segments on ( $\mu\text{A}$ )		2.5	5
Capacitance all segments on (pF)		500	1000
DC resistance all segments on (M $\Omega$ )	32	100	
Response time to 90% on (msec)		75	150
Decay time to 10% on (msec)		150	300
Contrast ratio		20:1	
Operating temperature range (°C)	-15	25	55
Viewing angle at 4Vrms		45°	
5Vrms		60°	
6Vrms		75°	
Expected life (hours)		50,000	

Overall dimensions: 51 x 30.5 x 3.5mm (Pin length: 6.4mm)

Order As **FY89W** (Liquid Crystal Display)



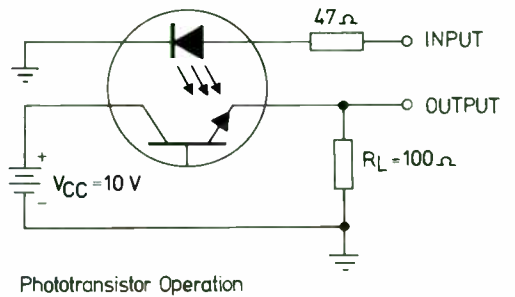
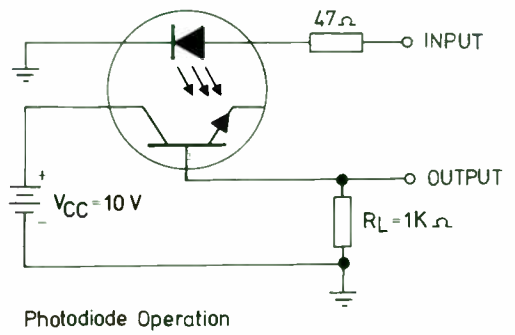
**OPTO-ISOLATORS**

Optically coupled isolators in 6-pin DIL packages. TIL 111 contains a gallium arsenide LED and an NPN silicon phototransistor and TIL113 contains a gallium arsenide LED and an NPN silicon photo-darlington. Both types are pin for pin compatible and a base lead is provided so that the device may be biased in the conventional manner.

Absolute maximum ratings:	TIL111	TIL113
Input to output voltage:	1500V	1500V
Collector-Base voltage (V <sub>CBO</sub> )	70V	30V
Collector-Emitter voltage (V <sub>CEO</sub> )	30V	30V
Emitter-Base voltage (V <sub>EBO</sub> )	7V	7V
Input-diode reverse voltage	3V	3V
Input-diode continuous forward current	100mA	100mA
Continuous power dissipation		
LED	150mW	150mW
Phototransistor	150mW	150mW
Total	250mW	250mW

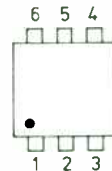
**Electrical characteristics**

Input-diode static reverse current (@ V <sub>R</sub> = 3V)	<10μA	<10μA
On-state collector current (V <sub>CE</sub> = 0.4V, I <sub>F</sub> = 16mA)	7mA (typical)	100mA (typical)
Phototransistor operation (I <sub>B</sub> = 0)	7mA (typical)	100mA (typical)
Photodiode operation (I <sub>E</sub> = 0)	20μA (typical)	
Off-state collector current (V <sub>CE</sub> = 10V, I <sub>F</sub> = 0)	1nA (typical)	100nA (typical)
Phototransistor operation (I <sub>B</sub> = 0)	1nA (typical)	100nA (typical)
Photodiode operation (I <sub>E</sub> = 0)	0.1nA (typical)	
h <sub>FE</sub> (V <sub>CE</sub> = 5V, I <sub>C</sub> = 10mA, I <sub>F</sub> = 0)	300 (typical)	15,000 (typical)
Input-diode static forward voltage (V <sub>F</sub> )	1.2V	1.5V
Collector-emitter saturation voltage (I <sub>C</sub> = 2mA, I <sub>F</sub> = 16mA, I <sub>B</sub> = 0)	0.25V	1V
Input to output resistor (diode-leads-shorted to transistor-leads-shorted at V <sub>in</sub> to V <sub>out</sub> = 1.5kV)	10 <sup>11</sup> Ω	10 <sup>11</sup> Ω
Input to output capacitance	1pF	1pF
Max operating frequency		
phototransistor operation	>125kHz	>10kHz
photodiode operation	>250kHz	
Min transfer ratio	13%	300%



**Pin connections**

- 1 Anode
- 2 Cathode
- 3 No connection
- 4 Emitter
- 5 Collector
- 6 Base



Order As **WL35Q** (Opto-Isolator)  
**WQ70M** (Darlington Isolator)

**SOLAR CELL MS4A**

A silicon photo-voltaic cell size 5.26 x 6.35mm coated with a tough varnish to protect the junction structure. Output current: 3mA into 100Ω at 3000 lumens per sq. ft. Open circuit voltage at 3000 lumens per sq. ft.: 500mV. Typical short circuit current at 3000 lumens per sq. ft. 5mA. Picture shows sensitive surface which is the negative.



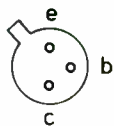
Order As **BL23A** (Solar Cell MS4A)

**PHOTOTRANSISTOR BPX 25**

A high sensitivity silicon planar NPN phototransistor for general purpose use. Top of package (TO 18) is lensed.

**Absolute maximum ratings**

V <sub>CBO</sub>	32V
V <sub>CEO</sub>	32V
V <sub>EBO</sub>	5V
I <sub>C</sub>	100mA
P <sub>TOT</sub>	300mW



**Electrical characteristics (open-circuit base, except for h<sub>FE</sub>) (typical)**

Light current (V <sub>CE</sub> = 6V, @ 1000 lux)	13mA
Dark current (V <sub>CE</sub> = 24V)	100nA
h <sub>FE</sub> (V <sub>CE</sub> = 6V, I <sub>C</sub> = 2mA)	500
Peak spectral response	800nm
Cut-off frequency (note 1)	200kHz

Note 1: Improved switching times can be obtained by connecting the base lead to give a quiescent bias current.

Order As **QF30H** (BPX 25)

**PHOTO-DARLINGTON TRANSISTOR MEL 12**

A very high sensitivity silicon planar NPN photo-darlington transistor featuring a very high light current and low dark current.

**Absolute maximum ratings**

V <sub>CBO</sub>	60V
V <sub>CEO</sub>	40V
V <sub>EBO</sub>	10V
I <sub>C</sub>	150mA
P <sub>TOT</sub>	200mW



**Electrical characteristics (open-circuit base, except for h<sub>FE</sub>) (typical).**

Light current (V <sub>CE</sub> = 5V @ H = 2mW/cm <sup>2</sup> ):	3mA
Dark current (V <sub>CE</sub> = 5V)	100nA

Order As **HQ61R** (MEL 12)

**LENS**

A 1in focal length semi-precision glass lens. Size: 9.1mm dia.

Order As **HQ63T** (Lens)

**LENSHOLDER**

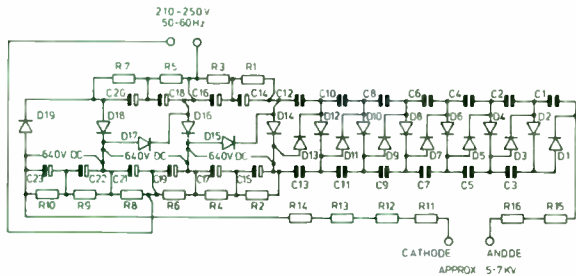
A black anodised aluminium lensholder, drilled to accept our 9mm. Lens in one end and photodarlington MEL12 in the other end. Outside dia. 12.7mm.



Order As **HQ64U** (Lensholder)

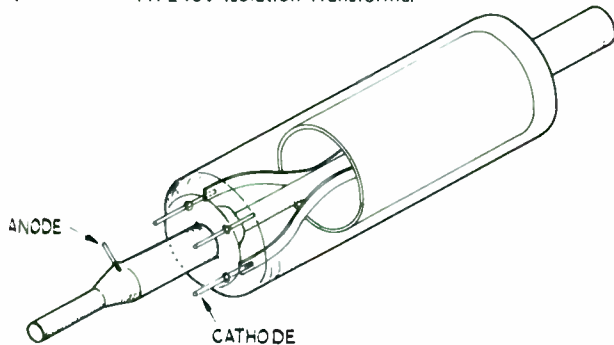
## LASER TUBE

A helium-neon laser tube having a typical power of 0.5mW. The laser is being stocked to complement the book "How to build a low-cost laser" described in the book section (page 198). However, the laser described in the book is somewhat old-fashioned and we are supplying a more modern type. The only practical difference is that the power supply shown in the book is not suitable for use with this laser. We have available a suitable pcb and circuit to drive this tube.



The parts required for the power supply are as follows:

- C1 to 13 1000V Disc 4700pF (13 off)
- C14 to 23 Axial 10  $\mu$ F 500V (10 off)
- R1 to 10 Std Res 1M (10 off)
- R11 to 16 1W Res 33k (6 off)
- D1 to 19 1N4007 (19 off)
- 1 5kV Laser PSU PCB
- 1m EHT wire
- 1 TR 240V Isolation Transformer



The laser emits randomly polarised red light at 632.8nm wavelength, and at a power which makes it completely safe provided that you do not stare directly into the beam, when retinal damage may result. Therefore never use in the presence of children unless a diverging lens is fitted in the beam. This laser is incapable of burning, cutting or drilling and may be directed at the skin when no harm whatsoever will result.

The lasers are supplied with a one year guarantee, provided that they are operated for at least 24 hours per month. The more they are used, the longer they will last. If they are left unoperated for long periods, they will cease to function.

The laser is capable of making small holograms when used as directed in the book mentioned above. It is also ideal for use in school physics laboratories, where many of the properties of light may be demonstrated with the laser.

### Specifications:

Typical power	0.5mW
Power min/max	0.3 to 1mW
Length x diameter	186 x 28mm
Beam exit diameter	0.53mm
Full angle divergence	1.5mRad max. (4.4 minutes of arc)
Starting Voltage	5kV DC
Operating Voltage	1.5kV DC including ballast resistor
Ballast resistor	100k $\Omega$
Power consumption	9W
Wavelength	632.8nm (red light at $4.7 \times 10^{14}$ Hz)
Operating mode	TEM <sub>00</sub> (Gaussian intensity distribution)

Order As XL11M (Laser Tube)

### 5kV Laser PSU PCB

A fibre glass board. Size 200 x 102mm

Order As HY19V (5kV Laser PCB)

## DISPLAY FILTERS

Anti-reflection filters for data displays which greatly improve the contrast. Suitable for use with LED displays, incandescent filament displays, neon gas discharge displays and gas discharge displays. For optimum effectiveness use the filter whose colour is as close as possible to that of the display.

Sold only in pieces 105 x 35 x 0.76mm in four colours. Suits up to eight  $\frac{1}{2}$  in. displays or up to six  $\frac{1}{2}$  in. displays, but may be cut with scissors to size required. Available in Amber, Green, Red and Yellow.

- Order As FR32K (Filter Amber)
- FR33L (Filter Green)
- FR34M (Filter Red)
- FR35Q (Filter Yellow)

## FIBRE OPTIC LIGHT GUIDE

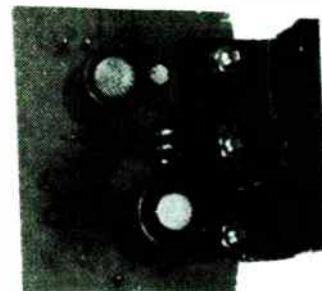
A rugged polymethyl methacrylate fibre with a polymer cladding which may be bent and handled in the same way as insulated wires without damage. Ideal for use in equipment to provide several light sources possibly in confined spaces from a single lamp some distance away. The fibre as supplied has a roughly cut end and this should be cleanly sliced off using a razor blade or very sharp knife. Light transmission can be increased by typically 33% by polishing the ends of the fibre after cutting.

Fibre diameter:	1mm (0.04 in)
Refractive index:	1.49
Nominal aperture:	0.53
Acceptance angle:	$\pm 32^\circ$ max
Transmission attenuation:	1.2dB/m (20-25% per metre)
Spectral response (3dB):	385 to 880nm
Temperature range:	-40°C to +80°C
Flammability:	Supports combustion 75mm per minute
Bending:	Min radius 20mm
Chemical resistance:	Attacked by organic solvents.

Sold in continuous lengths in multiples of  $\frac{1}{2}$  metre.  
Max length in one piece 100m.

Order As XR56L (1mm Light Guide)

## 8W AMPLIFIER



A hi-fi 8W amplifier based on the LM383 power amp IC, on page 237. In addition to the parts shown there one 8W Hi-Fi Heatsink is also required (see page 145).

### Printed Circuit Board

A printed circuit board is available for use with this project.

Order As BY73Q (8W Amp PCB)

### Kit

A complete kit of parts for this project offering a saving over buying all the parts separately.

Order As LW36P (8W Amp Kit)

**THE POWER AMP WITH THE BEAUTIFUL SOUND**

A superb quality 50W power amplifier. We threw away all our technical specification handbooks and designed an amp that just sounded musically perfect. When we'd finished we found that we'd got a pretty impressive technical spec as well!

**Power Output:** with 4-way supply shown and extra heatsink!  
 One channel: 450mV in, 1kHz, 8 $\Omega$  load 450mV in, 50W RMS  
 4 $\Omega$  load 900mV in, 72W RMS  
 Two channels: 450mV in, 1kHz, 8 $\Omega$  load, 60W RMS  
 4 $\Omega$  load, 49W RMS

**Frequency Response:**  
 Full power bandwidth: 20Hz to 28kHz Flat  
 6dB down at 95kHz

(\* Pulse tested only)

Noise: 100dB with 4-way supply shown, -110dB on standard power supply  
 Total Harmonic Distortion: < 0.05% at 1kHz  
 Overall size: 6.4 x 4.4 x 15.5 cm (1.5 x 1.1 x 6.1 in)  
 Unconditionally stable  
 Damping factor: 200  
 Input impedance: 15k $\Omega$   
 Slew rate: 14V/ $\mu$ s (10kHz)  
 Settling time with 1 $\mu$ F load in parallel with 8 $\Omega$  5 $\mu$ s (simulated electrostatic speaker)

The amplifier is unconditionally stable into any load and is short circuit protected. The current limit circuitry is designed in such a way that it does not restrict the excellent transient performance. The innovative total class AB driver stage allows unmatched transistors to be used yet gives undetectable crossover distortion. We recommend this amplifier for use with our organs, rhythm generators, synthesiser, piano etc. and for use as a top quality high fidelity amplifier.

**Parts list for one amp (Double everything for stereo pair)**

- |              |   |           |                                   |
|--------------|---|-----------|-----------------------------------|
| R1           | Min Res 22k   | C1        | Ceramic 47pF                      |
| R2,4         | Min Res 2k2   | C4        | Axial 470 $\mu$ F 16V             |
| R3           | Min Res 4k7   | C5        | Ceramic 100pF                     |
| R5           | Std Res 18k   | C6        | Axial 1 $\mu$ F 63V               |
| R6           | Min Res 220 $\Omega$  | C7,8      | Polystyrene 1000pF                |
| R7           | Min Res 10k   | C9        | Polyester 0.1 $\mu$ F             |
| R8           | Min Res 1k  | C10,11,12 | Axial 2.2 $\mu$ F 63V             |
| R9           | Min Res 470 $\Omega$  | Q1,2,3    | ZTX104                            |
| R10          | Min Res 8k2   | Q4        | BC161                             |
| R11          | Min Res 189   | Q5        | BC141                             |
| R12          | Horiz S-Min Preset 2k2  | Q6        | BC102L                            |
| R13          | Min Res 820 $\Omega$  | Q7        | BD149                             |
| R14,17       | Std Res 100 $\Omega$  | Q8        | BD140                             |
| R15,16       | Std Res 120 $\Omega$  | Q9,11     | 10T12                             |
| R18,19       | W.W Min 120 $\Omega$  | Q10,12    | 10T11                             |
| R20,21,23,24 | W.W Min 0.47 $\Omega$   | ZD1       | H/V61GAV                          |
| R22          | W.W Min 10 $\Omega$   | L1        | Chassis F.H. 20mm<br>Fuse 20mm 2A |
| C1           | Axial 10 $\mu$ F 63V  |           |                                   |
| C2           | Ceramic 220pF   |           |                                   |
| F1           | 15 x 18 turns of 24 swg enamelled copper wire wound on the body of a 1W Res 1k. |           |                                   |

**The following parts are also required**

- 1 50W Hi-Fi PCB
- 1 50W Hi-Fi Heatsink (ready drilled)
- 2 Heatsink Clip-On
- 2 Pins 2141 (pack of 30 only)
- 2 Kit 10126
- 4 Kit 10145
- 1m Systolex 2mm
- 1 Small Thermpath
- 9 Bolt 6BA 2mm (pack of 10 only)
- 9 Nut 6BA (pack of 10 only)
- 9 Shake 6BA (pack of 10 only)

Solder, strapping wire, Wire 10m for power supply connections, Min Screened for input, Zip wire for output to loudspeaker

**Note:** These latter two items are not included in the kit

**Power Supply**

- Parts List**
- C1,2 Can 4700 $\mu$ F 40V with Clip Can 15
  - D1-4 1N5402 (4 di) (Mono) KBPG606 (1 di) (Stereo)
  - T1 Tr 28V 1.5A
  - F1 F Holder 20
  - Fuse 20mm 1A
  - F2,3 Chassis F.H. 20mm
  - Fuse 20mm 2A (Mono) 4A (Stereo)
  - SW1 D2ST Switch e.g. Toggle SA
  - LPI Pan Neon (connected across primary of T1)

**Construction**

The pcb is printed with component designations. Fit the pins and wire-links to the board, then fit the remaining components except Q6 to Q12. Put the heatsinks on Q4,5. Bolt the main heatsink onto the top of the pcb and bolt fit Q6 to Q12. Cut suitable lengths of systoles and insulate the leads of the transistors. Smear the mica washers with thermpath, then bolt down the transistors. Form the leads of Q6 so that they hold the flat face of the transistor down touching the heatsink. Apply a blob of thermpath to the flat face of the transistor before fixing. If the additional Heatsink 2L is used it may be fixed with 2 self tapping No 6 x 1cm. Spread thermpath over the junction.

Build the power supply and connect all the power lines except HT2. Turn the preset R12 fully clockwise. Connect a milliammeter between HT2 on the pcb and HT2 at the power supply. Switch on and allow the amplifier to settle for about ten minutes. Then slowly turn R12 until the meter reads 20mA. Leave for a further ten minutes and readjust. Switch off. Disconnect the meter and link up HT2. Connect a voltmeter between 0V (1) and 0V (2) to check the offset voltage. The meter should read between +0.2V and -0.2V. If it does not fall between these outside limits switch off and swap Q1 with Q3 or Q2 with Q4. Repeat above test.

Connect a loudspeaker between 0V (1) and 0V (1). Apply a signal to the input and check that there is no audible distortion. The output sound should be clean and sharp with dynamic musical crescendos handled effortlessly. The amplifier may be used with the highest quality loudspeakers or studio monitors for superb natural sound reproduction.

When choosing a loudspeaker bear in mind that the amplifier is capable of producing transient peaks of power in excess of 100W anywhere in the audio frequency range from less than 20Hz to well over 20kHz. For normal domestic use it will be sufficient to bolt the 50W Hi-Fi Heatsink to the chassis in which the amp is built. For higher power use, fix a Heatsink 2L to the heatsink on the board.

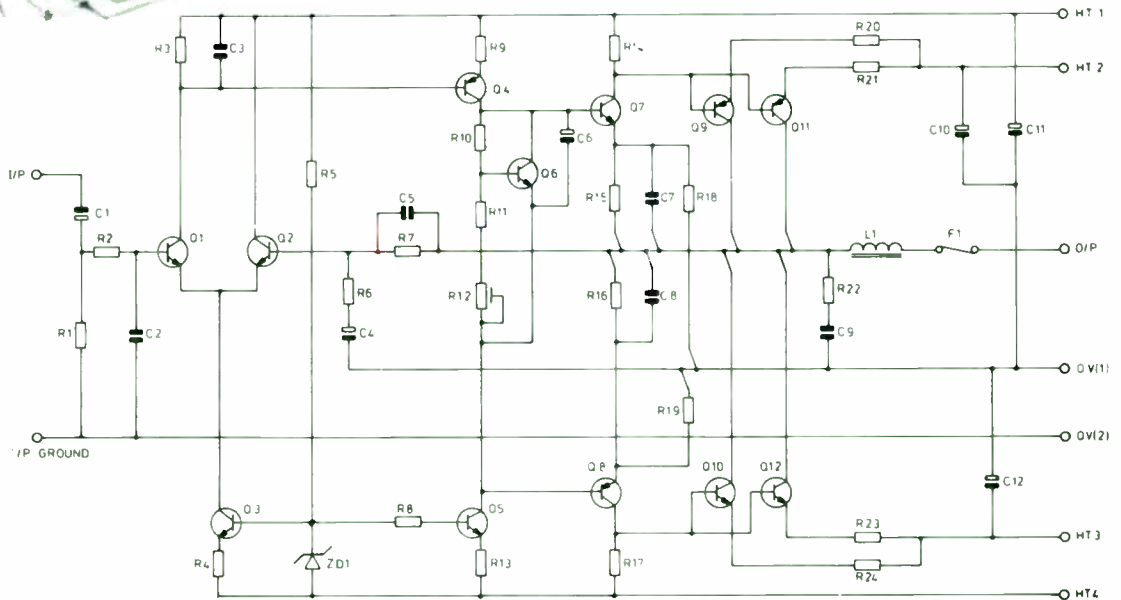
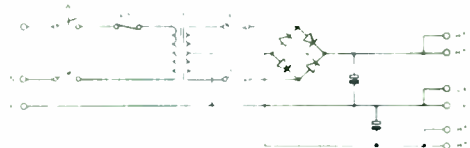
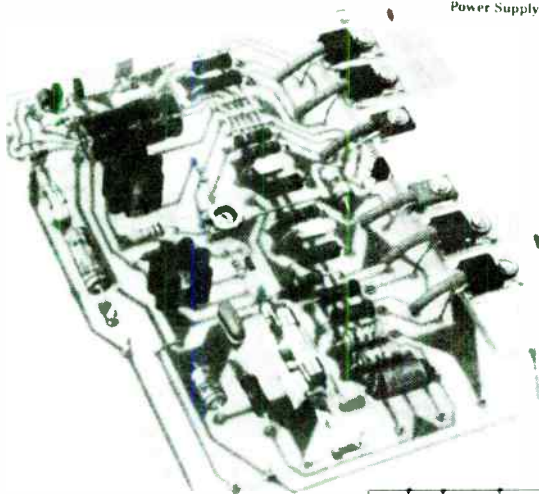
**Printed Circuit Board**

**Order As HQ68Y (50W Hi-Fi PCB)**

**Kit**

A complete kit of parts for this project offering a saving over buying all the parts separately.

**Order As LW35Q (50W Amp Kit)**



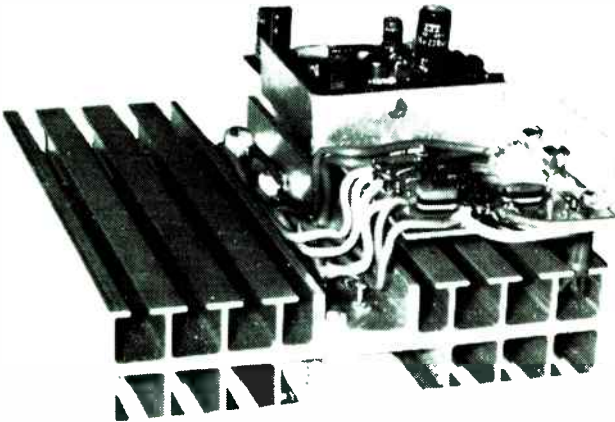


## 150W POWER AMP

A very high quality power amp capable of delivering 225W continuous RMS sine wave into a 4Ω load when used with the power supply shown. With two amps running on the power supply shown the output is reduced to 160W per channel. (Into 8Ω the amp delivers 146W (one only) or 112W with a stereo pair). The transient peaks can easily exceed 300W so you should have a bank of speakers capable of handling at least 400W with one amp and 4Ω impedance, 300W each with two amps and 4Ω impedance, 300W with one amp and 8Ω impedance and 200W each with two amps and 8Ω impedance.

### Specification

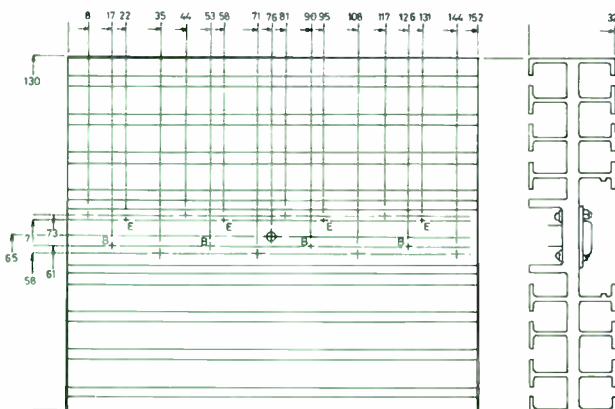
Output Power with 4Ω load both channels simultaneously:	160W rms continuous sine wave per channel
Frequency response:	30Hz to 20kHz (-1dB) 15Hz to 37kHz (-3dB)
Total harmonic distortion at 160W:	<0.1% at 1kHz
Damping factor:	80
Sensitivity for 160W into 4Ω:	1V rms



### Construction

Fit the components to the pcb as shown. Note that the clip-on heatsinks are required for Q3, 4 and 5 and the Heatsink DR2 for Q6 and 7. Drilling instructions for the Heatsink 6W-1 are shown. Q6 to 11 must be mounted using mica washers and silicone grease e.g. Thermpath. Ensure that all transistor mounting holes are deburred and rubbed down with a fine emery cloth as even the smallest metal filing may punch through the thin mica washer when the transistor is bolted up tightly, and this will damage several transistors.

The pcb is fixed to the heatsink using three 19mm stand-offs. These slot neatly into the vanes of the heatsink. Connections to the collectors of Q8, 9, 10 and 11 are made by means of solder tags mounted under the nuts. Link the tags in pairs and take the two wires through the 8mm (5/16 in.) hole in the centre of the transistors. Keep the connections between the output transistors and the pcb as short as possible and use 32/02 wire. The output is protected against short circuit by a 3A fuse fitted to the pcb.



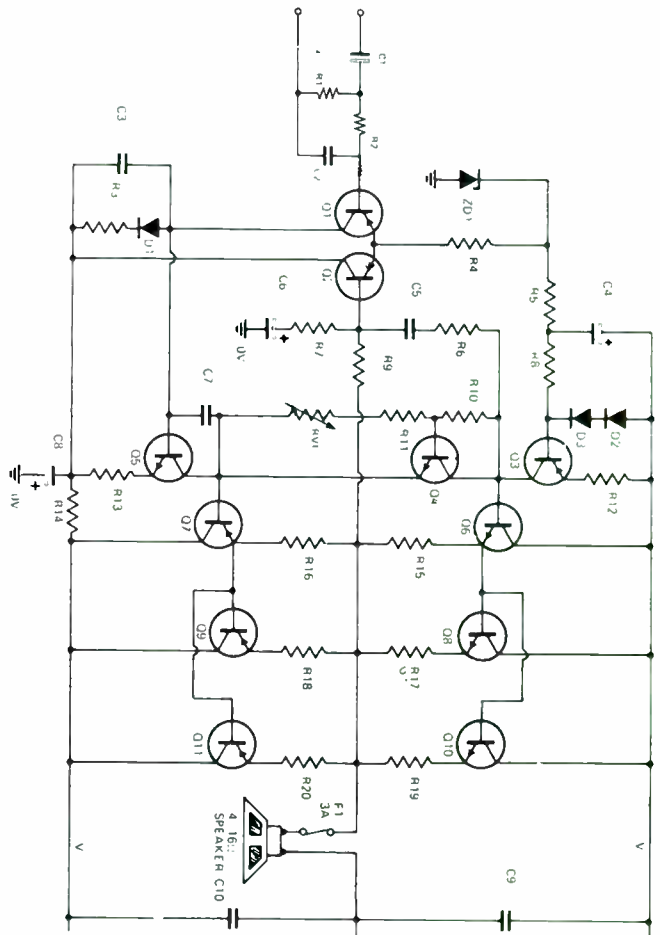
ALL DIMENSIONS IN MILLIMETRES  
 16 HOLES 5mm DIA +  
 1 HOLE 8mm DIA ⊕

Bolt down the power supply components — the bridge rectifier is best bolted to the side of the transformer chassis. Keep all the parts close together and keep all wires as short as possible. If you have two power amps run separate wires from the power supply to each amp individually. The OV return from the loudspeaker(s) should be brought to the OV link on the capacitors C6 and C7 and not taken to the pcb. The OV to the pcb(s) should be taken from this point also.

Before connecting the plus and minus supplies to the amp switch on the power supply and measure the voltage between FS2,3 and OV. It should be between +50V and +55V approx. And the voltage between FS4,5 and OV should be between -50V and -55V approx. (Measure on a DC voltage range). If all is well switch off and connect the power supplies to the amp(s). Remove FS2 (FS3 for second amp) and connect a milliammeter in its place. Turn VR1 to its centre position. Switch on and if the current exceeds 250mA switch off again immediately.

Check for short circuits, but if none can be found, the most likely cause is an earth loop. Before switching on again check that all the fuses are intact. Never switch on if any one or more of the fuses has blown. If all is well, however, adjust VR1 until the current reads about 70mA. Allow the amp to warm up for about 15 minutes until the current stops increasing then readjust for 75mA. Switch off, reconnect the fuse, switch the multimeter to a low DC volts range, switch on again and measure the voltage between the loudspeaker output and OV. This voltage should not exceed plus or minus 0.2V.

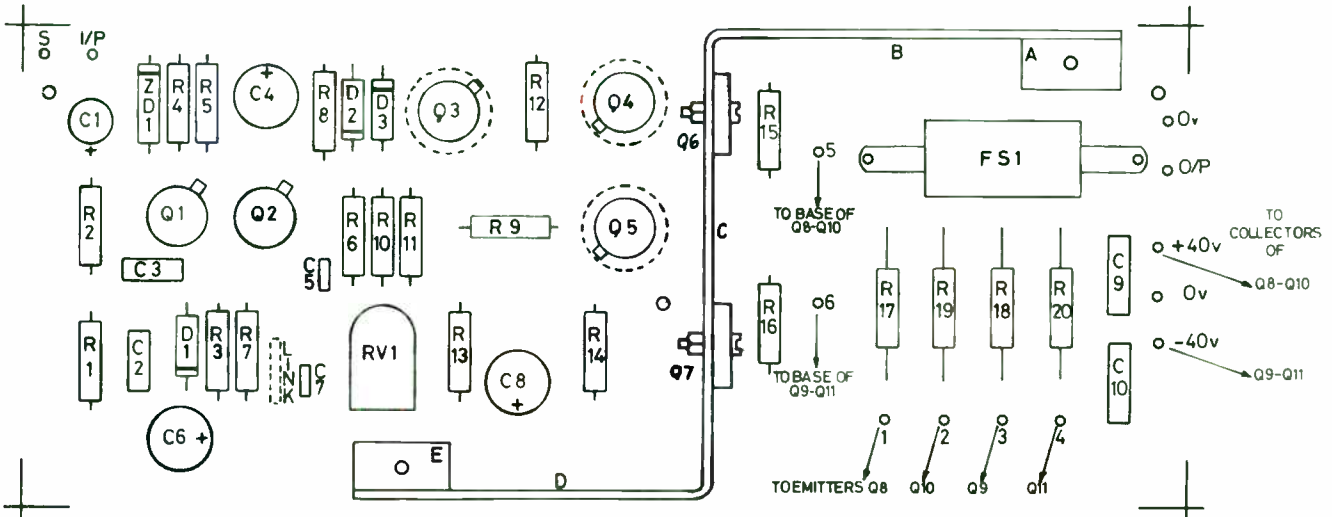
Use a heavy wire for connection to the loudspeakers bearing in mind that the transient peaks to the speakers can exceed 8 Amps.



Continued on next page

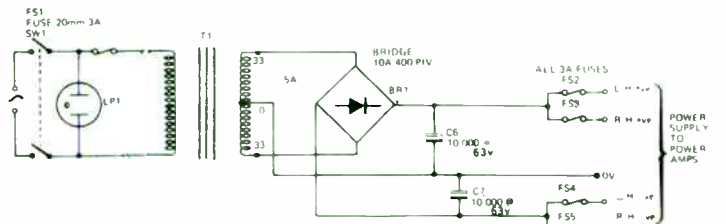
**Parts List for One Amplifier**

R1 Std Res 3k9	R14 Std Res 33Ω	C9,10 Polyester 0.1μF	1 Chassis F/H 20mm
R2 Std Res 820Ω	R15 Std Res 47Ω	ZD1 BZX61 C15V	1 Fuse 20mm 3A
R3 Std Res 220Ω	R16 Std Res 47Ω	D1,2,3 1N4001	3 Stand-Off Long
R4 Std Res 2k2	R17, 18, 19, 20 W/W Min 0.27Ω	Q1,2,3 BFX30	3 Heatsink Clip-On
R5 Std Res 1k	RV1 Hor S-Min Preset 470Ω	Q4,5 2N1893	1 Heatsink 6W-1
R6 Std Res 220Ω	C1 PC Elect 4.7μF 63V	Q6 BD711	12 Bolt 6BA x 1/2in.
R7 Std Res 220Ω	C2 Ceramic 3900pF	Q7 BD712	12 Nut 6BA
R8 Std Res 1k	C3 Ceramic 1500pF	Q8 2N3055	2 Mounting Kits 'P' Plas
R9 Std Res 4k7	C4 PC Elect 220μF 16V	Q9 MJ2955	4 Mounting Kits TO3
R10 Std Res 2k2	C5 Ceramic 39pF	Q10 2N3055	4 Tag 6BA
R11 Std Res 820Ω	C6 PC Elect 220μF 16V	Q11 MJ2955	1 Heatsink DR2
R12 Std Res 68Ω	C7 Ceramic 33pF	1 100W Amp Board (see page 24)	Also required: Thermpath, Wire
R13 Std Res 100Ω	C8 PC Elect 47μF 63V	13 Veropins 2141	32/02, Hook-up Wire etc.



**Parts List Power Supply**

T1 Tr 32032/6 1/2A	2 Bolt 4BA x 1/2in
BR1 Bridge JO2	1 Nut 2BA
C6,7 Can 10,000μF 63V	1 Transformer Mounting Plate
FS1,2,3,4,5 Fuse 20mm 3A (only 3 required for mono)	1 Bolt 2BA x 1in.
4 Chassis F/H 20mm (only 2 required for mono)	2 Nut 4BA
1 Safuseholder 20mm	
1 Square Neon	
1 Rocker Sw DP	
2 Clip Can 50	
9 Bolt 2BA x 1in.	



**150W Power Amp Kit**

A kit of parts to build a mono amp, offering a saving over buying all the parts separately.

Order As LW32K (150W Power Amp Kit)

**MONITOR TIMER**

A very accurate timer that will switch mains appliances on and off again at preset times. A smart case is available fully punched and printed to which a double 13A socket outlet may be fitted so that appliances up to 1kW total (5A) may be transferred from normal mains outlets directly to the timer. Simply plug them into the timer and they will switch on and off at the times you have pre-set. In addition the timer functions as a normal 24-hour clock.

**Features:**

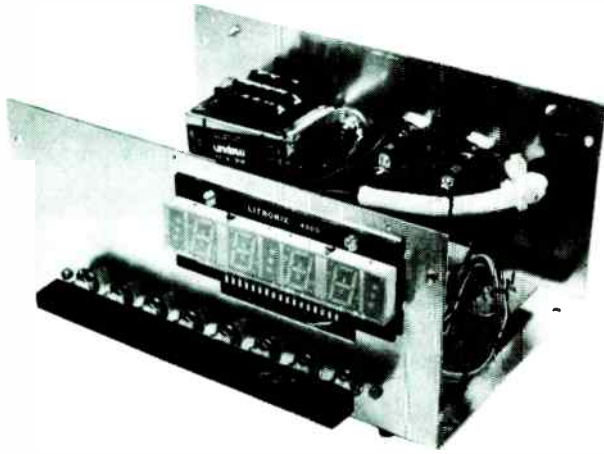
- High brightness 1/2in. red display.
- Very accurate to within a few seconds (depends on accuracy of mains frequency 50Hz).
- Two buttons must be locked in before main clock time can be reset which effectively stops misoperation by "little fingers".
- Repeat button allows timer to operate on and off once every day until cancelled.
- Dim display switches display off, but all timing functions continue.
- Any appliance connected to timer may be switched on and then off with each successive operation of "Test" button.
- Colon flashes once every second.
- LED's on display indicate whether on and/or off times are set.
- Relay to fit board will switch up to 8A total load (but ensure you



order suitable mains cable, that listed in parts list is suitable for 5A (1kW) load). Virtually any 12V relay will operate if wired in in place of relay specified. Designed to fit a smart wood-ended case which makes the timer very presentable for use with hi-fi units in the lounge.

*Continued on next page*

## MONITOR TIMER (continued from previous page)



### Construction:

Put the components on the pcb (except the switches) as indicated by the printed legend and solder. Take care to ensure that C2, D1, D2, BR1, IC1 and the transistors are all connected the right way round. Solder the 9 links on the pcb and put the 19 pins into the remaining holes and solder them. Cut the L/C wire into 16 equal lengths and wire up the display with 14 of them as shown in the circuit diagram.

On SW1, 2, 5 and 8, lift with a small screwdriver the rear of the link that comes from under the spring and hook it over the side of the switch. (Do not remove it altogether, leave the end under the spring in position.) Then slide the switches in their correct positions into the bracket with the fixing holes to the front. Bend over the four lugs to clamp the switches in position. Place the assembly on the pcb, insert the pins of the switches in the holes and solder. (If the bracket is supplied with an interlocking bar and return spring, these will not be required.)

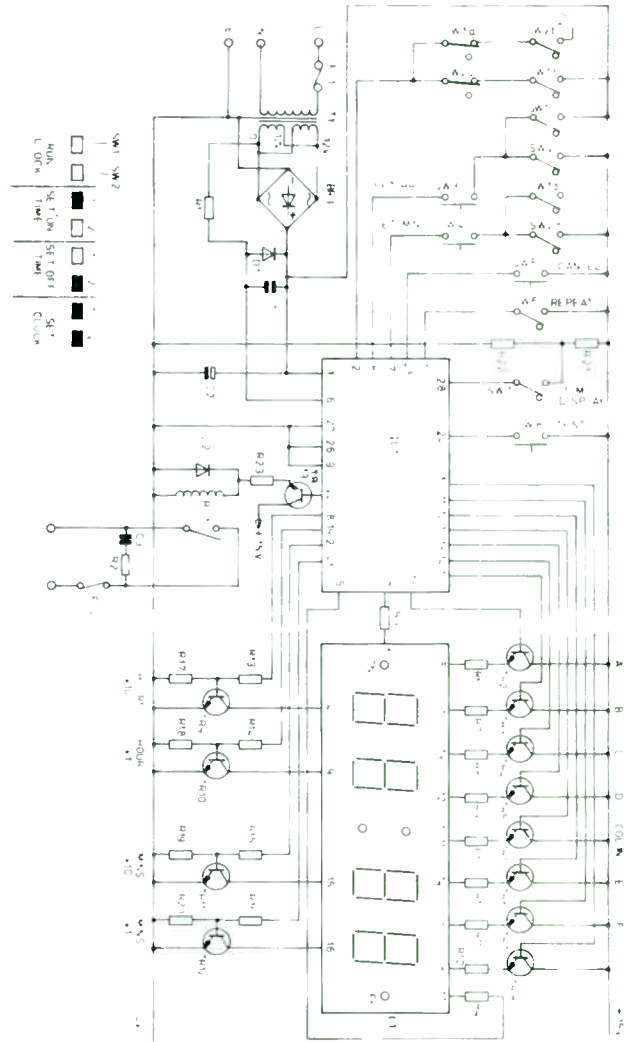
Bolt the transformer, fuseholders, pcb and display to the chassis and the socket outlet to the outer case. Put the tag on one of the transformer fixings. Cut about 250mm from the piece of mains cable and strip off the sheath. Allowing sufficient wire for the outer case to be easily removed, connect a piece of blue wire from N on the socket outlet to one of the top two tags on the transformer. Connect a short piece of brown wire from the end tag of FS1 to the other top tag on the transformer. Connect another piece of brown wire from the end tag of FS2 to one of the o/p pins on the pcb and another piece from the other O/P pin on the pcb to L on the socket outlet. Connect the side tags on the two fuseholders together with a piece of brown wire. Connect a piece of green/yellow wire between the earth tag and E on the pcb and another piece between the earth tag and E on the socket outlet. Connect the two remaining pieces of L/C Wire to the pins marked AC on the pcb and connect the other end of one to an end tag of the row of four tags on the transformer and link it to the next but one tag. Connect the other end of the other wire to one of the remaining two tags on the transformer and link it on to the last unused tag.

Put the grommet in the hole in the back, pull the mains cable through and tie a knot in it, such that when pulled from outside the case there will be no strain on the connections inside. Strip the end of the cable and connect the brown to the side tag of one of the fuseholders, the blue to the top tag on the transformer which already has a blue wire connected to it and the green/yellow to the earth tag.

Put the 1A fuse in FS1 and the 5A fuse in FS2 and switch on. Connect a voltmeter between IC1 pin 1 (positive) and IC1 pin 26 (negative) and check that the voltage is between 14 and 19 volts. The case may now be assembled, after carefully gluing the filter to it.

### Parts List

R1	Min Res 27k	The following parts are also required	1	DIL Socket 28-pin
R2	Std Res 1000 $\Omega$		1	Flat Head Self-tapping
R3 to 12	Min Res 1000 $\Omega$		6	3 Pin Latch contacts Black
R13 to 16	Min Res 68k		1	Clock Timer PCB
R17 to 20	Min Res 100k		1	Clock Timer Case
R21	Min Res 10k		1	Double Socket Outlet
R22	Min Res 100k		1	Unswitched Socket
R23	Min Res 33 $\Omega$		1	Filter Resistor
C1	Polyc 0.015 $\mu$ F		19	Pin 2145
C2	Avad 2200 $\mu$ F 25V		4m	L/C Wire
C3	Mix D 0.01 $\mu$ F 1000V		1	Grommet Small
D1	1N4149		2m	6/5 Mains Cable White
D2	1N921		4	Bolt 6BA x 1.0m
BR1	Br 3/16-3/16		4	Nut 6BA
TR1 to 12	Br 3/16		1	Cap 68VA
TR13	Br 3/16		2	Bolt 6BA x 1.0m
IC1	MS 71240		2	Nut 6BA
SW1 & 2	Latch Switch 4-pole		2	Strapping Wire 24swg
SW3 to 8	Latch Switch 2-pole		10	
L1	Multiplex Common Cathode Display			
L1	Min 1.42V			
RL1	Re Lay 117 12V			
FS1 & 2	Fuseholder 120mm 1.25A Fuse 200mm 1A FS2 Fuse 200mm 5A			



The following parts used in this project are not described elsewhere in this catalogue.

**Printed Circuit Board** Order As HY21X (Clock Timer PCB)

### Case

A very smart aluminium case fully punched and printed in black with wooden end cheeks to give a most pleasing appearance.

Order As LW30H (Clock Timer Case)

### Component Schedule

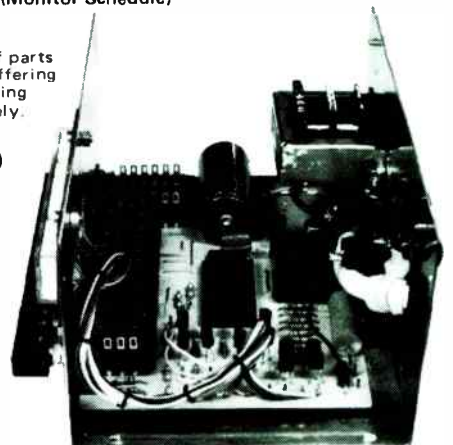
To help you order the correct parts for this project a component schedule/order form is available.

Order As XF32K (Monitor Schedule)

### Kit

A complete kit of parts for this project offering a saving over buying the parts separately.

Order As LW31J (Clock Timer Kit)





## MICHRON MK II DIGITAL CLOCK

### Features

- \* High brightness 4-digit 0.7 in. red LED display
- \* For simple clock operation module needs only transformer and two push switches to operate
- \* 24-hour alarm output drives audible alarm and/or radio
- \* 12 or 24 hour display with PM indicator in 12-hour mode
- \* Power failure indication
- \* Automatic changeover to battery during mains fail (battery not supplied in kit)
- \* Automatic brightness control facility
- \* Sleep timer
- \* Snooze timer
- \* Alarm 'on' indicator
- \* Set 'time' lockout to avoid accidental misoperation
- \* Seconds display
- \* 240V AC 50 or 60Hz operation
- \* Direct drive means no radio frequency interference
- \* Compact module
- \* Centre spot flashes once every second
- \* For alarm output just wire 8Ω speaker to module
- \* Separate setting of time, alarm time and sleep counter by fast and slow set controls
- \* Sleep counter set to 59 minutes in 'one-finger' operation



### MA1023 MODULE

The heart of our Michron Mk II is the MA1023 module which needs only the addition of the Clock Transformer and two push-buttons (Fast Set and Slow Set) to function. The circuit of our Michron Clock shown below is a typical application circuit.

### Pin Functions

- |                                     |   |
|-------------------------------------|---|
| 1 V <sub>LED</sub> : 4V AC at 125mA | 16 Alarm display switch                                     |
| 2 V <sub>LED</sub> : 4V AC at 125mA | 17 Sleep display switch                                     |
| 3 Standby battery +9V at 10mA       | 18 Alarm off switch   |
| 4 V <sub>AC</sub> : 9V AC at 10mA   | 19 Snooze switch  |
| 5 Standby oscillator preset         | 20 24-hour output   |
| 6 Brightness control                | 21 Sleep output   |
| 7 V <sub>SS</sub> : 0V              | 22 Negative radio supply                                    |
| 8 V <sub>SS</sub> : 0V              | 23 Positive radio supply                                    |
| 9 Colon control                     | 24 Alarm output for direct connection to radio audio stages |
| 10 50/60 Hz select                  | 25 Negative speaker output                                  |
| 11 12/24 hour select                | 26 Positive speaker output                                  |
| 12 Fast set switch                  | 27 V <sub>DD</sub>  |
| 13 Slow set switch                  | 28 V <sub>DD</sub>  |
| 14 Time set allow switch            |   |
| 15 Seconds display switch           |   |

Order As XL14Q (MA1023)

### Parts List

R1	Min Res 1k2	4	Washer 4BA
R2	Min Res 680 <sup>Ω</sup>	1	Tag 43A
VR1	Horiz S-Min Preset 1M	1	Poz1 Screw M2 6mm
IDR	RPY55A	1	6BA Spacer 0.25 in.
LS1	1/5 Lo-Z 388	1	Bolt 6BA 0.25 in.
T1	Clock Transformer	1	Nut 6BA
PB1 to 6	Click Switch	1	Washer 6BA
SW1 to 4	Sub-Min Slide	4	Nylon Washer 6BA
1	Michron Clock Mk II PCB	4	Self-Tapper No.4 x 1/2 in.
1	Module MA1023	1	Self-Tapper No.4 x 0.375 in. Countersunk
17	Pins 2145	1	Flat Sprung Clip 4BA
1	Jack Skt 3.5	2	Michron Mk II Clock Case
1	Clip PP3	1	Hook-up Wire
1	SR Grommet 5M-3	5m	Min Mains Cable
4	C/S Screw 4FA 1/2 in.	2m	Systoflex 2mm
4	Nut 4BA	50mm	

### Note

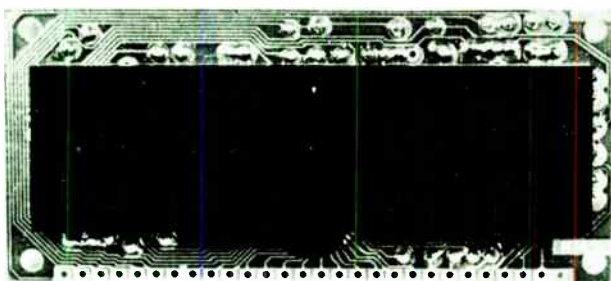
If you wish to operate a mains radio or other appliance up to 1kW you will require the following additional parts – and these are not included in the kit.

- 1 Axial 100μF 25V
  - 1 Open Relay 6V
  - 1 1N4001
- Plugs and sockets to suit (2-wire connection).

### Construction Details

Full construction details are given in our leaflet MES92.

Order As XF31J (Michron Mk II Leaflet)



The following parts used in this project are not shown elsewhere in this catalogue.

### Printed Circuit Board

Order As BY74R (Michron Mk II PCB)

### Clock Case

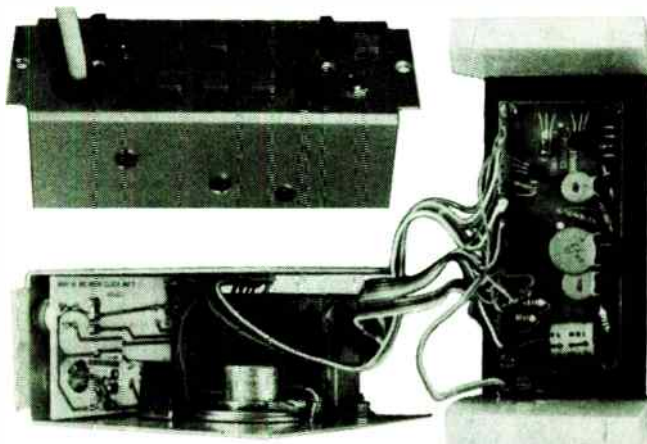
A very attractive case with 8mm thick polished white plastic sides and a 6mm thick transparent red viewing filter. The top, base and rear of the case is satin-brushed aluminium, fully punched and printed. The side pieces are angled slightly to tilt the face up a little.

Order As YB92A (Michron Mk II Case)

### Kit

A complete kit of parts for this project offering a saving over buying all the parts separately.

Order As LW37S (Michron Mk II Clock Kit)



## TRAIN CONTROLLER



### Features

- Proportional Speed Control for smooth train movements even at very low speeds
- Acceleration Control allows you to choose whether train goes from stationary to full speed over a long or short period, automatically.
- Deceleration Control allows you to bring train to a standstill quickly or slowly, automatically.
- Emergency Brake.
- Steam Boost applies full power to the track to get the engine moving if it gets stuck.
- Short Circuit Protection with overload indicator.
- Powerful output: 1.6A at 12V D.C.
- 15V AC Output to drive point motors, signals etc.
- 15V DC Output.

### Construction

Mount the components on the front panel of the case: VR3,4,5, N1, SW2,3,4 and D7,9 as shown in Fig. 2. Mount the components to the rear panel: the six terminal posts, F1, and the 4BA tag with nut, bolt and washer. Scratch off the orange paint so that the tag makes good contact with the metal panel.

Cut 1m off the mains cable and of the remaining 2m feed about 250mm into the box and clamp it with the grommet in the hole provided. Connect the brown to L, and the blue to N on VR5/SW1 and the green/yellow to the solder tag (E1). Keep the cable pushed well down to the rear of the case. Strip the outer sheath off about 1/2m of the 1m piece of mains cable and use 150mm of brown to connect the two points marked '7' in Fig 2; use 100mm of blue to connect the two points marked '9'; and 200mm of brown to connect the two points marked '8'.

Mount the transformer on the base plate with tags 31 and 32 facing inwards and secure with the two 2BA nuts, bolts and washers. Fit the 2BA solder tag to the more central bolt. Connect the remaining 1/2m of mains cable between the two points marked 10 (blue wire) and 11 (brown wire). Cut the green/yellow off at both ends.

Use 250mm of hook-up wire to connect the two points marked 5 in Fig. 2, a similar length for points 6, and about 25mm to link pins 1 to 6 and pins 3 to 4 on SW3. Also with bare wire make the links on SW2 (pins 2 to 5), VR3 and VR4 as shown in Fig. 2. Cut four pieces of hook-up wire and connect together the points marked 1 then 2 then 5 and then 6 as shown in Fig. 2.

Fit and solder the 24 pins to the pcb in the holes numbered 1 to 21 and TR4 e,b,c. Fit and solder the two dual-in-line sockets and then the rest of the components taking great care to correctly orientate C1, 2 and 9, and the diodes and transistors. Plug in the two IC's being careful not to touch the pins and ensuring that they are the right way round. Bolt the pcb to the base component side up with three 4BA nuts, bolts, spacers and washers and at the same time bolt the four feet to the base with four 4BA nuts, bolts and washers (put the washers inside the feet). Check to ensure that the feet mounting bolts do not touch the pcb.

Smear the mica washer rear of Q4 and the case (after scratching off any paint and rubbing down with emery cloth) with silicone grease (e.g. Thermpath), then bolt Q4 to the base with the 6BA nut,

bolt and washer. With short pieces of hook-up wire connect the pins to the points marked Q4 e,c,b on the pcb — e to e, c to c and b to b.

With pieces of hook-up wire connect each of the pins on the pcb using the numbers outside the rectangular box to find its destination (i.e. 3 to 3 and so on). Note that pcb pins 6 (E2, E3), 13(20, 21), 14(26, 33), 15(19,21) and 19(13, 15) are connected to two places with one wire to each. Make all these wires up into cable forms (as shown in the photographs) running them around the edges of the box. Finally insulate tags 10 and 11 on the mains transformer, and the tags on SW1, N1 and F1 with insulating tape.

The unit can be set-up with or without a voltmeter. First here is the setting-up procedure with a voltmeter. Switch speed control to "off", forward/reverse switch to forward and turn acceleration and deceleration controls fully anticlockwise. Insert FS1, connect unit to mains and switch speed control to "on", and then to position 1. If the emergency brake light glows, press SW2 to extinguish.

Turn the voltmeter to AC volts and check that there is 15V between terminal posts 1 and 2. Turn the voltmeter to DC volts and check that there is 15V DC between posts 3 and 4. Leave the voltmeter at DC volts and connect between posts 5 and 6. Adjust VR2 until meter reads 0V. Turn speed control to position 10 and adjust VR1 until meter reads +17.5V. (Note that this control output does not actually give a DC voltage, but a pulse derived from the mains whose mark/space ratio is controlled by VR5).

To set-up the unit without a voltmeter proceed as before, but connect posts 5 and 6 to a model railway track with an engine on it. With speed control at position 1 set VR2 until engine just hums audibly. Turn the speed control to 10 and adjust VR1 to desired maximum speed.

Disconnect the mains and carefully put the two parts of the case together using four 4BA bolts. Take great care to ensure that wires do not become fouled. Follow the layout shown in the photographs as closely as possible to avoid difficulties. The unit is now ready for use.

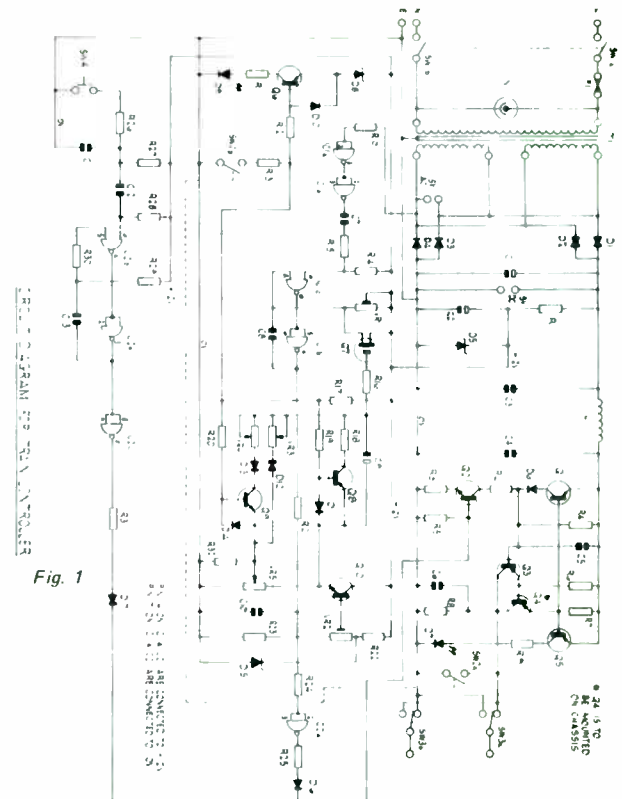
### CONTROLS

#### Emergency Brake

Operating SW2 cuts off the supply to the model engine and effects immediate braking. Indicator D9 will glow whilst the emergency brake is on.

#### Forward/Reverse Switch

SW3 reverses the polarity of the control output on posts 5 and 6 only.



### Parts List

R1	Std Res 330Ω
R2	Min Res 1k
R3	Min Res 100Ω
R4,32	Min Res 2k2
R5,27	Min Res 100k
R6	Min Res 470Ω
R7	W/W Min 0.33Ω
R8	Std Res 1k
R9,22	Min Res 680Ω
R10	Min Res 220k
R11	Min Res 180Ω
R12	Min Res 1k5
R13,26	Min Res 270Ω
R14,28,29	Min Res 1M
R15,16,25,31	Min Res 47k
R17,19,20	Min Res 56k
R18	Min Res 47Ω
R21,24,30	Min Res 10k
R23	Min Res 4k7
VR1	Hor S-Min Preset 1M
VR2	Hor S-Min Preset 4k7
VR3	Pot Lin 22k
VR4	Pot Log 470k
VR5	Sw Pot Lin 4k7
C1	Axial 2200μF 25V
C2	Axial 1000μF 25V
C3,4	Disc 0.1μF
C5	Disc 0.022μF
C6, 11	Polyester 0.1μF
C7	Polystyrene 220pF
C8, 10	Polyester 0.068μF
C9	Axial 100μF 10V
C12	HV Disc 1000pF
C13	Polyester 0.047μF
D1,2,3,4	1N5402
D5	BZYBBC12
D6,10,14,16,17	1N4148
D7,9	LED Red
DB,15	BZYBBC6VB
Q1,5,6,8	BC327
Q2,9,10	BC337
Q3	BC161
Q4	MJE2955

Q7	ME4220	2
IC1,2	4011BE	1
L1	RF Supp Choke 3A	1
T1	Tr 12 V 1A	24
N1	Pan Neon Red	4
F1	Fuse 20mm 1A and Safesholder 20	2
SW1	Sw V.F.6	2
SW2	Pushpck DPCO	2
SW3	Toggle Sw	1
SW4	Push Sw	1
<b>Also required</b>		
	Terminal Post Red	9
	Terminal Post Black	9

Terminal Post Brown	4
Kit 'P' Plus	1
DIL Socket 14-pin	1
Pins 2141	1
Cap Fast	1
Bolt 2BA 1/8in	1
Nut 2BA	1
Washer 2BA	2
Tag 2BA	1
Bolt 4BA 1/8in	10m
Nut 4BA	3m
Washer 4BA	
Tag 4BA	
4BA Spacer 1/8in	
Bolt 6BA 1/8in	
Nut 6BA	
Washer 6BA	
Train Control PCB	
Train Control Case	
Knob RK403	
Knob RK401	
SR Grommet 5M-3	
Hook-up Wire	
Min Mains White	
Thermopath	

### Steam Boost

Operating SW4 gives a full power pulse to the track irrespective of the setting of the speed control and helps the engine overcome any initial friction etc.

### Overload

If there is a short circuit or partial short circuit that would cause more than 1.6A to flow from the control output, the unit limits the current and D7 glows. As soon as the short circuit is removed the unit becomes operational again.

### Acceleration

This control sets the time taken for the engine to go from rest to the full speed set by the speed control. The longer the time you require, the further clockwise you should turn the control. For example with speed control at 'O' turn acceleration control to 5. Now turn speed control to the speed you want the train to reach. The train will now start to move away slowly, gathering speed until it reaches the speed set by the speed control. If the acceleration control had been set to a higher number, the train would have gathered speed more slowly, but would eventually reach the same speed as before.

### Deceleration

This control sets the time taken for the engine to come from the speed set by the speed control to rest. The longer the time you require, the further clockwise you should turn the control. For example, say speed control is at 7, turn deceleration control to say position 5. Nothing will happen until you turn the speed control down. You may do this as quickly as you like, but the train will slow down smoothly until it reaches the new lower speed set by the speed control or stops if speed control turned to 'O'. If the deceleration control had been turned to a higher number, the train would have taken longer to slow down.

The following parts used in this project are not shown elsewhere in this catalogue.

### Printed Circuit Board

Order As BY75S (Train Control PCB)

### Case

A functionally styled metal case finished in orange and fully punched and printed in white. The box has a sloping front panel.

Order As YB93B (Train Control Case)

A complete kit of parts for this project offering a saving over buying all the parts separately.

Order As LW49D (Train Controller Kit)

### Component Schedule

To help you order the correct parts for this project a component schedule/order form is available.

Order As XF28F (Train Controller Schedule)

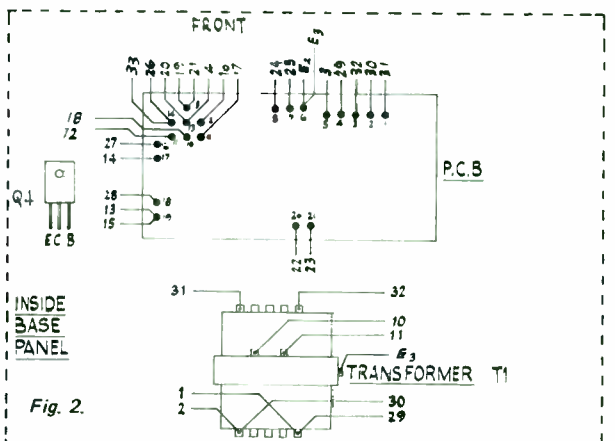
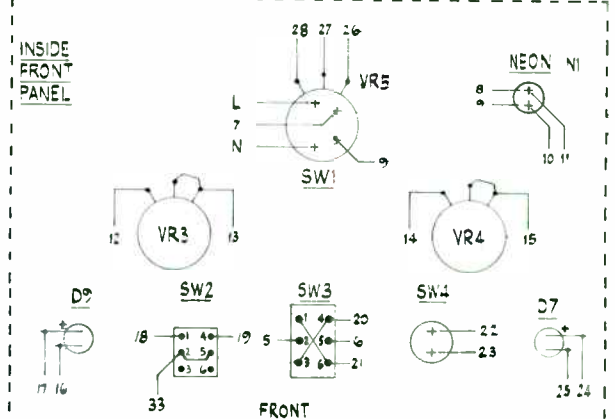
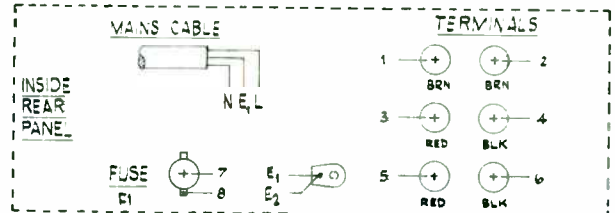
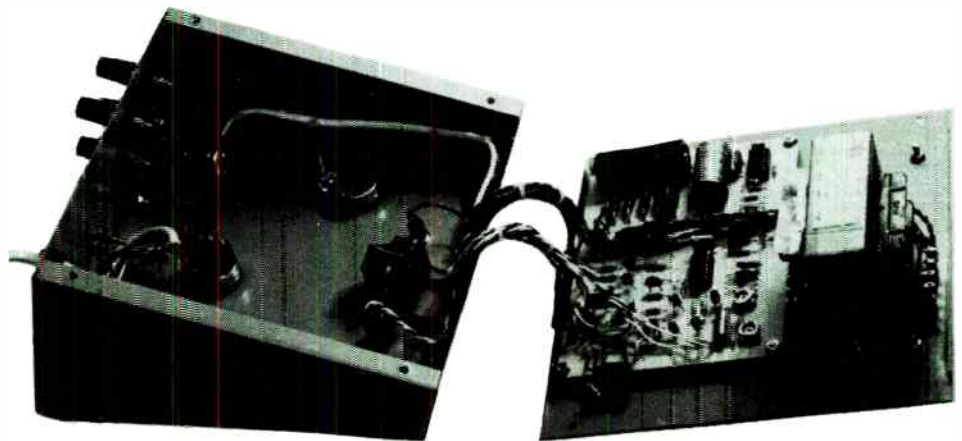


Fig. 2.



## BURGLAR ALARM SYSTEM

This project is split into two parts. Firstly it describes the construction of an Ultrasonic Movement Detector, and secondly a Burglar Alarm Control Box which can be used with any type of intruder detector including the ultrasonic one.

### ULTRASONIC MOVEMENT DETECTOR

#### Features

- Fully adjustable sensitivity so that large or small rooms may be covered.
- LED lights on ultrasonic unit if set off - so if you have several you can tell which one was the cause.
- Two-wire system.
- Saves fitting dozens of contacts on doors, windows etc. one unit covers the whole room.
- Any movement in covered room sets off alarm.
- If sensitivity correctly adjusted, it is not triggered by sounds e.g. telephone bells, hammering on windows, doors etc. or by small pets, papers fluttering in a draught etc.

#### Parts List

R1	Min Res 2M2
R2, 4, 5, 8, 9	Min Res 100k
R3	Min Res 2k2
R6, 11, 12, 13, 15	Min Res 10k
R7, 10	Min Res 150k
R14	Min Res 470Ω
R16	Min Res 1k
VR1, 2	Hor S Min Preset 10k
C1, 3, 7	Polystyrene 2200pF
C2, 8, 9, 11	Axial 10μF 25V
C4	Ceramic 10pF
C5, 10	Ceramic 22pF
C6	Polyester 0.1μF
C12	Axial 22μF 10V
C13	Axial 47μF 10V
C14	Axial 100μF 4V
C15, 16	Axial 220μF 10V
C17	Polystyrene 1000pF
Q1, 2	BC548
Q3	MCR102
IC1, 2	LM301A
IC3	NE555
D1, 2, 3	1N4148
D4	LED Red
D5	BZV68C9V1
L1	RF Supp Choke 1A
T1, 2	Ultrasonic Transducers

#### Also required

- Box PB1 White
- Ultrasonic Detector PCB
- 1 Hole Plug 3in.
- 1 DIL Socket 8 pin.
- 4 C/S Screw 6BA x 1/4in.
- 4 Nut 6BA
- 4 Washer 6BA
- 4 6BA Spacer 3in.
- 150mm Strapping Wire 18swg
- 6 Pin 2141
- 2 Quickstick Pads



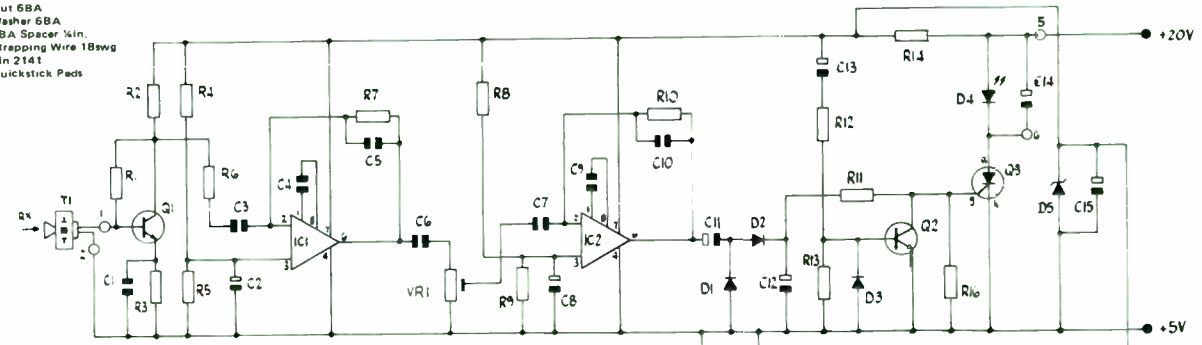
### BURGLAR ALARM CONTROL BOX

#### Features

- Provision for connection of up to four Ultrasonic Detectors
- Provision for connection of up to 40 make or break type detectors
- Battery operation during mains failure
- Alarm not set off by mains failure
- May be connected to any external alarm bell or hooter
- Detects any interference to wires connecting detectors
- Set by key on control box or external key
- Internal alarm buzzer
- Control Box tamper switch
- Battery test
- Tamper-proof external horn

#### Parts List

R1, 14, 74	Min Res 1k5	R21	Min Res 6k8	VR2, 3, 4, 5	Hor S Min Preset 4k7
R2	Min Res 220Ω	R23	Min Res 15k	C1, 2, 15	Axial 1000μF 25V
R3, 49, 53, 65, 68	Min Res 100k	R24	Min Res 2k2	C3, 5, 7, 8, 9	Axial 100μF 25V
R4, 7	Min Res 33k	R25	Std Res 390Ω	C4, 6	Polyester 0.1μF
R5, 8	Min Res 270Ω	R26	Std Res 220Ω	C10, 11, 12, 13, 14	Axial 1μF 63V
R6, 11, 22, 51, 57, 76, 77	Min Res 1k	R27	Std Res 100Ω	Q1, 3, 5, 8, 9, 17, 18, 19, 20	BC337
R9, 10, 66	Min Res 330Ω	R28, 30, 41, 43, 70	Min Res 4k7	Q2, 7	BD131
R12, 20, 32, 33, 34, 35, 45, 46, 47, 48, 50, 54, 55, 59, 61, 62, 64, 67, 69	Min Res 10k	R29, 31, 42, 44	Min Res 8k2	Q4	MPSA14
R13	Min Res 47k	R36, 37, 38, 39	Min Res 18k	Q6, 10, 12, 14	2N3905
R15	Min Res 68Ω	R40	Min Res 5k6	Q11, 13, 15, 16	MCR102
R16, 17	Min Res 47Ω	R52, 58	Min Res 3k3	IC1, 2, 3, 4	μA741C 8 pin DIL
R18, 19	Min Res 100Ω	R56, 60, 63, 72	Min Res 560Ω	D1, 2, 3, 4, 5, 6, 7, 8, 28, 29, 30, 31	1N4002
		R75	Std Res 270Ω	D5, 9, 15, 16, 17, 18, 21, 22, 23, 27	1N4148
		VR1	Min Res 470Ω		
			1W Res 68Ω		
			Hor S Min Preset 2k2		



Please note that the circuit shown in Fig. 1 has been amended to improve the performance. Therefore the Ultrasonic Detector parts list is incorrect. See newsletter for corrections.

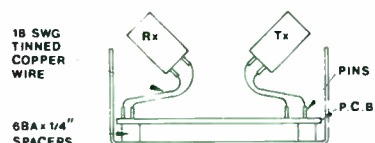


Fig. 3. METHOD OF MOUNTING TRANSDUCERS

#### Construction

Fit and solder the pins, then the IC sockets to the pcb. Fit and solder all the other components to the pcb taking care that you correctly orientate C2, 8, 9, 11, 12, 13, 14, 15, 16 and the diodes, transistors and IC's

Drill out the box as shown in Fig. 2 and mount the pcb using the nuts, bolts, washers and spacers. Note that no hole is shown in Fig. 2 for cable entry, but a hole will be required somewhere to bring in the two wire cable for connection to the control box. The position and size of this hole, however, will depend on where box is to be sited and type of cable used.

Mount the LED in the right hand hole in the front plate and connect a wire from anode to pin 5 and cathode to pin 6. The two transducers are mounted on pieces of 18 swg tinned copper wire as shown in Fig. 3. They should be wired with receiver (Rx) to pins 3 and 4, and transmitter (Tx) to pins 1 and 2. Now fit the lid and adjust the transducers until they are horizontal and at 90° to one another. This will give maximum coverage of the room to be protected. Stick the unit to a wall or ceiling giving a clear sight of the whole room to the unit.

The ultrasonic beam will bounce around the room reflected by the walls, windows and doors and a pattern of reflected signals will be detected by the receiver. If something moves in the room, the reflection paths will change and also the pattern seen at the receiver will change. This change is detected in the circuitry and the alarm will go off.

Finally adjust VR1 fully clockwise and VR2 to just past its mid-position clockwise and leave the unit to be tested when the control box is completed. The ultrasonic detector is powered over a two-wire circuit from the control box and when set-off partially short circuits its own power supply and this is detected by the control box which gives the alarm. The control box will also go off, if the wire to the control box is cut, short circuited or tampered with in any way. The setting up details for the ultrasonic detector are given in the setting up details for the control box.

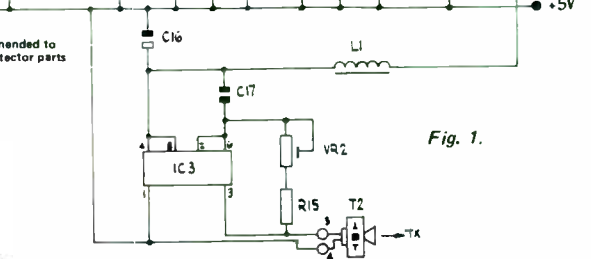
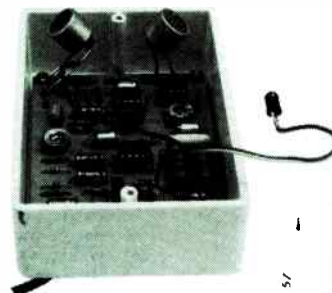


Fig. 1.

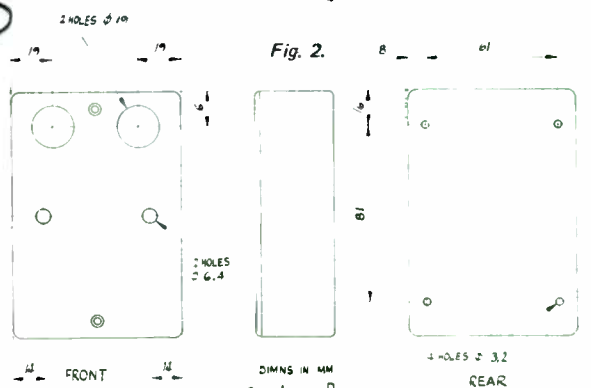


Fig. 2.

DRILLING DATA FOR BURGLAR ALARM Tx-Rx



# BURGLAR ALARM

## BURGLAR ALARM (continued from previous page)

### Construction

Fit and solder all the pins and D.I.L. sockets to the Burglar Alarm pcb, then assemble and solder the rest of the components taking care that the polarity of the Axial capacitors, diodes and transistors is correct. Bolt the buzzer and the fuseholder to the pcb using one of the 6BA x 1/4in. screws, nuts and washers and the two BBA screws, nuts and washers. Solder the fuseholder to the pcb pins and solder the buzzer wires either way round. Smear the mica washer with Thermaph or any silicone grease, place the heatsink on the pcb and bolt Q7 through the heatsink with the other 6BA screw, nut and special washer.

Fix the four brackets to the pcb using the 6BA x 1/4in. screws, nuts and washers. Drill holes in the box for all the cables you will require e.g. mains in, mains cable to external alarm, up to eight cables to detectors. The size of the holes will depend on how many cables you need and their position will depend on where the box is sited. Alternatively a standard conduit fixing could be used and the cable run in conduit for extra safety. (Although cutting the cables will not stop the alarm sounding.) Slide the pcb into the box and secure with the four self tapping screws.

Pull in the mains cable and solder as shown in Fig. 7. Connect five 150mm pieces of hook up wire to the five pins for connection to the transformer. Fix the transformer using the 4BA screws, nuts and washers and put the solder leg on one bolt and solder the mains earth to it. Connect the wires to the transformer as shown in Fig. 7. Fit the microswitch to the box using the two 6BA x 1/4in. screws, nuts, washers and spacers, then fix all the components to the front panel as shown in Fig. 8.

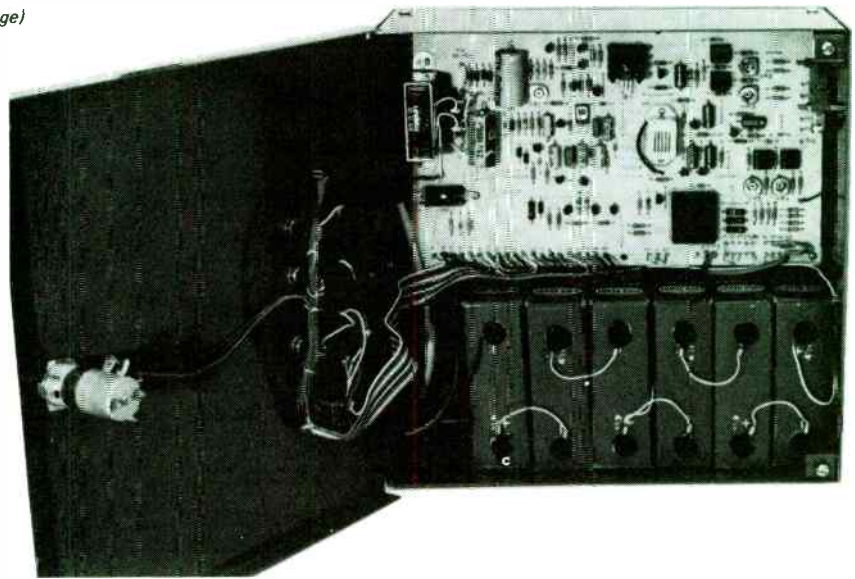
Using the 20 way ribbon cable make all the connections to the front panel as shown in Figs 7 and 8. Designations such as P1, P2 etc. refer to pin numbers on the pcb. Connect the microswitch to the pcb as shown in Fig. 7. Place six of the batteries in the box and link up as shown using hook up wire and the twelve 2BA Spades. Connect the two 1k resistors R76, 77 as shown in Fig. 9. Strap together pins 32, 33, 34 and 35 and link to one of the pins marked 31. Put the 2BA screw in the top hole on the control box to hold the microswitch operated. Switch SW1 to 'Test' and SW2 to off position. Connect the mains. The internal buzzer will sound and may be temporarily disconnected to avoid headaches. D19, 20 and 26 should be lit also. D19 indicates that a contact detector circuit has triggered and D20 indicates that an ultrasonic detector has been set off.

Switch a multimeter to DC volts and make the following checks and adjustments

Connect multimeter		
(+ve) Red lead to (+ve)	Black lead to (-ve)	Meter should read approx.
Pin 7	Pin 2	30V
Pin 6	Pin 2	15V
Pin 20	Pin 2	0.6V
Pin 22	Pin 20	5V
Pin TP1	Pin 20	5V
	Pin 20	Adjust VR2 until meter reads less than 2V then turn VR2 until meter just flicks up to about 9.5V
Pin TP3	Pin 20	Adjust VR3 as for VR2
Pin TP4	Pin 20	5V approx.
Pin TP5	Pin 20	Adjust VR4 as for VR2
Pin TP6	Pin 20	Adjust VR5 as for VR2

Press 'Reset Alarm' button and D19 and 20 should go out. Connect pin 24 to pin 25 and D19 should light. Press 'Reset Alarm' and check that D19 remains lit. Now briefly short circuit pins 22 and 23 and lamp D13 should light. Press 'Reset PSU' button and D13 will be extinguished. Now remove the link between 24 and 25, press the 'Reset Alarm' button and D19 will go out. Press 'Battery Test' button and D25 should glow brightly with no sign of fading. Disconnect the mains. D26 will be extinguished, but no other lamp should light. Repeat the voltage checks, they will all be a little lower voltage than before. Do not readjust the presets. Reconnect the mains. Operate SW1 to Standby, and reconnect the buzzer. Remove the straps from pins 31, 32, 33, 34 and 35, and remove the two 1k resistors.

Now wire up the ultrasonic detector from pin 22 and 23. If you are using more than one simply connect them all back to the same pins (22 and 23). At the ultrasonic detector connect the wire from pin 22 to pin 2 and the wire from pin 23 to pin 5. Once all the ultrasonic detectors are connected, strap pin 24 to 25 at the control box and with a multimeter switched to DC volts connect the black lead to pin 20 and red lead to pin 22. Meter should read 5V. If the reading is low



strap 24 to 26 or 24 to 27 or use any combination of these three strap to get as close as possible to 5V. Now move the multimeter red lead to pin 23 and adjust VR1 in the control box for 20V. As before if 20V cannot be achieved strap 28 to 29 or 28 to 30 etc. At the ultrasonic detector disconnect one wire of the LED and connect the multi-meter black lead to pin 2 and red lead to the cathode of Q2 (striped end). Switch to a low DC volts range (2.5V). The meter will jump about, but adjust VR2 until you find the point where the meter jumps to the highest readings. This adjustment sets the transmit frequency to the point at which the ultrasonic transceiver pair are at peak sensitivity one to the other. Reconnect the LED and put the lid on the box. With the whole system operational adjust VR1 through the front cover until small movements do not set off the alarm, but large movements, e.g. a person taking a step anywhere in the room does set the alarm off. Finally put the hole plug in the remaining hole in the box. If you are not using any ultrasonic detectors then the two 1k resistors R76, 77 have to be left installed as shown in Fig. 9. Now wire up the contact type detectors. We strongly recommend the use of reed switches e.g. Reed Switch Standard or Reed Switch Miniature and either Magnet Small or Magnet Large and not microswitches, as micro switches will operate for example if a wooden door warps slightly, or moves slightly in a draught. The reeds should be mounted so that they are operated when the door, window etc. is closed. Put the reed in the door frame and the magnet in the door. Now wire all the detectors as shown in Fig. 10. Up to ten may be connected in each parallel set and up to four parallel sets may be used. The connection points are pins 31 and 32, 31 and 33, 31 and 34, and 31 and 35. Each detector must have an Oxide 100k connected as shown in Fig. 10. If you have 10 or less contacts connect them to 31 and 32 and link the other three points, if you have 11 to 20 contacts, connect ten between 31 and 32, the rest between 31 and 33 and link the other two points, if you have 21 to 30 contacts put 10 on 31 and 32, 10 on 31 and 33 and the rest on 31 and 34 and link 31 and 35 and if you have 31 to 40 contacts put 10 on each of 31 and 32, 31 and 33, and 31 and 34, and the rest on 31 and 35. If you are using pressure mats wire them as shown in Fig. 10 to pins TP4 and 36. Note that it is most important that the 100k resistors have a temperature coefficient of less than 100ppm/°C e.g. Oxide 100k. Close all doors, windows etc. and switch to standby,

then back to test and double-check that every contact is closed (and pressure mats unoperated). Switch a multimeter to DC volts and connect the red lead to TP5 and black lead to pin 20. Readjust VR4 until meter just flicks to about 9.5V. Put a short circuit across any pair of wires going to a contact or set of contact detectors and check that meter flicks to less than 2V. Remove the short circuit and check that meter returns to around 9.5V. Now move the multi-meter red lead to TP3 and readjust VR3 until meter just flicks to about 9.5V. Then operate each contact detector in turn and ensure that in each case the meter flicks to less than 2V and back to about 9.5V when the contact is closed again. If ultrasonic detectors are fitted move the multimeter red lead to TP2 and readjust VR2 until meter just flicks to about 9.5V. Short circuit pins 22 and 23 and ensure that meter flicks to less than 2V. Remove the short circuit and press the 'Reset PSU' button and check that meter returns to around 9.5V. Move the multi-meter red lead to TP3 and readjust VR3 until meter just flicks to 9.5V. Disconnect one of the wires to one of the ultrasonic detectors and check that meter flicks to less than 2V. Reconnect the wire and ensure that meter returns to around 9.5V. Leave the ultrasonic detector running for an hour or so, then check and readjust the sensitivity (VR1 in detector) if necessary. Sensitivity is increased by turning VR1 anticlockwise through the front cover. Fit and solder all the components to the External Alarm pcb, then fit it in its box with the horn and batteries and connect them as shown in Fig. 11 temporarily leaving one wire off the horn. Fit the 1mm sockets to their bracket, fit that in the box and connect them as shown in Fig. 11. Run the Mains cable from the control box to the site for the external alarm box. Temporarily fix the external alarm box and connect a 1mm plug to each wire of the Mains cable so that they just fit in the sockets with no slack, i.e. if the box or cable were to be moved slightly the plugs would fall out. Put the plugs in the special tool, and fix the cable with the Hiatts, one of them as close as possible to the cable entry point in the box insulate the spare connectors on the external batteries and wrap them in tin foil with the wires coming out through as small a hole as possible in the top. This will stop moisture rotting the batteries. Now connect the wires at the control box as shown in Fig. 10 and set the alarm off with the key at 'Set'. Warn the neighbours and then

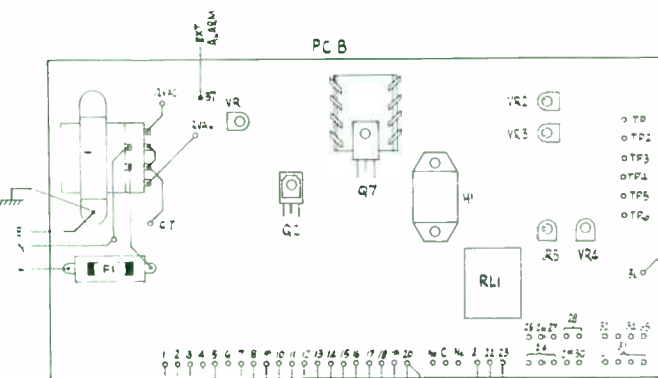
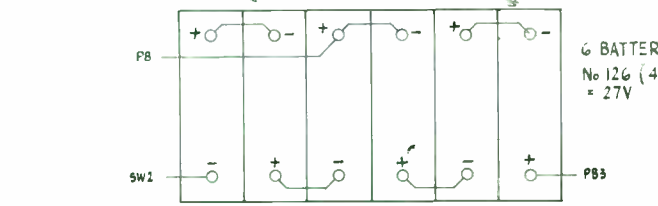


Fig. 7.





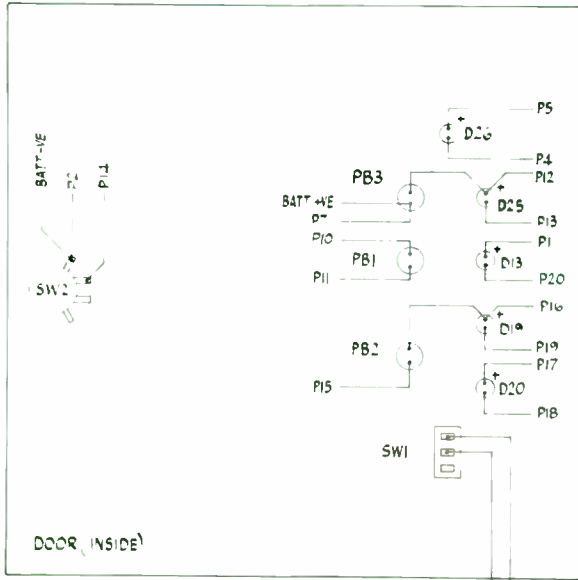
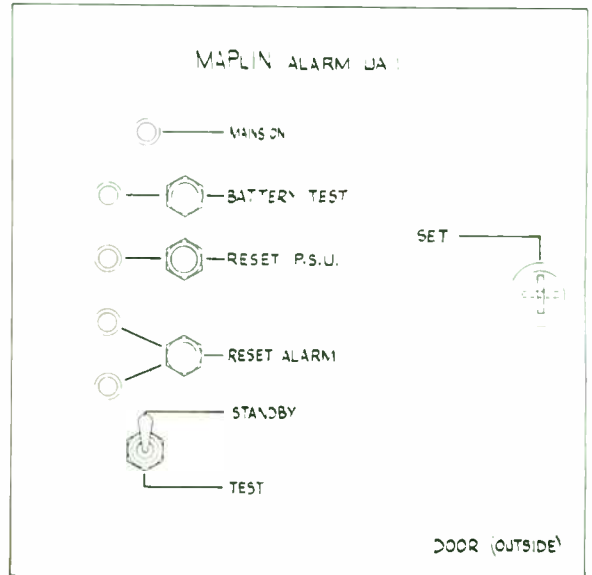


Fig. 8.



connect the horn, which will sound. Fix the box together and then hook it onto the wall. With the special tool push the three 1mm plugs up into their sockets and fix the top flange to the wall to hold the cable firmly in place. Switch the key to 'off' and press the appropriate reset button. The alarm system is now ready for use.

**The Alarm in Use**

The Maplin burglar alarm offers a very high degree of protection. Place the external hooter box in a prominent position. This alone will deter most burglars. Don't be concerned about making the hooter box obvious, it is completely protected. If the wires to it are cut or tampered with the horn will go off. If the box is ripped off the wall the horn will go off. The batteries in the external box will run the horn for over four hours even after being installed for over a year. We recommend that you change the external batteries every two years.

If you have a contact on the garage doors or any other point away from the main building don't worry if the wires to the contact are accessible. If the wires are cut the alarm will go off. If the wires are short circuited or a resistor of any value is connected between the wires the alarm will go off. This is not so with the pressure mats since they will generally be fitted under a carpet and the wires can be completely hidden. However it could be connected to the same points as the contact detectors (i.e. 31 and 32, 33, 34 or 35) if an Oxide 100k resistor is wired across the wires at the mat. In this condition the wires to the mat are fully protected in the same way as the other contact detectors.

Similarly the wires to the ultrasonic detectors are fully protected and cannot be interfered with without the alarm going off. The main control box cannot be unscrewed without setting the alarm off. Cutting the mains off to the unit will have no effect. The alarm will not go off at once, but as soon as any contact is broken, it will. During a power failure the unit gives full protection as before and if set off during a power failure it will sound the horn for at least four hours. When power is connected the unit applies a tiny current to both sets of batteries which has the effect of stopping any leakage currents and greatly increases the shelf life, so that when they are called on to supply current, they are in top condition even though they may have been installed for many months.

The most vulnerable area in the alarm system is the keyswitch. You will probably want to fit an additional keyswitch, perhaps on the front door. Take care to hide the wires to this switch. If they could be cut before setting the alarm off, then the system would be rendered inoperative.

It is also a wise precaution to hide the main control box or at least place it so that it cannot be seen from any outside window. It might well be a wise precaution to tell anyone who sees the alarm that the wires to the key switches are protected in the same way as all the other detectors. To set the alarm, with all keyswitches off throw the standby switch to test. If any contacts are operated the reset lamp will light and the buzzer will sound. Also if any of the cables are broken or short circuit the lamp will light and the buzzer will sound. If no lights come on turn the key switch to set and the alarm will be set up, regardless of the position of the standby/test switch. Normally the unit will be in the standby position.

It is advisable to run the mains power cable back to the main fuse box of the house and supply it from an otherwise unused outlet. Leave the unit switched on all the time. In standby the unit draws very little current. If you switch off the mains to the unit, it will continue in standby operating from its battery and replacing these more frequently will be far more expensive. At least once a month check the batteries by operating the 'Battery Test' button. This applies a heavy load across the batteries. Hold the button pressed for a few seconds. The lamp should glow brightly. If the batteries are in the least suspect the glow will quickly fade and when this happens the batteries should be changed.

If the alarm goes off it can only be stopped by first turning the keyswitch off and then pressing the appropriate reset button. If the alarm has been caused by a contact detector operating then D20 will be lit. Press 'Reset Alarm' to cancel. If an ultrasonic detector has gone off, lamp D13 will be lit. The detector that caused the alarm will have the lamp on the detector lit. To reset, press 'Reset PSU' then 'Reset Alarm'. If the alarm has been caused by a break in the wires to an ultrasonic detector, lamp D19 will light. To reset, press 'Reset Alarm'.

**Keyswitch**

Wire additional keyswitches exactly as the one in the box i.e. connect a normally open contact on the switch between pins 2 and 14. Any number may be fitted, and any one turned to 'Set' will arm the alarm.

The following parts used in this project are not shown elsewhere in this catalogue.

**Printed Circuit Boards**

- Order As BY91Y (Ultrasonic Detector PCB)
- BY92A (Burglar Alarm PCB)
- BY93B (External Alarm PCB)

**Alarm Buzzer 12V**

A buzzer similar to the one described on page 136, but not requiring a solid mounting to operate loudly.

- Order As BY94C (Alarm Buzzer 12V)

**Burglar Alarm Box**

A steel box with hinged front, punched and printed in white. Finished in stove enamelled grey.

- Order As XY13P (Burglar Alarm Box)

**Alarm Box Bracket**

Small L bracket to hold PCB in Burglar Alarm Box.

- Order As BY95D (Alarm Box Bracket)

**External Plug Tool**

A small metal tool to enable the plugs to be easily inserted into the External Alarm Box.

- Order As BY96E (Extn Plug Tool)

**External Alarm Box**

A hard wearing steel box with louvred front and sloping top for external mounting.

- Order As XY14Q (External Alarm Box)

**Ultrasonic Detector Kit**

A kit of all the parts required offering a saving over buying all the parts separately.

- Order As LW38R (Ultrasonic Detector Kit)

**Burglar Alarm Kit**

A complete set of parts excluding those mentioned in notes 1, 2 and 3, but including the external alarm box components. The kit offers a saving over buying all the parts separately.

- Order As LW39N (Burglar Alarm Kit)

**Component Schedule**

To help you order the correct parts for this project a component schedule/order form is available.

- Order As XF29G (Burglar Alarm Schedule)

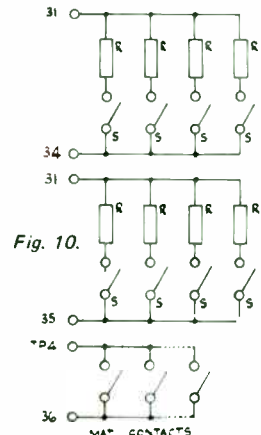


Fig. 10.

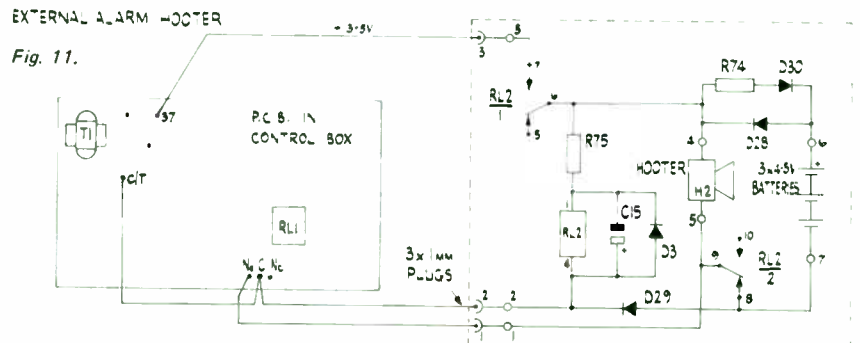
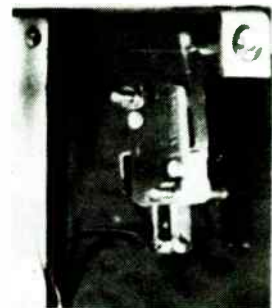
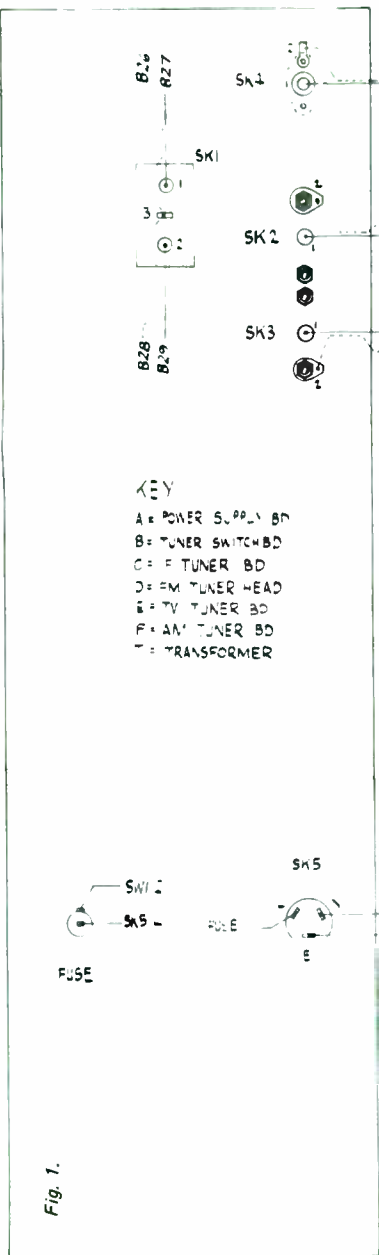
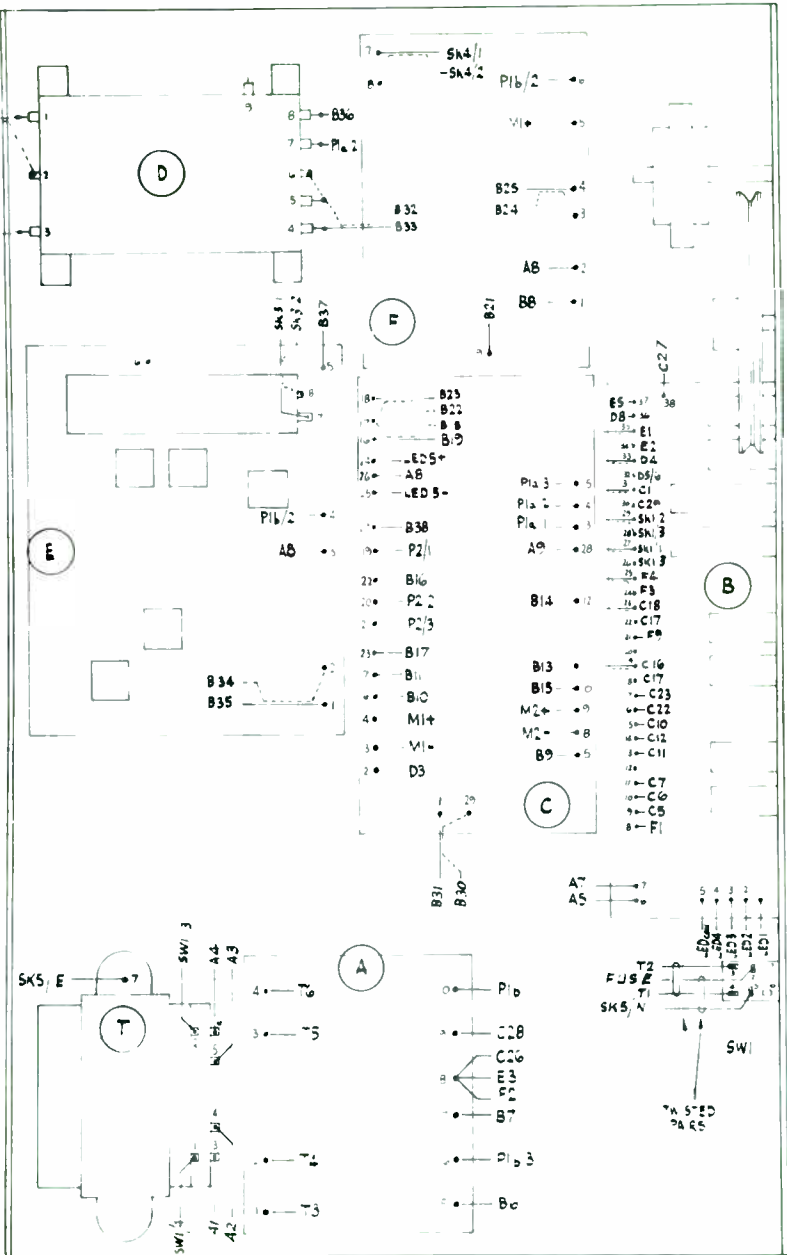


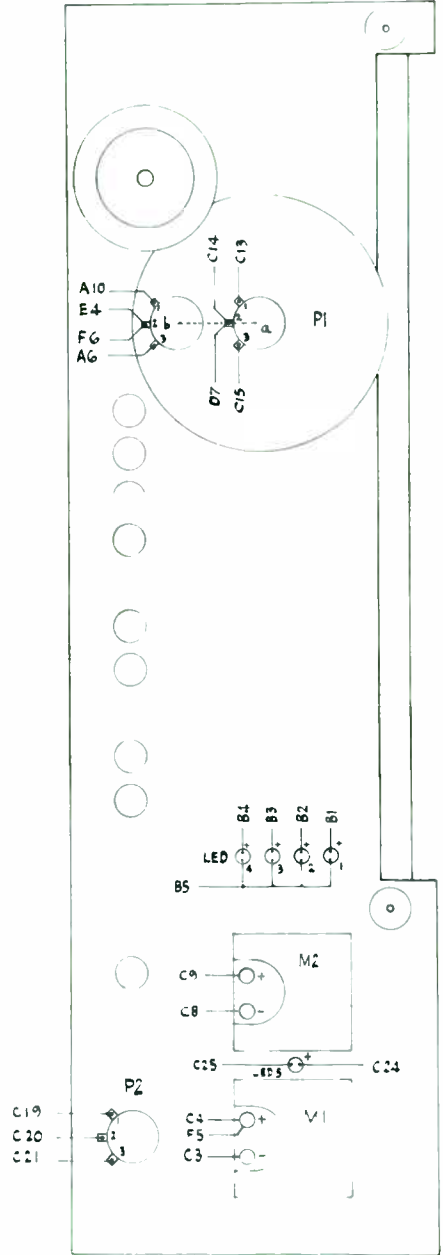
Fig. 11.



ASIDE VIEW OF REAR PANEL



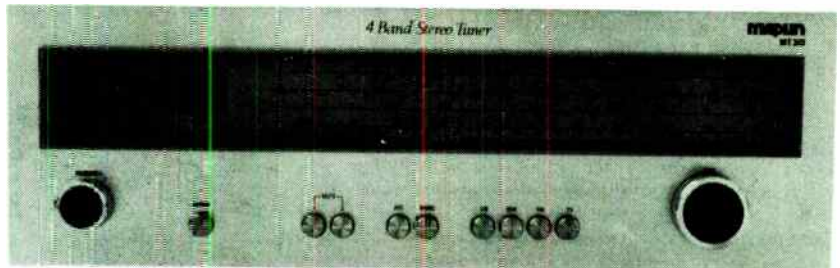
ASIDE VIEW OF DECK



ASIDE VIEW OF FRONT PANEL

**STEREO TUNER**

- Superb high fidelity reproduction
- Easy to build — no test equipment required
- Receives UHF TV sound
- Covers Long Wave, Medium Wave and VHF FM
- VHF FM band in Stereo
- Tuning meter
- Signal strength meter
- Stereo beacon
- Interstation two-level mute
- Automatic frequency control
- Stereo width control
- Mono switch for distant stereo stations
- Illuminated tuning scale
- 15kHz Deviation for 26dB noise: Better than 2µV in 75Ω.



**Construction**

This project is supplied in the form of six pre-built, tested and aligned modules and a metalwork kit. First assemble the metalwork as described in the leaflet supplied with it. Then fit the six modules into the chassis and interwire them as shown in Fig. 1. Setting-up instructions are supplied with each module, but they are very simple and do not require any test equipment. However, if you wish to set the scale exactly you will require a multimeter. The modules required to build this project are as follows:

**Metalwork Kit**

This kit contains the chassis, louvred black rear cover and fully printed and punched double-anodised front panel and printed and punched rear panel. It also contains all the parts to build the tuning scale including flywheel, drive cord, pulley etc and the printed scale, pointer and perspex screen. It also contains the lamps, LED's, potentiometers, knobs, aerial and output sockets, all the nuts and bolts, all the interconnecting unscreened wire required, and full instructions.

Order As LW40T (Tuner Metalwork Kit)

**Power Unit Module**

This ready-built module is shown as 'Module A' on Fig. 1. It is a fully assembled and tested power supply unit for the complete tuner. Also supplied with this module are the fuse, fuseholder, mains plug and socket, mains switch and 2m of Min Mains cable.

Order As LW41U (Tuner PSU Module)

**Switching Module**

This ready-built module is shown as Module 'B' on Fig. 1. It is a fully assembled and tested switch-bank which mounts directly onto the chassis. Also included with this module are the screened interconnecting wires and the two panel meters.

Order As LW42V (Tuner Switching Module)

**FM IF Module**

This ready-built module is shown as Module 'C' on Fig. 1. It is a fully assembled, tested and aligned module and is supplied with setting-up instructions which are very simple and do not require any test equipment.

Order As LW43W (Tuner IF Module)

**FM Tuner Head**

This ready-built module is shown as Module 'D' on Fig. 1. It is a fully assembled, tested and aligned head and is supplied with simple setting-up instructions which do not require any test equipment.

Order As LW44X (Tuner Head EF5600U)

**TV Tuner**

This ready-built module is shown as Module 'E' on Fig. 1. It is a fully assembled, tested and aligned head for decoding the sound signals from the composite TV signal.

Order As LW45Y (TV Sound Tuner)

**AM Tuner**

This ready-built module is shown as 'Module F' on Fig. 1. It is a fully assembled, tested and aligned tuner and IF for medium and long wave transmissions. Supplied with simple setting-up instructions which do not require any test equipment.

Order As LW46A (AM Tuner)

**Tuner Kit**

All the above parts are available as one complete kit.  
Order As LW48C (Stereo Tuner Kit)

**Component Schedule**

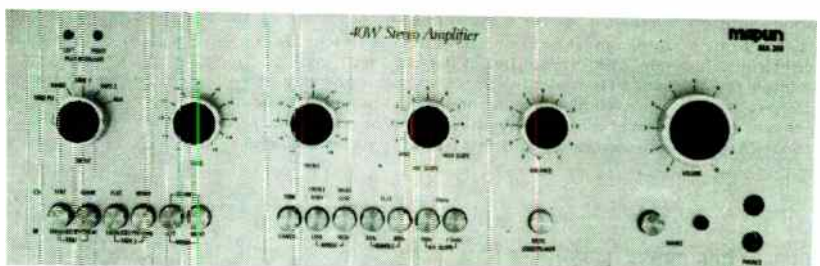
To help you order the correct parts for this project a component schedule/order form is available.

Order As XF22Y (Tuner Schedule)

**40W STEREO AMPLIFIER**

**Specification**

- Power output both channels driven, continuous rms sine wave: 44W per channel into 8Ω at 1kHz
- Power output, one channel driven, continuous rms sine wave: 50W per channel into 8Ω at 1kHz
- Frequency response of whole system 10Hz to 40kHz: -3dB
- Balance Control: -2dB to +8dB in either direction
- Rumble Filter switchable between flat, -12dB per octave below 32Hz, and -18dB per octave below 80Hz.
- HF Filter switchable between 5kHz, 7.5kHz and 15kHz with slope continuously variable in each setting between flat and -18dB per octave above the switched frequency.
- Bass Control switchable between two operating ranges: Low — gives a turnover frequency of 200Hz and ±15dB boost or cut at 30Hz; High — gives a turnover frequency of 450Hz and ±15dB boost or cut at 80Hz.
- Stereo Headphone Amp delivers 5W rms into 8Ω and an internal preset sets the phones level. Two stereo headphones can be connected simultaneously.
- Tape, Tape Preview, Tuner and Aux inputs have sensitivity variable by internal presets from 40mV to 1V, so that any equipment can be exactly matched into this amp.



- Magnetic Pick-up input has sensitivity of 5mV into 47kΩ.
- Treble Control switchable between two operating ranges: High — gives a turnover frequency of 2.5kHz and ±15dB boost or cut at 15kHz; Low — gives a turnover frequency of 600Hz and ±15dB boost or cut at 6kHz.
- Tape Output levels variable by internal preset between 40mV and 1V.
- Outputs for two separate pairs of loudspeakers.
- Outputs are short-circuit protected and fused.
- Mains facility outlets: one switched, two unswitched and all fused.
- Power amps have individual fuses which also protect the power supply.
- Maximum load: Not less than 4Ω per channel.
- Fast music transients are not limited by the output protection circuitry up to 80W peaks into 8Ω.

*Continued on next page*



Peak overload detector LED's to indicate if input gain presets have been set too sensitive.

Mono buttons switch one input or both inputs to both main channels.

Tone cancel button to cut out all filters and tone controls for a perfectly flat response.

Two tape outputs which can be switched to deliver to the tape machines either a perfectly flat signal or the signal after passing through the tone controls and filters.

Tape preview inputs allow recorded signal to be heard through main amp while recording proceeds from any input through the pre-amp section. Caters for two tape machines.

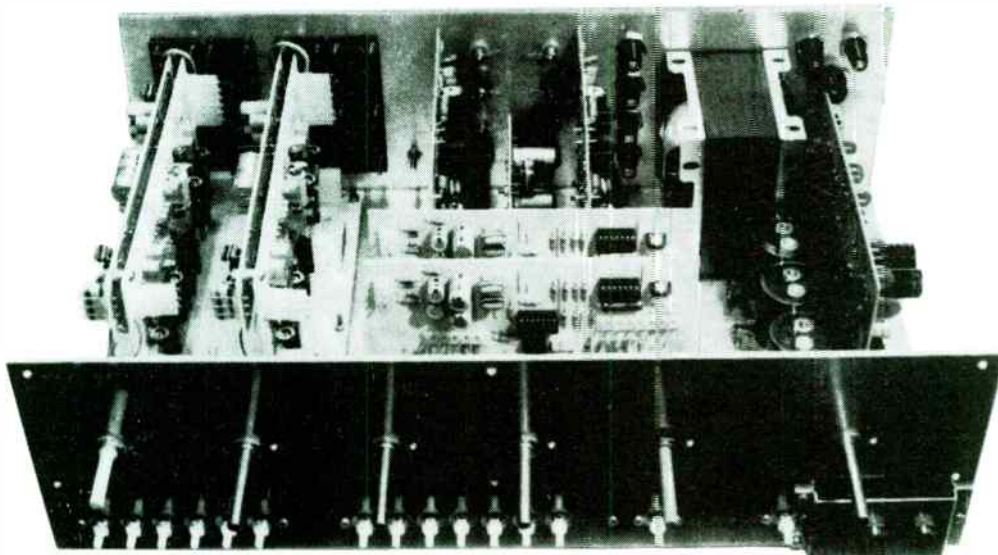
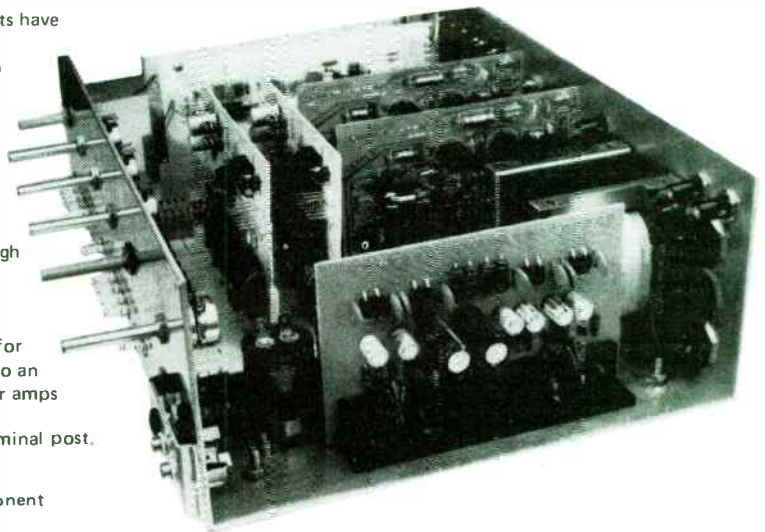
Pre-amp output and power amp input linked on rear panel for connection to a graphic equaliser. There is also an additional pre-amp output so that other power amps may be driven.

Inputs and outputs on phono sockets; speakers on 4mm terminal post.

### Component Schedule

To help you order the correct parts for this project a component schedule/order form is available.

Order As XF21X (40W Amp Schedule)



We very much regret that it has not been possible to include the full construction details of this amplifier in the catalogue, owing to a last minute design change (to make the pcb's pluggable for ease of construction and servicing) which turned out to be more difficult to achieve than we had anticipated. We have therefore had to print the construction details separately and this leaflet is either included

with this catalogue or you can obtain a copy by enclosing a note requesting XH48C (Leaflet MES33) in a reply paid envelope. We will send you a copy of the leaflet free of charge and replace your envelope. Please accept our sincere apologies for any inconvenience this will cause you.

## ORDER CODE CROSS-REFERENCE INDEX

8800 15	10	BB77 80	10	BL36	205	BR67 68	193	EW58 61	104	BY65 69	259	FF88 99	87
8816	24	8881	24	BL38	206	BR69	175	EW62 68	105	BY70	260	FF00 08	84
8818 20	24	8882 99	23	BL39 44	42	BR70 71	174	EW69 73	114	BY71 72	258	FH10 13	84
8822	24	BF00 14	49	BL45	206	BR72 74	175	EW74 77	117	BY73	262	FH14 15	85
8824 27	24	BF 15	50	BL46-56	41	BR75	174	EW78 80	116	BY74	267	FH16 20	84
8828 37	15	BF16 41	49	BL57 59	47	BR76	176	EW81 88	*18	BY75	269	FH21 27	85
8838	32	BF42 45	50	BL60 63	42	BR77 78	175	EW89 98	*19	BY78 80	15	FH29	84
8839	13	BF46 59	49	BL64	72	BR79	173	EW99	124	BY81 84	32	FH30 36	85
8840 41	32	BF60 85	50	BL65 70	47	BR80 87	178	EX00 04	64	BY85 86	38	FH37	87
8842	13	BF86 94	47	BL71 72	43	BR88	10	EX05 15	62	BY87 90	32	FH38	85
8843 45	32	BH00 17	47	BL73	79	BR89	188	EX16	62	BY91 97	273	FH39	84
8846	13	BH18 29	48	BL74 76	48	BR90	175	EX17 21	64	C	70	FH40	86
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