

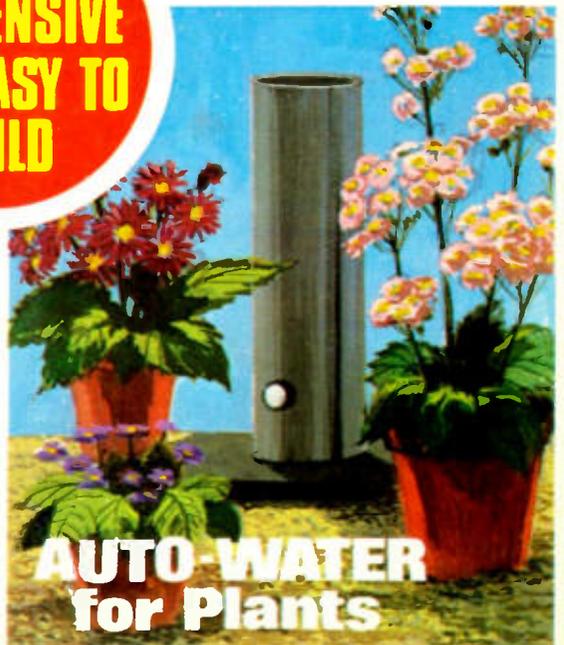
Practical projects to build at home

everyday electronics

DEC. 73
15p



**ALL
INEXPENSIVE
AND EASY TO
BUILD**



NEW EDU-KIT MAJOR

COMPLETELY SOLDERLESS ELECTRONIC CONSTRUCTION KIT.

BUILD THESE PROJECTS WITHOUT
SOLDERING IRON OR SOLDER.



Total Building Costs
£7-23 P P & Ins. 44p.
(Overseas P & P
£1-85p.)
(+ 10% VAT 72p)

★ 4 Transistor Earpiece Radio ★ Signal Tracer ★ Signal Injector ★ Transistor Tester NPN-PNP ★ 4 Transistor Push Pull Amplifier ★ 5 Transistor Push Pull Amplifier ★ 7 Transistor Loudspeaker Radio MW/LW ★ 5 Transistor Short Wave Radio ★ Electronic Metronome ★ Electronic Noise Generator ★ Batteryless Crystal Radio ★ One Transistor Radio ★ 2 Transistor Regenerative Radio ★ 3 Transistor Regenerative Radio ★ Audible Continuity Tester ★ Sensitive Pre-Amplifier. Complete with parts, price list & plans.

★ 24 Resistors ★ 21 Capacitors ★ 10 Transistors ★ 3 1/2 loudspeaker ★ Mica Baseboard ★ 3 12-way connectors ★ 2 Volume controls ★ 2 Slider Switches ★ 1 Tuning Condenser ★ 3 Knobs ★ Ready Wound MW/LW/PW Coils ★ Ferrite Rod ★ 6 1/2 yards of wire ★ 1 yard of sleeving, etc. ★ Plans 50p.

ROAMER TEN

with VHF including aircraft. 10 Transistors. 9 Tunable Wavebands, MW1, MW2, LW, SW1, SW2, SW3, Trawler Band, VHF and Local Stations also Aircraft Band. Built in Ferrite Rod Aerial for MW/LW. Retractable, chrome plated 7 section Telescopic Aerial, can be angled and rotated for peak short wave and VHF listening. Push Pull output using 600 mw Transistors. Car Aerial and Tape Recording Sockets. 10 Transistors plus 3 Diodes. Ganged Tuning Condenser with VHF section. Separate coil for Aircraft Band. Volume on/off. Wave Change and tone Control. Attractive Case in black with silver blocking. Size 9" x 7" x 4". Easy to follow instructions and diagrams. Parts price list and plans 30p (FREE with parts).
Total Building Costs **£8-50** P P & Ins. 52p
(Overseas P & P £1-85) (+ 10% VAT 85p)



NEW EVERYDAY SERIES

Build this exciting New series of designs

E.V. 5 5 Transistors and 2 diodes. MW/LW. Powered by 4 1/2 volt Battery. Ferrite rod aerial, tuning condenser, volume control, and loudspeaker. Attractive case with red speaker grille. Size 9" x 5 1/2" x 2 1/2" approx.
Parts price list and Plans 15p. Free with parts.
Total Building Costs **£2-73** P P & Ins. 30p
(Overseas P & P £1-25p) (+ 10% VAT 27p)

E.V. 6 Case and looks as above. 6 Transistors and 3 diodes. Powered by 9 volt battery. Ferrite rod aerial, loudspeaker, etc. MW/LW coverage. Push Pull output. Parts price list and Plans 15p. Free with parts.
Total Building Costs **£3-60** P & P Ins. 30p
(Overseas P & P £1-25p) (+ 10% VAT 36p)

E.V. 7 Case and looks as above. 7 Transistors and 3 diodes. Six wavebands. MW/LW, Trawler Band, SW1, SW2, SW3, powered by 9 volt battery. Push Pull output. Telescopic aerial for short waves. 3" loudspeaker. Parts price list and easy build plans 20p. Free with parts.
Total Building Costs **£4-08** P P & Ins. 31p
(Overseas P & P £1-85) (+ 10% VAT 40p)



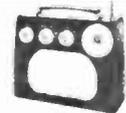
POCKET FIVE

3 Tunable wavebands. M.W./L.W. and Trawler Band. 7 stages, 5 transistors and 2 diodes, super-sensitive ferrite rod aerial, moving coil loudspeaker, attractive Black and Gold Case. Size 5 1/2" x 1 1/2" x 3 1/2" approx. Plans and parts price list 15p. (Free with parts).
Total Building Costs **£2-28** P P & Ins. 26p
(Overseas P & P £1-25p) (+ 10% VAT 22p)



ROAMER EIGHT Mk 1 NOW WITH VARIABLE TONE CONTROL

7 Tunable Wavebands: MW1, MW2, LW, SW1, SW2, SW3 and Trawler Band. Built in Ferrite Rod Aerial for MW and LW. Retractable chrome plated Telescopic aerial for Short Waves. Push pull output using 600mw transistors. Car aerial and Tape record sockets. Selectivity switch, 8 transistors plus 3 diodes. Fine tone moving coil speaker. Air spaced ganged tuning condenser. Volume/on/off, tuning, wave change and tone controls. Attractive case in rich chestnut shade with gold blocking. Size 9 x 7 x 4in. approx. Easy to follow instructions and diagrams. Parts price list and plans 25p (FREE with parts).
Total Building Costs **£6-98** P P & Ins. 47p
(Overseas P & P £1-85) (+ 10% VAT 69p)



TRANSONA FIVE

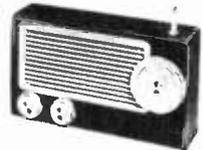
Wavebands, transistors and speaker as Pocket Five. Larger Case with Red Speaker Grille and Tuning Dial. Plans and parts price list 15p (Free with parts).
Total Building Costs **£2-50** P P & Ins. 26p
(Overseas P & P £1-25p) (+ 10% VAT 25p)



TRANS EIGHT

8 TRANSISTORS and 3 DIODES

6 Tunable Wavebands; MW, LW, SW1, SW2, SW3 and Trawler Band Sensitive ferrite rod aerial for M.W. and L.W. Telescopic aerial for Short Waves. 3in. Speaker, 8 improved type transistors plus 3 diodes. Attractive case in black with red grille, dial and black knobs with polished metal inserts. Size 9 x 5 1/2 x 2 1/2in. approx. Push pull output. Battery economiser switch for extended battery life. Ample power to drive a larger speaker. Parts price list and plans 25p (FREE with parts).
Total Building Costs **£4-48** P P & Ins. 33p
(Overseas P & P £1-25) (+ 10% V.A.T. 44p)



NEW ROAMER NINE

WITH V.H.F. INCLUDING AIRCRAFT



Nine Transistors, 9 Tunable wavebands as Roamer Ten, built in ferrite rod aerial for MW/LW. Retractable chrome plated telescopic aerial for VHF and SW. Push Pull output using 600 mw transistors. 9 Transistors and 3 diodes, tuning condenser with V.H.F. section, separate coil for aircraft, moving coil loudspeaker, volume ON/OFF and wavechange. Attractive all white case with red grille and carrying strap. Size 9 1/2" x 7" x 2 1/2" approx. Parts Price list and Plans 30p (FREE with parts)
Total Building Costs **£6-95** P P & Ins. 44p.
(Overseas P & P £1-85p) (+ 10% VAT 69p)

"EDU-KIT"



Build Radios, Amplifiers, etc' from easy stage diagrams. Five

units including master unit to construct

Components include:
Tuning Condenser: 2 Volume Controls: 2 Slider Switches: Fine 3" Tone Moving Coil Speaker: Terminal Strip: Ferrite Rod Aerial: 2 Plugs and Sockets: Battery Clips: 4 Tag Boards: 10 Transistors: 4 Diodes: Resistors: Capacitors: Three 1" Knobs. Units once constructed are detachable from Master Unit, enabling them to be stored for future use. Ideal for Schools, Educational Authorities and all those interested in radio construction.
Parts price list and plans 25p (FREE with parts).

Total Building Costs **£5-50** P P & Ins. 33p
(Overseas P & P £1-85) (+ 10% VAT 55p)

ROAMER SIX

Case and looks as Trans-Eight

6 Tunable Wavebands: MW, LW, SW1, SW2, SW3, Trawler band plus an Extra Medium waveband for easier tuning of Luxembourg etc. Sensitive ferrite rod aerial and telescopic aerial for Short Waves. 3in. Speaker. 8 stages—6 transistors and 2 diodes. Attractive black case with red grille, dial and black knobs with polished metal inserts. Size 9 x 5 1/2 x 2 1/2in. approx. Plans and parts price list 25p (FREE with parts).

Total Building Costs **£3-98** P P & Ins. 31p
(Overseas P & P £1-85) (+ 10% VAT 39p)

RADIO EXCHANGE CO

61a HIGH STREET, BEDFORD, MK40 1SA Tel. 0234 52367

Reg. no. 788372

I enclose £..... for

Name.....

Address.....

• Callers side entrance "Lavells" Shop

• Open 10-1, 2.30-4.30 Mon. Fri. 9-12 Sat.

(Dept. E.E.25.)

The Catalogue you MUST have!

HOME RADIO COMPONENTS

250 pages 11¼" x 8¼"

6,785 electronic components clearly listed and indexed

1,750 pictures

10 free Vouchers each worth 5p.

Price list regularly updated

Bookmark with useful list of technical abbreviations

Details of our popular Credit Account Service and our Easy Ordering System are included in the catalogue.

Only 55p. plus 22p POST AND PACKING

POST THIS COUPON
with cheque or P.O. for 77p.

The price of 77p applies only to customers in the U.K. and to BFPO addresses

Name _____

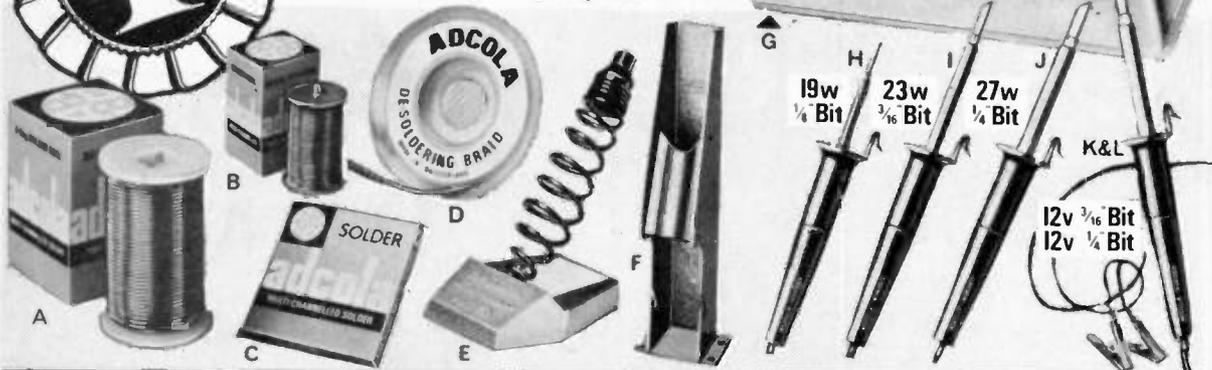
Address _____

HOME RADIO (Components) LTD. (Regn. No. London 912966)
Dept. EE, 234-240 London Road, Mitcham CR4 3HD



ADCOLA

the champions of
soldering equipment



Please send me the following items

PRINT NAME

PRINT ADDRESS



E.E. 12

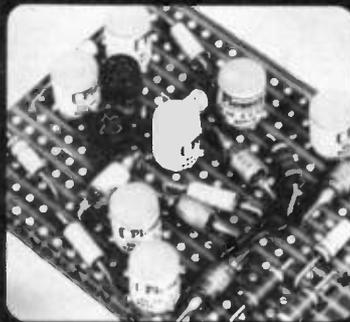
ADCOLA PRODUCTS LTD ADCOLA HOUSE GAUEN ROAD LONDON, SW4 6LH
V.A.T. REGD. No 235 6153 72 REGD. No 442762

A SOLDER REEL 1/2 KILO	£1.40	<input type="checkbox"/>
B SOLDER REEL 3 OZ	£0.48	<input type="checkbox"/>
C SOLDER PACK	£0.07	<input type="checkbox"/>
D DE-SOLDERING BRAID	£0.75	<input type="checkbox"/>
E L686 SOLDERING STATION	£1.88	<input type="checkbox"/>
F L68 PROTECTIVE SHIELD	£1.08	<input type="checkbox"/>
G INVADER SOLDERING KIT	£4.39	<input type="checkbox"/>
H L706 INVADER	£2.23	<input type="checkbox"/>
I L646 INVADER	£2.42	<input type="checkbox"/>
J L1076 INVADER	£2.48	<input type="checkbox"/>
K BL646 BATTERY MODEL	£3.05	<input type="checkbox"/>
L BL1076 BATTERY MODEL	£3.17	<input type="checkbox"/>

New Catalogue

All prices include 10% V.A.T. Please tick items required.

VEROBOARD



VEROBOARDS GIVE A PROFESSIONAL FINISH TO YOUR WORK

0.1" and 0.15" pitch, plain and copper clad universal circuit boards.

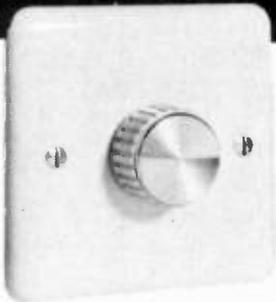
AVAILABLE FROM YOUR LOCAL RETAILER.

TRADE DISTRIBUTOR N. Rose (Electrical) Ltd., London, W.C.1.



VERO ELECTRONICS LTD.
Industrial Estate, Chandler's Ford
SO5 3ZR Tel: Chandler's Ford 7952

A DEXTER DIMMASWITCH



The DEXTER DIMMASWITCH is an attractive Dimma unit which simply replaces the normal light switch. It is available as a complete "ready to install" unit or "simple to assemble" kit. Two models are available controlling up to 300W or 600W of all lights, except fluorescents, at mains 200-250V, 50Hz. All DEXTER DIMMASWITCH models have built-in radio interference suppression.

600 watt	£3.52	Kit form	£2.97
300 watt	£2.97	Kit form	£2.42

All plus 12p post and packing

Prices include VAT. Please send c.w.o. to:

DEXTER & COMPANY

2 ULVER HOUSE
19 KING STREET
CHESTER CH1 2AH
Tel: 0244-25883

AS SUPPLIED
TO H.M. GOVERNMENT
DEPARTMENTS, HOSPITALS,
LOCAL AUTHORITIES,
ETC.

INSTRUMENTAL AUDIO EFFECTS

SUPER "FUZZ" UNIT KIT. CONNECTS BETWEEN GUITAR & AMPLIFIER. OPERATES FROM 9v BATTERY (not supplied). ALL COMPONENTS AND PRINTED CIRCUIT BOARD WITH FULL INSTRUCTIONS. KIT PRICE: £2.86 post paid.

CREATE "PHASE" EFFECT ON YOUR RECORDS, TAPES ETC.. UNIQUE CIRCUITRY ENABLES YOU TO CREATE PHASE EFFECT AT THE TURN OF A KNOB. OPERATES FROM 9v BATTERY (not supplied) COMPLETE KIT OF COMPONENTS WITH PRINTED CIRCUIT BOARD & FULL INSTRUCTIONS. KIT PRICE: £2.86 post paid.

MAIL ORDER ONLY.

S.A.E. ALL ENQUIRIES.

DABAR ELECTRONIC PRODUCTS

98a, LICHFIELD STREET,
WALSALL, STAFFS. WS1 1UZ

You'll hardly be able to believe your ears!

Can you really get sound quality like this for less than £19?

Yes, you can! with the new

STEREO 21

Until now, richly satisfying sound has always cost a richly satisfying price. But not any more! For an almost unbelievable £18.45, you can have Stereo 21—audio for the connoisseur! Whatever your taste in music, you can hear it on STEREO 21 the way its composers heard it in their dreams! Beethoven or Mahler... Ellington or Jellyroll Morton... Das Nibelung or Jesus Christ Superstar... Carols from King's College Chapel or the return of a Beatle... everything from a prettily fluting baroque organ to the newest pop group at full throttle—STEREO 21 does them all justice!

And have you ever seen a handsomer audio installation? Compact enough to go in a university-student's bedroom-study, elegant enough for the suavest penthouse pad in Town, STEREO 21 offers you all the pride of possession as well as a thrilling musical experience!

Top-quality amplifier, BSR turntable, matching speakers. Deck and speaker cabinets you simply wrap round and glue to build. Screw in the amplifier and connect up (all push fit no soldering whatsoever), so simple literally anyone can do it. Except for glue and panel pins all parts supplied including full instructions—all for £18.45 (plus the cost of post and packing if you buy by mail), and—to round it all off—a money-back Guarantee if your pleasure in STEREO 21 is not complete!

Just think—in only a few days you could be giving your ears the treat of a lifetime—AND introducing your envious friends to STEREO 21!



Personal shoppers and mail order price

£18.45 plus £1.60 p & p

Diamond stylus if required £1.37 extra

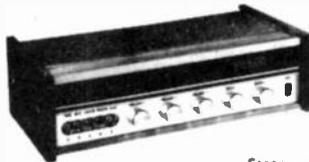
Suitable pair of stereo headphones with individual level controls and padded earpieces to give optimum performance £3.85.

THE TOURIST PUSH-BUTTON CAR RADIO KIT £6.60

The Tourist PB is suitable for 12 volt working on both negative and positive earth vehicles. It covers the full medium and long wave bands. It is permeability tuned and sturdily constructed. Output is a full 2.5 watts into an 8 ohms speaker. But the Tourist PB will operate into any loud-speaker from 8 to 15 ohms. Apart from the output stage, which is an integrated circuit, the only other electronic components that need soldering are some capacitors, resistors, etc. The kit includes a pre-built RF tuner unit, and fully modularised IF stages which are pre-aligned before despatch. As well as electronic components this kit also contains 2 diamond-spun aluminium knobs, elegant matching front panel, dial, washers, screws and wire. The Tourist PB can be mounted in any standard size dash panel and it has an illuminated tuning scale. Chassis size is: 7in wide, 2in high and 4½in deep. Circuit diagram and comprehensive instructions 55p free with parts. Fully retractable and lockable car aerial £1.37 post paid.

CAR RADIO KIT £6.60 p. and p. 55p. Speaker with baffle and fixing strips £1.65 x 23p p. & p. post free if bought with the kit. Send stamped addressed envelope for leaflet.

If you can solder on printed circuit board, you can build this push-button car radio kit. It's simple—just follow the step-by-step instructions.



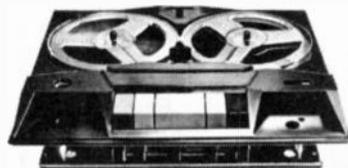
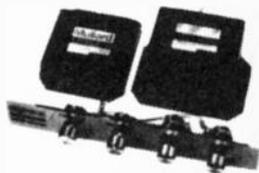
RELIANT Mk IV MONO AMPLIFIER

*5 Electrically Mixed inputs. *3 Individual Mixing controls. *Separate bass and treble controls common to all 5 inputs. *Mixer employing F.E.T. (Field Effect Transistors). *Solid State Circuitry. *Attractive Styling.

INPUTS 1. Crystal Mic or Guitar 9mV. 2. Moving coil Mic. or Guitar 8mV. Inputs 3, 4 & 5 are suitable for a wide range of medium output equipment (Gram, Tuner, Monitor, Organ, etc.) All 250mV sensitivity. Output 20 watts into 8Ω (suitable for 15Ω.) Size approx 12½ x 6 x 3½ins. **£13.50** p. & p. 60p

UNISOUND MODULES

ONLY £7.64 + 55p. p. & p. For the man who wants to design his own stereo—here's your chance to start, with Unisound—pre-amp, power amplifier and control panel. No soldering—just simply screw together. 4 watts per channel into 8 ohms. Inputs: 120mV (for ceramic cartridge). The heart of Unisound is high efficiency I.C. monolithic power chips which ensure very low distortion over the audio spectrum.



PE TAPE LINK CONSTRUCTORS

Suitable 3 speed tape deck, 5mm heads. Caters up to 5½ins. spools. 240V AC mains. Unused but store soiled hence no warranty.

£4.00 £1 p. & p.



IN-CAR ENTERTAINMENT AT HOME

With this elegant stereo 8 track add on unit, audio enthusiasts now have the opportunity to extend their systems to include the playing of 8 track cartridges. Simply select your channel, by push button, four digital lamps indicate channel selected. The Viscount III, the fabulous Stereo 21 and the Unisound Modules **£10.60** plus 90p p. & p. will accept this unit, simply connect up.

RADIO AND TV COMPONENTS (ACTON) LTD, Dept. E 21 HIGH STREET, ACTON, LONDON W3 6NG · 323 EDGWARE ROAD, LONDON W2

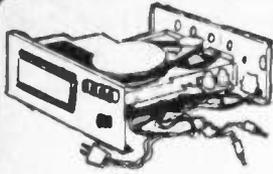
Edgware: 9 a.m. to 5.30 p.m., half day Thurs. Acton: 9.30 a.m. to 5 p.m. Closed all day Wed.

Mail orders to Acton. Terms C.W.O. All enquiries Stamped Addressed Envelope.

Goods not despatched outside U.K.



BI-PRE-PAK AUDIO BARGAINS



8 TRACK ONLY £11

incl. P. & P. and VAT

The latest B.S.R. 8 Track cartridge Replay Deck. Ready to install in your Hi-Fi Stereo System. This unit comes complete with Hi Gain Stereo Pre-Amplifier, 4-Programme Indicator Lamps, Track Selector Switch, all leads and plugs, etc. for 230 volt A.C. mains operation.

5W & 10W AMPS

5W ONLY £1.98

10W ONLY £2.49

incl. P. & P. and V.A.T.



Specification:-

	5 Watt	10 Watt
Nominal Volts	12-14V	25-30V
Into 3 Ohms	5W	10W
Into 8 Ohms	2W	10W
Into 15 Ohms	1W	8W
Typical Distortion	<5%	<5%
Freq. response at 3dB	10Hz to 30KHz	10Hz to 30KHz
Sensitivity (Typically)	20mV	20mV
Full power consumption (30 Ohms)	650mA	580mA
Size	2½" x 1½"	2½" x 1½"

The 5W matchbox sized amplifier will run satisfactorily from a 12V car battery. Can also be used for portable voice reinforcement such as public functions where mains supply is not accessible. A small mains unit kit is available. Two amplifiers are ideal for Stereo. Complete connection details and treble, bass, volume and balance control circuit diagrams are supplied with each unit. Discounts are available for quantity orders.

Cheapest in the U.K. Built and tested

STEREO DECODER £4.95

incl. P. & P. and VAT



A ready built unit, ready for connection to the I.F. stages of your existing FM Radio or Tuner. A tell tale light can be connected to show the presence of a Stereo transmission and correct operation.

The Unit is in the form of a small printed circuit, and no further alignment is necessary, as all preset adjustments have already been carried out at the factory.

It is recommended that a L.E.D. is used as the indicating light and a suitable device is available from us at 36p. Supplied with all necessary instructions.

I enclose £..... for 8 Tracks/..... 5W Amps/..... 10W Amps/..... Decoders (Please insert quantities and delete those not applicable.)

Name

Address

BI-PRE-PAK

Co. Regn. No. 820919

Dept. E, 222/224, West Road,
Westcliff-on-Sea, Essex SSO 9DF
Tel: Southend (0702) 46344

PLUGS

Pack 107 5 pin Din	22p
Pack 108 3 pin Din	20p
Pack 135 ¼" Jack	27p
Pack 130 ¼" Jack Stereo	50p
Pack 103 Loudspeaker Plug	17p
Pack 100 Phono Plug	7p
Pack 230 3 pin Socket	25p
Pack 236 5 Pin Socket	33p
Pack 234 L/speaker Socket	33p
READY MADE LEADS	
3 pin to 3 pin Din	70p
3 pin to open end	55p
5 pin to 5 pin Din	90p
5 pin to open end	70p
5 pin to 4 phono plugs	£1
Speaker lead Din to spade 12ft.	40p
Extension lead Din plug to socket 12ft.	70p

All leads approx. 6ft. in length.

DIAMOND STYLI

BTA; 9TA; 9TAHC; GP91; ST4; ST9; EV26; GCB	All at 80p each.
Double Diamond	£1.25.
Diamond suitable for Orbit	
NM22; G800; M3D	£2.25 each.

HEADPHONES

Sennheiser HD414	£10.60
AKG K50	£6.50
Beyer DT485	£35.00

RECORD CARE

Cecil Watts Dust Bug	£1.20
Parastatic Disc Preener	45p
Antistatic Fluid	20p
Dust Bug Spares (Brush & Roller)	15p

Prices Inc VAT and Post.

CASSETTE TAPES

Audio-Magnetics C60				
3	6	10	20	
£1.00	£1.90	£3.20	£6.30	
Cassette Caddy £1.20				
Cassette Head Cleaner 35p				

ZONAL ILFORD TAPE

5" Standard 600ft	25p
5½" Standard 900ft	50p
7" (Plain boxed) 1200ft	60p
7" (Westminster Boxed) 1800ft.	£1.25
7" Reel of Leader Tape (Blue or green)	75p

MICROPHONES

AKG D109	£11.50
AKG D202E1	£39.50
AKG D190C	£17.00
AKG D190E	£18.20
AKG D224	£50.00
Sennheiser MD211N	£45.00
Sennheiser MD413N	£27.00
Sony ECM50	£85.00
Audio RMS7F Radio Mike.	£210.00

SPEAKERS

E.M.I. 350 Kit 8 ohms	£8.20
E.M.I. 450 Kit 8 ohms	£4.50

CARTRIDGES

Goldring G800	£6.00
Orbit NM22	£4.00
Shure 75/6	£6.00
Sonotone 9TAHC (Dia)	£2.00
Sonotone 8T4A (Dia)	£1.50
Ronnette 105 (Dia)	£1.25

J. J. Francis (WOOD GREEN) Ltd.
MANWOOD HOUSE, MATCHING GREEN,
HARLOW, ESSEX CM17 0RS Tel: Matching 476



become a RADIO-AMATEUR!

learn how to become a radio-amateur in contact with the whole world. We give skilled preparation for the G.P.O. licence

free!

Brochure, without obligation to:

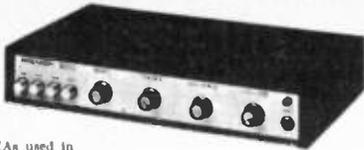
BRITISH NATIONAL RADIO & ELECTRONICS SCHOOL P.O. Box 156, JERSEY

NAME:

ADDRESS:

EEB 12 3
BLOCK CAPS please

PREMIER 800 STEREO AMPLIFIER



(As used in
SYSTEM '800')

A truly high quality stereo amplifier—compare the specification, compare the price. Output: 5 watts per channel. Frequency response: 30-20,000 Hz — 2 db. Distortion: 1% Output Impedance 8 ohms nom. Inputs equalised to R.I.A.A. Magnetic 4mV. Ceramic 100mV. Tuner 100mV. Tape 100mV. Tape out 150mV. Din sockets for inputs and outputs. Controls: Bass, Treble, Volume, Balance, Selector, Mono/Stereo switch. Stereo headphone socket. Attractive slim line design teak cabinet with aluminium front panel. Size 12½" x 6½" x 2½"

ONLY £17-85 Carr. 50p.

PREMIER PARAGON STEREO HI-FI AMPLIFIER



Gives the best possible reproduction of records, radio and tape at a reasonable price.

Fitted with all the controls and facilities you're ever likely to want, the Paragon gives you a degree of sophistication that is usually only found with amplifiers costing twice its price. It has bass and treble slide controls, volume and balance knobs, and eight push-buttons. There's also a standard stereo jack socket on the front panel, plus a ceramic/magnetic cartridge switch and a mains outlet socket on the back panel. Specification: 10+10 watts into 8 ohms. Power/frequency response: 0dB 10 watts into 8 ohms - 3dB 20Hz - 25KHz. Distortion typically less than 0.25%. Inputs for Magnetic phono (4mV) Ceramic phono (66mV) Radio/Tape (100mV). High and low filters. Teak finish cabinet. Size: 12½" x 6½" x 10½".

£27-50 P. & P. 60p.

PREMIER STEREO SYSTEM '84'

Consists of the Premier Paragon Stereo Amplifier, Garrard SP25 III in teak finish plinth with cover and fitted Goldring 800 stereo magnetic cartridge plus a pair of Marsden Hall Annex 100 Loudspeaker Systems. Complete with Free leads and plugs. £64 Carr. & Insurance £1-75

MSB-3002 Stereo Tuner Amplifier



£29-50

P & P 50p

Fantastically low-priced stereo tuner amplifier covering LW, MW & VHF with built-in decoder for stereo reception. Output 2 x 4 watts RMS. Input for ceramic or crystal pick-up. Output for tape recorder. Switched A.F.C. Stereo headphone socket. Controls—volume, tone, balance, selectors and tuning. Attractive walnut finish cabinet with 2 matching speakers.

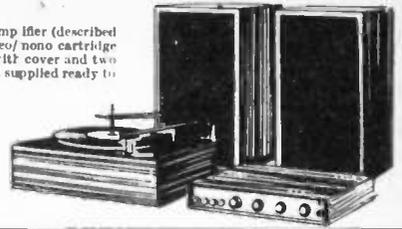
PREMIER HI-FI STEREO SYSTEMS

SYSTEM 'ONE'

Consists of the Premier 800 Mk II all transistor stereo amplifier (described left) Garrard auto/manual record player unit fitted stereo/mono cartridge with diamond stylus and mounted in teak finish plinth with cover and two cloth front loudspeaker systems. Absolutely complete and supplied ready to plug in and play. The 800 Mk II amplifier has an output of 5 watts per channel with inputs for ceramic and magnetic pick-up, tape and tuner also tape output socket and headphone socket. Controls: Bass, Treble, Volume, Balance, Selector, Mono/Stereo switch. Headphone socket. Power on/off. Teak finish cabinet with aluminium front panel. Size: 12½in. x 6½in. x 2-in.

£43-00

Carr. £1-75



SYSTEM 'TWO'

As above but with slotted front teak finish loudspeakers. Garrard SP25 Mk. III and magnetic cartridge.

£49-50

Carr. £1-75

FREE STEREO HEADPHONES AND ALL LEADS AND PLUGS WITH ABOVE SYSTEMS

NEW PREMIER COMPACT STEREO SYSTEM



All transistor stereo amplifier mounted into teak finish plinth with cover and Garrard 2025 T/C autochanger and a pair of matching teak finish cloth front speaker systems.

- ★ Output 4 watts rms per channel.
- ★ Separate volume, bass, treble and balance controls.
- ★ Stereo/Mono ceramic cartridge.
- ★ Tape/Tuner input and Tape output sockets.
- ★ Complete with all leads ready to use.

£31-00 Carr. & Ins. £1-50

STEREO HEADPHONE EXTENSION LEAD

15 foot curly cord. £1-50, P. & P. 10p.

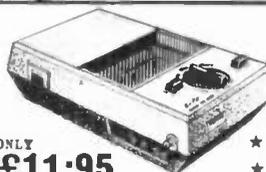


GARRARD SP25 MK III SINGLE RECORD PLAYER FITTED GOLDRING 800 MAGNETIC STEREO CARTRIDGE. COMPLETE IN TEAK FINISH WITH COVER.

PREMIER PRICE

£16-50

P. & P. £1



"LIFE"

AC/DC
CASSETTE
RECORDER

ONLY
£11-95

P. & P. 50p

- ★ Tape eject button
- ★ Complete with microphone, batteries and ban-ile
- ★ Battery/Mains operation
- ★ Single knob operation



MODEL CT-330 MULTITESTER

The Model CT-330 Multitester is a de-luxe, accurate and high sensitivity instrument having many features which are desirable and required in testing modern electronic equipment. The Model CT-330 is very compact and of sturdy construction. Only the finest parts are used—1% resistors, low-resistance selector switch, clear scales and rugged meter movement. Ranges: DC Voltage: 0, 0.6, 6, 30, 120, 600, 1,200, 3,000, 6,000V (20,000ohms/V). AC Voltages: 0, 6, 30, 120, 600, 1,200V (10,000 ohms/V). DC Current: 0, 0.6, 6, 60, 600mA. Resistance: 0, 6k, 60k, 6M, 60M (30, 3k, 30k, 300k ohms at centre scale). Capacity: 0-00005-0-01µF, 0-001-0-2µF. Decibels: -20 to +63db.

£8-25

P. & P. 25p



MODEL 630 MULTITESTER

Ranges: DC Voltages: 0, 3, 15, 60, 300, 600, 1,200V (30,000 ohms/V). AC Voltages: 0, 6, 30, 120, 600, 1,200V (15,000 ohms/V). DC Current: 0, 0.03, 3, 30, 300mA. Resistance: 0, 16k, 160k, 1.6M, 16M ohms (10, 100, 10k, 100k ohms at centre scale). Decibels: -20 to +63db.

£8-50 P. & P. 25p



MULTIMETER 20,000 O.P.V.

Compares with meters costing double its price. Features large easy-to-read meter, unusually high sensitivity—wide choice of ranges. With test leads, batteries and manual. Size: 4½" x 3½" x 1½". Ranges: DC Voltages: 5, 25, 50, 500, 2,500V, (20,000 O.P.V.). AC Voltages: 10, 50, 100, 500, 1,000V (10,000 O.P.V.). DC Current: 50µA, 2.5, 250mA. Resistance: 6k, 6M ohms. Decibels: -20 to +22 db. Capacitance: 10µF to 0-100µF, 0-100µF to 0-1µF. Optional leather case. £5.90 P. & P. 25p

£5.90 P. & P. 25p

HI-FI STEREO HEADPHONES

Designed to the highest possible standard. Fitted 2½" speaker units with soft padded ear muffs. Adjustable headband. 8 ohms impedance. Complete with 6ft lead and stereo jack plug.

£2-25

P. & P. 25p.



COMPACT CASSETTES LOW-NOISE

Screw Fixing. Fully Guaranteed. In Library Cases.

	EACH	3 for	6 for	10 for
C80	31p	89p	£1-72	£2-75
C90	44p	£1-22	£2-38	£3-85
C120	57p	£1-54	£3-04	£4-95

P. & P. 10p each (3 and over 15p)

EMI LOW NOISE CASSETTES

Brand New in Library Cases

C80 (List 71p) 48p	C90 (List 98p) 70p	C120 (List £1-48) 92p



P. & P. 15p

PREMIER RADIO

56 GEORGE STREET, LONDON W1H 5RH. TEL: 01-935 7917

ALL PRICES INCLUDE VAT

Also at:
23 Tottenham Court Road,
London W1P 9RA
Tel: 01-636 3451

BI-PRE-PAK

SUPPLIERS OF SEMI-CONDUCTORS TO THE WORLD

COMPLETE TELEPHONES



EX. G.P.O. NORMAL
HOUSEHOLD TYPE
ONLY £1.05

POST & PACKING 45p EACH



TELEPHONE DIALS

Standard Post Office type.
Guaranteed in working order.

ONLY 27½p

POST & PACKING 16½p

OVER
1,000,000

TRANSISTORS IN STOCK

We hold a very large range of fully marked, tested and guaranteed transistors, power transistors, diodes and rectifiers at very competitive prices. Please send for free catalogue.

Silicon planar plastic transistors. Unmarked, untested factory clearance. A random sampling showed these to be of remarkably high quality.

Audio PNP, similar to ZTX500, 2N3702/3, BCY70 etc.
Audio NPN, similar to ZTX300, 2N3708/9, BC107/8/9, BC168/9 etc.
Please state Audio NPN or Audio PNP when ordering.
ALL AT 500 for £3.30, 1,000 for £5.50, 10,000 for £44 P. & P. 11p/1,000.

OUR VERY POPULAR 4p TRANSISTORS

TYPE "A" PNP Silicon alloy, TO-5 can.
TYPE "B" PNP Silicon, plastic encapsulation.
TYPE "E" PNP Germanium AF or RF.
TYPE "F" NPN Silicon plastic encapsulation.
TYPE "G" NPN silicon similar ZTX 300 range
TYPE "H" PNP silicon similar ZTX 500 range

8 RELAYS FOR VARIOUS TYPES £1.10
P & P 27½

FREE CATALOGUE FOR



TRANSISTORS,
RECTIFIERS,
DIODES,
INTEGRATED
CIRCUITS,
FULL PRE-PAK
LISTS

TESTED AND GUARANTEED PAKS

B79	4	1N4007 Sil. Rec. diodes. 1,000 PIV lamp plastic	55p
B81	10	Reed Switches, 1" long, 8" dia. High Speed P.O. type	55p
B99	200	Mixed Capacitors. Approx. quantity, counted by weight	55p P & P 15p
H44	250	Mixed Resistors. Approx. quantity counted by weight	55p P & P 15p
H47	40	Wirewound Resistors. Mixed types and values.	55p
H49	2	OC71 Light Sensitive Photo Transistor	55p
H28	20	OC200(1/2/3) PNP Silicon uncodded TO-5 can	55p
H30	20	1 Watt Zener Diodes, Mixed Voltages 6.8 - 43V.	55p
H33	100	Mixed Diodes, Germ. Gold bonded, etc. Marked and Unmarked.	55p
H38	30	Short lead Transistors, NPN Silicon Planar types.	55p
H39	6	Integrated Circuits, 4 Gates BMC 962, 2 Flip Flops BMC 945	55p
H40	20	BFY50 2, 2N696, 2N1613 NPN Silicon uncodded TO-5	55p
H41	2	Sil Power transistors comp pair BD131/132	55p

UNMARKED UNTESTED PAKS

B1	50	Germanium Transistors PNP, AF and RF	55p
B66	150	Germanium Diodes Min. glass type	55p
B83	200	Trans. manufacturers' rejects all types NPN, PNP, Sil. and Germ.	55p
B84	100	Silicon Diodes DD-7 glass equiv. to OA200, OA202	55p
B86	100	Sil. Diodes sub. min. IN914 and IN916 types	55p
H46	40	250m-W. Zener Diodes DO-7 Min. Glass Type	55p
H45	30	Top Hat Silicon Rectifiers, 750mA. Mixed volts.	55p
H16	15	Experimenters' Pak of Integrated Circuits. Data supplied	55p
H17	20	3 amp. Silicon Stud Rectifiers, mixed volts	55p
H20	20	BY126/7 Type Silicon Rectifiers 1 amp plastic. Mixed volts.	55p
H34	15	Power Transistors, PNP, Germ. NPN Silicon TO-3 Can.	55p

MAKE A REV COUNTER FOR YOUR CAR

The 'TACHO BLOCK'. This encapsulated block will turn any 0-1mA meter into a linear and accurate rev. counter for any car with normal coil ignition system.

£1.10 each



Our famous PI Pak is still leading in value for money.

Full of Short Lead Semiconductors & Electronic Components, approx. 170. We guarantee at least 30 really high quality factory marked Transistors PNP & NPN, and a host of Diodes & Rectifiers mounted on Printed Circuit Panels. Identification Chart supplied to give some information on the Transistors. Please ask for Pak P.I. Only 55p. 11p P & P on this Pak.



A CROSS HATCH GENERATOR FOR £3.85 !!!

YES, a complete kit of parts including Printed Circuit Board. A four position switch gives X-hatch, Dots, Vertical or Horizontal lines. Integrated Circuit design for easy construction and reliability. This was a project in the September 1972 edition of Television.

This complete kit of parts costs £3.85, post paid.

A MUST for Colour T.V. Alignment.

ELECTRONIC TRANSISTOR IGNITION

Now in kit form, we offer this "up to the minute" electronic ignition system. Simple to make, full instructions supplied with these outstanding features:-

Transistor and conventional switchability, burglar proof lock up and automatic alarm, negative and positive compatibility. This project is a "star" feature in the September edition of "Electronics Today International" magazine. Our kit is recommended by the ETI magazine.

Complete kit including p & p £7.92
Ready built and tested unit £3.02 extra.

PLASTIC POWER TRANSISTORS

NOW IN TWO RANGES

These are 40W and 90W Silicon Plastic Power Transistors of the very latest design, available in NPN or PNP at the most shatteringly low prices of all time. We have been selling these successfully in quantity to all parts of the world and we are proud to offer them under our Tested and Guaranteed terms. Range 1. VCE. Min 15. HFE Min 15.

40 Watt	1-12	13-25	26-50
	22p	20p	18p
90 Watt	26p	24p	22p

Range 2. VCE. Min 40. HFE Min 40.

40 Watt	1-12	13-25	26-50
	33p	31p	29p
90 Watt	38p	36p	33p

Complementary pairs matched for gain at 3 amps. 11p extra per pair. Please state NPN or PNP on order.

INTEGRATED CIRCUITS

We stock a large range of I.C.s at very competitive prices (from 11p each). These are all listed in our FREE Catalogue, see coupon below.

METRICATION CHARTS now available

This fantastically detailed conversion calculator carries thousands of classified references between metric and British (and U.S.A.) measurements of length, area, volume, liquid measure, weights etc. Pocket Size 15p. Wall Chart 18p.

LOW COST DUAL IN LINE I.C. SOCKETS

14 pin type at 16½p each } New now low profile
16 pin type at 18p each } type

BOOKS

We have a large selection of Reference and Technical Books in stock.

These are just two of our popular lines:
B.P.I. Transistor Equivalents and Substitutes; 40p
This includes many thousands of British U.S.A., European and C.V. equivalents.

The Hiffe Radio Valve & Transistor Data Book 9th Edition; p. & p. 23½p.
Characteristics of 3,000 valves and tubes, 4,500 Transistors, Diodes, Rectifiers and Integrated Circuits. 75p

Send for lists of publications
N.B. Books are void of V.A.T.

Please send me the FREE Bi-Pre-Pak Catalogue.

NAME.....
ADDRESS.....

ALL PRICES INCLUDE 10% VAT
MINIMUM ORDER 50p. CASH WITH ORDER
PLEASE: Add 11p post and packing per order
OVERSEAS ADD EXTRA FOR POSTAGE
BUY THESE GOODS WITH ACCESS.

BI-PRE-PAK LTD

CO. REG. No. 820919

DEPT. E, 222-224 WEST ROAD, WESTCLIFF-ON-SEA, ESSEX S50 9DF
TELEPHONE: SOUTHEND (0702) 46344

YES, "YOU'VE GOT THE WHOLE WIDE WORLD IN YOUR HANDS"! ALMOST UNBELIEVABLE! Think of the year 1984 and what might be produced then—now get the fantastic **ASTRAD 17** and SEE for yourself that the incredible Russians have done it all NOW! It's the radio perfectionist's dream come true! **THIS ONE SUPERSEDES ALL EARLIER MODELS!** It will probably make your present radio seem like a "crystal set"! Complete with optional battery eliminator for both battery and mains use! We're almost giving them away at only £18.50—a mere fraction of even today's Russian miracle price! We challenge you to compare performance and value with £80 radios! *Send quickly, from receipt of goods test on mail order 7 days approval, refund if not delighted. Or call. Volume controlled from a whisper to a roar that would fill a hall! Much wider band spread, for absolute "pin-point" station selection! Plus "MAGIC EYE" tuning level indicator for ultra perfect tuning sensitivity! Yes, the Russians have surpassed themselves, proving again their fantastic ability in the field of electronics and brilliantly reflecting their advanced micro-circuitry techniques in the field of space and satellite communications. Yes, EVERY **WAVEBAND** instantly at your fingertips including Standard Long, Medium, Short and Ultra Short Waves to cover the four corners of the earth during 24 hours a day including all normal transmissions, VHF, FM/USW, AM: LW, MW, SW, gets, locally, local & new stations, non TV operation, and messages from all over the world! Expensive **TURRET TUNER** side control waveband selection unit (as used on expensive T.V.'s!). Every waveband clicks into position giving incredible ease of station tuning! Genuine push-pull output! ON/OFF volume and separate Treble and Bass tone controls for utter perfection of reproduction and tone! Press-button dial illumination! Take it anywhere—locally or internationally on standard batteries (obtainable everywhere) or direct through battery eliminator from 220/240V AC mains supply. Internal ferrite rod aerial plus built-in "rotatable" telescopic aerial extending to 39 in approx. It's also a fabulous **CAR RADIO**. Can also be used through extension amplifier, tape recorder or public address system. SIZE 13in x 10in x 4 1/2in overall approx. Magnificently designed, in highly polished cases. Made to give years of perfect service. Purer & sweeter tone than ever. (U.K. service facilities & spares available for years & years to come, if ever necessary!). With **WRITTEN GUARANTEE**, manual with simple operating instructions & circuit diagram, PLUS ultra sensitive earphone for personal listening. ONLY £18.50 (with mains/battery eliminator £2.25 extra)/**BOX, POST, ETC. 45p. NO MORE TO PAY! *BUT WAIT**, for only 75p extra you get the sensational "COMPUTERISED" **WORLD TUNING GUIDE** (it enables you to zone & time in a flash for transmissions the whole world over—even a child can do it in a flash—it even lets you know when to tune into the U.K. when abroad. **NO GUESSING! NO MESSING!**) PLUS Standard 'longlife' batteries and Converter Plug. (Sorry—We cannot change these new radios for any earlier model purchased.) Send quickly to Uxbridge Road address, or call at either Store. But **HURRY! SHOPERTUNITIES SAVE YOU £££.**

THOUSANDS OF MILES REDUCED TO INCHES?
1973 RUSSIAN RADIO TECHNOLOGY
SHRINKS THE WORLD! *COMPUTERISED?



BRAND NEW FABULOUS ASTRAD 17
PORTABLE RADIO & COMMUNICATIONS RECEIVER



28 TRANSISTORS AND DIODES!
WAVEBANDS: STANDARD LONG and MEDIUM
Plus 5 SHORT WAVEBANDS
Plus ULTRA SHORT WAVES
(V.H.F. AM, FM, MW, LW, USW.)
BATTERY MODEL £18.50 **BOX POST ETC. 45p**
MAINS/BATTERY ELIMINATOR £2.25 extra

FIRST TIME EVER!
 *NOW AVAILABLE WITH **fabulous "COMPUTERISED" WORLD TUNING GUIDE!**
 NO MORE GUESSWORK—**INSTANT DATA** at your fingertips—enables you to **ZONE & TIME IN A FLASH** for transmissions the world over!

THIS OFFER ONLY FROM US!

BUY ONE FROM US! **SAVE £23.03 NOW!**
fabulous BRAND NEW SOLID STATE
 This equipment's got EVERYTHING!
BATTERY/MAINS AC Combined V.H.F. AM/FM RADIO and CASSETTE TAPE RECORDER & PLAYER
 WITH REMOTE CONTROL MICROPHONE
 RECOMMENDED RETAIL PRICE £44
OUR PRICE £20.97 **CARR ETC. 50p**

Shopertunities "thunder" ahead with an offer that's FANTASTIC (even by our standards). We've snapped up 500 magnificent machines. Latest sensation in the world of sound! First-class makers! Fabulous **VHF, AM/FM Radio AND Cassette Tape Recorder & Player** combined & it also runs off standard batteries or mains. (Simply plug in the 220/240V AC line cord.) Record and play back anything, anywhere! **IMPORTERS RECOMMENDED RETAIL PRICE £44! WE OFFER AT UNDER HALF PRICE!**
 Wonderful features: * Press-button Keyboard Control Panel or latest **MASTER SWITCH CONTROL!** * "MAGIC EYE" Visual Battery check/recording level indicator or built-in automatic Leveller! * Separate ON/OFF and HI-LO volume controls! * Heavy duty built-in speaker! * Earphone (for personal listening or "monitoring") and extension speaker. * Remote control microphone! * Built-in swivel telescopic extension aerial (24in approx.)! Magnificently made case with carry handle. (DESIGNS VARY SLIGHTLY.) Takes standard 30, 60, 90 or 120-minute Cassette Tapes, obtainable everywhere. **AND the amazing built-in full circuit VHF, AM/FM Radio** gives you superb clarity of tone, incredible station selection. Unique rotating Station Selector Dial—gets locally, local city and regional stations in every part of the country, plus B.B.C. National, VHF. Picks up dozens of foreign stations. Fabulous in your car! You could pay £££'s more for a Car Radio or Car Cassette player. **ONLY £20.97, carr. etc., 50p—NO MORE TO PAY!** Complete with simple instructions, remote control microphone with on/off switch and microphone stand. **WITH WRITTEN GUARANTEE.** Send quickly, test on mail order 7 day approval from receipt of goods, refund if not delighted. Or call. **BONUS OFFER:** Batteries and Cassette Tape 28p extra if required. Callers: ACCESS & BARCLAY CARDS ACCEPTED AT BOTH STORES.

SHOPERTUNITIES LTD.

FIRST TIME EVER! SAVE £16.02!
BRAND NEW AC/DC BATTERY/MAINS
Cassette TAPE RECORDER & PLAYER
 WITH REMOTE CONTROL MICROPHONE.
FIRST CLASS MAKERS
 WE COULD CHARGE UP TO £26.97!
OUR PRICE £10.95 **POST ETC. 50p**

THE ONE STEP FORWARD EVERYONE HAS WAITED FOR! NOW a superb deluxe portable **BATTERY/MAINS** tape recorder and player—and incredible Shopertunities bring it to you for **ONLY £10.95**. Due to our cut price we cannot name first-class makers—but rest assured you're getting one of the **BEST!** Expensive "PIANO KEYBOARD" CONTROL PANEL (or latest **MASTER SWITCH** control) AND **AUTOMATIC LEVEL CONTROL**. No fiddling with awkward tape and reels, just "slap-in" a cassette and off you go! (Takes 30, 60 or 90 minute standard cassette tapes obtainable everywhere.) Amazing performance ensures perfect tapings and superb reproduction! Remote control microphone. Rapid Rewind! Fast forward! Beautiful tone from a whisper to a roar! Complete—record anywhere, indoors or out! Runs on standard batteries AND 220/240V AC mains. Separate jacks for remote control microphone, etc. Size 9 1/2in x 5in x 2 1/2in approx. Design can vary slightly. With carry handle. **WRITTEN GUARANTEE** and full instructions. (Importers recommended selling price £26.97!) **OUR PRICE ONLY £10.95, post, etc. 50p. NO MORE TO PAY! *Send quickly, test on mail order 7 days approval from receipt of goods—refund if not delighted. BONUS OFFER—Cassette tape, Standard batteries AND microphone stand 55p extra, if required.**

Order by post to Uxbridge Road address or call at either store. Bargains galore at both stores. **(COMMERCIAL TRAVELLERS PLEASE NOTE: Merchandising office at Holborn Store.)**

Dept. EE/NC/24, 164 UXBRIDGE RD. (facing Shepherds Bush Green), LONDON W12 8AQ. (Thurs. 1, Fri. 7). Also at 37/39 HIGH HOLBORN (opposite Chancery Lane), LONDON, W.C.1. (Thurs. 7 p.m.). BOTH OPEN MON. TO SAT. 9 A.M. TILL 6 P.M.

FREE BOOKLET

All types of
TRANSISTORS — RECTIFIERS
BRIDGES—SCR'S—TRIACS
INTEGRATED CIRCUITS
F.E.T.—LIGHT DEVICES

OVER 1500 DIFFERENT DEVICES
ENTIRELY NEW 1973 EDITION
SEND FOR YOUR FREE COPY TODAY



More Devices
New Prices
New Ranges

This is a must for all

Semi-conductor Users
(ask for booklet No. 36)

INTEGRATED CIRCUITS VERY IMPORTANT. ONLY branded I.C.'s

are to the FULL manufacturers specifications. ALL others are not. Henry's sell only branded Integrated Circuits. From TEXAS INSTRUMENTS, FAIRCHILD, SIGNETICS. So why buy alternatives? Under special devices when you can purchase the genuine article from us—ex stock—need we say more!



Type	1/11	12/29	30/99	Type	1/11	12/29	30/99	Type	1/11	12/29	30/99
8N7400N	0-20	0-18	0-16	8N7448N	1-50	1-27	1-13	8N74142N	2-88	2-88	2-52
8N7401N	0-20	0-18	0-16	8N7450N	0-20	0-18	0-16	8N74146N	1-44	1-44	1-26
8N7401AN	0-38	0-38	0-38	8N7451N	0-20	0-18	0-16	8N74147N	2-30	2-30	1-83
8N7402N	0-20	0-18	0-16	8N7453N	0-20	0-18	0-16	8N74148N	2-01	2-01	1-63
8N7403N	0-20	0-18	0-16	8N7460N	0-20	0-18	0-16	8N74150N	2-30	2-30	2-01
8N7403AN	0-38	0-38	0-38	8N7470N	0-33	0-30	0-27	8N74151N	1-15	1-15	1-00
8N7404N	0-24	0-21	0-18	8N7472N	0-38	0-38	0-34	8N74153N	1-09	1-09	0-96
8N7405N	0-20	0-18	0-16	8N7473N	0-44	0-44	0-37	8N74156N	1-16	1-16	1-00
8N7405AN	0-44	0-44	0-38	8N7474N	0-48	0-48	0-42	8N74158N	1-09	1-09	1-00
8N7406N	0-40	0-38	0-35	8N7475N	0-59	0-58	0-51	8N74159N	2-44	2-44	1-34
8N7407N	0-40	0-38	0-35	8N7476N	0-45	0-36	0-32	8N74160N	1-58	1-58	1-18
8N7408N	0-25	0-22	0-19	8N7477N	0-80	0-70	0-60	8N74161N	1-58	1-58	1-38
8N7409N	0-33	0-33	0-28	8N7478N	0-85	0-80	0-75	8N74162N	1-58	1-58	1-38
8N7409AN	0-44	0-44	0-38	8N7479N	1-25	1-10	0-95	8N74163N	1-58	1-58	1-38
8N7410N	0-20	0-18	0-16	8N7482N	0-87	0-80	0-72	8N74164N	2-01	2-01	1-76
8N7411N	0-25	0-23	0-21	8N7483N	1-20	1-10	1-00	8N74165N	2-16	2-16	1-89
8N7412N	0-28	0-28	0-25	8N7488N	1-87	1-87	1-63	8N74166N	2-16	2-16	1-89
8N7412AN	0-38	0-38	0-33	8N7489N	4-32	4-32	3-78	8N74167N	4-10	4-10	3-59
8N7413N	0-30	0-27	0-25	8N7490N	0-75	0-70	0-63	8N74170N	2-88	2-88	2-52
8N7414N	0-72	0-72	0-63	8N7491AN	1-10	1-00	0-90	8N74171N	5-78	5-78	5-04
8N7416N	0-30	0-27	0-25	8N7492N	0-75	0-70	0-63	8N74172N	1-58	1-58	1-45
8N7417N	0-30	0-27	0-25	8N7493N	0-75	0-70	0-63	8N74173N	1-58	1-58	1-45
8N7420N	0-23	0-18	0-16	8N7494AN	0-85	0-80	0-75	8N74174N	1-80	1-80	1-57
8N7422AN	0-28	0-28	0-25	8N7496N	0-85	0-80	0-75	8N74175N	1-29	1-29	1-13
8N7424N	0-38	0-38	0-33	8N7496N	1-00	0-90	0-83	8N74176N	1-44	1-44	1-26
8N7425N	0-37	0-34	0-32	8N74100N	2-18	1-89	1-89	8N74177N	1-44	1-44	1-26
8N7426N	0-37	0-37	0-32	8N74104N	0-60	0-58	0-46	8N74180N	1-44	1-44	1-26
8N7427N	0-43	0-43	0-37	8N74105N	0-60	0-58	0-46	8N74181N	5-18	5-18	4-53
8N7430N	0-20	0-18	0-16	8N74107N	0-61	0-61	0-46	8N74182N	1-44	1-44	1-26
8N7432N	0-37	0-37	0-32	8N74110N	0-67	0-67	0-50	8N74184N	2-16	2-16	1-89
8N7433N	0-48	0-43	0-38	8N74111N	0-86	0-86	0-76	8N74185AN			
8N7433AN	0-67	0-67	0-60	8N74116N	2-16	2-16	1-89				
8N7437N	0-43	0-43	0-37	8N74118N	1-00	0-90	0-83	8N74188N	6-48	6-48	5-87
8N7438N	0-43	0-43	0-37	8N74119N	1-62	1-82	1-68	8N74190N	2-30	2-30	2-01
8N7439AN	0-57	0-57	0-50	8N74120N	0-67	0-67	0-50	8N74191N	1-58	1-58	1-38
8N7440N	0-20	0-18	0-16	8N74121N	0-61	0-61	0-46	8N74192N	2-30	2-30	2-01
8N7441AN	0-85	0-79	0-73	8N74122N	0-80	0-80	0-70	8N74193N	2-30	2-30	2-01
8N7442N	0-85	0-79	0-73	8N74123N	1-44	1-44	1-26	8N74194N	1-72	1-72	1-51
8N7443N	1-50	1-27	1-13	8N74125N	0-69	0-69	0-60	8N74196N	1-44	1-44	1-26
8N7444AN	1-50	1-27	1-13	8N74126N	0-69	0-69	0-60	8N74198N	1-58	1-58	1-38
8N7445N	0-16	0-14	0-12	8N74127N	0-78	0-78	0-63	8N74197N	1-58	1-58	1-38
8N7446N	0-16	0-16	0-12	8N74136N	0-63	0-63	0-55	8N74198N	3-18	3-18	2-77
8N7447AN	1-80	1-80	1-57	8N74141N	1-00	0-90	0-80	8N74199N	2-88	2-88	2-52

LARGER QUANTITY AND O.E.M. PRICES PHONE (01) 723 3646. PRICING OF SN7400 SERIES IS CALCULATED ON THE TOTAL NUMBER ORDERED REGARDLESS OF MIX. SN74... HIGH POWER... SN74... LOW POWER SERIES IN STOCK... SEND FOR LIST 36. FREE ON REQUEST. LOW PROFILE SOCKETS 14 PIN... 15P 16 PIN... 17P 8 PIN... 14P

TRANSISTORS

A SELECTION FOR FULL LIST SEND FOR BOOKLET 36 TODAY

AAZ213 10p	BC182 12p	BYZ13 85p	OC36 65p	ZTX108 10p	2N3714 16p
AC107 36p	BCY32 85p	C106D 55p	OC44 18p	ZTX300 14p	2N3771 7.25p
AC128 20p	BCY39 1.00	GET111 55p	OC45 18p	ZTX302 18p	2N3773 1.25p
AC187 20p	BCY85 2.50	GET115 55p	OC71 18p	ZTX500 15p	2N3790 2.25p
AC177 35p	BCY70 1.50	GET880 55p	OC72 25p	Z0301 40p	2N3819 35p
ACY309 65p	BD124 20p	MJ340 50p	OC77 55p	2N697 15p	2N3866 75p
AD149 50p	BDY72 13p	LM309K 1.97	OC81 25p	2N706 10p	2N3903 15p
AD161 39p	BD124 80p	MAT121 25p	OC83 25p	2N930 20p	2N4002 14p
AD169 39p	BD131 45p	MJ235 50p	OC10 25p	2N987 45p	2N4126 15p
AF117 20p	BP115 22p	MJE505 50p	OC170 25p	2N1132 25p	2N4871 35p
AF118 50p	BP180 33p	MJE520 50p	OC200 55p	2N1304 22p	2N5487 35p
AF139 33p	BF14 13p	MJE305 50p	OC369 95p	2N1613 20p	2N601 8.00p
AF186 40p	BFX13 25p	OC771 1.00	OC771 1.00	2N1671 1.00	2N626 8.00p
AF239 44p	BFX34 55p	ORP12 55p	ORP12 55p	2N2147 75p	2N8303 70p
AS727 30p	BFX88 22p	NKT217 45p	ORP60 45p	2N2160 80p	4Q2020 45p
BA115 10p	BPY60 20p	NKT404 60p	P346A 20p	2N2926 10p	4Q361 45p
BAK13 5p	BPY61 20p	OAD 60p	T1L209 25p	2N3063 20p	4Q362 40p
BC107 12p	BPY64 45p	OAS 10p	TIP29A 49p	2N3064 45p	4Q408 50p
BC108 12p	BPY90 75p	OQ400 8p	TIP30A 59p	2N3065 45p	4Q486 75p
BC109 12p	BLY36 6.25	OQ202 10p	TIP31A 61p	2N3440 50p	4Q636 1.00p
BC109C 14p	BX820 15p	OC16 85p	TIP41A 74p	2N3449 1.10	4Q430 85p
BC113 18p	BU105 2.20	OC20 1.25	TIP42A 90p	2N3526 80p	
BC147 12p	BY100 15p	OC28 65p	T1843 26p	2N3614 50p	
BC189C 14p	BY127 15p	OC35 65p	T185A 25p	2N3702 11p	

All types offered subject to availability. Prices correct at time of press E. & D. E. 10% VAT to be added to all orders. UK post, etc, 15p. per order.

TBA800 5 WATT I.C.
Suitable alternative to SL403D. 5/30 volt operated. 8/16 ohm 5 watt output. With circuits and data £1-50



Sinclair IC12
with circuits and data. 6 watt IC with printed circuit board 28 volt operated £1-80



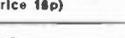
ZN414 IC
Integrated circuit radio as featured by many magazines (PW Jan. 73 Reprint Ref. No. 19 for 10p) £1-20



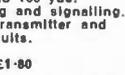
Toshiba Power and Preampifier modules
TH9013P 20 watt Power amplifier 22-0-22 or single 45 volts operated £4-57



TG9014P Stereo
two channel preampifier. £1-50 (circuit book No. 42 price 18p)



Ultrasonic Transducers
Operate at 40Khz up to 100 yds. Ideal remote switching and signalling. Complete with data transmitter and receiver new I.C. circuits. Per pair £3-90



3015F 7 SEG.
I.C. size complete with data price £2 each or 4 for £7 (digital clock circuits ref. No. 31, 15p)



TRANSISTORS SPECIAL OFFER

2N3055	AF117
2547p ea	2515p ea
10042p	10013p
50039p	50012p
100034p	100010p

BY127
2512p ea
1009p
5008p

ZENER DIODES
400 m/w BZY88 / BZX83. From 3-3 volt - 33 volts 10p each

1-3 watts 5% Miniature Tubulars
IN4700 series. From 3-3 volt - 33 volt 18p each.

SILICON RECTIFIERS
1 amp series
IN4001 to IN4007 From 8p ea
1.5 amp
PL4001 to PL4007 From 8p ea
3 amp
PL7001/IN5400 From 14p ea
Send for full list 36

MORE OF EVERYTHING AT HENRY'S
See pages 649-650 and Back Cover of this magazine.
BEST VALUE

Semi-Conductor QUANTITY DISCOUNTS

10% 12-15%
25+ 20% 100+
Any one type except where quantity discounts shown.
Min. order £1-00 please.

TRIACS - Stnd. mounting with accessories
3 AMP RANGE
Type P.I.V. Price ea.
SC35A 100v 80p
SC35B 200v 85p
SC35D 400v 90p
SC35E 500v £1-20



6 AMP RANGE
SC40A 100v 90p
SC40B 200v 95p
SC40D 400v £1-20
SC40E 500v £1-30



10 AMP RANGE
SC45A 100v £1-05
SC45B 200v £1-15
SC45D 400v £1-45
SC45E 500v £1-85



15 AMP RANGE
SC50A 100v £1-45
SC50B 200v £1-65
SC50D 400v £1-95
SC50E 500v £2-25



TRIACS - Additional Types
40430 TRIAC (T066) 85p
40669 TRIAC (Plastic) 90p
40486 TRIAC (T05) 75p



NEW RANGES BRIDGE RECTIFIERS
FEATURES SMALL SIZE AND LOW COST. Sizes are approx.
250mA QUARTER AMP
B025/05 50 PIV 18p
B025/10 100 PIV 18p
B05/05 50v 22p
B05/10 100v 20p
B05/20 200v 23p
B05/40 400v 25p
B05/60 600v 27p
1/4 x 1/4 x 1/4" dia.



1 AMP P.I.V.
B1/05 50v 25p
B1/10 100v 25p
B1/20 200v 28p
B1/60 600v 30p
1/4 x 1/4 x 1/4" dia.



2 AMPS P.I.V.
B2/05 50v 35p
B2/10 100v 40p
B2/20 200v

Henry's

PANEL METERS · TRANSFORMERS · CONTROLS · RELAYS
 IRONS · TOOLS · VALVES · POT CORES MOST TYPES OF COMPONENTS
 You need a catalogue! 55p post paid complete with Discount Vouchers



UK's
**LARGEST RANGE
 OF KITS &
 GADGETS**

TEST EQUIPMENT

MULTIMETERS

- (carr. etc. 30p)
- 200H (M210) 20K/Volt Slimline with case 4-95
 - TLH33D 2K/Volt Robot with case 4-95
 - U437 10K/Volt Steel case. AC up to 40 KHz 4-95
 - U4324 20K/Volt with AC current ranges 8-00
 - AF105 50K/Volt with Leather case 6-50
 - U4313 20K/Volt AC current. Steel case 10-50
 - U4341 Plus Built in transistor tester 10-50
 - Model 500 30K/Volt 9-95



OTHER EQUIPMENT

- SE250B Pocket Signal Injector 1-90 carr. 15p
- SE500 Pocket Signal Tracer 1-50 carr. 15p
- TE15 Grid Dip meter 440kHz-280mHz 13-45 carr. 30p
- TE40 A.C. Millivoltmeter 1-2mHz 18-75 carr. 35p
- TE55 28 Range valv. voltmeter 10-25 carr. 40p
- TE20 120kHz-500mHz RF Generator 16-95 carr. 40p
- TE22D 20Hz-200kHz Audio Generator 18-75 carr. 40p
- SE350A Deluxe Signal Tracer 9-95 carr. 20p
- SE400 Volts/ohms/R-C sub./RF field/R.F. gen. 11-25 carr. 20p

New Revolutionary Supertester 680R

- Accessories
- 680R Multi-tester 18-50
 - Transistor tester 11-00
 - Electronic voltmeter 18-00
 - Amp clamp 11-95
 - Temperature probe 11-95
 - Gauss meter 11-95
 - Signal Injector 5-95
 - Phase Sequence 5-95
 - EHT Probe 5-95
 - Shunts 25/50/100A 4-50 each

A SELECTION OF INTERESTING ITEMS

- C3025 Compact transistor tester 5-50 p & 15p
- E1300 Mono mag. cart. preamp. 1-95 p & 15p
- E1310 Stereo mag. cart. preamp. 4-95 p & 25p
- Easiphone telephone amplifier 6-15 p & 25p
- D1203 Telem. with PU coil 3-60 p & 20p
- LL1 Door Intercomm. and chime 11-95 p & 25p
- Chattelle (lights as you talk) 13-90 p & 20p
- 1 Kw Dimmer/controller 3-00 p & 10p
- 9" Twin spring unit For 2-75 p & 15p
- 16" Twin spring unit Reverbs 6-50 p & 25p
- Car Tachometer Electronic 7-50 p & 15p
- VHF 105 Aircraft Band Corrector 3-95 p & 15p
- B2005 4 Ch. mic. mixer 2-95 p & 15p
- B2004 2 ch. Stereo mixer 4-75 p & 15p

BUILD THIS RADIO

Portable MW / LW radio kit using Mullard RF/IF module. Features MW — bandspread for extra selectivity. Slow motion tuning. Fibreglass PVC cabinet. 600mW output. All parts £7-98 (battery 22p), carr. etc. 32p.



EXCLUSIVE: SPECIAL OFFERS

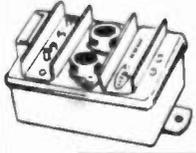
- MW/LW CAR RADIO AKAI GX40
 4 or — Earth with speaker Stereo cassette recorder, and fittings. £8-50 carr./£9-95 carr/packg. 50p, packg. 30p. Pair Akai ADM microphones. £8-95 carr/packg. 20p.
- 8 TRACK CAR STEREO
 (— Earth) with speakers in 5 WAVEBAND PORTABLE Pods & fittings. £12-50 carr/packg. 40p.
- HANIMAX HC1000
 Battery cassette recorder. £10-50 carr/packg. 25p.
- HANIMAX HC2030
 Battery/Main cassette recorder. £13-50 carr/packg. 30p.
- PORTABLE CASSETTE TAPE PLAYER—
 for car or carry around. £7-25 carr/packg. 20p.
- HANIMAX POCKET CALCULATOR WITH % KEY. £33-50.

SPECIAL PURCHASES

- AVOMETER MOVEMENTS
 AVO 8 or 9 50mA MOVEMENTS. Ex Brand New AVO's £3-50 Post 20p.
- UHF TV TUNERS CHANNELS 21 TO 64
 Brand new transistorised geared tuners for 625 Line Receiver IF output. £2-50 Post 20p.

EASY TO BUILD KITS BY AMTRON— EVERYTHING SUPPLIED

- | Model No. | Description | Price |
|-----------|--|-------|
| 310 | Radio control receiver | 2-98 |
| 300 | 4-channel R/C transmitter | 5-95 |
| 345 | Superhet R/C receiver | 5-95 |
| 455 | AM signal generator | 12-33 |
| 65 | Simple transistor tester | 1-40 |
| 115 | 8 watt Amplifier | 3-90 |
| 120 | 12 watt amplifier | 4-70 |
| 125 | Stereo control unit | 5-70 |
| 130 | Mono control unit | 3-60 |
| 605 | Power supply for 115 | 4-55 |
| 610 | Power supply for 120 | 4-55 |
| 615 | Power supply for 2 x 120 | 5-73 |
| 230 | AM/FM aerial amplifier | 2-93 |
| 240 | Auto parking light | 5-90 |
| 275 | Mic. preamplifier | 6-08 |
| 570 | LF generator 10Hz-1mHz | 15-80 |
| 575 | E.C. wave generator 20Hz-20KHz | 14-50 |
| 590 | SWR meter | 12-85 |
| 620 | NI-CAD Charger 1-2-12v | 8-00 |
| 630 | STAB Power supply 6-12v 0-25-0-1A | 8-15 |
| 690 | DC motor speed Gov. | 2-87 |
| 700 | Electronic Chaffinch | 7-00 |
| 705 | Windscreen wiper timer | 6-80 |
| 760 | Acoustic Pitch | 10-75 |
| 780 | Metal Detector (electronics only) | 9-65 |
| 790 | Capacitive Burglar alarm | 6-85 |
| 835 | Guitar preamp. | 4-25 |
| 840 | Delay car alarm | 6-15 |
| 875 | CAP. Discharge Ignition for car engine (-Ve Earth) | 13-15 |
| 80 | Scope Callibrator | 2-25 |
| 255 | Level indicator | 6-15 |
| 525 | 120-160mHz VHF timer | 11-30 |
| 715 | Photo cell switch | 7-70 |
| 795 | Electronic continuity tester | 4-30 |
| 860 | Photo timer | 13-25 |
| 871 | Slide projector auto feed control | 7-15 |
| 235 | Acoustic Alarm for driver | 7-60 |
| 465 | Quartz XTAL checker | 8-75 |
| 220 | Signal Injector | 2-30 |
| 390 | VOX | 15-50 |
| 432 | Testkit | 19-30 |
| 670 | Buffer Battery Charger | 6-55 |
| 885 | Capacitive Contact Alarm | 6-25 |
| 850 | Electronic Keyer | 18-75 |
| 820 | Electronic Digital Clock | 58-50 |



ALL KITS OFFERED SUBJECT TO STOCK AVAILABILITY



BUILD THIS TUNER

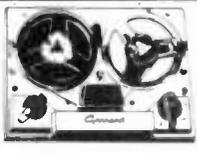
MW/LW Radio Turner to use with any amplifier. Features Mullard RF/IF module Ferrite aerial, built in battery. Excellent results. Size 7" x 2 1/2" x 3 1/2". All parts £4-85, carr. 15p.

MULTI-USE & RADIONIC KITS

- 10-1 10 Projects 3-60
- 50-1 10 Projects 6-00
- 150-1 150 Projects 13-20
- Telephone Communicator 7-20
- X20 20 (Elec.) Projects 4-95
- X40 40 (radio) Projects 9-45 (carr./packing 40p)

All transistor circuits with hand books

All types offered subject to availability. Prices correct at time of press E & OE. 10% VAT TO BE ADDED TO ALL ORDERS. UK post etc. 15p per order unless stated.



GARRARD BATTERY TAPE DECK

GARRARD 2 speed 9 volt tape decks. Fitted record/play and oscillator/erase heads. Wind and rewind controls. Takes up to 4" spools. Brand new complete with head circuits. £9-50 carr. 30p

TOP QUALITY SLIDER CONTROLS

60mm stroke high quality controls complete with knobs (post, etc. 15p any quantity).

Singles Log and Lin 5K, 10K, 22K, 50K, 100K, 250K, 500K, 1 Meg. 45p each.

Ganged Log and Lin 10K, 22K, 50K, 100K, 250K, 85p each. (Quantity discounts available)

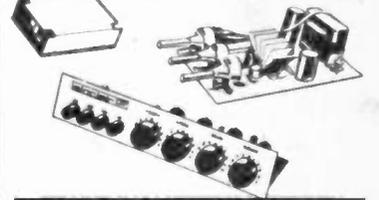
Complete with knobs.

MARRIOT TAPE HEADS

4 TRACK MONO or 2 TRACK STEREO '17' High Impedance £2-00
 '18' Med. Impedance £2-00
 R730/E73 2 track mono Record/2 track low imp. 75p pair.
 Erase Heads for '17' and '18' 75p
 '63' 2 track mono. Hi Imp. £1-75
 '43' Erase Head for '63' 75p
 (Post, etc. 15p any quantity).

SINCLAIR, MINIATURE AMPLIFIERS & TUNER/DECODER

- AMPLIFIERS (carr. etc. 20p)
- 4-300, 0-3 watt 9 volt 1-75
 - 104, 1 watt 9 volt 2-20
 - 304, 3 watt 9 volt 2-50
 - 555, 3 watt 12 volt 2-85
 - E1208, 5 watt 12 volt 4-50
 - 608, 10 watt 24 volt 4-10
 - 410, 10 watt 28 volt 4-95
 - Z30, 15 watt 30 volt 3-57
 - E1206, 30 watt 45 volt 9-75
 - Z50, 30 watt 50 volt 4-37
 - E1210, 24 + 24 watts 19-30
 - RE500, 5 watt IC mains operated Amplifier with controls £8-30
 - SAC14, 7 + 7 watt Stereo with controls £8-00
 - SAC13, 15 + 15 watt Stereo with controls £11-00
- SINCLAIR PROJECT 60 (carr. 20p)
- Z30 3-57 Z50 4-37
 - Stereo 60 Preamp. 7-97
 - PZ5 £3-07, PZ6 £6-37
 - PZ8 (for Z50) £4-77 (TRANS £2-95)
 - AFU £4-45
- New SINCLAIR PROJECT 80
- Stereo Preamp. 9-50
 - Audio Filter Unit 5-50
 - Z40 15 Watt Amp. 4-30
 - Z60 25 Watt Amp. 5-50
 - PZ5 Mod. for 1 on 2 Z40 3-98
 - PZ6 Mod. (S Tab) 6-25
 - PZ8 Mod. (S Tab) 6-30
 - 1 on 2 Z60 6-30
 - TRANSFORMER FOR PZ5 2-95
 - Project 605 Kit 19-95



POWER SUPPLIES FOR EVERY PURPOSE

- (All cased unless stated chassis)
- 470C 6.75/9 volt 300 mA (includes Multi-Adaptor for Tape Recorders, etc.) 1-95 post 20p
 - Car Lighter Voltage Adaptors 300mA (State voltage 6v, 7.5v, 9v) 1-95 ea. post 25p
 - SC202 3.6/7.5 volt 400mA 3-25 carr. 30p
 - HC244R Stabilised version 4-25 carr. 30p
 - P500 9 volt 500mA 2-80 post 20p
 - P11 24 volt 500mA (chassis) 2-80 post 20p
 - P15 26/28 volt 1 amp (chassis) 2-70 post 20p
 - P1080 12v 1 amp (chassis) 3-25 post 20p
 - P1081 45v 0-9 amp (chassis) 4-40 post 20p
 - P12 4-12 volt 0-4-1 amp 6-75 post 30p
 - SE101A 3.6/9/12 volt 1 amp (Stab.) 9-15 post 25p
 - RP184 6.75/9/12 1 amp (Stab.) 9-95 post 30p



FIBRE OPTICS

0-01 Diam. Mono Filament £1-50 per 25 metre reel
 0-13 Diam. 64 Fibres Sheathed. £1-00 per metre
 SPRAYS 15mm Diam. Mares Tails £9-50.



Henry's

RADIO LIMITED

EDGWARE ROAD, W2

SEE FACING PAGE FOR ADDRESSES

Henry's

DISCOUNT HI-FI, TV, TAPE AND CAR ENTERTAINMENT

Low prices means less VAT - Henry's give full guarantees and demonstrations for callers. Plus big savings.
Also at Modern Electrics (Retail) Ltd., 120 Shaftesbury Avenue, W.1. Your Sony dealer.

**BEST VALUE
IN U.K.**



STEREO AMPLIFIERS

(carr./packing 50p)			
AKAI	AA5200	61 70	
	AA5300	78 50	
	AA5800	117 50	
AMSTRAD	1C2000 Mk. II	29 50	
	4000 Mk II	23 95	
EAGLE	TSA149	25 10	
	TSA151	34 85	
	AA2	30 80	
	AA4	42 45	
	AA6	55 95	
HOWLAND WEST	DA1000	22 45	
HENELEC TEXAN KIT		28 50	
HENELEC TEXAN	Built	35 00	
NIKKO	TRM300	25 95	
	TRM400	32 50	
PIIONEER	SA500A	34 25	
ROTEL	RA 211	32 65	
	RA311	41 15	
	RA611	60 80	
	RA810	75 75	
	RA1210	92 50	
SINCLAIR	2000	22 95	
	3000	28 95	
TANDBERG	TA300	68 60	
TELETON	SAQ206B	22 50	
	SAQ307	22 50	
	GA202	28 50	

STEREO RADIO TUNERS

(carr./packing 50p)			
AKAI	AT550	60 50	
	AT580	94 50	
AMSTRAD	3000	23 55	
EAGLE	AA8	40 50	
	TS1152	29 45	
HENELEC Stereo Kit		24 95	
HENELEC Stereo Built		24 95	
HOWLAND WEST	DA1000T	25 35	
PIIONEER	TX500A	48 75	
ROTEL	RT222	32 65	
	RT322	43 75	
	RT622	65 40	
SINCLAIR	2000	26 95	
	3000	26 95	
TELETON	GT202	30 50	

DECODERS / SYNTHESIZERS

(carr. etc. 30p)			
DYNACO QUADRATOR	AA10	16 90	
EAGLE	AA26	12 00	
TATE 1	Chassis	16 35	
TATE 3	Chassis	17 95	
TATE 4	Chassis	19 95	
TATE 7	Boxed	25 95	

MATCHED SPEAKER SYSTEMS

Recommended pairs 8 ohms (Carr. / Packing £1.50 pair)			
RANK DOMUS			
150	26 95 pr.		
175	33 75 pr.		
250	53 75 pr.		
MARSDEN HALL			
110	22 50 pr.		
150	27 50 pr.		
200	34 50 pr.		
DYNACO			
A10	43 00 pr.		
A25	69 00 pr.		
A35	79 00 pr.		
WHARFEDALE			
Denton 2	18 watt	27 20 pr.	
Linton 2	20 watt	32 65 pr.	
Melton II	25 watts	51 80 pr.	
Trilon	25 watt	40 80 pr.	
LEAK			
150	18 watt	32 65 pr.	
250	18 watt	44 30 pr.	
CELESTION			
120	20 watt	37 80 pr.	
COUNTY	25 watt	33 60 pr.	
15	30 watt	50 40 pr.	
44	44 watt	81 20 pr.	
UK's largest stockists for KEF			
Acoustic Research, Mordaunt Short & Cambridge Audio speakers. In stock and on demonstration. Phone for keenest price.			
BATTERY CASSETTE RECORDERS (carr. etc. 30p)			
Amerex	100	11 00	
Wien	ET1008	11 00	
Philips	EL3302	14 40	
	N2203	16 60	
	N2211	19 95	
Sony	M1101	14 65	
	M1102	12 95	

STEREO MAGNETIC CARTRIDGES

(carr. etc. 15p)				
SHURE	M44G	4 20		
M3Dm	3-20	M75/6/11B	6 75	
	M44 7	M75 EDII	8 50	
	M44E	M75 EJII	7 95	
	M55E	M75GII	7 25	
GOLDRING				
G850	2-85	G800SE	10 00	
G800	3-85	G820	6 70	
G800H	3-95	G820E	10 00	
G800E	5-95	G820SE	13 35	
ADC				
Q36	10-70	Q30	5 90	
Q32	8 70			
GRADO				
FTR	5 25	FTE	8 25	
F3E	11 25	F2	18 75	
EMPIRE				
999REX		999TEX	14 95	
		999QUX	3 70	
		999XEX	4 80	
		999YEX	8 50	
RONETTE		SM500/7	4 60	
		SM500/5	4 60	
		SM500/E	6 95	

STEREO COMPACTS

Complete with Speakers (c.p. £1.25)			
Fidelity	UA3	39 90	
Sony	G2601KL	125 50	
	G2615N	71 50	
Sony	GXT4520KL	103 50	
Sony	GXT4730KL	97 50	
Philips	GF908	102 75	
Philips	RH802	159 95	
Philips	RF836	57 20	
Philips	GF826	41 75	
Philips	RH811/RH421	84 95	
Philips	RF839	55 95	
Philips	GF829	39 95	
Philips	GF815	47 75	
Philips	GF808	65 75	
Philips	RH814/RH411	98 75	
Philips	GF603	19 95	

8 TRACK STEREO HOME UNITS

(carr./packing 70p)			
Amerex ACR301			48 00

PORTABLE TV BATTERY MAINS

(c.p. £1.00)			
Elizabeth T9	9"	43 50	
Crown 9TV	9"	46 50	
Elizabethan T12	12"	43 95	
Teleton TV12	12"	46 95	
Sony 10T150	9/10"	52 50	

CASSETTE PLAYER



FOR CAR - HOME AND AROUND

Actually the price far below the quality of the superb player. It is a beautiful quality both in sound and looks. Features wind rewind, volume and tone controls. Speaker is very good indeed. Comes complete with earphone, batteries. Full guarantee. Optional adaptor to run off car or mains.

DOLBY / NRU

(carr./packing 30p)			
Teleton	SNR100D	29 50	
Philips	N6720	15 00	
Tex	N60/AN80/AN180	stocked	

RECORD DECK PACKAGES

(carr./packing 75p) *Less cart. - rest with			
(HL) SP25 III/800 or H		15 95	
(M) SP25 III/M/565		19 45	
(HL) AP76/G800		25 55	
(M) AP76/M756S		29 10	
(HL) GL75 P/C		33 50	
(HL) GL75 P/C G800		36 65	
(HL) GL75 P/C G800E		39 15	
(HL) MP60 (TRD) G800		15 80	
(HL) HT70 (TPD) G800		19 50	
RANK DOMUS	BD200	43 60	
	BA400	53 95	
	*Pioneer PL12D	31 75	
	*Thorens TD165	43 80	
	Thorens TD160C	50 80	

BATTERY / MAINS CASSETTE

(carr. etc. 35p)			
Wien	RT452	13 65	
Amerex	AC101	12 00	
Elizabethan	LZ315	12 25	
Amerex	AC104	16 00	
Philips	N2204	20 75	
	N2205	29 50	
PYE	9115	27 75	
	9118	21 20	
Hitachi	TRQ291	27 50	
Sony	M2000G	23 25	
	MR4010G	28 95	
	MR4000G	52 50	
BASF	CC9201	37 25	
Hitachi	TRQ2335	49 50	

BATTERY / MAINS RADIO CASSETTE RECORDERS

(carr. etc. 30p)			
Amerex	ACR200	22 00	
	ACR201	30 00	
Elizabethan	LZ416	27 25	
	LZ516	29 10	
BASF	CC9301	50 75	
Philips	RR322	28 75	
	RR413	33 90	
	RR712	48 30	
Sony	M4141FG	43 20	
	M2400W	36 90	
	M2400FG	36 90	
	M4400FG	68 50	
Grundig	C250	47 95	
Hitachi	TR1240E	57 40	
	TR511B1	35 00	
	KCT1210L	33 50	

STEREO RECORDER DECKS

(carr./packing 50p)			
Cassette			
Philips	NF2506	44 50	
	N2510	£87.10	
Pye	9145	44 50	
Tandberg	TCD300	112 00	
Akai	CS30D	50 65	
	CS33D Dolby	62 50	
	GXC36D	65 15	
	GXC40D	57 40	
	GXC38D Dolby	81 45	
	GXC46D Dolby	89 15	
	GXC45D	74 30	
TEAC	A250/A350-A450	Stocked	

Reel to Reel			
Akai	4000DS	62 50	
Tandberg	3321X/3341X	107 70	
Large range Akai/Tandberg/Revox/Teac stocked.			

STEREO PHONES

(carr./packing 20p)			
AKAI	G3000	8 60	
ASE11	G2222	5 95	
ASE22	MD802	1 95	
DULCI	MD806	3 75	
SH650D	PIONEER	5 90	
SH850GX	SE20A	8 45	
SH1300VS	SE50	16 35	
AKG	SEL20	7 90	
K60	SEL25	11 15	
ROTEL	SEL40	12 99	
RH630	ACCESSORIES		
RH790	HT102 JB	1 40	
SENNHEISER	Junction Box	1 40	
HD414	JB3DE Din	1 40	
WHARFEDALE	Junction Box	1 60	
DD1	JB11D De Luxe	1 60	
ISODYN	Junction Box	1 95	
KOSS	0250 Phone		
K6	Switch	4 75	
K6/LC	CONTROL		
K711	BOXES		
KRD711	G1301		
HV1	17 50 (two phones)	2 62	
K0727	G1305		
K0747	Controller	2 15	
PR04AA	21 95 FF12-pairs		
PRO5LC	23 95 (Sliders)	6 25	
HOWLAND WEST	Koss TA4	4 20	
CIS200	T5A	4 95	
CIS250	T10A	8 50	
CIS1000	HW Mk.III		
CIS2000	Controller	6 90	

YOU CAN PAY BY BARCLAYCARD OR ACCESS

For callers or by phone 01-402 4736
Easy credit terms for callers to 309 and 354-356

STEREO RECORDERS

(carr./packing 70p)			
Akai	1721L		67 20
Cassette			
Akai	GXC40 Dolby		59 95
	GXC46 Dolby		89 95
Philips	N2400/RH411		63 75
	N2401/RH411		74 50
	N2405/RH411		79 95
	N2405/RH401		49 50
8 Track			
Akai	CR8D		53 60
	CR80SS		93 65

STEREO TUNER AMPLIFIERS

(carr./packing 75p)			
Akai			

CRESCENT RADIO LTD

11 & 40 MAYES ROAD, LONDON N22 6TL 888 3206

10% VAT TO BE ADDED TO ALL GOODS & CARRIAGE PRICES

7" x 4" LOUDSPEAKER
A top quality speaker ideal where small size is important. Manufactured by E.M.I. for a well-known hi-fi set maker. Size: 7in. x 4in. Impedance: 8 ohms. Flux: 38,000. Max. Free range: 90Hz to 12kHz. Power handling: 5W. Unbeatable. Price: £1.00. Free postage on this item.

ADD LUXURY TO YOUR CAR WITH A MOTOR DRIVEN CAR AERIAL

5 Section
Extended Length 100cm
Length under Fender 40cm
Cable Length 120cm
complete with Fixing Bracket and Control Switch
£6-75 plus 25p P. & P.

STEREO / MONO HEADPHONE VOLUME CONTROL BOX
Plug Stereo phones into this control box and you then incorporate a right and left hand volume control and a stereo/mono switch. Complete with stereo jack plug and 2 m. cable.
A Bargain at £1. Plus 10p P. & P.

LOW VOLTAGE AMPLIFIER Few only at plus 13p P. & P. **£1-75**
5 transistor amplifier complete with volume control, is suitable for 9V d.c. and a.c. supplies. Will give about 1W at 8 ohm output. With high IMP input this amplifier will work as a record player, baby alarm, etc., amplifier.



"CRESCENT" DIGITAL CLOCK KIT

24 Hour Bixie Digital Clock Kit. We supply:
★ A complete set of components
★ A complete set of easy to follow instructions
★ Printed circuits made to make construction as simple as possible
★ A cabinet and front panel to give a professional finish.
All for the price of the components. £29-50
Please send S.A.E. for more information.

MINIATURE RELAY

6 volt 70 ohm.
Single Pole Changeover.
Approx. size — 1 1/4" x 1" x 1/2".
40p plus 5p P. & P.

TWO WAY STEREO ADAPTOR
Stereo jack plug to two stereo line sockets complete with 110 mm of cable. For plugging two stereo inputs into one. A Bargain at 65p plus 5p P. & P.

LOUDSPEAKER BARGAINS
E.M.I. 450 set 3, 8, 15 ohm £2-75 plus 25p. P. & P.
E.M.I. 350 set 8 ohm. £7-00 plus 25p. P. & P.

MINI LOUDSPEAKERS
2 1/2" (57mm) 40ohm — 80p each
2 1/2" (57mm) 80ohm — 80p each
Please include 5p. P. & P. up to 3 Mini-Loudspeakers



TRI-VOLT BATTERY ELIMINATOR
Enables you to work your transistor radio, amplifier, or cassette, etc. from A.C. mains through this compact eliminator. Just by moving a plug you can select the voltage you require — 6v, 7 1/2v or 9 volts. This means all your transistor power pack applications can be handled by this one unit.
Approx. size: 2 1/2" x 2 1/2" x 3 1/2". OUR PRICE — £2-75p + 10p. P. & P. Same model suitably wired for the Philips Cassette — £2-00 + 10p. P. & P.

"CRESCENT" 100 WATT R.M.S. ALL PURPOSE AMPLIFIER U. BUILD IT

We supply the three modules for you to build this Disco-Group-P.A. amplifier into the cabinet of your choice.

★ **THE POWER AMP MODULE TP 100W**
170W. r.m.s. sq. wave 300W instantaneous peak into 8 ohm (60W into 16 ohm). £14-25, carr. 45p.

★ **THE PRE-AMP MODULE**
Four control pre-amp. Vol. Bass, Treble, Middle controls. Designed to drive most amplifiers using P.F.T. first stage. £2-96 carr. 25p.

★ **THE POWER SUPPLY MODULE P2100**
Is supplied complete with the mains transformer. £9-96, carr. 50p. Complete fixing instructions are supplied and no technical knowledge is required to connect the three ready wired modules. A fantastic bargain. If you purchase all three modules. £25, carr. 75p. Send S.A.E. for further details on this or our ready built amplifiers

COMPONENTS AND HI FI FOR THE HOME CONSTRUCTOR

OUR SHOPS ARE OPEN ALL DAY FROM 9 A.M. TO 6 P.M. 6.30 P.M. ON FRIDAY (WE CLOSE ALL DAY THURSDAY)

13 SOUTH MALL, EDMONTON, N.9 803 1685

TRI-VOLT CAR CONVERTER
Enables you to work your Transistor Radio, Amplifier or Cassette etc. from the 12 volt car supply positive or negative earth. This converter supplies 6, 7 1/2 or 9 volts and is transistor regulated. Approx. size 2 1/2" x 3 1/2" x 2". Very easy to fit and a real money saving device for £2-50 + 10p. P. & P.

WAFER SWITCHES
1 pole 12 way
2 pole 2 way
2 pole 3 way
2 pole 4 way
2 pole 6 way
2 pole 4 way
4 pole 3 way
18p each. Please inc. 5p P. & P. Up to 5 switches.



200/250V MAINS RELAY
Heavy duty contacts. 2 500 Ω coil. All new and untested D.I.T. mains relays 50p + V.A.T. Carr. Free. Special quantity price: £40 per 100 relays.

"CRESCENT BEAT BRITE" SINGLE CHANNEL SOUND TO LIGHT UNIT
This fantastic little box approx. 4" x 3" x 2 1/2" when connected to the output of a sound source from 1 to 100 watts produces a psychedelic light display of up to 1000 watts. Complete with a sensitive level control the unit is fused and can not harm your amplifier. A Bargain at £7-50 plus 10p P. & P.

MINIATURE RELAYS
Brand new range of British made Relays. Size—1 1/2" x 1" x 1/2"
All two changeovers with 250V. 1-5A contacts and suitable for fitting on .1m Veroboard.
Type Volts Current Ohms
27/A 12v 17M/A 700 Ω
21/A 12v 23M/A 490 Ω
12/A 6v 33M/A 185 Ω
80p each.
Please include 5p P. & P up to 3 Relays.

MAIN TRANSFORMER
Fused Primary 240V. Secondary 220V @ 50mA. 6-3V @ 1A.
This transformer is made to a very high standard and is a small size: 2 1/2" x 2 1/2" x 2 1/2". 60p plus 15p P. & P.

POTENTIOMETERS
All types 1" and less diameter.
SINGLES DUAL
5K Log or 10K
10K Lin Less 10K
25K Switch 25K Less
50K Switch 50K Switch
100K 12p ea. 100K 40p.
250K Double 250K
500K Pole 500K each
1M Switch 1M
2M 2M
24p ea.
Up to 3 Pots. Please add 5p. P. & P.

THE MONEY SAVING CATALOGUE



No. 6
4th printing

WITH 25p REFUND VOUCHER

96 pages (8 1/2 x 5 1/2) packed with bargains in famous name transistors, resistors, capacitors, pots + I.C. circuits and diagrams; components, accessories, etc + valuable technical data, illustrations, etc. Everything is brand new, to makers' spec.—It's all in our fascinatingly informative catalogue. Yours for 25p. post free (U.K. only) and the voucher included allows you 25p. off when your order is for £5 or more.
SEND FOR YOUR COPY TO-DAY! with latest supplement

- **DISCOUNTS**
10% on orders £5 or more.
15% on orders £15 or more. except certain items charged nett GUARA
- **POST/PACKING**
Free in U.K. on orders above £2.
10p surcharge on orders under £2.

If you already have No. 6 Catalogue send S.A.E. for latest prices and information list.

ELECTROVALUE

ELECTROVALUE LTD. Reg. No. 1047769 R.O. as below
(Ev. 4) 28 ST. JUDES Rd., ENGLEFIELD Grn., EGHAM, SURREY, TW20 0HB
Hours: 9—5.30: Sat. 1 p.m. Tel: Egham 3603 Telex 264475

EXPRESS COMPONENTS

17 ALBERT SQUARE
LONDON E15 1HJ

KITS FOR E.E. PROJECTS
(Electronic Components Only)

TREMOLO —SEE COST BOX
WAA WAA £1.50
FUZZ-TREBLE £1.50

For Fuzz-Treble, component board components only.
Include extra £1-85 for transformer.

GEN. PURPOSE AMPLIFIER

£4.50

MAIL ORDER ONLY

The largest selection

EX COMPUTER BOARDS

Packed with transistors, diodes, capacitors and resistors—COMPONENT VALUE £1.50, 3 for ONLY 55p + p + p 30p

SPECIAL ONE. As above PLUS Power Transistors ONLY 55p each + p + p 15p

STABILISED POWER MODULES
Complete with circuit diagrams, etc. 99p each + p + p 15p

PAXOLINE BOARDS 7 1/2" x 9" approx. 4 for 80p + p + p 20p.

FIBRE-GLASS PRINTED CIRCUIT BOARDS

1 1/2" x 4" approx. 2 for 55p

DECON-DALO 33PC Marker

Ethc resistant printed circuit marker pen 90p each

VEROBOARDS

Packs containing approx. 50pc. Inc. various sizes, all -1 matric 55p

REPANCO CHOKES & COILS

RF Chokes
CH1. 2.5mH 25p CH2. 5.0mH 25p
CH3. 7.5mH 25p CH4. 10mH 25p
CH5. 1.5mH 25p

COILS

DRX1 Crystal set 55p DRR2 Dual range 45p

COIL FORMERS & CORES

NORMAN 1/2" Cores & Formers 7p
1" Cores & Formers 8p

SWITCHES

DP/DT Toggle 85p SP/ST Toggle 18p

FUSES

1 1/2" and 20mm, 100mA, 200mA, 250mA, 300mA, 1A, 1.5A, 2A
QUICK-BLOW 4p ea. ANTI-SURGE 5p ea.

EARPHONES

Crystal 2.5mm plug 33p
Crystal 3.5mm plug 33p
4 ohms 2.5mm plug 22p
4 ohms 3.5mm plug 22p

DYNAMIC MICROPHONES

81223. 200 ohms plus on/off switch and 2.5mm and 3.5mm plugs £1.60

3-WAY STEREO HEADPHONE JUNCTION BOX

H1012 £1.87

2-WAY CROSSOVER NETWORK

K4007. 80 ohms Imp. Insertion loss 3dB £1.21

CAR STEREO SPEAKERS

(Angled) £3.85 per pair.

BI-PAK

CATALOGUE AND LISTS
Send S.A.E. and 10p.

INSTRUMENT CASES



(Black Vinyl covered)

No.	Length	Width	Height	Price
BV1	8"	5 1/2"	2"	90p
BV2	11"	6"	3"	£1.20

ALUMINIUM BOXES

BA1	5 1/2"	2 1/2"	1 1/2"	42p
BA2	4"	4"	1 1/2"	41p
BA3	4"	2 1/2"	1 1/2"	41p
BA4	5 1/2"	4"	1 1/2"	47p
BA5	4"	2 1/2"	2"	41p
BA6	3"	2"	1"	34p
BA7	7"	5"	2 1/2"	66p
BA8	8"	6"	3"	84p
BA9	6"	4"	2"	54p

VISIT OUR COMPONENT SHOP

18 BALDOCK ST., WARE, Herts. (A10)

Open Mon.-Thurs. 9.15-6 p.m. Sat. 9.15-5.30. Late Night Shopping until Fri. Tel. 61593

BIB HI-FI ACCESSORIES

De Luxe Groov-Kleen

Model 42 £1-84

Chrome Finish Model 60 £1-50



Ref. 36A. Record/Stylet Cleaning Kit 28p

Ref. 43. Record Care Kit £2-35

Ref. 31. Cassette Head Cleaner 54p

Ref. 32. Tape editing Kit £1-54

Model 9. Wire Stripper/Cutter 83p

Ref. P. Hi-Fi Cleaner 31p

Ref. 32A. Stylus Balance £1-36

Ref. J. Tape Head Cleaning Kit 51p

Ref. 34. Cassette Case £1-27

Ref. 56. Hi-Fi Stereo Hints & Tips 32p

ANTEX SOLDERING IRONS

X25. 25 watt £1-93

CCN 240. 15 watt £2-15

Model G. 18 watt £2-15

SK2. Soldering Kit £2-86

STANDS: ST1 £1-21. ST2 77p

SOLDER: 188WG Multicores 7oz 82p

228WG 7oz 82p. 188WG 22ft 28p

228WG Tube 22p

ANTEX BITS AND ELEMENTS

Bits No.

102 For model CN240 3/32" 38p

104 For model CN240 3/16" 38p

1100 For model CCN240 3/32" 38p

1101 For model CCN240 3/16" 38p

1102 For model CCN240 1/8" 38p

1020 For model G240 3/32" 38p

1021 For model G240 1/8" 38p

1022 For model G240 3/16" 38p

50 For model X25 3/32" 38p

51 For model X25 1/8" 38p

52 For model X25 3/16" 38p

ELEMENTS

ECN 240 £1-16 CCN 240 £1-32

EG 240 £1-16 EX 25 £1-18

ANTEX HEAT SINKS 10p

V.A.T. included in all prices. Please add 10p P. & P. (U.K. only). Overseas orders—please add extra for postage.

NEW COMPONENT PAK BARGAINS

Pack No.	Qty.	Description	Price
C1	250	Resistors mixed values approx. count by weight	0-55
C2	200	Capacitors mixed values approx. count by weight	0-55
C3	50	Precision Resistors mixed values 1% 2%	0-55
C4	75	1/4 W Resistors mixed preferred values	0-55
C5	5	Pieces assorted Ferrite Rods	0-55
C6	2	Tuning Gangs, MW/LW VHF	0-55
C7	1	Pack Wire 50 metres assorted colours	0-55
C 8	10	Reed Switches	0-55
C 9	3	Micro Switches	0-55
C10	15	Assorted Pots & Pre-Set	0-55
C11	5	Jack Sockets 3 x 3.5m 2 x Standard Switch Type	0-55
C12	40	Paper Condensers preferred types mixed values	0-55
C13	20	Electrolytics Trans. types	0-55
C14	1	Pack assorted Hardware—Nuts/Bolts, Grommets etc.	0-55
C15	4	Main Slide Switches	0-55
C16	20	Assorted Tag strips & Panels	0-55
C17	10	Assorted Control Knobs	0-55
C18	4	Rotary Wave Change Switches	0-55
C19	3	Relays 6—24V Operating	0-55
C20	4	Sheets Copper Laminate approx. 10" x 7"	0-55

PLUGS AND SOCKETS

Socket	Price
P8 35 DIN 2 Pin (Speaker)	0-06
P8 36 DIN 3 Pin	0-10
P8 37 DIN 5 Pin 180°	0-10
P8 38 DIN 5 Pin 240°	0-10
P8 39 Jack 2.5mm Switched	0-09
P8 40 Jack 3.5mm Switched	0-10
P8 41 Jack 1/2" Switched	0-17
P8 42 Jack Stereo Switched	0-26
P8 43 Phono Single	0-06
P8 44 Phono Double	0-10
P8 45 Car Aerial	0-09
P8 46 Co-Axial Surface	0-09
P8 47 Co-Axial Flush	0-14

INLINE SOCKETS

PS 21 D.I.N. 2 Pin (Speaker)	0-18
PS 22 D.I.N. 3 Pin	0-17
PS 23 D.I.N. 5 Pin 180°	0-14
PS 24 D.I.N. 5 Pin 240°	0-17
PS 25 Jack 2.5mm Plastic	0-10
PS 26 Jack 3.5mm Plastic	0-12
PS 27 Jack 1/2" Plastic	0-24
PS 28 Jack 1/2" Screened	0-28
PS 29 Jack Stereo Plastic	0-22
PS 30 Jack Stereo Screened	0-32
PS 31 Phono Screened	0-14
PS 32 Car Aerial	0-15
PS 33 Co-Axial	0-17

PLUGS

PS 1 D.I.N. 2 Pin (Speaker)	0-11
PS 2 D.I.N. 3 Pin	0-12
PS 3 D.I.N. 4 Pin	0-15
PS 4 D.I.N. 5 Pin 180°	0-14
PS 5 D.I.N. 5 Pin 240°	0-15
PS 6 D.I.N. 6 Pin	0-15
PS 7 S.I.N. 7 Pin	0-15
PS 8 Jack 2.5mm Screened	0-10
PS 9 Jack 3.5mm Plastic	0-09
PS 10 Jack 3.5mm Screened	0-12
PS 11 Jack 1/2" Plastic	0-13
PS 12 Jack 1/2" Screened	0-18
PS 13 Jack Stereo Screened	0-29
PS 14 Phono	0-08
PS 15 Car Aerial	0-15
PS 16 Co-Axial	0-10

CABLES

CP 1 Single Lapped Screen	0-08
CP 2 Twin Common Screen	0-08
CP 3 Stereo Screened	0-08
CP 4 Four Core Common Screen	0-23
CP 5 Four Core Individually Screened	0-30
CP 6 Microphone Fully Braided Cable	0-10
CP 7 Three Core Mains Cable	0-07
CP 8 Twin Oval Mains Cable	0-08
CP 9 Speaker Cable	0-04
CP 10 Low Loss Co-Axial	0-10

CARBON POTENTIOMETERS

Log and Lin	
4-7K, 10K, 22K, 47K, 100K, 220K, 470K, 1M, 2M	
VC 1 Single Less Switch	0-14
VC 2 Single D.P. Switch	0-26
VC 3 Tandem Less Switch	0-44
VC 4 1K Lin Less Switch	0-14
VC 5 100K Log anti-Log	0-44

HORIZONTAL CARBON PRESETS

0-1 watt 0-06 each
10K, 20, 47K, 10K, 2-2K, 4-7K, 10K, 22K, 100, 100K, 220K, 470K, 1M, 2M, 4-7M

BOOK BARGAIN BUNDLE

8 Books comprising
2 Transistor Equivalent Books
1 Radio and Electronic Colour Code and Data Chart
1 Radio Valve Guide PLUS
3 other Constructional books on Receivers, FM Tuners, etc.
Also 1 General Constructional book
Value £3 Our Price £2 10p p + p

RP1 Handbook of Transistor Equivalent and Substitutes	40p
BP2 Handbook of Radio, T.V. and Industrial Tube & Valve Equiv.	40p
BP3 Handbook of Tested Transistor Circuits	40p
BP4 International Handbook of the World's Short Wave, Medium and Long Wave Radio Stations and FM/TV Listings	35p
BP5 Handbook of Simple Transistor Circuits	35p
BP7 Radio & Electronic Colour Codes and Data Chart	15p
BP8 Sound and Loudspeaker Manual	50p
BP9 38 Practical Tested Diode Circuits for the Home Constructor	35p
BP11 Practical Transistor Novelty Circuits	40p
129 Universal Gram-Motor Speed Indicator	8p
134 How to make FM & TV Aerials, Bands 1, 2 and 3	18p
141 Radio Servicing for Amateurs	20p
146 High Fidelity Loudspeaker Enclosures	37p
156 Transistor Circuits Manual No. 1	10p
160 Coil Design & Constructional Manual	30p
161 Radio, TV and Electronics Data Book	25p
170 Transistor Circuits for Radio-Controlled Models	40p
174 Transistor Subminiature Receivers	38p
175 Transistor Test Equipment and Servicing Manual	25p
176 Transistor Audio Amplifier Manual	40p
177 Modern Transistor Circuits for Beginners	40p
178 A Comprehensive Radio Valve Guide, Book 5	30p
183 How to Receive Foreign TV Programmes on your set by simple modifications	32p
185 Tested Shortwave Receiver Circuit using MAT's	30p
187 The TSL Mark 4 Valved FM Tuner and its construction	20p
196 Reactance-Frequency Chart for Audio & RF use	15p
Resistor Colour Code Disc Calculator	10p

CARTRIDGES

ACOS GP91-18C. 200mV at 1.2cm/sec	£1-16
ACOS GP93-1. 280mV at 1cm/sec	£1-65
ACOS GP96-1. 100mV at 1cm/sec	£2-65
TTC J-2005. Crystal/Hi Output	95p
TTC J-200 10C Crystal/Hi Output Compatible	£1-10
TTC J-200 CB Stereo/Hi Output	£1-60
TTC J-2105 Ceramic/Med. Output	£1-84

CARBON FILM RESISTORS

The E12 Range of Carbon Film Resistors. 1/8th watt available in PAKS of 50 pieces, assorted into the following groups:—
R1 50 Mixed 100 ohms-820 ohms 40p
R2 50 Mixed 1K ohms-8.2K ohms 40p
R3 50 Mixed 10K ohms-82K ohms 40p
R4 50 Mixed 100K ohms-1 Meg. ohms 40p
THESE ARE UNBEATABLE PRICES—LESS THAN 1p EACH INCL. V.A.T.

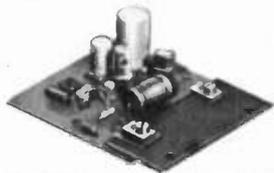
BI-PAK SUPERIOR QUALITY LOW-NOISE CASSETTES

C60. 32p C90. 41p C120. 52p

-the lowest prices!

BI-PAK QUALITY COMES TO AUDIO!

AL10/AL20/AL30 AUDIO AMPLIFIER MODULES



The AL10, AL20 and AL30 units are similar in their appearance and in their general specification. However, careful selection of the plastic power devices has resulted in a range of output powers from 3 to 10 watts R.M.S. The versatility of their design makes them ideal for use in record players, tape recorders, stereo amplifiers and cassette and cartridge tape players in the car and at home.

Parameter	Conditions	Performance
HARMONIC DISTORTION	Po = 3 WATTS f=1KHz	0-25%
LOAD IMPEDANCE	—	8-16 Ω
INPUT IMPEDANCE	f=1KHz	100 k Ω
FREQUENCY RESPONSE (±3dB)	Po=2 WATTS	50 Hz-25KHz
SENSITIVITY for RATED O/P	Vs=25V, Ri=8 Ω f=1KHz	75mV. RMS
DIMENSIONS	—	3" x 2 1/2" x 1"

The above table relates to the AL10, AL20 and AL30 modules. The following table outlines the differences in their working conditions.

Parameter	AL10	AL20	AL30
Maximum Supply Voltage	25	30	30
Power output for 2% T.H.D. (RL = 8 Ω f = 1 KHz)	3 watts RMS Min.	5 watts RMS Min.	10 watts RMS Min.

AUDIO AMPLIFIER MODULES

AL 10. 3 watts RMS	£2.19
AL 20. 5 watts RMS	£2.59
AL 30. 10 watts RMS	£3.01

POWER SUPPLIES

PS 12. (Use with AL10 & AL20)	88p
SPM 80. (Use with also AL30 & AL50)	£3.25
FRONT PANELS SP 12 with Knobs	£1.10

PRE-AMPLIFIERS

PA 12. (Use with AL10 & AL20)	£4.85
PA 100. (Use with AL30 & AL50)	£13.15

TRANSFORMERS

T461 (Use with AL10)	£1.38 P & P 15p
T538 (Use with AL20)	£1.93 P & P 15p
BMT80 (Use with AL30 & AL50)	£2.15 P & P 25p

PA 12. PRE-AMPLIFIER SPECIFICATION

The PA 12 pre-amplifier has been designed to match into most budget stereo systems. It is compatible with the AL 10, AL 20 and AL 30 audio power amplifiers and it can be supplied from their associated power supplies. There are two stereo inputs, one has been designed for use with ceramic cartridges while the auxiliary input will suit most magnetic cartridges. Full details are given in the specification table. The four controls are, from left to right: Volume and on/off switch, balance, bass and treble. Size 152mm x 64mm x 35mm.

Frequency response—
20Hz-50KHz (-3dB)
Bass control—
± 12dB at 60Hz
Treble control—
± 14dB at 14KHz
*Input 1. Impedance
1 Meg. ohm
Sensitivity 300mV
†Input 2. Impedance
30 K ohms
Sensitivity 4mV

EA1000 AUDIO AMP MODULE 3 WATTS R.M.S.



Module Tested and Guaranteed. Full hook-up diagrams and complete technical data supplied free with each module or available separately at 10p each.

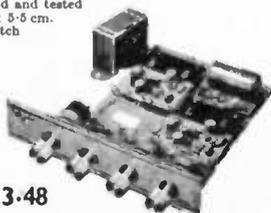
ONLY
£2.89

SPECIAL OFFER £2 each while stores last

The STEREO 20

The 'Stereo 20' amplifier is mounted, ready wired and tested on a one-piece chassis measuring 20 cm x 14 cm x 5.5 cm. This compact unit comes complete with on/off switch, volume control, balance, bass and treble controls, Transformer, Power supply and Power amps. Attractively printed front panel and matching control knobs. The 'Stereo 20' has been designed to fit into most turntable plinths without interfering with the mechanism or, alternatively, into a separate cabinet. Output power 20w peak. Input 1 (Cer.) 300mV into 1M. Freq. res. 25Hz-25kHz. Input 2 (Aux.) 4mV into 30K. Harmonic distortion. Bass control ±12dB at 60Hz typically 0-25% at 1 watt. Treble con. ±14dB at 14kHz.

£13.48



50W pk 25w (RMS)

0.1% DISTORTION!
HI-FI AUDIO AMPLIFIER

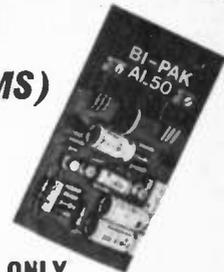
THE AL50

★ Frequency Response 15Hz to 100,000-1dB.

★ Load—3, 4, 8 or 16 ohms.

★ Distortion—better than .1% at 1 KHz.

★ Signal to noise ratio 80dB.



ONLY
£3.58 each

★ Supply voltage 10-35 Volts.*

★ Overall size 63mm 105mm x 13mm.

Tailor made to the most stringent specifications using top quality components and incorporating the latest solid state circuitry and AL50 was conceived to fill the need for all your A.F. amplification needs.
FULLY BUILT—TESTED—GUARANTEED.



STABILISED POWER MODULE SPM80

AP80 is especially designed to power 2 of the AL50 Amplifiers, up to 15 watt (r.m.s.) per channel simultaneously. This module embodies the latest components and circuit techniques incorporating complete short circuit protection. With the addition of the Mains Transformer MT80, the unit will provide outputs of up to 1.5 amps at 35 volts. Size: 63mm x 105mm x 30mm. These units enable you to build Audio Systems of the highest quality at a hitherto unobtainable price. Also ideal for many other applications including—Disco Systems, Public Address Intercom Units, etc. Handbook available 10p PRICE £3.25

TRANSFORMER BMT80 £2.15 p. & p. 28p

STEREO PRE-AMPLIFIER TYPE PA100

Built to a specification and NOT a price, and yet still the greatest value on the market, the PA100 stereo pre-amplifier has been conceived from the latest circuit techniques. Designed for use with the AL50 power amplifier system, this quality made unit incorporates no less than eight silicon planar transistors, two of these are specially selected low noise NPN devices for use in the input stages. Three switched stereo inputs, and rumble and scratch filters are features of the PA100, which also has a STEREO/MONO switch, volume, balance and continuously variable bass and treble controls.

SPECIFICATION

Frequency Response	20Hz - 20KHz ± 1dB
Harmonic Distortion	better than 0.1%
Inputs: 1. Tape Head	1.25 mV into 50K Ω
2. Radio, Tuner	35 mV into 50K Ω
3. Magnetic P.U.	1.5 mV into 50K Ω
All input voltages are for an output of 250mV. Tape and P.U. inputs equalised to RIAA curve within ± 1dB. from 20Hz to 20KHz.	
Bass Control	± 15dB at 20Hz
Treble Control	± 15dB at 20 KHz
Filters: Rumble (High Pass)	100Hz
Scratch (Low Pass)	8KHz
Signal/Noise Ratio	better than -65dB
Input overload	+ 26dB
Supply	+ 35 volts at 20mA
Dimensions	292mm x 82mm x 35mm

ONLY £13.15

SPECIAL COMPLETE KIT COMPRISING 2 AL50's, 1 SPM80, 1 BMT80 & 1 PA100 ONLY £25.30 FREE p. & p.

Giro No. 388-7006

Please send all orders direct to warehouse and despatch department

BI-PAK

P.O. BOX 6, WARE, HERTS

Postage and packing add 11p. Overseas add extra for airmail.

Minimum order 55p. Cash with order please.

Guaranteed Satisfaction or Money Back

The Sinclair Cambridge... no other calculator is so powerful and so compact.

Complete kit-£24.95! (PLUS VAT)

The Cambridge – new from Sinclair

The Cambridge is a new electronic calculator from Sinclair, Europe's largest calculator manufacturer. It offers the power to handle the most complex calculations, in a compact, reliable package. No other calculator can approach the specification below at anything like the price – and by building it yourself you can save a further £5.50!

Truly pocket-sized

With all its calculating capability, the Cambridge still measures just $4\frac{1}{2}'' \times 2'' \times \frac{1}{16}''$. That means you can carry the Cambridge wherever you go without inconvenience – it fits in your pocket with barely a bulge. It runs on ordinary U16-type batteries which give weeks of life before replacement.

Easy to assemble

All parts are supplied – all you need provide is a soldering iron and a pair of cutters. Complete step-by-step instructions are provided, and our service department will back you throughout if you've any queries or problems.

The cost? Just £27.45!

The Sinclair Cambridge kit is supplied to you direct from the manufacturer. Ready assembled, it costs £32.95 – so you're saving £5.50! Of course we'll be happy to supply you with one ready-assembled if you prefer – it's still far and away the best calculator value on the market.



Features of the Sinclair Cambridge

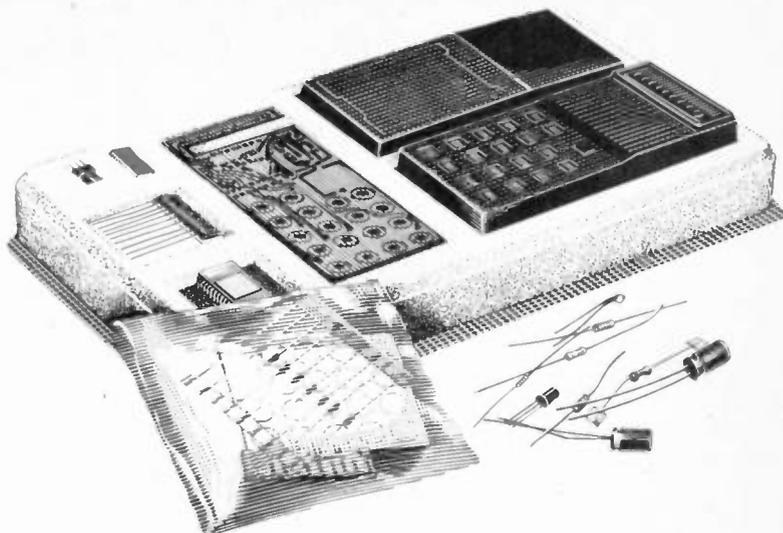
- * Uniquely handy package. $4\frac{1}{2}'' \times 2'' \times \frac{1}{16}''$, weight $3\frac{1}{2}$ oz.
- * Standard keyboard. All you need for complex calculations.
- * Clear-last-entry feature.
- * Fully-floating decimal point.
- * Algebraic logic.
- * Four operators (+, -, x, ÷), with constant on all four.
- * Constant acts as last entry in a calculation.
- * Constant and algebraic logic combine to act as a limited memory, allowing complex calculations on a calculator costing less than £30.
- * Calculates to 8 significant digits, with exponent range from 10^{-20} to 10^{79} .
- * Clear, bright 8-digit display.
- * Operates for weeks on four U16-type batteries. (MN 2400 recommended.)

A complete kit!

The kit comes to you packaged in a heavy-duty polystyrene container. It contains all you need to assemble your Sinclair Cambridge. Assembly time is about 3 hours.

Contents:

1. Coil.
2. Large-scale integrated circuit.
3. Interface chip.
4. Thick-film resistor pack.
5. Case mouldings, with buttons, window and light-up display in position.
6. Printed circuit board.
7. Keyboard panel.
8. Electronic components pack (diodes, resistors, capacitors, transistor).
9. Battery clips and on/off switch.
10. Soft wallet.



This valuable book – free!

If you just use your Sinclair Cambridge for routine arithmetic – for shopping, conversions, percentages, accounting, tallying, and so on – then you'll get more than your money's worth.

But if you want to get even more out of it, you can go one step further and learn how to unlock the full potential of this piece of electronic technology.



How? It's all explained in this unique booklet, written by a leading calculator design consultant. In its fact-packed 32 pages it explains, step by step, how you can use the Sinclair Cambridge to carry out complex calculations like:

Logs	Sines	Cosines
Tangents	Reciprocals	nth roots
Currency conversion	Compound interest	and many others...

sinclair

Sinclair Radionics Ltd, London Road,
St Ives, Huntingdonshire
Reg. no: 699483 England
VAT Reg. no: 213 8170 88

Why only Sinclair can make you this offer

The reason's simple: only Sinclair – Europe's largest electronic calculator manufacturer – have the necessary combination of skills and scale.

Sinclair Radionics are the makers of the Executive – the smallest electronic calculator in the world. In spite of being one of the more expensive of the small calculators, it was a runaway best-seller. The experience gained on the Executive has enabled us to design and produce the Cambridge at this remarkably low price.

But that in itself wouldn't be enough. Sinclair also have a very long experience of producing and marketing electronic kits. You may have used one, and you've almost certainly heard of them – the Sinclair Project 60 stereo modules.

It seemed only logical to combine the knowledge of do-it-yourself kits with the knowledge of small calculator technology.

And you benefit!

Take advantage of this money-back, no-risks offer today

The Sinclair Cambridge is fully guaranteed. Return your kit within 10 days, and we'll refund your money without question. All parts are tested and checked before despatch – and we guarantee a correctly-assembled calculator for one year.

Simply fill in the preferential order form below and slip it in the post today.

Price in kit form: £24.95 + £2.50 VAT. (Total: £27.45)

Price fully built: £29.95 + £3.00 VAT. (Total: £32.95)

EE 12 73	
To: Sinclair Radionics Ltd, London Road, St Ives, Huntingdonshire, PE17 4HJ	
Please send me	Name _____
<input type="checkbox"/> a Sinclair Cambridge calculator kit at £24.95 + £2.50 VAT (Total: £27.45)	Address _____ _____ _____
<input type="checkbox"/> a Sinclair Cambridge calculator ready built at £29.95 + £3.00 VAT (Total: £32.95)	
*I enclose cheque for £ _____, made out to Sinclair Radionics Ltd, and crossed.	
*Please debit my *Barclaycard/Access account. Account number _____	
*Delete as required.	
PLEASE PRINT	

everyday electronics

PROJECTS...
THEORY.....

PREVENTIVE MEASURES

The electronics enthusiast has frequent opportunities to provide good service for others, apart from satisfying his own personal interests and needs. This is because of the varied nature of the end-products of his hobby. In this context, a rather special case arises this month, which we feel merits the attention of all constructors.

We are all very familiar with the phrase "prevention is better than cure". The old adage is one of the first things to be implanted in our minds when quite young. This logic becomes part of our subconsciousness, though often we fail to heed this sound advice in our day-to-day affairs until damage or loss has been suffered.

True the increase in house break-ins and car thefts has brought attention to the need for security devices and systems that, if they do not actually prevent unauthorised entry, will at any rate give prompt indication immediately such a felony is attempted.

The basis of all modern intruder alarms is electronics, though systems may differ widely in the kind of sensing techniques employed. Many designs have been published for simple alarm systems suitable for protecting premises and motor vehicles. This month we publish another security system, but one that has been designed to counter the threat and danger of a baby or young child being unlawfully taken from a pram or other baby carriage.

Incidents of baby snatching from unattended prams and pushchairs have been headline news during the last few months. Although this inexplicable crime has not reached epidemic proportions, like other well-publicised offences, it could become "catching". The best way to discourage further incidents is to provide protection that frustrates an attempt to baby snatch by giving out a strident warning to alert passers-by.

The *Baby Snatch Alarm* described in this issue will take little in time, effort, or money to assemble. In use, it will give peace of mind to the busy mother when she has to leave a baby unattended, if for but a few moments, while she goes about her shopping.

Remember, electronics is our servant, and we constructors should be prepared at all times to use it whenever feasible to help solve everyday problems. Here is an excellent example of circuitry put to worthwhile use as a preventative measure. Why not make this project *your* good turn?

Fred Bennett

Our January issue will be published on Wednesday, December 19

EDITOR F. E. Bennett • ASSISTANT EDITOR M. Kenward • B. W. Terrell B.Sc.
ART EDITOR J. D. Pountney • P. A. Loates • K. A. Woodruff
ADVERTISEMENT MANAGER D. W. B. Tilleard

© IPC Magazines Limited 1973. Copyright in all drawings, photographs, and articles published in EVERYDAY ELECTRONICS is fully protected, and reproduction or imitations in whole or part are expressly forbidden.

All reasonable precautions are taken by EVERYDAY ELECTRONICS to ensure that the advice and data given to readers are reliable. We cannot, however, guarantee it, and we cannot accept legal responsibility for it. Prices quoted are those current as we go to press. Everyday Electronics, Fleetway House, Farringdon Street, London, E.C.4. Phone: Editorial 01-634-4452; Advertisements 01-634-4202.



**..EASY TO CONSTRUCT
..SIMPLY EXPLAINED**

VOL. 2 NO. 12

DECEMBER 1973

CONSTRUCTIONAL PROJECTS

- BABY SNATCH ALARM** Provides protection for babies in prams or push chairs by D. Smith 658
AUTO WATER FOR PLANTS Looks after your plants while you are away by C. Embleton 672
TREMOLO UNIT Effect unit for guitar or organ by M. H. George 679

GENERAL FEATURES

- EDITORIAL** 656
TEACH-IN '74 Lesson 3: Zener diode and the capacitor by Phil Allcock 662
PICKUPS AND TURNTABLES by Gordon J. King 667
WHAT DO YOU KNOW? Components 671
RUMINATIONS by Sensor 676
TOOL KIT OFFER 677
HELP! Your questions answered 678
COUNTER INTELLIGENCE A retailer comments by Paul Young 678
DOWN TO EARTH Resistor wattage by George Hylton 682
BRIGHT IDEAS Your constructional tips 685
SHOP TALK Component buying problems by Mike Kenward 686
TEACH-IN '74 QUESTION TIME 686
DEMO CIRCUITS II The Hartley Oscillator by Mike Hughes 689
READERS LETTERS From you to us 693

Publisher's Annual Subscription Rate, including postage to any part of the world, £2.35. International Giro facilities Account No. 5122007. State reason for payment "message to payee". Address to Everyday Electronics, Subscription Department, Carlton House, Great Queen Street, London, WC2E 9PR. Binders for volumes 1 and 2 (state which) and indexes for volume 1 available for 97p and 11p respectively, including postage, from Binding Department, at the above address.

We are unable to supply back copies of Everyday Electronics or reprints of articles and cannot undertake to answer readers' letters requesting designs, modifications or information on commercial equipment or subjects not published by us. An s.a.e. should be enclosed for a personal reply. Letters concerning published articles should be addressed to: The Editor, those concerning advertisements to: The Advertisement Manager, both at the address shown opposite.

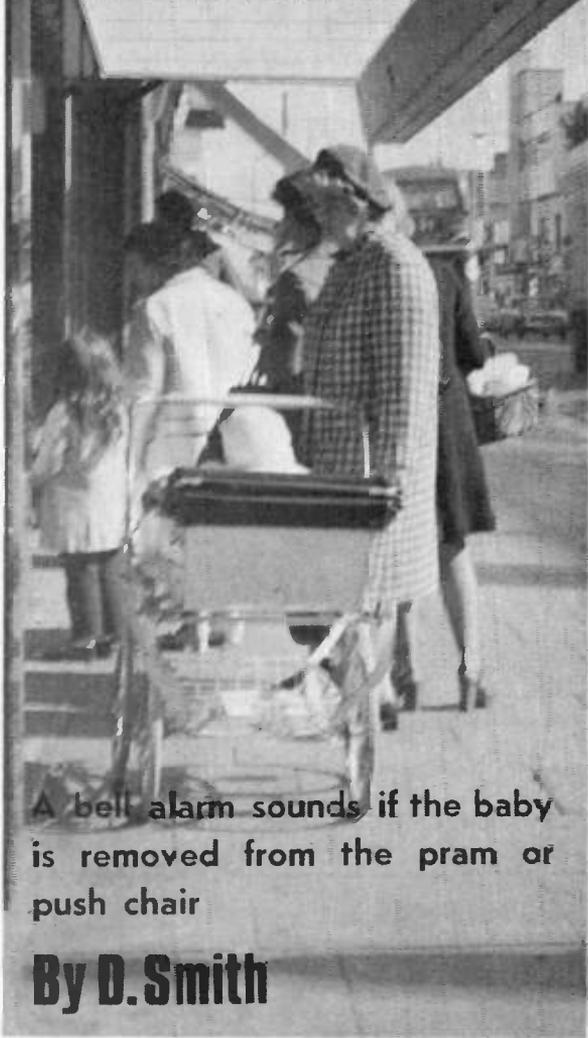
NEXT MONTH

V.C.O. Effects Unit
Sewing Machine Speed Control
Fetset Receiver

PLUS

Semiconductor Primer No. 1
More details on page 685

BABY SNATCH ALARM



A bell alarm sounds if the baby is removed from the pram or push chair

By D. Smith

THIS alarm has been designed to fit easily on any pram or push chair, to sense the baby without actual contact, and to be virtually fool-proof in operation. When the unit is connected and switched on, the baby cannot be removed, the pram cannot be pushed away, and the unit cannot be disconnected or opened without the alarm sounding.

There are ways of preventing the alarm sounding but without studying the actual operation of the unit a would-be snatcher would not be able to take the baby.

BABY SYSTEM

The sensing element used is a pressure mat that is virtually waterproof and is placed under the sheet or mattress to sense when the baby is actually in the pram. This mat is connected to the main unit, which is hung on the side or end of the pram, by a twin lead and a jack plug.

If the jack plug is removed, the lead cut, or the pressure taken off the mat, the alarm sounds. To prevent the pram being taken away the lead is passed through one of the wheels before being plugged into the main unit, thus the wheel cannot turn unless the wire is unplugged—sounding the alarm.

The whole system is controlled by a switch operated by a key—in the same way as a car's ignition switch—and is supplied by a 6 volt lantern battery so it is safe even if it gets wet.

THE CIRCUIT

The circuit diagram of the alarm is shown in Fig. 1, SK1 is the socket into which the pressure mat is plugged, S1 is a microswitch fitted under the front panel of the case so that should the unit be opened while turned on, the alarm bell WD1 will sound. Switch S2 is the master, key operated on/off switch and LP1 and LP2 provide visual indication of the alarm condition and light a small sign reading "Baby Snatch."



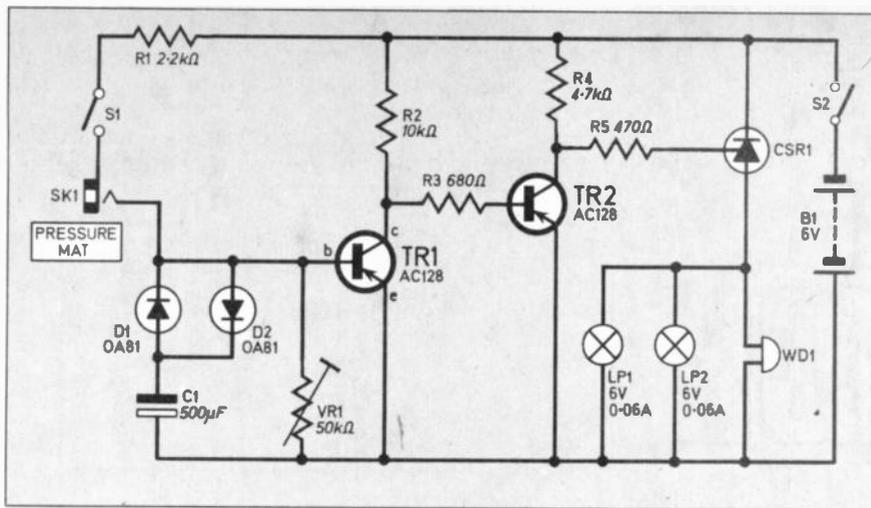


Fig. 1. The complete circuit diagram of the Baby Snatch Alarm.

With the pressure mat connected and the unit closed and turned on, capacitor C1 will charge through the mat, S1, R1 and D1, thus holding TR1 on. Diodes D1 and D2 prevent TR1 from being turned off when the unit is first switched on and C1 is discharged.

With TR1 on, TR2 is off and the thyristor CSR1 will not be fired and thus no current will flow to LP1, LP2 and WD1. If the circuit from TR1 base to the negative line is broken—by removing the pressure from the mat, unplugging the mat or opening S1, capacitor C1 will discharge through D2 and VR1 at a rate determined by VR1 and, after a short delay TR1 will turn off, TR2 will turn on and hence fire CSR1 which will pass current to the warning devices LP1, LP2 and WD1.

Once CSR1 is passing current it cannot turn off until the current falls to nearly zero or the voltage is removed. Although the bell only requires intermittent current, LP1 and LP2 pass enough continuous current to keep CSR1 conducting and thus the lights will show and the bell will continue to ring until the unit is turned off by the key switch.

Capacitor C1 and VR1 provide a short delay—up to about 10 seconds depending on the setting of VR1—so that should the baby jump up and down or in some way temporarily remove its weight from the mat, the alarm will not

sound. Only if the weight remains off the mat for longer than the set time will the alarm sound.

Power for the unit is from a 6V SP996 battery which, on standby will last a very long time (probably at least six months to a year with normal use) and would certainly be capable of sounding the bell for about half an hour continuously. Hopefully the alarm will only be operated for test purposes.

Components....

Resistors

R1	2.2k Ω
R2	10k Ω
R3	680 Ω
R4	4.7k Ω
R5	470 Ω
All $\frac{1}{4}$ W \pm 10% carbon	

Capacitor

C1	500 μ F elect. 12V
----	------------------------

Semiconductors

TR1	AC128 germanium pnp
TR2	AC128 germanium pnp
CSR1	1A 50 p.i.v. thyristor
D1, 2	0A81 or similar diodes (2 off)

Miscellaneous

SK1	jack socket with plug
S1	s.p.s.t. micro switch
VR1	50k Ω skeleton preset
LP1, 2	6V 0.06A bulbs in double holder with motif plate
WD1	4.5V or 6V bell (Friedland type)
S2	key operated s.p.s.t. switch
B1	SP996 6V battery
Veroboard 23 holes x 13 strips x 0.15 matrix, small brackets to fix Veroboard, case (see text) metal for pram mounting brackets, wire, 4BA fixings, Pressure mat.	

SEE
**SHOP
TALK**

**Approximate cost
of components
including V.A.T.**

£8:00 plus case

CONSTRUCTION

The main circuit is built on a piece of Veroboard. The strips must be cut and separated as shown in Fig. 2. Larger holes in the board are drilled for VR1, also two more holes are drilled to take the two fixing brackets. Make sure that you remember to strap together strips *D*, *E* and *F*. All the external connections are made by using terminal pins, these are fitted to each end of the board as shown. Mount all the components on the board, soldering the transistors in last using a heat shunt on each wire as it is soldered.

The cabinet can be to your own personal choice but the one used on the prototype is a standard chassis size 205 x 150 x 75mm. The sloping front was produced by measuring down 25mm on each side of the chassis and then cutting two pieces out, one each side. The lid of the chassis was also cut down to match.

The chassis is then drilled and finally covered in Contact or a similar covering. Advertise what the unit is on the front using Letraset, this will deter would-be baby snatchers and also warn other mothers not to pick the baby up, however innocent the motive is. Some holes are cut in the bottom of the box to allow the sound from the bell to be heard and to take SK1. The lamp indicator hole should be cut in the top. The micro-switch is fitted inside and to the front of the box so that it operates (opens) when the lid is removed.

The key switch is fitted to the front of the box on the lid. The unit can be then wired up as shown in Fig. 3. Two brackets are made up to fit onto the pram and are fastened to the rear by fixing screws. Two of these screws also serve to fix into position the Veroboard assembly.

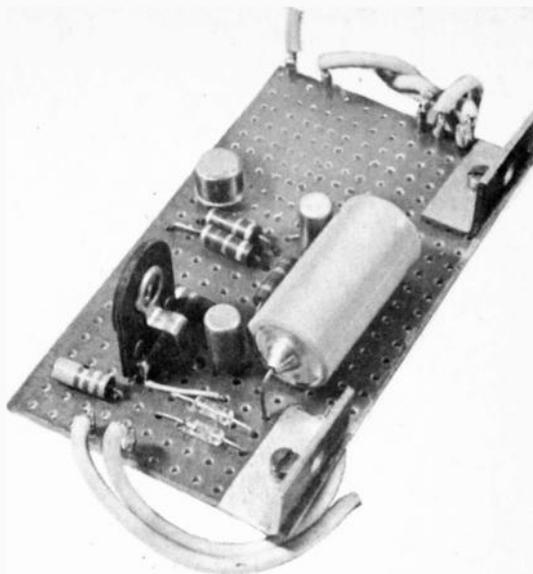
The battery is soldered in as it should be quite a while before this needs replacing; also the battery is difficult to connect using other methods and as reliability is required, soldering seems to be best. The lid is fastened on making sure that the microswitch operates correctly.

FITTING AND TESTING

The pressure pad is fitted underneath the baby. If extra pressure is required (because the baby is very light) either place some extra weight on the mat to "bias" it, double the mat or place under the mat a piece of hardboard with indentations in it. The mat seems to operate better sometimes by point pressure rather than overall pressure. The pressure mat wires should be long enough to pass through a pram wheel and join the main unit via a jack plug.

TESTING

When testing the unit allow it to be turned on for some time before triggering it, this enables C1 to charge fully and thus provides a check on



Photograph of the circuit board for the Baby Snatch Alarm.

the delay time. Adjust VR1 to provide the required time delay before the alarm sounds—possibly one or two seconds.

In use the mat can be left in the pram and connected to the unit by passing the lead through the wheel and plugging in the jack plug when needed. The unit is then turned on by operation of the key switch and the key removed. When the mother returns, she turns off the unit with the key, unplugs the mat and pushes the pram away. □

PRACTICAL ELECTRONICS

PARTY STROBE

Get that Christmas party swinging with an easy-to-build medium power strobe.

VOICE OPERATED FADER

Ideal for parties and Discos. It automatically fades the music when you speak.

DECEMBER ISSUE ON SALE NOW—20p

NEXT MONTH P.E. COULD SAVE YOU MONEY!

CAR IGNITION TIMING LIGHT

LOUDSPEAKER ENCLOSURE

JANUARY ISSUE WILL BE ON SALE DECEMBER 14
20p—ORDER YOUR COPY NOW—

THE GOOD COMPANIONS

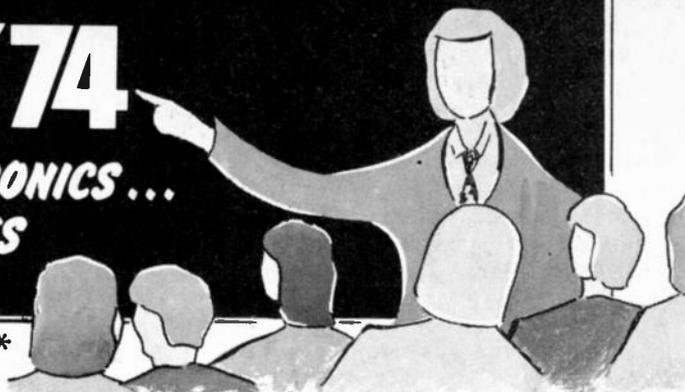


Two magazines designed to complement each other in every way—together satisfying the needs of everyone involved in electronics.

PE

TEACH-IN '74

FOR BEGINNERS IN ELECTRONICS ...
THEORY AND EXPERIMENTS



TUTOR: PHIL ALLCOCK*

LESSON 3 Zener diode and the Capacitor

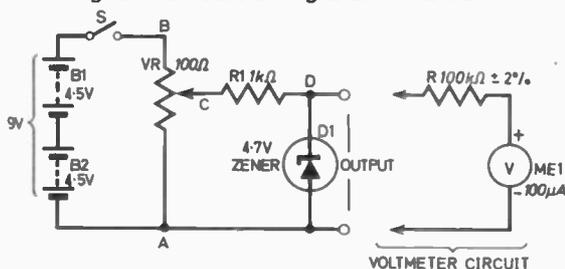
In addition to the IN4001, the shopping list includes a second diode known as a Zener diode. This component is very similar to the IN4001 diode except that the maximum current is less and the breakdown voltage is carefully controlled during manufacture to be close to a specified level, in this case 4.7 volts ± 5 per cent. Diodes such as this are sometimes called breakdown diodes and they are specifically designed to be used in the reverse direction at the breakdown voltage.

In Fig. 2.8 the diode voltage in the breakdown region is almost constant and independent of the reverse breakdown current. Providing the current and power dissipation are restricted the diode can be operated in this manner to give an almost constant voltage difference of approximately 4.7 volts without harmful effects. The dissipation limit for the diode specified is 400mW (0.4 watt) and since the voltage is 4.7 volts the reverse breakdown current must be limited to a maximum value of

$$I_{max} \text{ (mA)} = \frac{400}{4.7} \left(\text{mA} = \frac{\text{mW}}{\text{volts}} \right) \\ \approx 85\text{mA}$$

Figure 3.1 shows a circuit using the Zener diode. Notice the different symbol for the Zener diode and also the direction in which it is connected relative to the battery polarity.

Fig. 3.1. Circuit using a Zener diode.



* North Staffordshire Polytechnic (Any communications arising from the Teach-In '74 series must be addressed to Everyday Electronics, Fleetway House, Farringdon Street, London E.C.4)

With the switch closed the full 9 volts is applied to the 100 ohm potentiometer but only a fraction of this voltage is fed to the Zener diode via the 1 kilohm current-limiting resistor. As the potentiometer slider moves from A towards B the fraction of this 9 volts passed to the diode increases until a point is reached, about mid-way along the 100 Ω potentiometer, at which the voltage equals the Zener breakdown voltage of 4.7V. Up to this point no current can flow via the 1 kilohm resistor but once the breakdown voltage is reached, or exceeded, current can flow via the 1 kilohm and the Zener diode.

Since the voltage across the Zener has to remain almost constant the excess voltage supplied by the potentiometer must appear across the 1 kilohm resistor. It is this resistor which limits the diode current to a safe value when the potentiometer slider is at point B. Under these conditions the Zener current will be approximately

$$\frac{(9 - 4.7)}{1.0} = 4.3\text{mA} \left(\frac{\text{volts}}{\text{k}\Omega} = \text{mA} \right)$$

If the 1 kilohm resistor was changed to 100 ohm the maximum current would be approximately ten times greater i.e. 43mA.

CAPACITOR ACTION

This month we are introducing another very useful component, the capacitor. Like resistors, capacitors are made in a wide range of values and there are several distinct types, but before considering these in detail we will examine the behaviour of the basic capacitor illustrated in Fig. 3.2. This is simply a pair of metal plates arranged close together but not in actual contact. The space between the plates can be filled with air or some other insulating material

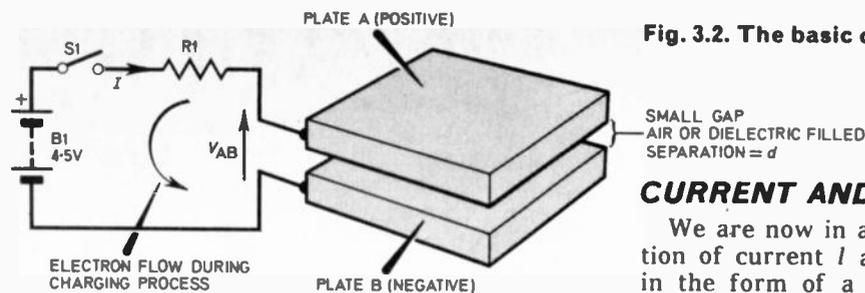


Fig. 3.2. The basic capacitor and charging circuit.

CURRENT AND VOLTAGE VARIATION

We are now in a position to sketch the variation of current I and voltage V_{AB} against time in the form of a graph, as shown in Fig. 3.3. Since the capacitor is initially uncharged, V_{AB} is zero and the current is limited to

$$I_{max} = \frac{E}{R1} \text{ (from Ohm's law).}$$

At all times the circuit voltages must obey our previous rules and so we can also write $E = I R1 + V_{AB}$ (Kirchhoff's law).

This equation states that the sum of the voltage across the resistor ($IR1$) and the capacitor (V_{AB}) is always equal to E and since E is constant (in this case) any increase in V_{AB} must occur simultaneously with a decrease in current I ($R1$ is also constant). Clearly, when I is zero V_{AB} and E are equal as already discussed. The rate at which the charging process occurs depends on the values of both the resistor $R1$ and the capacitor $C1$.

The basic unit of capacitance is the farad but as this is a fairly large unit it is usual to deal with sub-divisions such as microfarads (μF), nanofarads (nF) and picofarads (pF). The wall chart gives the values of these sub-divisions and should be consulted as necessary until the terms and their meanings are thoroughly familiar.

CAPACITANCE VALUE

At this stage the reader may be wondering how the capacitance value is related to the basic parallel plate system of Fig. 3.2, and the answer lies in the relationship between the charge transferred and the voltage V_{AB} . The capacitance of a given capacitor, or system of plates, is in fact a measure of the amount of charge transfer necessary to produce a voltage difference (V_{AB}) across the capacitor, of 1 volt.

The greater the charge that has to be moved to produce one volt difference, the larger the capacitance of the system considered. In practice the capacitance is determined by the dimensions and separation of the two plates and also the type of material used to fill the space between them. This material is known as the dielectric. Increasing the plate area and/or reducing the plate separation, lead to an increase in capacitance. The above relationships are conveniently summarised:

(a) charge (in coulombs) = capacitance (in farads) x voltage (in volts) or $Q = CV_{AB}$

(b) capacitance of parallel plate capacitor =

$$\text{constant} \times \frac{\text{plate area}}{\text{plate separation}}$$

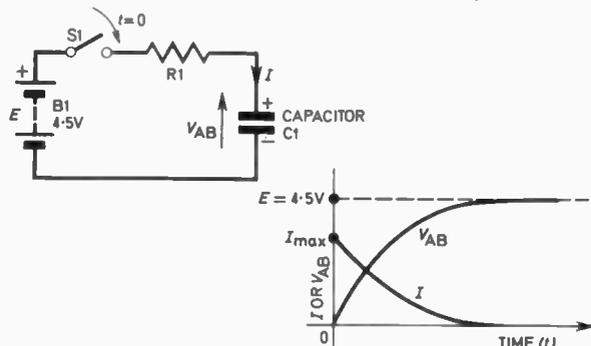


Fig. 3.3. Variation of current and voltage in circuit shown.

such as dry paper or plastic.

Now we already know that the metal plate is a good electrical conductor because it has "free" electrons in its structure and these can be made to move under the influence of an e.m.f. provided, by say, a battery. However, in the circuit of Fig. 3.2 the path for current flow is different to that previously considered since the capacitor plates are not in contact.

When the switch is closed electrons leave plate A and accumulate on plate B and a current I flows in the metallic parts of the circuit due to the applied e.m.f. Each electron "carries" a fixed negative electric charge and initially the metal plates are electrically neutral (i.e. they have their correct quota of electrons). Consequently this movement of electrons causes plate A to become positively charged with respect to plate B, since B now has an excess whilst A has a deficiency of electrons.

This charge transfer, around the circuit, causes a voltage difference V_{AB} between the capacitor plates which is in opposition to the battery e.m.f. Because of this opposition, the rate of charge movement (which is simply the circuit current I) decreases as the voltage V_{AB} increases.

An equilibrium condition is eventually reached and the capacitor is then said to be fully charged. In this state the voltage V_{AB} would be equal to the battery voltage of 4.5 volts and the current I would be zero. The resistor $R1$ is included to limit the initial level of the current when the switch is closed. The process is similar to the flow of water from a full to an empty container. The flow stops when the water levels are equal.

The constant in (b) depends on the material used for the dielectric.

DISCHARGED AND STORED ENERGY

If the capacitor C_1 in Fig. 3.3 was ideal it would remain charged, with a voltage difference E , even if removed from the rest of circuit, providing no external connection is made between the plates. If such a connection is made, say with a resistor R_1 and a switch S_1 as shown in Fig. 3.4, the charge would be "restored" when the switch closes and a current would flow during this process. The new equilibrium condition would be when V_{AB} and I are both zero. The energy lost as heat in the resistor represents the energy that was stored in the previously charged capacitor and it can be shown that this energy is given by:

$$\text{energy} = \frac{1}{2} C (V_{AB})^2 \text{ joules.}$$

In this equation C is in farads and V_{AB} is in volts. For a given capacitance the energy stored rises as the square of the voltage, so doubling the voltage increases the energy by four times. The resistor R_1 limits the initial discharge current and the curves in Fig. 3.4 illustrate the variation of I and V_{AB} during the discharge period.

TIME CONSTANT

The time to fully charge or discharge an ideal capacitor is theoretically infinite but in practice the process can be considered complete when the voltage or current change is within 1 per cent of the final equilibrium value. The rate at which a given capacitor can alter its state of charge is determined by the circuit "time constant" which is given by the product $C \times R$.

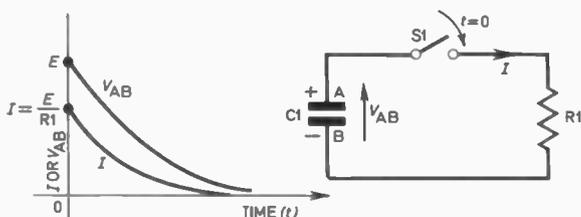


Fig. 3.4. Discharge of the capacitor.

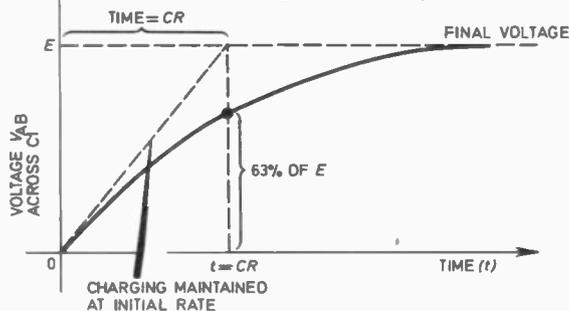


Fig. 3.5. Time constant graph.

If C is in farads and R is in ohms the product CR gives the time constant in seconds.

Two interpretations of the meaning of "time constant" are possible: If the capacitor charge (or discharge) rate is maintained constant at the initial value then the process would be complete in a time equal to the circuit time constant. Alternatively the time constant is the time required for approximately 63 per cent of the full change to actually take place. Both interpretations are illustrated in Fig. 3.5.

To reach the point at which the charging is 99 per cent complete a time equal to approximately $5CR$ is required. The charge and discharge curves are often called "exponential" and are very important—many changes that occur in nature follow the same law of variation. A large number of electronic circuits employ capacitor/resistor combinations for timing and pulse generation and we shall come across these later in the series.

CAPACITOR TYPES

A wide choice of different types of capacitor exists and the circuit symbols used are shown on the wall chart. In addition to the capacitance value and associated percentage tolerance, it is normal to quote a maximum working voltage rating. The use of very thin dielectrics allows large capacitance values to be achieved within a reasonable volume but the voltage rating falls as the plate separation is reduced.

Some dielectrics can yield high capacitance values but are not perfect insulators and this introduces an internal leakage path between the plates which allows the charge to leak away within the capacitor itself. A further point is that the larger values of capacitance may only be available with a polarised type of capacitor, which implies operation with one voltage polarity only. Many so called electrolytic capacitors are of this form and these components often have very wide tolerances, typically +100 per cent and -50 per cent.

In some applications the temperature variation of capacitance may also be of interest. The common capacitor types and their main characteristics are listed in Table 3.1. For general circuit applications the polyester and polycarbonate types will be quite suitable. Electrolytic types are invariably used for power supplies, decoupling and similar applications requiring large values, say $10\mu\text{F}$ or more.

When a particular type of capacitor is specified it is unwise to use another type without first considering its suitability in the given application. This is especially true when operation at high frequencies is involved.

SERIES AND PARALLEL

Capacitors of similar voltage rating can be connected in parallel and this gives a total

Table 3.1 Capacitors

Type of Dielectric	Typical Range of Capacitance Values	Typical Voltage Rating	Main Characteristics
Silver Mica	1 pF to 10,000 pF	300V	Close tolerance $\pm 1\%$. Stable, low loss. Low leakage. Used at high frequencies.
Polystyrene	50 to 10,000 pF	30-500V	$\pm 2\%$ or better if required. Relatively bulky. Low loss. Good insulation.
Ceramic	1.0-10,000 pF	30-1500V or more for special "suppressor" types.	Tolerance $\pm 20\%$. R.F. applications, decoupling. Some types have controlled temperature characteristics.
Polyester Polycarbonate	0.01-1.0 μ F 0.01-10 μ F	50-250V	$\pm 20\%$ or better. General purpose applications. Larger values relatively expensive.
Tantalum	0.1-500 μ F	5-100V (Observe polarity)	Low leakage; polarised; stable; low voltage ratings, small size.
Electrolytic	Up to 10,000 μ F or more.	5-500V (Observe polarity)	High values, mainly polarised. Wide tolerance +100%-50% Poor stability.
Variable Types	500 or 1000 pF max. (10 : 1 max/min ratio.) Low values available for trimmers e.g.: 0.5/5 pF.	500V or more	Air insulation types—low loss, stable. Silvered ceramic, P.T.F.E. or mica compression types for low value trimmers.

capacitance equal to the sum of the separate components. Thus a 250 μ F and a 500 μ F capacitor will give 750 μ F when joined in parallel (like polarity ends together—positive to positive, negative to negative when electrolytics are involved). Connection in parallel gives an effective increase in plate area, hence the increase in capacitance.

Series connection is also possible but this gives a capacitance less than the smallest value used. The rule for calculating the effective capacitance is simply

$$\frac{1}{C_{\text{effective}}} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \text{etc.}$$

A 1 μ F in series with a 0.5 μ F would give an effective value of 0.33 μ F. If the capacitors are polarised the positive of one capacitor must be joined to the negative of the next and the individual voltage ratings must be adequate, since high leakage in one component will affect the voltage distribution across all elements.

It is also possible to series connect electrolytics, back to back, to simulate a non-polarised (i.e. reversible) electrolytic but the effective value may be somewhat indeterminate as one capacitor is always effectively the wrong way round and may not yield its specified capacitance under these conditions. The voltage rating is also ill-defined with this connection.

LEAKAGE CURRENT

The leakage current of electrolytic capacitors can be a nuisance if not allowed for in the circuit design stage. When these types are subjected to normal voltage levels, after periods "out of service", the leakage current may initially rise well above the normal leakage current level. The current eventually decreases as the electro-chemical action rebuilds the dielectric barrier.

In general the leakage current depends on the capacitance and voltage and is sometimes specified as a certain maximum current level per unit CV product (farad x volt). For low leakage applications tantalum types are extremely useful but usually have a very low reverse voltage limit above which current flow increases rapidly.

COLOUR CODES

Some capacitors, usually below 1 μ F, have the capacitance, tolerance and voltage rating given by a colour code. The illustrations on the chart give details of two fairly common codes. Ceramic, tantalum bead and polyester types are often colour coded.

Next month we shall begin our study of the behaviour of the BC107 transistor and introduce some experiments using this device.

Test No. 7

Devise a suitable layout for the circuit shown in Fig. 3.1 and wire up the components on the Tutor Board in a neat manner. Connect the voltmeter across points A and D and with the switch open turn the 100 ohm potentiometer to point A. Close the switch and check that the voltmeter reads zero. Slowly turn the potentiometer whilst observing the meter. The voltage rises at first and then remains almost constant at about 4.7 volts even though the potentiometer is turned fully towards point B.

Repeat the procedure with the voltmeter connected across the 1 kilohm resistor (point C and D). In this case the meter will only begin to show an appreciable reading when the diode begins to break down. By studying the circuit and the test results, show that when connected across the 1 kilohm resistor, the voltmeter behaves as though it was a 0.10mA meter in series with the diode.

Test No. 8

This test illustrates the charge-discharge mechanism covered in this month's part. Build the circuit shown in Fig. 3.6 with the capacitor $C1 = 250\mu\text{F}$. Observe correct polarity. With the switch initially in position A connect the 0 to 10V voltmeter circuit across the capacitor and check that the capacitor is uncharged.

Operate the switch to position B whilst still observing the meter. Satisfy yourself that the operation of the circuit is correct and that the discharge occurs more quickly than the charge. Why is this so? (A charged capacitor can be discharged by returning the switch to position A.)

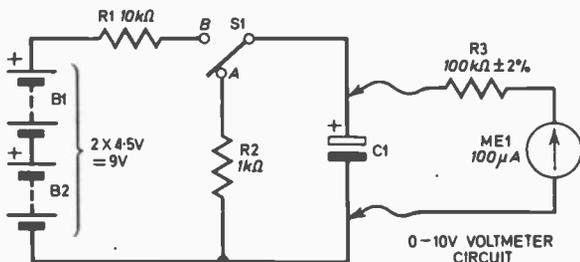


Fig. 3.6. Circuit for use with Test No. 8.

Test No. 9

Repeat Test No. 8 using the $1000\mu\text{F}$ capacitor. Using the "seconds hand" of a clock or wristwatch measure the time taken for the capacitor to charge to 63 per cent of its final voltage. To perform this test it is necessary first to determine the voltage across the $1000\mu\text{F}$ capacitor when fully charged. This reading should be approximately 8 volts, which is less than the total battery voltage. (If you have remembered

your earlier tests you will know why this is so —if not, go back over the earlier work to find the answer!)

Work out the voltage equivalent to the 63 per cent point which should come somewhere near to five volts. This is half full scale deflection on the meter. The timing is best done with the help of a friend who can note the time elapsed when you call out that the 63 per cent point has been reached. It helps if the switch is moved to position B when the seconds hand is at a convenient point on the clock face.

Use the results to estimate the actual capacitance value, which has a wide tolerance on the $1000\mu\text{F}$ nominal value. Due to the shunting effect of the voltmeter the effective charging resistance is about 9 per cent less than the 10 kilohm resistor i.e. about 9.1 kilohm.

To help check your results note that a capacitor of exactly $1000\mu\text{F}$ would take 9.1 seconds to charge to 63 per cent of its final voltage, irrespective of the actual battery voltage in use.

Test No. 10

Modify the circuit wiring on the Tutor Board to match the schematic circuit of Fig. 3.7. This is very similar to the previous circuit but allows for rapid charging of the $1000\mu\text{F}$ when the switch is in position B. With the switch in position A the only discharge path is via the 100 kilohm and meter and the time constant is now much greater than before (100 seconds for a nominal capacitor value of $1000\mu\text{F}$).

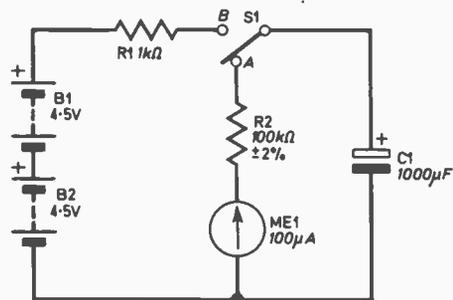


Fig. 3.7. Circuit for use with Test No. 10

Using this arrangement try to plot a discharge curve by taking meter readings every 10 seconds after switching to position A. Don't forget that the rate of fall of voltage (or current) will become less as discharge takes place. Several minutes will be needed for a complete discharge with the given values, as using the $5CR$ factor, mentioned earlier, 99 per cent discharge will take 500 seconds!

After recording all the important points, dismantle the circuit and reconnect the protective meter shorting lead.

See page 686 for a progress check.

PICKUPS

By GORDON J. KING

FOR record reproduction three main items besides amplifiers and speakers are involved, (i) the pickup cartridge (ii) the pickup arm and (iii) the turntable unit. The complete unit is usually finished off nowadays with a wooden plinth and tinted Perspex dust cover.

Sometimes the plinth is made sufficiently large to carry the amplifier, it then being necessary to connect a couple of loudspeaker systems and the mains supply to this. The alternative is for the amplifier to be a separate unit designed to accept the signals from the gramophone pickup.

One would rarely nowadays expect to see the loudspeakers in the same cabinet as the record playing equipment and amplifier—at least not when good quality stereo reproduction is the order of the day.

The encased three items are often referred to collectively as the record playing unit which, from a spinning stereo record, yields left and right audio signals for applying to the pickup sockets of the amplifier; this in turn driving the left and right loudspeaker systems to reproduce the two-channel stereo information.



The Toshiba SR-870 stereo deck with belt drive turntable and electret condenser cartridge.

& TURNTABLES



The Pioneer PL61 stereo turntable with Hall effect motor, belt drive deck, tone arm and strobe light.

The left and right channels are called respectively the A and B channels in some quarters and are colour-coded white and red.

The turntable is commonly driven by mains supply power, the drive motor having synchronous characteristics which tend to "lock" the speed to the mains frequency, thereby ensuring (with the spinning mass of the turntable) rotational speed constancy which is absolutely essential for faithful reproduction.

Fluctuations of speed below about 10Hz cause a waver of pitch called *wow*, while a similar effect above 10 hertz, is called *flutter*.

Some turntable drive motors are powered from electronic oscillators which means that by changing the oscillator frequency the speed can be regulated; moreover, and more important, a servo control arrangement can be engineered

into this in a manner where any speed change produces a control parameter change in the direction required to correct the speed—a sort of feedback system.

V-SHAPED GROOVE

An ordinary stereo disc carries the left and right signals on the two walls of a common V-shaped groove, which means that the two lots of information are recorded mutually perpendicular and each in a plane 45 degrees to the surface of the record. The wall nearest to the centre of the disc carries the left channel signals and the other wall the right channel signals.

It is the job of the pickup cartridge to extract the signals and to present them in isolation to the left and right channels of the amplifier. For the best stereo effect it is important for the signal "leakage" from one channel to the other channel, to be as small as possible. This *channel separation* is given in terms of a decibel ratio, the higher the decibel value the better. The reciprocal term is *crosstalk*, also presented as a decibel ratio, indicating how much signal in one channel is getting into the other channel.

Any pick-up cartridge is thus expected to "trace" the modulation on the two walls and to present it in two isolated channels in an electrical form corresponding to the left and right signals which originated the modulation from the microphone system.

A pick-up cartridge, therefore, can be regarded as a generator which is powered by the mechanical energy coupled from the moving, modulated groove via the vibrating stylus assembly.



The Toshiba SR-510 stereo deck featuring direct drive turntable and condenser cartridge. Suitable for playing CD4 four channel discs.

GENERATING SYSTEMS

The two main generating systems are *piezoelectric* and *electromagnetic*. The former is

based on the fact that an electric charge is produced when certain kinds of natural and man-made crystals are bent or stressed. The amount of electricity so yielded depends on the degree of stress.

It is noteworthy that gas and cigarette lighters are now using this principle, whereby the lighting action is arranged to bend a crystal sufficiently to produce enough electricity to cause a spark to ignite the gas!

Piezoelectric pick-ups, though, only produce a low output—often less than 1V. This is because only relatively small stresses occur from the deflection of the stylus coupling under the control of the groove modulation. Generally, the better the overall quality of the cartridge the smaller the electric output.

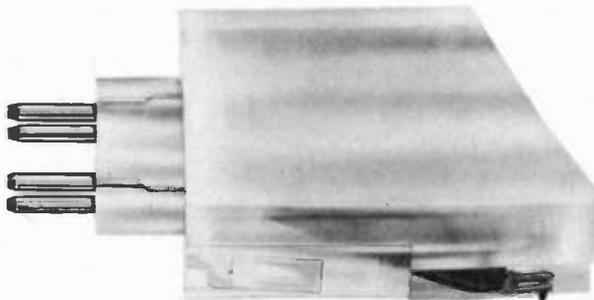
As piezoelectric crystals are not very resilient it is necessary to "gear-down", so to speak, the stylus-to-crystal coupling, which means that the effective deflection at the crystal is less than that at the stylus.

The majority of early piezoelectric cartridges and pickups employed the crystal, Rochelle salt. This is rather fragile and is sensitive to temperature and humidity changes.

Recent years have seen a change from this sort of crystal to a man-made crystal based on a ceramic material. The piezoelectric effect is introduced during manufacture by an electrostatic polarizing process which orientates the crystal-line structure of the ceramic so that it exhibits similar characteristics to Rochelle salt. However, the crystal is harder, chemically inert and immune to humidity and other atmospheric conditions.

It produces less output than Rochelle salt and is used mostly in the better quality piezoelectric cartridges which would normally be connected to an amplifier having sufficient input stage (pre-amplifier) gain to step-up the weak signals to operate the power amplifier.

A couple of well known ceramic species among the many available are the Decca Deram and the Goldring CS91E, yielding respective per-channel outputs of some 35 millivolts and 20 millivolts into 2 megohm loads.



The Decca Deram ceramic stereo cartridge is the most popular budget model ever produced; available with both spherical and elliptical stylus assemblies.

.. SPECIAL OFFER!

A HIGH QUALITY TOOL KIT

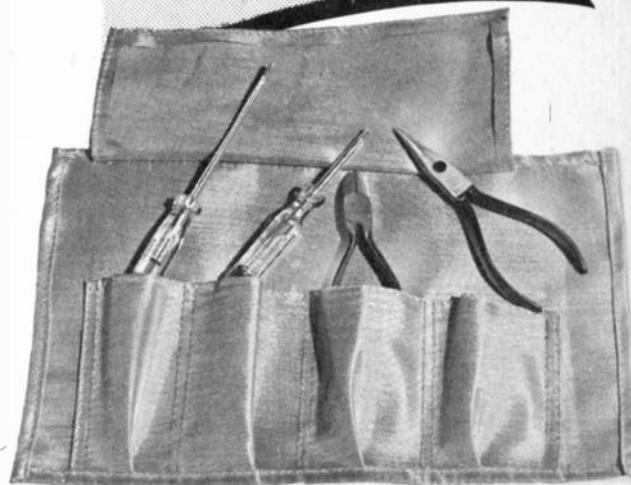
AT A SPECIAL PRICE

£2.99

The tools in the roll are as follows:

- 1 pair 5½ inch "telephone" pliers
- 1 pair 4 inch side cutters
- 1 4-inch insulated screw driver
- 1 2-inch mains tester (100 to 500 V) screw-driver

Please complete both parts of the coupon below
Allow 28 days for delivery



To: EVERYDAY ELECTRONICS
 DEPT. E.E.1. ROCHESTER X
 KENT, ME99 1AA

Please send me the Tool Kit(s) as indicated at
 £2.99 per kit.

I enclose cheque/P.O. No.

Value

No. OF KITS REQUIRED

NAME

ADDRESS

Tel. No.

No. OF KITS REQUIRED

NAME

ADDRESS

From: EVERYDAY ELECTRONICS
 DEPT. E.E.1., ROCHESTER X, KENT
 ME99 1AA

(Please cut around dotted line)

The Kit

To help new readers and established constructors, the staff of E.E. in conjunction with a leading supplier of tools, have put together four tools of high quality that form the basis of any constructor's tool kit. The tools are not cheap but, together with a strong, woven, greaseproof nylon "roll" are offered to readers at a saving of approximately 80p on the recommended retail price.

The kit would make an excellent Christmas present for anyone just starting electronic construction—but be sure to order immediately to avoid disappointment.

Remittance must be by cheque or postal order (name and address on back of cheques please), crossed and made payable to IPC Magazines Ltd. This offer is open to readers in Northern Ireland, England, Scotland, Wales and Channel Islands only. It is not available in Eire or overseas.



Batteries

I recently bought a transistor radio that needed 9 volts to run it. As I did not have the right physical sized batteries I temporarily wired up six HP7s to give the right voltage and the radio did not work. Eventually

when I got the right batteries (HP11s) all was well. The original smaller batteries were new and gave the right voltage so why wouldn't they run the radio?

Assuming you did not make a mistake in wiring up the batteries we suspect that the small HP7s were current limiting. This means in simple terms that they did not have enough guts to do the job properly. Because of their small size there is not a very large area of chemically active surface within them; when you draw current from a battery, gases are generated at one of the electrodes and there is a material put in the battery especially to absorb these gases—called a depolariser.

Probably you were trying to draw a high current from the battery and the depolariser was not able to keep up with the gas generation—consequently the battery would cease to pass current. As soon as you switched off and removed the batteries the depolariser would start to have an effect and the battery would appear perfectly normal again.

CSRs

What are the differences between a thyristor, triac and diac?

The thyristor and triac are both used to control high power alternating currents in applications such as light dimmers and motor speed controllers. The thyristor will never let more than half the total mains energy pass through it because it has rectifier properties; the triac, on the other hand, will control both positive and negative going mains excursions.

You can seldom substitute one for another in circuits because the driving circuits usually have to be different. The diac is sometimes called a trigger diode because it is a device that will not conduct current in either direction until a certain voltage is developed across it; when that voltage has been reached the device goes into conduction (in either direction) until the current that is flowing falls below a certain level and then it drops back out of conduction until it is triggered by another high voltage.



...Counter Intelligence

BY PAUL YOUNG

A retailer discusses component supply matters.

I suppose in other trades with the approach of Christmas the retailer has a fairly clear idea what stock he must lay in. Whether it be Teddy Bears, Socks, or Light Ale, he can judge on past experience his probable needs. The component dealer has no such yardstick. True he may sell a few more soldering irons, or multi-meters but on the whole it will depend, on what the projects are in the magazines and also whether they "catch on". Alas the line—hold on, my crystal ball is slipping so I can only cross my fingers and hope!

Width or Depth

In addition one of the major difficulties facing the retailer is the proliferation of all types of electronic components, and he is faced with the invidious choice of stocking in width (i.e. a large variety) or depth (i.e. a smaller variety but greater quantity) and

it is becoming more and more obvious that in order to give his customers good service he will have to settle for the latter! We must trust that between all of us everything will be covered.

To accentuate the problem the manufacturers themselves are dictating terms which rule out any alternative. Only recently we had a notification from Repanco stating that in future in their "transistor coil" range not less than 100 of any type of coil could be supplied at one time. They do not supply through wholesalers and there are 16 different varieties of coil. On a quick calculation, it meant an outlay of nearly £600 in order to sell a few dozen coils. I have no doubt they can justify their decision on economic grounds, but I am sure the sober truth is that they have been wooed by the colour T.V. manufacturers.

We joined a buying group several years ago and it was

hoped that between all the members we might buy them, each member buying one range but there was insufficient interest, and so one more component bites the dust. I would like to be able to tell you that this is an isolated case, but unfortunately I cannot. I could quote probably another six examples at least. So when you ask your supplier for an XYZ coil and he tells you he has not got one, do not think he is too lazy to pick up the phone and order some!

Asides

Being near Christmas I was hoping to tell you about the Indian who walked into our shop one day and asked us to make him a talking kettle, and about the Russian chauffeur who used to come down to our shop once a week in an embassy car, complete with a hammer and sickle flag on the front. He would enter and stand stiffly to attention and say "Me Sokolov, me want 7 lamp Philips"! but this would be deviating too far from the straight and narrow, so you will have to read my memoirs. Good Christmas shopping.

TREMOLO UNIT

By M.H. GEORGE



An effects unit for use with electric guitar or organ.

Approximate cost of components including V.A.T. £2.10 plus case

THE tremolo effect is one electronic musical effect which has become extremely popular with electric guitar and organ players, but for the average amateur user, the drawback is that commercial units are very expensive to buy. The effect of tremolo is to vary the amplitude of the input signal at a rate determined by the setting of the speed control.

CIRCUIT ACTION

The "electronics" part of the circuit is simply an oscillator producing a sine wave voltage variation of frequency between about 3Hz and 15Hz. This varying signal is then used to modulate the signal input from the instrument. The oscillator configuration used is known as a twin T bridge (Fig. 1), which gives a 180

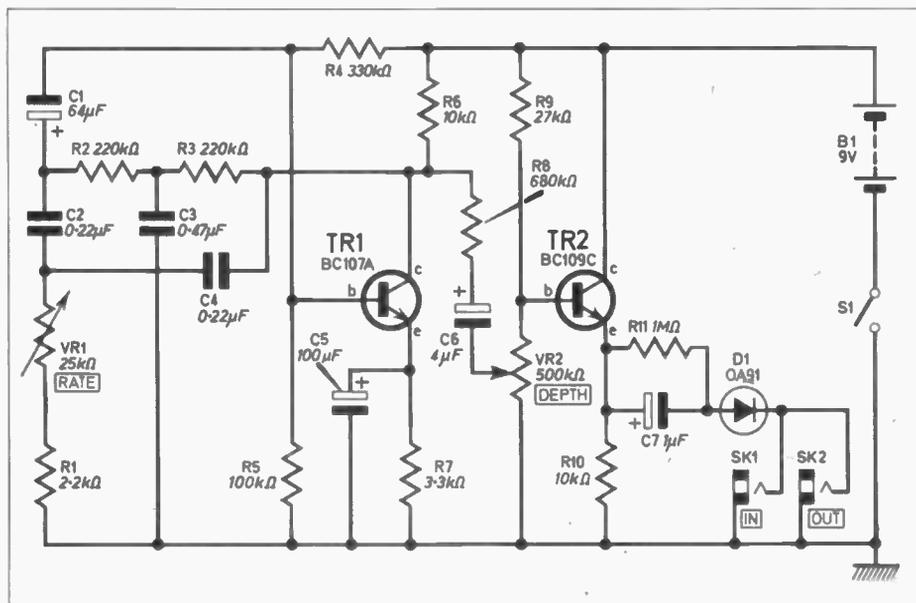


Fig. 1. Complete circuit diagram of the Tremolo Unit.

degrees phase shift at a frequency set by the values of C2, C3, C4 and R2, R3, R1 and VR1. This shift, when added to the 180 degrees phase shift produced by TR1, connected as a common emitter amplifier, gives a total 360 degrees shift, or positive feedback, which results in oscillation.

The slowly varying signal appearing at TR1 collector is taken via C6 and R8 to the "depth" control, VR2, which determines how much of this alternating voltage is fed to the base of TR2, connected as an emitter follower to buffer the relatively high impedance output from TR1 against possible low impedances at the input jack sockets.

The values of C1 and C5 are not critical, and may be anything between 40 μ F and 200 μ F, the main consideration probably being the physical size of the components. Also D1 may be any germanium diode, TR2 should be one of the higher gain groupings of the BC109, i.e. BC109B or C, while TR1 should be a lower gain grouping of BC107, i.e. unclassified or BC107A.

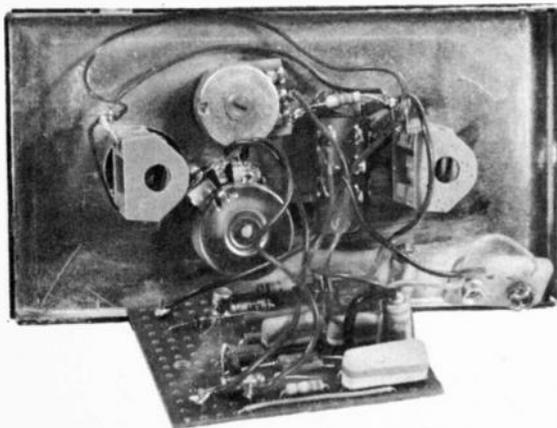
VEROBOARD WIRING

The piece of Veroboard may be cut from a standard strip of 65mm width (16 holes). Capacitors and resistors should be mounted first after making the necessary breaks in the strip and mounting holes of 4BA or 6BA clearance to preference, see Fig. 2. The transistors may be mounted next, and the diode last, using a heat-sink on the leads of these components, especially the germanium diode.

The best way of connecting the wires, which run between the front panel and the board, to the Veroboard is to use Veropins or short pieces of stiff wire at these points, and then make the connections later, soldering the wires to the pins.

CASE CONSTRUCTION

The front panel lid should be drilled first, as indicated in Fig. 3—the round holes are most easily and neatly made with chassis punches. A 6mm hole should be drilled and the remainder



filed out to form the 12mm by 6mm rectangular hole for S1. The switch, controls and sockets can now be mounted and interwired.

The box part of the case is drilled to take the Veroboard, and in one corner, to take a Terry clip or similar for the battery mounting. When positioning these holes, make sure, of course, that none of the top panel components are fouled in any way by components on the Veroboard or by the battery.

The circuit board is mounted on spacers which are of sufficient height to ensure that the copper side of the board is clear of the metal case. The board and clip are best secured using countersunk screws, so that the base of the unit is left fairly flat. The final assembly is completed by wiring the front panel to the Veroboard. Wires between the lid and the board should be of reasonable length to facilitate removal of the lid for battery changing, etc.

THE UNIT IN USE

As the circuit diagram shows, it does not matter which way round the amplifier and instrument are connected to the unit, which is connected between the instrument and the amplifier. It is suitable for use with guitar or organ □

Components

Resistors

R1	2.2k Ω	R6	10k Ω
R2	220k Ω	R7	3.3k Ω
R3	220k Ω	R8	680k Ω
R4	330k Ω	R9	27k Ω
R5	100k Ω	R10	10k Ω
All $\frac{1}{4}$ W + 10% carbon		R11	1M Ω

Capacitors

C1	64 μ F elect. 9V
C2	0.22 μ F
C3	0.47 μ F
C4	0.22 μ F
C5	100 μ F elect. 9V
C6	4 μ F elect. 9V
C7	1 μ F elect. 9V

} polyester

Potentiometers

VR1	25k Ω carbon log.
VR2	500k Ω carbon lin.

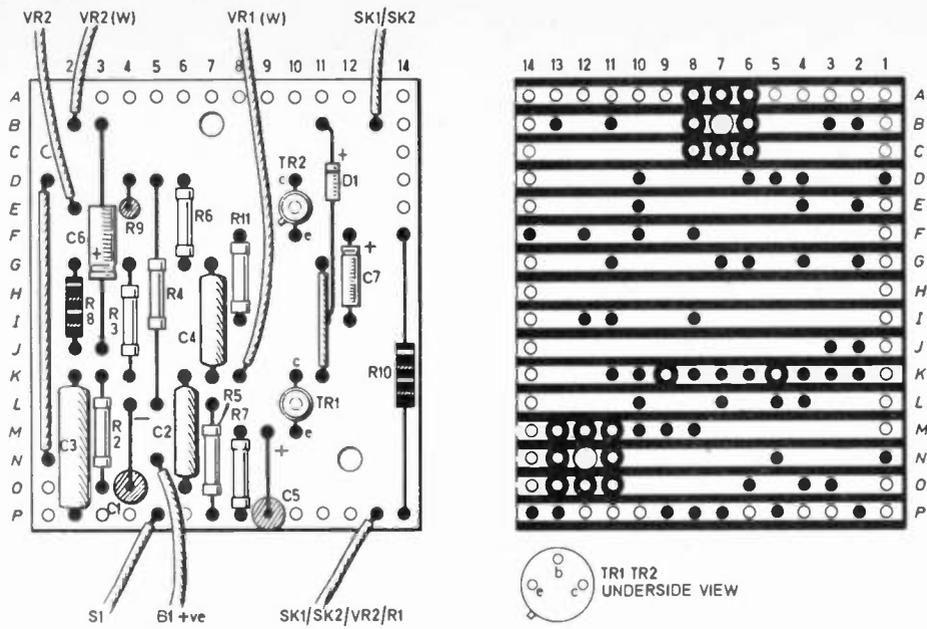
SEE
**SHOP
TALK**

Semiconductors

TR1	BC107 or BC107A silicon npn
TR2	BC109B or BC109C silicon npn
D1	OA91 germanium diode

Miscellaneous

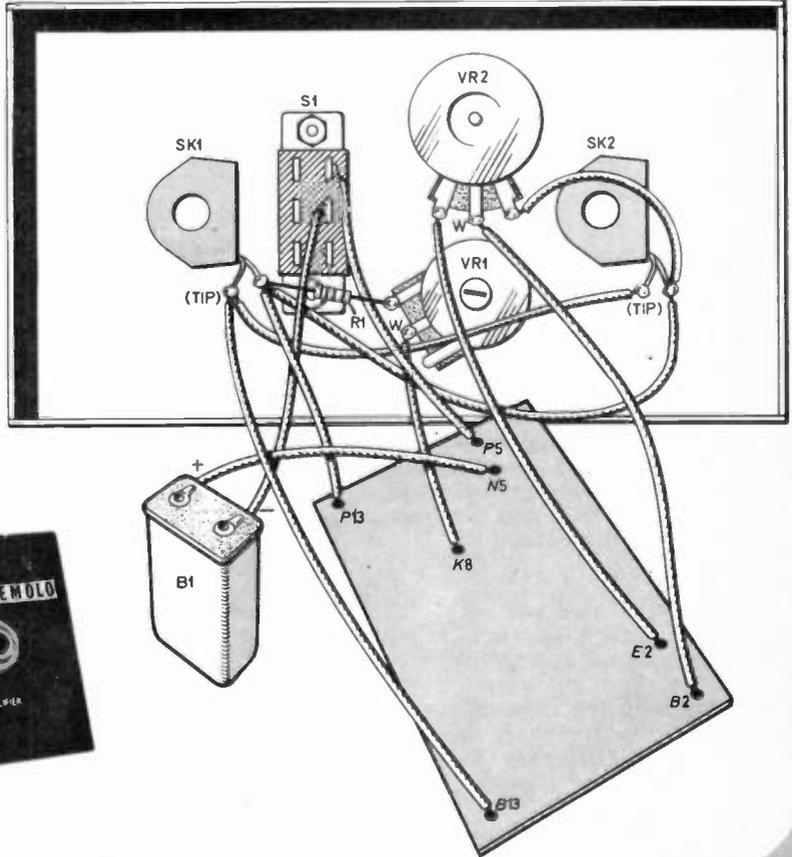
SK1	standard jack socket
SK2	standard jack socket
S1	s.p.s.t. slide or toggle switch
B1	9V PP3 battery
Battery connectors, Veroboard 14 holes by 16 strips x 0.15 inch matrix, aluminium case 138mm x 74mm x 40mm (approx), knobs for VR1 and VR2.	



TREMOLO UNIT

Fig. 2 (above) Layout and wiring of the components mounted on the Veroboard.

Fig. 3 (right) Layout and wiring of the complete unit.



DOWN TO EARTH

By GEORGE HYLTON

"How is it that carbon resistors, all about the same size, can have quite different power ratings?"

Traditionally, carbon resistors come in standard wattage ratings such as $\frac{1}{2}$ W, $\frac{1}{4}$ W, $\frac{1}{8}$ W and so on. In recent times, however, resistor makers have taken to quoting power ratings which take into account the ambient temperature in which the resistor has to work. The basis of power ratings for resistors is temperature.

There is always some temperature which is high enough to damage the materials from which a resistor is made. One source of heat is the power dissipated in the resistor when current flows through it. Even if there were no other source of heat, this self-heating would impose a limit to the power which could safely be dissipated in the resistor.

In practice, the resistor has to operate in surroundings which may raise its temperature even when no power is being dissipated. This explains those puzzling differences in power ratings.

AMBIENT TEMPERATURE

To illustrate the point, let's conduct an imaginary experiment with a resistor. This resistor has a maximum safe operating temperature of exactly 100 degrees centigrade. Anything higher will destroy it. We now pop it into the oven with the thermostat set to 100 degrees centigrade. Our resistor is kept at its upper temperature limit by the ambient temperature inside the oven alone. Any more heat and it will die.

If, keeping it in the oven, we pass any current through it at all, its temperature will pass the safe limit and the resulting chemical changes will destroy it. Our resistor may, in ordinary circumstances, be $\frac{1}{2}$ watt type,

but in the oven, to all intents and purposes, it's a zero-watt type.

If we relent a little, and turn the oven down to 90 degrees C, we can pass a little current through the resistor without damaging it. But only enough to raise its temperature by 10 degrees C, that is, from 90 degrees C back to 100 degrees C again. Any more, and it's finished. So it's still far from being a $\frac{1}{2}$ watt resistor.

If we go on turning down the oven, to 80 degrees C, 70 degrees C, 60 degrees C and so on, at each new lower temperature we can safely put more electrical power into the resistor. Eventually we shall have reduced the temperature so much that our " $\frac{1}{2}$ watt" resistor will really be able to dissipate $\frac{1}{2}$ watt of electrical power without coming to grief.

ACTUAL DISSIPATION

How do you know what temperature allows the full power rating to be achieved? You don't, without consulting the maker's data on the particular type of resistor you are using. If the resistor happens to be a type made for military use the rated ambient temperature may be quite high, say 70 degrees C.

It will be obvious from our oven experiment that such a resistor, if rated at $\frac{1}{2}$ watt at 70 degrees C, will safely dissipate more than $\frac{1}{2}$ watt at room temperatures of 20-25 degrees C. By the same token, a resistor intended for use in domestic equipment and rated to dissipate $\frac{1}{2}$ watt at 25 degrees C will certainly not stand up to $\frac{1}{2}$ watt at 70 degrees C. On the other hand, it will probably be much smaller than its military, high-temperature counterpart, of

the same apparent power rating.

Our "resistor - in - the - oven" example was highly artificial and unrealistic in one respect. We assumed for the purpose of the argument that a sharp dividing line could be drawn between a safe operating temperature and a lethal one. Real life isn't like that, and the dividing line is blurred. As the temperature is raised, the destructive chemical reactions are speeded up, but they still go on, slowly, at lower temperatures, gradually destroying the resistive "track" and so altering the resistance. If your particular application can tolerate a 10 per cent change of resistance over the lifetime of your equipment, then you can work your resistors harder than if only a one per cent change can be tolerated.

SPECIFICATIONS

This idea of the allowable change of resistance over a period of time is built into some makers' specifications. The Mullard CR25 resistor is an example. Graphs are published which enable the user to select an operating power which ensures that the resistance stays within known limits.

You can now see why some makers quote several ratings for the same resistance. A resistor with, say, 0.5 per cent tolerance may be expected to stay within, say, one per cent of its nominal value for 1000 hours at one dissipation, within five per cent at another, higher dissipation, and within 10 per cent at a still higher one—all at a specified maximum ambient temperature, of course.



"Can't you be satisfied with a transistor radio glued to your ear like everyone else!"

This Christmas

if your imagination stops at cigars...

...give Antex



MODEL X25 Soldering Iron
220-240 Volts or 100-120 Volts. The leakage current of the NEW X25 is only a few microamps and cannot harm the most delicate equipment even when soldered "live". Tested at 1500v. A.C. This 25 watt iron with its truly remarkable heat capacity will easily "out-solder" any conventionally-made 40 and 60 watt soldering irons, due to its unique construction advantages. Fitted long-life iron-coated bit 1/8". 2 other bits available 3/32" and 3/16". Totally enclosed element ceramic and steel shaft. Bits do not "freeze" and can easily be removed. **PRICE £1-93** (rec. retail) P & P 8p. Suitable for production work and as a general purpose iron.



MODEL CCN
220 volts or 240 volts. The 15 watt miniature model CCN also has negligible leakage. Test voltage 4000v. A.C. Totally enclosed element in ceramic shaft. Fitted long-life iron-coated bit 3/32". 4 other bits available 1/8", 3/16", 1/4" and 3/64". **PRICE £2-15** (rec. retail) P & P 5p.

MODEL G 18 watt miniature iron, fitted with long-life iron-coated bit 3/32". Voltage 240, 220 or 110. **PRICE £2-15.** (rec. retail) P & P 5p.



MODEL CN Miniature 15 watt soldering iron fitted 3/32" iron-coated bit. Many other bits available from 3/64", to 3/16". Voltages 240, 220, 110, 50 or 24. **PRICE £1-93.** (rec. retail) P & P 5p.



all prices include VAT at 10%

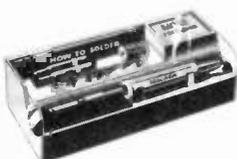


MODEL SK.2 KIT
Contains 15 watt miniature iron fitted with 3/16" bit, 2 spare bits 5/32" and 3/32" heat sink, solder, stand and "How to Solder" booklet. **PRICE: £2-87.** (rec. retail) P & P 8p.



MODEL MLX KIT
Battery operated 12v. 25 watt Iron fitted with 15' lead and 2 heavy clips for connection to car battery. Packed in strong plastic wallet with booklet "How to Solder". **PRICE £2-27** (rec. retail) P & P 12p.

MODEL SK.1 KIT
Contains 15 watt miniature iron fitted with 3/16" bit, 2 spare bits 5/32" and 3/32", heat sink, solder, stand and "How to Solder" booklet. **PRICE £3-25** (rec. retail) P & P 12p.



From radio or electrical dealers, car accessory shops or in case of difficulty direct from:—
ANTEX LTD. FREEPOST
(no stamp required) **PLYMOUTH**
PL1 1BR Tel: 0752 67377.

Please send the following:

I enclose cheque/P.O./Cash (Giro No. 2581000)

NAME

ADDRESS

EE 12

SAXON ENTERTAINMENTS LTD.

STANDARD & CUSTOM-BUILT AUDIO & ELECTRONIC EQUIPMENT
NEW & SECONDHAND MUSICAL INSTRUMENTS.
DISTRIBUTORS FOR A.K.G. HIGH QUALITY MICROPHONES.

SAXON CONTROL UNITS

NEW STEREO VERSION £19-75
now with mic. override
& case (30p carr.)
Mono version (illustrated) £6-50
Same spec. but runs from
PP.9 battery, and less mic.
facility. (20p carr.)

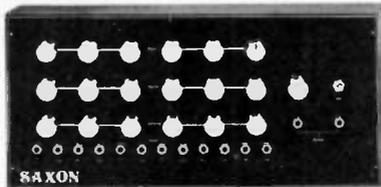


Two decks, and full headphone monitoring. The stereo model is mains operated and measures 17 1/2" x 3" x 4" deep. Finished white on black fascia. Controls: Left/Right deck fader, volume, bass, treble, Headphone Selector and volume, Microphone volume, bass, treble, mains on/off.

NOW MORE THAN EVER COMPARABLE TO UNITS OVER TWICE THE PRICE

SAXON PA/MIXER CONTROL UNITS

Using grouped pairs of inputs and outputs (high low Z inputs) with bass, treble and volume on each pair, plus master control. These low-noise units will feed all makes of amplifiers. Ideal for clubs, discos, etc. Standard jack sockets. Compact design, strong metal cases. Guaranteed 3 years.



●M.4H

4 high Z, 4 low Z inputs, 4 sets of controls. Case 14" x 8" x 2 1/2" Carr. pd. £18-50 V.A.T.

●M.6HL Case 18" x 8" x 2 1/2" 12 inputs (5 high Z, 6 low Z). Carr. pd. £27-50 V.A.T.

Channel section module. Gain—16 x (24dB) Tone controls—18dB swing. Carr. pd. £3-50 + V.A.T.

120 AND 160 WATT HEAVY DUTY MODULE

Rugged class A driver stage, this module will run from all our mixers, etc., and most other makes. Delivers 120 watts into an eight ohm load and employs 4 T03 can (115 watt) output transistors. These are the modules where extra power is demanded.

Power output 120 watts into 8 ohms
Freq. response 20-20,000 HZ ± 2dB
Input sensitivity 200 mV into 10K
Construction Fibreglass board
With supply 8" x 4" x 5"

Module & power supply £18-95
(Carr. 40p)

160 watt version with power supply £27-90
(Carr. 50p)

Low distortion parallel push-pull output stage.

SOUND AND LIGHT UNITS

Our popular 3 channel model handles up to 3KW (3000 watts) of lighting and incorporates versatile sound control arrangement to enable professional standards to be achieved. Both units are excellent examples of Saxon quality and value.



3 CHANNEL UNIT MK. II

Includes bass, middle and treble as well as master controls. 2 amplifier sockets eliminate need for split leads. Up to 3KW lighting load. Smartly finished steel case. Carr. 30p. £19-75

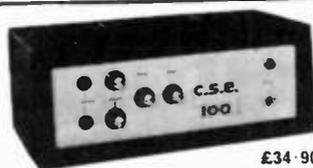
SINGLE CHANNEL UNIT

Operates from 5 to 100 watt amplifiers. Supplied for bass note operation, is easily adapted for treble or mid-range at a cost of about 5p. NOW ONLY £7-50 carr. paid

COMPLETE AMPLIFIERS

CSE 100. With extra heavy duty mains transformer

This versatile unit is now available in a black vinyl case and so represents even better value than ever delivering speech and music powers of up to 100 watts RMS and continuous signal outputs of 70 watts. Two individually controlled inputs with wide range bass and treble controls.



£34-90 carr. paid

With an RMS output of 120 watts speech and music, 100 watts continuous power, four individually controlled FET input stages and wide range bass and treble controls, this amplifier has established itself as a unit offering quality and reliability at low cost.

SAXON 100 £48-50 carr. free



LOUDSPEAKERS British made bargains!!
12" 25 watt 8/15 ohms £6-50 carr. 30p. 15" 50 watt 8/15 ohm £16-50 carr. 50p.
12" 40 watt 15,000 gauss magnet system 8/15 ohm £11-50 carr. 40p.

600 Watt 3 colour Light Boxes Smart Rexine finish £18 carr. free.

A.K.G. MIC. BARGAIN—D.90c. £19-50
—the choice of professionals!

S.A.E. with ALL enquiries please.

Prices quoted do NOT include V.A.T. 10% must be added on to total value inc. carriage of order for V.A.T. S.A.E. for special price list.

Orders and personal shoppers to:

SAXON ENTERTAINMENTS LTD., 327 Whitehorse Rd., W. Croydon, Surrey. CR0 2HS.

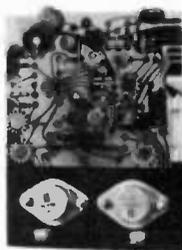
Telephone 01-684 6385

Hours 9.30 a.m.—5.30 p.m.

TRADE & EXPORT ENQUIRIES INVITED

Better design Better performance Better value with SAXON POWER AMP MODULES in 3 ideal sizes

New Versions using 3A "Plastic Power" Driver Transistors Now Available. To meet demand, we have included a more powerful module in our well-established and proven range. These power amplifiers are carefully assembled, tested and guaranteed. They offer superb value for reliability and versatility.



SA35 35 watts RMS. Uses 7 transistors and 7 diodes Carr. paid. £4-45

SA50 £5-65

SA100 makes an ideal unit in disco assemblies. A real glutton for work. £10-90

Reliable, tough and compact. 11 transistors, 6 diodes. Carr. paid.

BRIEF SPEC. FOR ALL THREE MODULES

All modules incorporate OPEN AND SHORT CIRCUIT PROTECTION, plus proof against over-dissipation and faulty inductive loads in the SA.100.

Freq. response 15-40,000 Hz ± 1dB
Distortion 0-2% at 1 kHz
Loads 4 to 16 ohms
Quiescent current 15 mA
Noise Better than -75 dB
Supply voltage SA35 25-45 volts
SA50/SA100 40-70 volts
4 1/2" x 4" x 1" (SA100)
4" x 3" x 1" (SA35/SA50)

Circuits, connecting instruction and application data are supplied free with all modules.

POWER SUPPLIES

FOR THE SA 35, SA 50 & SA100 MODULES

PU45	Unstabilized supply for 2 SA35s	£4-90
PU70	Unstabilized supply for one or two SA50 or SA100 power amps	£7-75 carr. 40p
PS45	Stabilized module for two SA35's	£3-50 carr. free
MT45	Transformer for above, heavy duty	£3-50 carr. 20p
MT30	Transformer for unstabilized supply complete with rectifier diodes mounted	£3-50 carr. 20p
PS70	Stabilized supply module for one or two SA50's or SA100's	£4-90 carr. free
MT70	Transformer for PS70	£4-90 carr. 40p

SAXON MODULES ARE BUILT ON GLASS FIBRE P.C. BOARD IN OUR OWN FACTORY AND SUPPLIED FULLY TESTED & GUARANTEED

TERMS OF BUSINESS

Cash with order (C.W.O.) For C.O.D. please add 35p extra, cash by regd. letter, please

BRIGHT IDEAS

Readers' Bright Ideas; any idea that is published will be awarded payment according to its merit. The ideas have not been proved by us.

When desoldering printed circuit boards one frequently comes across multi-terminal components such as integrated circuits and transformers which defy desoldering owing to the small size of the average soldering iron bit. To effectively increase the area of the bit a few turns of heavy gauge wire round the soldering iron bit will allow such components to be desoldered. A similar extension, with a protruding wire, can be used for cutting through thermo-plastics, which tend to mess-up a soldering iron bit if used directly.

N. Howard,
Rutland.

This idea came to me while I was trying to find my solder reel in amongst the pile of "junk" accumulating on my workshop bench. At that time my components were stored in plastic interlocking storage drawers often advertised in this magazine. My solder reel fits neatly in the smallest of these drawers. To make the solder run freely a hole must be drilled slightly larger than the diameter of the solder in the middle of one side of the drawer and the case. I have since made a wire feed based on this same principle.

A. Freed,
Bucks.

I have found a useful and inexpensive way of making microphone or earpiece holders. A plastic, one ounce ground pepper container obtainable from nearly all food stores is ideal from the point of view of size and the perforations in the lid avoid the necessity of making further holes. The microphone or earpiece is easily mounted with adhesive, in the lid behind these holes and the flex can be brought through the bottom of the container which, although quite strong, is light and very easy to cut.

S. M. Poultney,
Bath, Somerset.

Please Note: this column is intended for constructional ideas and ideas relating to electronic construction. It is not our intention to publish circuits of any description.

All items submitted should be original and not previously published. If similar ideas are submitted by two or more readers the first received will be published.

Next Month...



VCO EFFECTS UNIT

A voltage controlled oscillator that can be used as an effects unit with drums or other instruments. The oscillator can also be used with an amplifier to form a simple instrument.

RECEIVER

An f.e.t. m.w. receiver, the "Fetset" is simple to build using only two transistors in a pocket size case. A good design for the new constructor.

SEWING MACHINE SPEED CONTROL

A power controller that provides easier slow speed control of electric sewing machines.

All in the January issue of

Everyday Electronics

On sale Wednesday December 19



Baby Snatch Alarm

Although basically simple the *Baby Snatch Alarm* does incorporate one or two rather unusual components such as the pressure mat, key operated switch and the illuminated sign, apart from these three items the components are quite straight forward.

Taking the switch first, a basic switch is available from Home Radio or Henry's Radio but the ignition switches in cars are rather better as they use a better type of key and are thus less easily "picked". A breakers yard should be able to provide the switch but you may need to get the key from a garage. The pressure mat is only available from J. Bull as far as we know.

The lamp has proved rather more difficult to get—a suitable one is available from Home Radio but can only be supplied with the wording engraved and these are thus rather expensive (about £1.25). Various types are available from smaller suppliers—particularly ex-equipment types. If you cannot get a similar one it is possible to mount a piece of opaque Perspex on the front panel and use two "L" bracket type lamp holders behind it to illuminate the lettering.

Incidentally, the lettering is best added using Letraset and spraying over with clear varnish to protect it.

Tremolo

The *Tremolo* can be dealt with very quickly by saying that all the components should be readily available. If necessary a foot-switch may be added in parallel with the on/off switch, so that the unit can be foot operated when required.

The values of the electrolytic capacitors are not critical.

Auto-water

Once again few component buying problems for the *Auto-water* but some comment on one or two parts may be useful. The integrated circuit used is available in two types of case; this project uses the 14 pin dual in line (d.i.l.) type and, if the wiring diagrams are to be followed this type should be obtained—it is also a good idea to get a socket for the i.c. to prevent damage when soldering.

The relay must work mechanically and must possess at least two sets of contacts—so that it operates correctly—the contacts are not used for electrical connections and can thus be of any type.

Finally an unusual item, the drainpipe, this should be available from most d.i.y. shops—the diameter will need to be about 6 inches, we think this is more correctly called sewer pipe.

It was interesting to see one reader commenting in a recent letter that if we published any more audio effects units he would go mad and start pulling his hair out—I hope he does not as we don't like losing regular readers. The comment is of course a valid one but with fantastic interest in audio and special effects it is difficult for us not to publish such items regularly. A case of providing designs for the majority. Anyway there are always one or two other items in each issue that are aimed at different fields and this one is no exception.

TEACH-IN '74

QUESTION TIME

If you wish to test your progress in the *Teach-In '74* series so far, why not have a go at answering the following questions. The questions are based on the material presented in the first three parts. Answers next month.

1. Are electrons positive or negative?
2. How are current and charge related?
3. What does Ohm's law state?
4. What is the effective value of 10kΩ in parallel with 22kΩ?
5. What is the maximum current allowable for a 1 watt, 1kΩ resistor?
6. What colours represent ±1%, ±5% and ±10% in the resistor code?
7. What resistance value is coded Red, Violet, Yellow, Gold?
8. If the negative terminals of two 4.5V batteries are connected together what is the voltage difference between the remaining two terminals?

9. If the dielectric of a capacitor is made thinner what happens to the capacitance?
10. What is the time constant for $R=10k\Omega$ and $C=22\mu F$ in series?
11. What energy can be stored in a 1000μF, 100V working voltage, capacitor?
12. When constructing the 0-10V voltmeter must the resistor always be connected in the positive lead?
13. Does the band marking on a diode indicate the anode or the cathode connection.
14. A battery, resistor and diode are connected in series. The voltage across the diode is approximately the same as the battery. Is the diode (a) forward biased, (b) reverse biased, (c) damaged?
15. What is the maximum current allowable via a 10V, 400mW Zener diode?
16. What value results from 1μF in series with 5μF?
17. Does a lamp bulb have a constant resistance?

FREE

HEATHKIT Electronic kit Catalogue

SAVE ON OVER 130 KITS
YOU CAN BUILD

HOME APPLIANCES such as Pocket and Desk Top Electronic Calculator Kits, Electronic Digital Clock, Ultrasonic Burglar Alarm, Indoor/Outdoor Intercoms.

AUTOMOTIVE Testers, Engine Analysers, Tune-Up Meters, CD Ignition System, Timing Lights, Battery Charger.

PORTABLES Radios for Medium, Medium/LW, FM reception.

INSTRUMENTS for Test and Service, Transistor/Diode Checkers, Chart Recorders, Scientific.

SHORTWAVE AND AMATEUR RADIO includes:— Complete Stations, Receivers, Transceivers, Transmitters, a wide range of ancillary/auxiliary equipment.

STEREO Hi-Fi Systems, Compacts, Separates, Cassette, Loudspeakers, Transcriptors, Cartridges.

METAL DETECTORS

All models offer Kit savings—outstanding performance. Enjoyable leisure activities. Payment is so easy—choose cash or low deposit terms (from £2 per month for £40 credit).

May we have your enquiries today!



Ask
about our
low-deposit
terms

Visit your Heathkit Centres

LONDON showroom
233 Tottenham Court Road
Tel 636 7349

GLOUCESTER showroom & factory
Bristol Road, Gloucester
Tel 0452 29451

Please send me a FREE Heathkit catalogue

Name _____

Address _____

HEATH
Schlumberger

Heath (Gloucester) Limited, Dept: EE/12/73
Gloucester GL2 6EE. Telephone 0452 29451

DEMO CIRCUITS

11

By MIKE HUGHES

The Hartley Oscillator

To look at the conventional way a Hartley oscillator circuit is drawn it is rather difficult, at first, to grasp what is going on. In an attempt to simplify the explanation of how it works we have started off with a circuit that is more in keeping with the type of transistor stage we have come across so far. In actual fact there is no difference whatsoever between the circuits of Figs 11.1 and 11.2

BASIS OF OPERATION

Anyway, look at Fig 11.1 for a start! Transistor TR1 is basically a grounded emitter amplifier stage but instead of a resistor as a collector load we are using the primary winding of a transformer T1. Resistors R1, R2, and R3 are the normal biasing resistors we have come across before and C3—if we were to use it—would be the emitter decoupling capacitor to prevent negative feedback between emitter and base. More about C3 later.

Notice that T1 is wound so that the signal at point B is out of phase with that at point A (relative to the common point C). You can tell that there is a phase reversal between primary and secondary of the transformer by noting the

dots that show the starts of the respective windings.

Forgetting C1 for a moment, consider what is happening if we assume that the transistor is working as an amplifier that has its output signal fed back (in phase) to the input. When the circuit is switched on for the first time the bias current into the base of TR1 will make the voltage at A fall slightly; this induces a rising voltage at B and this is fed back to the input via C2 to point D. The effect of this rising voltage across C2 injects extra base current and the transistor conducts more making the voltage at A fall further.

If this argument is continued it can be seen that there is a form of positive feedback which continues until the transistor is fully conducting. When this happens there will be no further change in voltage at A and hence no induced voltage at B; consequently the feedback signal falls and this makes the transistor cease conducting and the voltage at A rises. Again positive feedback assists because the rise in potential at A makes the voltage at B fall—this reverses the direction of the feedback current which now opposes the bias current; this process continues until the transistor is turned off.

WAVESHAPES

One of the features of the Hartley oscillator is that it produces a very stable sinusoidal waveform but to achieve this end there are two points to consider. Firstly how do we prevent the transistor going from fully conducting to totally cut off (to get a pure sinewave we must not clip the waveform); secondly how do we control the frequency?

We will deal with the waveshape first as it is the simplest problem. The answer is to control the amount of positive feedback so that it is sufficient to maintain oscillation but not so high that clipping occurs. This can be done in one of two ways; either by reducing the turns ratio between primary and secondary of T1 or by deliberately introducing an amount of *negative* feedback that will negate the positive feedback to some degree. The latter technique is preferable because by its very nature it is self compensating to a fair degree.

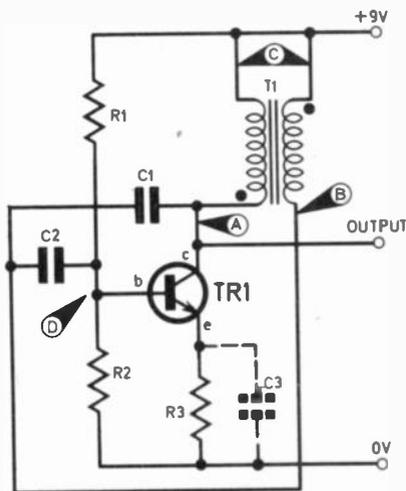


Fig. 11. 1. A basic Hartley circuit with the circuit layout slightly modified to ease the explanation.

In our example we are going to use a transformer with a 1 to 1 turns ratio, so we have ample feedback signal, and to keep this in bounds we can inject a considerable amount of negative feedback by totally removing the normal emitter decoupling capacitor C3 (that is why it is shown dotted). Later on if you make the circuit you can experiment with fewer turns on the secondary and you may have to reduce the amount of negative feedback to maintain oscillation; this is done by introducing progressively larger values of capacitance for C3.

FREQUENCY CONTROL

To see how the frequency is controlled it might be better to look at Fig 11.2. First, assure yourself that it is identical to Fig 11.1 except that instead of a symbol for a transformer we have used a single winding inductor, centre tapped. Don't worry though, this is identical to T1 of Fig 11.1. Point C is the same common point which is connected to the positive rail and you can, if you like, consider the single winding as being two adjacent windings on the same core having the start at A for the winding between A and C and the start at C for the winding between C and B. The reason for using a single winding is that in this instance we can dispense with one of the four lead out wires shown in Fig 11.1 (it is easier to make!).

Having sorted out the circuit now look at the position of our C1; it is across the terminals of inductor L1. This forms a tuned circuit that has maximum impedance when the reactance of C1 equals the reactance of L1 and this can only occur at one frequency,

$$\text{i.e. when } 2\pi fL = \frac{1}{2\pi fC}$$

where f is in Hz, L in henries and C in farads.

Fig. 11. 3. A practical Hartley Oscillator.

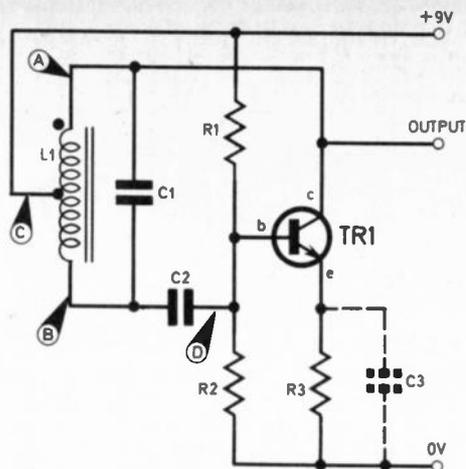
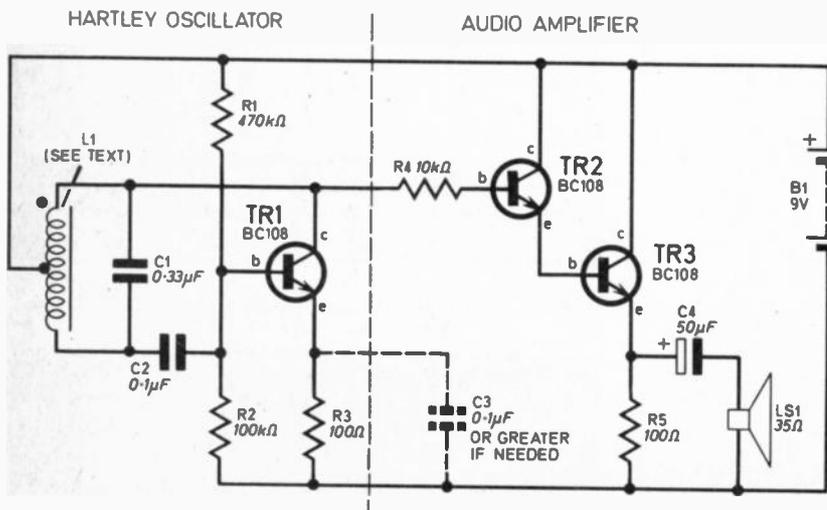


Fig. 11. 2. A more conventional schematic for a Hartley Oscillator.

By doing a little algebra it can then be shown that maximum impedance is obtained at a frequency given by:

$$f = \frac{1}{2\pi\sqrt{LC}}$$

When the tuned circuit L1 C1 shows maximum impedance maximum voltage drop across it will be obtained. Thus, in simple terms, it can be seen that the feedback signal amplitude at B will be maximum for only one frequency and it is at this frequency that the circuit will prefer to oscillate. If, however the amount of positive feedback is too great, not only will this distort the waveshape but also incite the circuit to oscillate at other frequencies—it is quite common to encounter a phenomenon called "squegging" when the circuit tries to oscillate at two frequencies at the same time. In audio circuits this sometimes sounds like an outboard motor ticking over (depending on the frequencies involved) and is known as "motor boating".

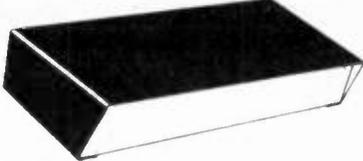
PRACTICAL CIRCUIT

A practical demonstration circuit is shown in Fig 11.3, this will oscillate quite happily in the upper audio frequencies. L1 has an inductance of about 1.5mH and can be made by winding 350 turns of 32 to 36 s.w.g. enamelled wire onto about 75mm of 3/8 inch diameter ferrite aerial rod. At 175 turns, a length of the wire should be looped out of the windings to form the centre tap.

Next part: The diode gate

PSYCHEDELIC LIGHTING UNIT IN KIT FORM

Make this fascinating three-channel unit from a kit which contains all components needed to produce a reliable and entertaining display. Takes its drive from the speaker terminals of a record player, tape recorder or portable radio. Will provide a brilliant 2kW of light, using normal 240 volt coloured lamps. Price per kit, £10.40



METAL CABINETS

These attractive steel cabinets are PVC covered in a range of colours, and offer an economically priced unit for the home constructor. The chassis, which has a white satin PVC finish, provides an easily accessible building area, with an integral fascia panel. The cabinet is supplied complete with stick-on feet. Colours available include Green, Grey Black, White and Blue. Every effort will be made to supply a selected colour, but please give alternatives if possible.

Approximate size in inches			Price
l	w	d	
18	6	3	£1.60
11	6 1/2	3	£2.04

Other sizes to special order. HOLES PUNCHED in front or back panels to your own requirements. Please send S.A.E. for quotation.

FIXED VOLTAGE REGULATORS

TO3 case. Gives stabilised supply. MVR 5 V, MVR 12 V, MVR 15 V. All priced at £1.65

VEROBOARD

	0-1	0-15
2 1/2 x 1in	7p	7p
2 1/2 x 3 1/2 in	20p	20p
2 1/2 x 5in	29p	29p
3 1/2 x 3 1/2 in	29p	29p
3 1/2 x 5in	31p	32p

PRINTED CIRCUIT CAPACITORS

Electrolytic, low voltage, small size. Available in the following uF/V: 0-47/63, 1/63, 2-2/63, 4-7/40, 10/63, 22/40, 100/10, 9p each; 47/40, 100/63, 220/40, 470/16, 15p each; 1,000/16, 18p each.

Our CATALOGUE, priced at 25p post free, shows the majority of the R.S. range of professional components. Most are available by return of post. Prices include VAT. All orders over 50p POST FREE. S.A.E. with all queries please.

CELECTRON-E

P.O. Box No. 1, Llantwit Major, Glamorgan, Wales GF6 9YN

AS SEEN
ON BBC-1 & BBC-2
TELEVISION

BUILD THE TREASURE TRACER Mk III METAL LOCATOR



- Genuine 5-silicon transistor circuit, does not need a transistor radio to operate.
- Incorporates unique varicap tuning for extra stability.
- Search head fitted with Faraday screen to eliminate capacitive effects.
- Loudspeaker or earphone operation (both supplied).
- Britain's best selling metal locator kit.
- Kit can be built in two hours using only soldering iron, screwdriver, pliers and wire snips.
- Excellent sensitivity and stability.
- Kit absolutely complete including drilled, tinned, fibreglass p.c. board with component siting printed on.
- Complete after sales service facilities.
- Weighs only 22oz; handle knocks down to 17" for transport.

Send s.a.e. for leaflet.

Complete kit
with prebuilt
search head

£9.80
Post etc. 35p
(Inc VAT)

Built, tested
and
Guaranteed

£13.75
Post etc. 35p
(Inc VAT)

MINIKITS ELECTRONICS, 35b Langley Drive,
Wanstead, LONDON E11 2LN. (Mail order only)

Everyday Electronics, December 1973

DISCOUNTS UP TO

60%

Global's GOLDEN Guarantee

WE GUARANTEE THAT WITHIN 7 DAYS OF PURCHASE IF ANY ITEM OF GOODS IS FOUND TO BE GENUINELY DEFECTIVE WE WILL REPLACE THE SAID GOODS WITHOUT QUESTION. AFTER 7 DAYS GOODS ARE COVERED BY MANUFACTURERS 12 MONTHS GUARANTEE.

ALL PRICES ARE INCLUSIVE OF V.A.T.

**FANTASTIC OFFER
GARRARD SP25 Mk III**
Goldingr G800. Teak finish, plinth and tinted cover with mains lead and DIN plug and screened lead. All fully wired.
Please add £1.75 for P. & P. and Ins. **£14.50**

TURNTABLES

Please add 95p P & P and Ins.

BSR MP60	£9.05
Garrard SP25 Mk III	£9.25
Garrard SL65B	£12.75
Garrard AP76	£16.75
Garrard 401	£25.95
Garrard Zero 100 (sgle)	£30.63
Garrard Zero 100 (Auto)	£34.95
Goldingr GL85/P. P & C	£59.30
Goldingr G101/P. P & C	£19.75
Goldingr GL72	£21.90
Goldingr GL72/P	£28.50
Goldingr GL75	£27.35
Goldingr GL75/P	£34.90
Goldingr GL Lid	£3.55
Goodmans TD100 P & C	
G800 Cart	£47.15
Thorens TD125	£59.95
Thorens TD125 AB Mk II	£92.50
Thorens TD160 AB & C	£44.95
Thorens TD165 AB & C	£51.50
Condor Auto Cleaner	£1.40 P & P 15p

TUNERS

Please add 95p P & P and Ins.

Alpha Highgate FT150	£12.95
Amstrad Multiplex 3000	£23.90
Lowther FM Mk 8 N/P	£42.75
Lowther FM Mk 9 N/P	£72.50
Metrosound FMS 20 Mk II	£37.75
Rogers R/brook FET 4 (Ch)	£32.95
Rogers R/brook FET 4 (Cased)	
Sinclair cased tuner	£36.50
Teleton GT202 (N/P)	£25.30
	£30.55

TUNER/AMPLIFIERS

Please add £1.10 P & P and Ins.

Alpha FR 3000	£61.35
Goodmans Module 80	£59.90
Goodmans Mod 80 Com	£106.50
Goodmans Mod. 90	£74.75
Goodmans One-Ten	£86.50
Rogers R/brook (Cha)	£61.90
Rotel 150A	£45.25
Rotel 200A	£57.95
Status STA160	£89.95

AMPLIFIERS

Please add 95p P & P and Ins.

Amstrad 8000 Mk II	£15.85
Amstrad IC2000 Mk II	£14.85
Amstrad Integra 4000	£22.95
Alpha Highgate FA400	£32.25
Global 10 + 10	£19.75
Global 20 + 20	£25.95
Keletron 700	£19.25



All prices correct at time of press (E. & O. E.) and are subject to alterations

GLOBAL AUDIO DISCOUNT WAREHOUSES

Dept. (EE12), 174 Pentonville Road, London N.1. Tel. 01-278 1769
Or: 4 High View Parade, Redbridge Lane East, Woodford Avenue,
Ilford, Essex. Tel. 01-550 1086

Open Monday to Saturday 9.30 a.m. to 6 p.m. LATE NIGHT FRIDAY 7 p.m.

MAIL ORDERS. Order with confidence. Send Postal Order, Cheque, Money Order, Bank Draft, Giro or Cash by Registered Mail. CALLERS. Please note that cheques can only be accepted together with Cheque cards (not Barclay Card).

2 minutes from KING'S CROSS, EUSTON & ST. PANCRAS
on main road leading to the East and West Country

Keletron 1500	£24.95
Metrosound ST20E Mk II	£29.45
Metrosound ST60	£49.70
Rogers R/brook (Ch)	£41.15
Rogers R/brook Mk III (Ca)	£44.35
Rogers R/bourne (Ch)	£54.25
Rogers R/bourne (Ca)	£56.75
Sinclair 2000	£24.00
Sinclair 3000	£30.50
Sinclair 605	£21.45
Sinclair PRO 60 2 x Z30/PZ5	£16.40
Sinclair PRO 60 2 x Z30/PZ6	£19.45
Sinclair PRO 60 2 x Z50/PZ6	£25.25
Trans	£25.45
Sinclair AFU (Filter Unit)	£4.95
Sinclair Stereo 60 Pre-amp	£7.35
Sinclair Z30 Amp	£3.85
Sinclair Z50 Amp	£4.50
Sinclair PZ5 Power Supp.	£4.20
Sinclair PZ6 Power Supp.	£6.15
Sinclair PZ8 Mains Trans.	£4.95
Sinclair PZ8 Power Supp.	£6.15

SPEAKERS

£1.65 for P & P (Per Pair)

Amstrad Acoustra 1500	£26.90
Amstrad Acoustra 2500	£20.75
B & W DHS	£38.50
Celestion Diston 15	£50.75
Celestion Ditton 44	£79.95
Goodmans D/Maxim	£39.70
Goodmans Mezo 3	£49.95
Goodmans Havant	£34.95
Keletron K54	£13.95
Keletron K58	£13.95
Sinclair Q16	£10.95
Sinclair Q30	£30.95
Wharfedale Denton II	£26.80

SPEAKER UNITS

Wharfedale Linton Kit	£16.85
Wharfedale Glendale Kit	£22.95
Goodmans Din 20 Kit	£14.75
Wharfedale Dovedale Kit	£44.95

PLINTH & COVERS

£3.20

For Garrard SP 25.
2025 TC.
3000, BSR
McDonald MP60 £3.08. P. & P. 71p.
For AP76, SL72B, SL95B, etc.
£4.75, + 71p P. & P.



CARTRIDGES

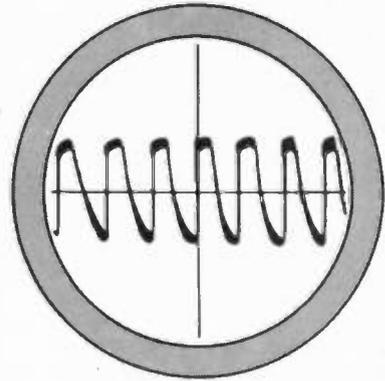
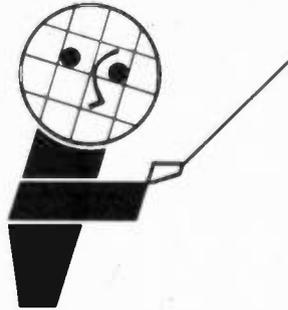
Please add 11p P & P and Ins.

Goldingr G850	£2.75
Goldingr G800	£3.75
Goldingr G800E	£6.70
Goldingr G800SE	£10.90
Shure M3D	£3.25
Shure M44E	£4.55
Shure M55E	£5.00
Shure 75ED Type 2	£9.25
Shure V15	£25.95
Shure M75E1 Type 2	£7.95

look! electronics really mastered

... practical
... visual
... exciting!

no previous knowledge
no unnecessary theory
no "maths"



RAPY

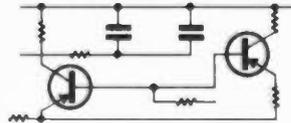
BUILD, SEE AND LEARN

step by step, we take you through all the fundamentals of electronics and show how easily the subject can be mastered. Write for the free brochure now which explains our system.

1/ BUILD AN OSCILLOSCOPE

You learn how to build an oscilloscope which remains your property. With it, you will become familiar with all the components used in electronics.

2/ READ, DRAW AND UNDERSTAND CIRCUIT DIAGRAMS



as used currently in the various fields of electronics.

3/ CARRY OUT OVER 40 EXPERIMENTS ON BASIC ELECTRONIC CIRCUITS & SEE HOW THEY WORK, including:

valve experiments, transistor experiments amplifiers, oscillators, signal tracer, photo electric circuit, computer circuit, basic radio receiver, electronic switch, simple transmitter, a.c. experiments, d.c. experiments, simple counter, time delay circuit, servicing procedures.

This new style course will enable anyone to really understand electronics by a modern, practical and visual method—no maths, and a minimum of theory—no previous knowledge required. It will also enable anyone to understand how to test, service and maintain all types of electronic equipment, radio and TV receivers, etc.

FREE POST NOW
for
BROCHURE

or write if you prefer not to cut page

To: **BRITISH NATIONAL RADIO & ELECTRONICS SCHOOL,**

P.O. Box 156, JERSEY. Please send your free brochure, without obligation, to:
we do not employ representatives

NAME

BLOCK CAPS

ADDRESS

PLEASE EEL 12 3

special free gift also to all our students

REMEMBER
TO USE THE
POSTCODE




Readers Letters

Beta Down Under

Having been interested in electronics for only a short while, I have found EVERYDAY ELECTRONICS and more especially the *Teach-In '74* series, to be most useful and informative for beginners like myself, and without it I probably would have given up long ago. Thank you.

For quite some time now I have wanted an electric guitar, but could never find sufficient finance to buy one commercially, so I was highly delighted when the project on the *Beta Electronic Guitar* was announced. I waited until I had all three issues concerning the *Beta* before embarking on my first electronic project.

I realised I would have trouble obtaining the transformer type M218 and probably the jack socket without sending to England for them, but decided to go ahead anyway and make as many of the parts as I could, including the pick-ups.

The materials and components were gathered together from three different states of Australia, and with the help of friends and an understanding wife, the guitar was manufactured on the kitchen bench.

All was completed and ready to go except for the transformer, and all enquiries for a 5 ohm to 50 kilohm matching transformer

turned up zero, so with the help of a very good friend and technician, a single transistor pre-amp circuit was developed to take its place, which, with a few modifications to original circuits, has done the job very well.

I am so pleased with the performance and sound of the guitar, plus the big saving in cost, that if anyone else in Australia is building or wanting to build the same, and is having the same difficulties as I had, I would be only too pleased to be of any assistance with information if they care to write to me.

Thank you once again for helping me get started in electronics through your magazine.

T Holmes,
152 Heber St.,
Moree, 2400
N.S.W.
Australia.

Battleground

I was interested in Mr. R. Macdonnell's letter, EVERYDAY ELECTRONICS July 1973, which mentioned various kits. He seems to have enjoyed a great deal of success with his equipment which functions correctly after being assembled and wired. My own experience however is that correct assembly and wiring with good soldered joints does not guarantee satisfactory operation of

electronic equipment.

Some years ago I caught the radio bug and decided to put together a t.r.f. radio or "straight" set as it is sometimes called. This receiver was a three valve plus rectifier set in a cream plastic case, and it produced a mains hum when switched on.

I then went to work on it by removing the metal rectifier and fitting a double-diode valve in its place. My joy was short lived however, because having removed the mains hum I now had a modulation hum from the loudspeaker.

Two 0.02 microfarad 1000V capacitors connected to each anode of the rectifier cured this trouble. Then transistor radio's appeared and I simply had to have a shot at these not knowing what lay in wait for me.

The first attempt was a complete failure and it was sent back from whence it came, my own fault of course, printed circuit soldering had defeated me (incorrect soldering iron—too large) produced many dry joints.

At present I have a transistor radio waiting for a new volume control because the one sent had faulty switch contacts. Has any other reader found it a battleground of electronics.

N. J. Mitchell
Lancs.

Price

As a schoolboy, I would like to thank you for putting your magazine and your projects within both the scope and pocket-money of the schoolboy enthusiast; I have already constructed quite a few of your ideas, and still find money for more!

N. D. Tyrrell,
Nr. Bristol.

COMPETITION WINNER

The first prize-winner of EVERYDAY ELECTRONICS soldering competition Mr. David Riley (right of our picture) with the Viscount Audio System donated by Radio and T.V. Components (Acton) Ltd. On the left are Editor Fred Bennett who made the presentation, and Assistant Editor Mike Kenward. Mr. David Riley whose home is at Orpington, Kent, has just entered University to study medicine.

One hundred runners-up have been awarded prizes consisting of soldering equipment donated by Adcola Products Ltd., Antex (Electronics) Ltd., and Multicore Solders Ltd.

EVERYDAY ELECTRONICS thanks all firms concerned for their valuable support for this contest.



"P.E" F.M. Varicap Stereo Tuner
THE STEREO F.M. TUNER

YOU CAN BUILD



Approx. Size 8 1/2" x 2 1/2" x 6 1/2"

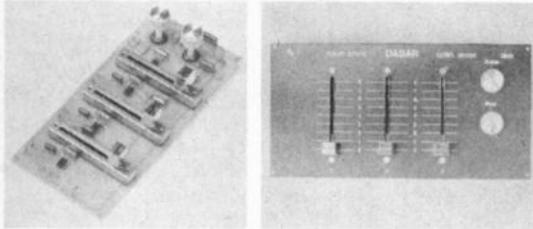
Features include push button "Spot On" tuning, with up to 5 pre-set stations (no difficult tuning dial and drive cord). Easy "no problem" construction, requiring only a few simple setting up adjustments with a D.C. Voltmeter. Uses NEW pre-set modules for R.F. and I.F. circuits—no circuit alignment. High efficiency Integrated Circuit Phase Lock Loop Decoder for perfect stereo reception, with stereo lamp indicator. TOTAL KIT price only £28.50 including V.A.T. and postage. With Fibre Glass P.C. Board, neat slimline teak veneered cabinet with brushed aluminium front panels, push buttons etc.

All parts available separately.
IDEAL FOR USE WITH THE "TEXAN", "GEMINI" AND ANY GOOD QUALITY STEREO AMPLIFIER. Please send large S.A.E. for full details.
22A, ECCLESALL ROAD, SHEFFIELD S11 0PE
Telephone No. (0742) 668888
THE COMPONENT CENTRE OF THE NORTH

ELECTRO SPARES

es

DABAR MN3 MIXER KIT



INTRODUCING THE NEW DABAR MINI THREE CHANNEL MIXER KIT WITH THE FOLLOWING FEATURES:

- ★ Three inputs easily adjustable to suit users input requirements, e.g., Mic., Tape, Disc, etc.
- ★ Uses advanced design with five integrated circuits.
- ★ Slider fader volume controls mount directly on P.C. board.
- ★ Full range bass and treble controls.
- ★ Guaranteed top grade components with fibreglass printed circuit board, ready-drilled and tinned.
- ★ Battery operated (2 x PP3) not supplied with kit.
- ★ Easy to follow assembly instructions (available separately 25p).
- ★ Attractive ready punched fascia plate, available at extra cost, gives that professional finish to the unit.
- ★ Size: 9.5" x 4.8" x 2".

PRICE: KIT ONLY £11.00
FACIA PLATE £1.50
MANUAL AND ASSEMBLY INSTRUCTIONS 25p
AVAILABLE READY BUILT WITH FACIA £15.00

ALL PRICES INCLUDE V.A.T. & POSTAGE IN U.K.
S.A.E. ALL ENQUIRIES.

DABAR ELECTRONIC PRODUCTS

98, LICHFIELD STREET, WALSALL, STAFFS, WS1 1UZ.

B.H. COMPONENT FACTORS LIMITED

SPECIAL RESISTOR KITS (1W 5% or 1W 5% CARBON FILM)
10E12 Kit: 10 of each E12 value, 10 ohms—1M, a total of 610, £3.10 net
25E12 Kit: 25 of each E12 value, 10 ohms—1M, a total of 1,525, £7.20 net

POLYESTER CAPACITORS MULLARD C200 250V
(µF) 0.01, 0.015, 0.022, 0.033, 0.047, 3µp each; 0.068, 0.1, 0.15, 4µp each; 0.22, 5µp; 0.33, 8µp; 0.47, 9µp; 0.68, 11µp; 1.0, 13µp; 1.5, 22µp; 2.2, 25µp.

MULLARD POLYESTER CAPACITORS C206 SERIES
160V: (µF) 0.01, 0.015, 0.022, 2µp; 0.047, 0.068, 3µp; 0.1, 0.15, 4µp; 0.22, 5µp; 0.33, 8µp; 0.47, 7µp; 0.68, 11µp; 1.0, 12µp.
400V: (µF) 0.001, 0.0015, 0.0022, 0.0033, 0.0047, 2µp; 0.0068, 0.010, 0.015, 0.022, 0.033, 3µp; 0.047, 0.068, 0.1, 4µp; 0.15, 6µp; 0.22, 8µp; 0.33, 12µp; 0.47, 14µp.

MINIATURE MULLARD ELECTRONICS 015 016 017 SERIES
(µF V): 1.63, 1.5:6.33, 2:2.63, 3:3.63, 4:4.0, 4:7.63, 8:40, 10:16, 10:63, 15:16, 15:63, 16:40, 22:25, 22:63, 32:10, 33:16, 33:40, 32:63, 47:10, 100:10, 100:25, 150:16, 220:10 All Above 6p, 47:63, 8p; 68:63, 12p; 100:63, 14p; 220:16, 8p; 220:63, 21p; 330:16, 12p; 470:6.4, 9p; 470:40, 20p; 1000:16, 20p; 1500:16, 25p; 2200:10, 25p.

ELECTROLYTIC CAPACITORS, Tubular and large can
(µF V): 2:2.25, 2:2.63, 4:7.10, 4:7.25, 4:7.63, 22:10, 22:25, 22:63, 5p; 2:10, 10:10, 50:10, 100:10, 10:25, 50:25, 10:50, 5µp; 200:10, 100:25, 50:50, 6µp; 500:10, 200:25, 100:50, 9µp; 1000:10, 500:25, 200:50, 11µp; 2000:10, 1000:25, 500:50, 16µp; 1000:50, 39µp; 1000/100, 66µp; 2000:25, 27µp; 2500:12, 17µp; 2500:25, 33µp; 2500:50, 62µp; 3000:50, 73µp; 5000:25, 66µp; 5000:50, 94µp. HI-VOLT: 8:350, 14µp; 16:350, 19µp; 32:350, 25µp; 50:250, 18µp; 100:500, 33µp.

MINIATURE CERAMIC PLATE CAPACITORS
50V: (pF) 22, 27, 33, 39, 47, 56, 68, 82, 100, 120, 150, 180, 220, 270, 330, 390, 470, 560, 680, 820, 1K, 1K5, 2K2, 3K3, 4K7, 6K8, (µF) 0.01, 0.015, 0.022, 0.033, 0.047, 2µp; 0.1, 30V, 4µp; 0.1, 100V, 5µp.

CARBON FILM RESISTORS 1/2W 5%, 10 ohms—2.2M, 1/2W 5% 10 ohms—1M, 1p each or 100 for 62p; 1,000 for £4.50.
METAL FILM RESISTORS 1W 5% 10 ohms—10M, 1µp each or 100 for £1.10. 15E12 KIT (15 each value 10 ohms—10M) £8.

Veroboard	0.1	0.15	IN4001	6p	QUANTITY DISCOUNT
2 1/2 x Sin	28p	28p	IN4002	7p	SPECIAL BULK BUY PRICES
2 1/2 x 3 1/2 in	26p	19p	IN4003	9p	ARE AVAILABLE BY
3 1/2 x Sin	32p	33p	IN4004	9p	QUOTATION FOR LARGE
3 1/2 x 3 1/2 in	28p	28p	IN514	7p	PROJECTS AND TRADE.
2 1/2 x 1 in	7p	7p	µL914	35p	
2 1/2 x Sin (plain)	—	14p	OC71	13p	S.C.R.
2 1/2 x 3 1/2 in (plain)	—	12p	OC75	17p	50V 1A 25p 3A 33p
5 x 3 1/2 in (plain)	—	22p	OC83	20p	100V 1A 39p 3A 40p
Insertion tool	39p	39p			400V 1A 50p 3A 60p
Track cutter	44p	44p			
Pins, pkt. 25	10p	10p			Screened wire, m. 51p
2 pin DIN Plug, 12p; 5kt.,					Tin screened wire, m. 10p
10p. 3 pin DIN Plug, 13p;					Stereo s.c. wire, m. 10p
5kt., 10p. 5 pin DIN Plug,					Connecting Wire, all colours, m. 21p
180p, 15p; 5kt., 12p. Trans-					Neon bulb 90V wire ended..... \$ for 24p
istor Equiv. Book, 40p.					Preset skeleton pots 1K—1M. 6p
Carbon pots 5K—2M log. &					
lin. single 16p; single					
with switch 26p, dual 46p.					

ALL PRICES INCLUDE V.A.T.
C.W.O. only. P. & P. 10p on orders below £5.
Discount: £10—10%, £20—15%.

Export Order enquiries welcome (VAT free)
Dept. E.E. 61, CHEDDINGTON ROAD, PITSTONE,
Near LEIGHTON BUZZARD, BEDS. LU7 9AQ
Tel.: Cheddington 668446 STD (0296). GIRO No. 331 7056
Catalogue FREE, Callers please phone first

Dimmit

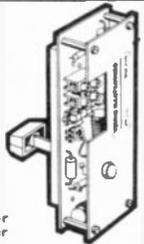
range of light dimmers

Illustrated is the popular PMSD1000 module. A 1000W professional quality dimmer. linear operation, interference suppression. 60mm slider range: size 12 x 5 x 4 cm. ideal for low cost stage and disco lighting. Used by schools, theatres, studios, etc.. Complete with scale plate, fixing screws and full instructions. £5.50 inc. VAT, add 10p P. & P. Also available in 2kW, with separate heatsink.

The Dimmit range includes standard wall mounting models for home and office, etc. Professional modules for use on lamps, heaters, motors etc. Rotary and Slider control versions. Ratings: 400W, 1,000W, 2,000W.

NEW addition to Dimmit range—Model SL800 sound to light converter. Modulates the light in time with sound. Built-in microphone. Just place unit near any sound source—radio, hi-fi, tv, human voice, etc. No connections to speaker required, simple wiring—similar to dimmer. Rating 800 watt. Full instructions. £6.50 inc. VAT, add 10p P. & P. Send 10p for complete illustrated catalogue and price list.

YOUNG ELECTRONICS Mail Order Dept.
54 Lawford Road, London NWS 2LN. Telephone 01-267 0201



AMAZING MINI-DRILL



FOR PRECISION MODEL WORK

+ 8 TOOLS

Money refund guarantee

Indispensable for precision drilling, grinding, polishing, etching, gouging, shaping. Precision power for the enthusiast. Shockproof. Completely portable power from 4 1/2 volt external battery. So much more scope with MINI-DRILL Super Kit (extra power, interchangeable chuck) £6.35 p.p. 13p. De Luxe Professional Kit with 17 tools £9.40 p.p. 23p.

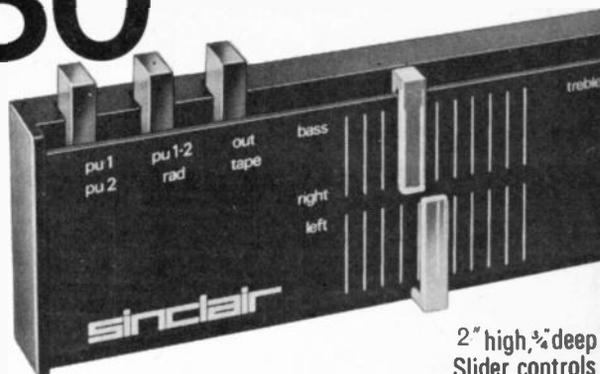
MERLIN SUPPLY CO.

PRICES INCLUDE V.A.T.
Dept. EE12D, NAILSEA, Bristol BS19 2LP

Project 80

the slimmest, most elegant hi-fi modules ever made

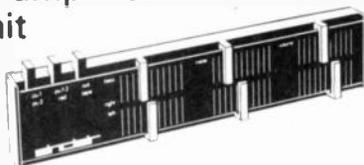
Living with hi fi takes on new meaning with Project 80 modules. They can be assembled virtually anywhere, creating opportunities to install systems hitherto only dreamed about and never before made practical. Quality and reliability are everything you could wish for. Units are mounted by 6BA bolts at rear passing through drilled holes, cases are in black with white embellishment.



2" high, 1/4" deep
Slider controls
New circuitry

Stereo 80 pre-amplifier and control unit

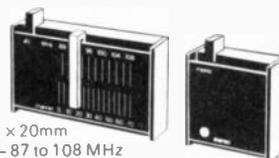
Each channel has independent tone and volume slider controls enabling exceptionally good environmental matching to be obtained. A virtual earth input stage forms part of the up-dated circuitry which includes generous overload margins. Clear instructions with template are supplied.



Size - 260 x 50 x 20mm (10 1/4 x 2 x 3/4 ins)
Inputs - Mag. P.U. 3mV RIAA corrected, Ceramic P.U., Radio, Tape
S/N ratio - 60dB
Frequency range - 10Hz to 25KHz + 3dB
Power requirements - 20 to 35 volts
Outputs - 100mV + AB monitoring for tape
Controls - Press button for tape, radio and P.U. Sliders for Volume, Bass and Treble.

R.R.P. £11.95 +£1.19 V.A.T.

Project 80 FM tuner and stereo decoder



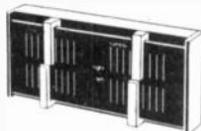
FM Tuner
Size - 85 x 50 x 20mm
Tuning range - 87 to 108 MHz
Detector - I.C. balanced coincidence.
AFC - Switchable
One 26 transistor I.C.
Twin dual varicap tuning
Distortion - 0.3% at 1KHz for 75KHz deviation
Ceramic filter in I.F. section
Sensitivity - 4 microvolts for 30dB quieting

Decoder-
With gallium arsenide tuning beacon and 19-transistor I.C.
Size - 47 x 50 x 20mm

FM tuner R.R.P. £11.95 +£1.19 V.A.T.

Decoder R.R.P. £7.45 +0.45p V.A.T.

Project 80 active filter unit



Size - 108 x 50 x 20mm (4 1/4 x 2 x 3/4 ins)
Voltage gain - minus 0.2dB
Frequency response - 36Hz to 22KHz, controls minimum
Distortion - at 1KHz - 0.03% using 30V
HF cut off (scratch) - 22KHz to 5.5KHz, 12dB/oct slope
L.F. cut off (rumble) - 28dB at 20Hz, 9dB/oct slope

R.R.P. £6.95 +0.69p V.A.T.

Z.40 & Z.60 power amplifiers



Z.40
Size - 55 x 80 x 20mm
Input sensitivity - 100mV
Output - 15W RMS continuous 8 Ω (35V).
Frequency response - 10Hz - 100KHz ±1dB
Signal to noise ratio - 64dB
Distortion - less than 0.1% at 10W into 8 Ω
Power requirements - 12-35 volts

R.R.P. £5.45 +0.54p V.A.T.

Z.60
Size - 55 x 98 x 20mm
Input sensitivity - 100-250mV
Output - 25W RMS 8 Ω (45V).
Distortion - typically 0.03%
Frequency response - 10Hz to more than 200KHz : 1dB
S/N ratio - better than 70dB

R.R.P. £6.95 +0.69p V.A.T.

Sinclair power supply units



PZ.8
The worlds most advanced unit in its class. It is a stabilised unit. Re-entrant current limiting makes damage from overload or even direct shorting impossible, a principle never before incorporated in a commercially available constructor module. Normal working voltage (adjustable) 45V.
R.R.P. £7.98 +0.79p V.A.T.
Without mains transformer PZ.5 30V un-stabilised
R.R.P. £4.98 +0.49p V.A.T.
PZ.6 35V stabilised
R.R.P. £7.98 +0.79p V.A.T.

Guarantee

If within 3 months of purchasing any product direct from us, you are dissatisfied with it, your money will be refunded on production of receipt of payment. Many Sinclair appointed Stockists also offer this guarantee.

Should any defect arise in normal use, we will service it without charge. For damage arising from mis use a small charge (typically £1.00) will be made.

sinclair

R.O. London Road, St Ives, Huntingdon, PE17 4HJ Phone St Ives (0480) 64311 Reg. No. 699483 England

To SINCLAIR RADIONICS LTD. ST. IVES, HUNTINGDON PE17 4HJ

Please send post paid _____

for which I enclose Cash/Cheque for £ _____ including V.A.T.

Name _____

Address _____

BLOCK LETTERS

E.E. 12

KITS FOR PREVIOUS PROJECTS

Unless otherwise stated, kits contain electronic parts only. The case and special items can be obtained locally. Also batteries are not included. Kits may be returned for refund if construction has not been started. We reserve the right to substitute components should deliveries be protracted so as to avoid undue delay.

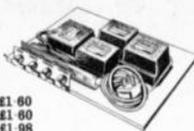
If reprint of data is required add 10p

HOME SENTINEL. Ward off the unwanted intruder!—No elaborate setting up or wiring required. Kit of parts £1-25.
"HEAT" INDICATOR. Press your button first and your opponent is blocked also suitable for Q'nix games and reaction testing. Kit of parts £1-10.
RECORD PLAYER. Good quality at a reasonable price—good enough for classical records and pop. Kit of parts £6-10.
WINDSCREEN WIPER CONTROL. Wet dirty road—Drive!—Fog—Smogged screen—Scraping wipers—combat these with add-on wiper control. Kit of parts £2-50.
FUZZ BOX. Add weird and interesting effects to guitar playing with this solid state Fuzz box. Kit of parts £2-50.
PHOTOGRAPHIC COLOUR TEMPERATURE METER. Used for colour photographer get the colours right gives quick indication of filters necessary for correction in any light. Can be used with natural or studio lighting. Kit of parts £2-50.
ASTRON M.W. RADIO. A simple M.W. reflex circuit receiver—easy to build £3-30.
REMOTE TEMPERATURE COMPARATOR. Measures small temperature changes in liquids or gases—fish tank, photographic solution—thermostatically controlled rooms etc. Kit £2-25.
RAIN WARNING ALARM. Keep your washing dry with this automatic alarm device. Kit £2-30.
WAA WAA PEDAL. Add excitement and sound vibration to your music. Kit £2-50.
ELECTRO LAUGH. Laughter simulator also useful electronic alarm. Kit of parts £2-20.
SOIL MOISTURE METER. Many plants are killed through over-watering—this meter measures soil moisture at root depth—probes can be left permanently beside the plant—indicator remotely sounded could monitor several plants. Kit £2-50.
SIGNAL INJECTOR. A useful pocket instrument for fault finding in radios and amplifiers. Kit £1-10.
BABY ALARM. Keep a check on the kids—this device will give you peace of mind as you watch T.V. Kit £4-40.
SIMPLE CALCULATOR. Teaching aid for multiplication—can be used for quick checks. Kit £2-10.
POWER SUPPLY UNIT. Just right for testing low voltage circuits—a simple stabilised supply providing 0-16 volts D.C. continuously variable. Kit £2-50.
METAL LOCATOR. A simple easy to construct self-contained metal locator giving a meter indication of buried metal. Kit £2-50.
AUDIO TONE GENERATOR. Makes electronic music—covers range from 50—20000 Hz. Specifically designed for use with tape recorder. Kit £2-25.
LIGHT TO SOUND CONVERTER. Produces an audio tone—the frequency of which is dependent on the light level. Kit £2-15.
SHAVEN INVERTER. Provides 260v 50hz from 12 volt car battery—gives approx. 10 watts which is enough for most shavers. Kit £4-25.
ELECTRONIC METRONOME. Electronic metronome with pulse frequency continuously variable from 40—225 beats per minute. Kit £2-15.
THROUGH LENS LIGHT METER. A simple light meter for use with single lens reflex camera. Kit £4-25.
MEDIUM AND LONG WAVE RADIO TUNER. A simple radio tuner for use with almost any amplifier. Kit £2-50.
INFRARED BURGLAR ALARM. Uses an invisible, reflected beam to detect intruders when beam is interrupted—a power output is switched on for up to 10 minutes. Kit £4-25.
CASSETTE TAPE POWER SUPPLIES. Two units to power a cassette tape player or recorder one from the mains. Price £2-50. Two from the car battery—price £1-40.
REACTOMATIC. A reaction testing game that can also be a quiz answering indicator. Kit £2-30.
ELECTRONIC MOUSE TRAP. A humane mouse trap—catches them alive so that you can release them in the park. Kit £2-25.
TRANSISTOR TESTER. A rapid tester for checking most transistors—tests transistors in an oscillator circuit and gives audible indication of goodness. Kit £2-15.
BIT SAVER. Prolongs life of soldering iron bit—prevents pitting. Kit £1-95.
ICE WARNING DEVICE. A device that can be set to indicate 'ice' conditions or similar temperature levels. Kit £1-25.
AUDIO COLOUR UNIT. Add a colour dimension to your audio equipment. This unit will modulate three lamps in accord with Bass—middle and treble notes of any music. Kit of parts £7-20.
U.H.F. T.V. AERIAL. A simple aerial for U.H.F. to reception on your set—could improve your reception immensely. Kit £1-25.
DAMP LOCATOR. Easily carried in your pocket this little unit gives visible indication of damp. Kit £1-25.
ENLARGER & EXPOSURE METER. For D.I.Y. photographer £2-90.
60p TIMER. Simple timer with audible warning. £4-15.

TERMS.—10% discount if ten of an item ordered, and postage where quoted—other items, post free if order for these over £5-00 otherwise add 20p.

MULLARD UNILEX STEREO SYSTEM

There is no doubt that it is a good system, we believe that for the money it is without comparison. We demonstrate gladly at our Tamworth Road depot. Prices of the individual items for this:—
 1 Unilex Amplifier Ref. EP.9000 .. £1 60
 1 Unilex Amplifier Ref. EP.9000 .. £1 60
 1 Unilex Pre-Amp Ref. EP.9001 .. £1 98
 1 Unilex Power Unit Ref. EP.9002 .. £2 53
 1 Control panel kit with spun aluminium faceplate knobs .. £2 30
 Or the complete outfit—£11-90 post paid.
 Pair of 15 ohm speakers made by E.M.I. are also available if required, price £2-30 the pair. No extra postage if ordered with the above, otherwise add 25p.



THYRISTOR LIGHT DIMMER

Domestic model for any lamp up to 250 watt. Mounted on switch plate to fit in place of standard switch. Virtually no radio interference. Price £2-95. Industrial model 5 amp module with control knob not on switch plate £2-30.



DISTRIBUTION PANELS

Just what you need for work bench or lab. 4 x 13 amp sockets in metal box to take standard 13 amp fused plugs and on/off switch with neon warning light. Supplied complete with 6 feet of flex cable. Wired up ready to work. £2-50 plus 23p P. & I

CD CAR IGNITION

This system which has proved to be amazingly efficient. We offer kit of parts as P.W. Circuit £2-85 plus 20p p. & p. Deluxe model with prepared circuit board £7-95. When ordering please state whether for positive or negative systems.

CENTRIFUGAL BLOWER

Miniature mains driven blower centrifugal type blower unit by Woods. Powerful but specially built for quiet running—driven by cushioned induction motor with specially built low noise bearings. Overall size 4 1/2" x 4 1/2" x 4". When mounted by flange, air is blown into the equipment but to suck air out, mount it from centre using clamp. Ideal for cooling electrical equipment or fitting into a cooker hood, film drying cabinet or for removing fumes from any soldering etc. etc. A real bargain at £2-05.



HORTSMAN 24 HOUR TIME SWITCH

With 6 position programmer. When fitted to hot water systems this could programme as follows:—

Programme	Hot Water	Central Heating
1	Twice daily	OFF
2	All day	OFF
3	Twice daily	Twice daily
4	All day	All day
5	Continuously	Continuously

Suitable of course, to programme other than central heating and hot water, for instance, programme upstairs and downstairs electric heating or heating and cooling or taped music and radio. In fact there is no limit to the versatility of this Programmer. Mains operated—Size 3" x 3" x 2" deep as illustrated but less case. Price £2-50 each.



GOOD COMPANION

We can now offer these again in i.e. version using Ferranti ZN414 and Mullard AF Modules 1172. Excellent tone wood cabinet. Cabinet size approx. 11in wide x 8in, high x 3in. deep. Complete assembly instructions £2-75 plus 23p post and ins.



MIGHTY MIDGET

Probably the tiniest possible radio, as described in Practical Wireless, January '73. All electronic parts £2-20 post paid.



DRILL CONTROLLER NEW IKW MODEL

Electronically changes speed from approximately 10 revs. to maximum. Full power at all speeds by finger-tip control. Kit includes all parts, case, everything and full instructions. £1-95 plus 13p post and insurance. Made up model also available. £2-50 plus 13p post & p.

THE TWENTYLITE

Fluorescent lighting units with polyester choke and finished white enamel. 24" model, ideal kitchen, bedroom, hallway, porch, lift, etc., with tube. Assembled ready to install. Price £2-90 p 23p p. & p.



RADIO STETHOSCOPE

Easiest way to fault find—traces signal from aerial to speaker—when signal stops you've found the fault. Use it on Radio, TV, anything—complete kit comprises two special transistors and all parts including probe tube and crystal earpiece. £2-20—twin stetho-stet instead of earpiece 53p extra—post and ins. 20p.



1 HOUR MINUTE TIMER

Made by famous Smiths company, these have a large clear dial, size 4 1/2in x 3 1/2in, which can be set in minutes up to 1 hour. After preset period the bell rings. Ideal for processing a memory jogger or, by adding simple lever, would operate micro-switch. £1-20



KITS FOR PREVIOUS PROJECTS CONT. FROM LEFT HAND COL.

NEON NOVELTY. Interesting modern ornamental device £1-65.
INDICATOR AUDIBLE WARNING. Add this audible warning device to car indicators or dash panel warning lights and your attention will be instantly drawn to the warning lamp kit. £1-20.
NIGHT LIGHT SWITCH. A simple control to dim a lamp. Kit £1-10.
GENERAL PURPOSE AMPLIFIER. An audio amplifier of reasonable quality for use with radio tuners—audio oscillators, record decks—electric guitars, etc. Kit £4-90.
HOME INTERCOM. Keep in touch with this simple, easily connected good quality two way intercom. Kit £4-90.
FLASHING LIGHT METRONOME. For use in the musical field and the laboratory—where an audible not on click could get lost or become annoying. Kit £1-40.
MINI ORGAN. A three octave, stylus operated organ—neatly and simply constructed on a printed circuit board. Kit £4-75.
RAIN ALARM II. Sounds an audible alarm as soon as the first rain drops fall. Kit £2-00.
CASSETTE AMPLIFIER. Boosts the output from cassette tape recorders and transistor radios. Kit £4-50.
AUDIO SIGNAL MIXER. Where you want to mix speech and music, and to fade them in and out—no tape enthusiast should be without this. Kit £2-90.
AUTO FAN. A thermostatic control for car engine fan, gives quicker warming up time, etc. Kit £2-35.
SLAVE FLASH. Photos taken with a single flash have a "flat" appearance—a second flash correctly positioned overcomes this. This unit enables a second (or third) flash to be automatically triggered. Kit £1-85.
ELECTRONIC DOORBELL. Not in fact a bell but an electronic circuit that produces an unusual sound when the button is pressed. Kit £4-00.
WAA WAA. Add another sound dimension to your guitar or organ. Kit £2-50.
I.O. RADIO. A fantastic personal radio uses a special I.E., is small, easy to build, yet gives excellent results. Kit £2-10.
AQUARIUM THERMOSTAT. A very sensitive electronic thermostat. Can also be used for other applications requiring fine control of temperature. Kit £2-95.
TRAIN CONTROLLER. With most control there is considerable loss of power on low speeds—this unit overcomes this problem and makes slow speed realistic. Kit £2-15.
STEREO HEADPHONE ADAPTER. Enables one or two sets of stereo headphones to be used with an amplifier. £1-85.
4 BAND TRF RECEIVER. Receives amateur, shipping and normal medium wavebands. £2
GAS ALARM. A simple alarm detects gases, vapours and smoke. £2-90

8 GANG TUNING CONDENSERS. 500pf each section ideal for transmitter or communications receiver. 61p.
SPIT MOTOR

200-250V induction motor, driving a Carter gearbox with a 1 1/2" output drive shaft running at 5 revs p.m. Intended for roasting chickens, also for driving models—windmills, colour-

ed disc lighting effects, etc. £2 05 plus 20p post and ins.

RECORD PLAYBACK HEADS (TRUVOX)
 Individual prices of these are:—
 2 track record playback heads 80p each.
 4 track record playback heads 72p each.
 Erase heads are also available separately—
 2 track 33p—4 track 55p

TINNET AUDIO UNIT
 Although only the same size as an Oxo cube these are completely self contained and comprise microphone, 3 transistor amplifier with volume control and battery compartment and finally a dynamic earpiece. All in a plastic case. Made by Ardent (80k), we believe at over £50 each. These are really hearing aids complete except for the ear tube but we are not selling these as hearing aids only for the micro mixer parts they contain. Believed to be in perfect working order but not tested. Price £25 00 each.

MAINS MOTOR
 Precision made—as used in record decks and tape recorders—ideal also for extractor fan, blower, heaters, etc. New and perfect. 51p at 50p. Postage 20p for first one then 10p for each one ordered.
 1" stackmotor 94p.
 1 1/2" stackmotor £1-10.

NEED A SPECIAL SWITCH
 Double Lead Contact. Very slight pre-wire closes both contacts. 8p each 10 for 60p. Plastic push rod available separately operating. 6p each. 10 for 54p.

RESETTABLE FUSE
 How long does it take you to renew a fuse? Time yourself when next one blows. Then reckoning your time at £1 per hour see how quickly our resettable fuse (auto circuit breaker) will pay for itself. Price only £1-10 each or £12 per dozen, specify 5, 10 or 15 amp—simply fit in place of switch.

RECORD PLAYBACK HEADS (TRUVOX)
 Individual prices of these are:—
 2 track record playback heads 80p each.
 4 track record playback heads 72p each.
 Erase heads are also available separately—
 2 track 33p—4 track 55p

TINNET AUDIO UNIT
 Although only the same size as an Oxo cube these are completely self contained and comprise microphone, 3 transistor amplifier with volume control and battery compartment and finally a dynamic earpiece. All in a plastic case. Made by Ardent (80k), we believe at over £50 each. These are really hearing aids complete except for the ear tube but we are not selling these as hearing aids only for the micro mixer parts they contain. Believed to be in perfect working order but not tested. Price £25 00 each.

MAINS MOTOR
 Precision made—as used in record decks and tape recorders—ideal also for extractor fan, blower, heaters, etc. New and perfect. 51p at 50p. Postage 20p for first one then 10p for each one ordered.
 1" stackmotor 94p.
 1 1/2" stackmotor £1-10.

NEED A SPECIAL SWITCH
 Double Lead Contact. Very slight pre-wire closes both contacts. 8p each 10 for 60p. Plastic push rod available separately operating. 6p each. 10 for 54p.

RESETTABLE FUSE
 How long does it take you to renew a fuse? Time yourself when next one blows. Then reckoning your time at £1 per hour see how quickly our resettable fuse (auto circuit breaker) will pay for itself. Price only £1-10 each or £12 per dozen, specify 5, 10 or 15 amp—simply fit in place of switch.

J. BULL (ELECTRICAL) LTD.

(Dept. E.E.), 7 Park Street, Croydon CRO 1YD

Callers to: 102/3 Tamworth Road, CROYDON.

MAINS OPERATED CONTACTOR

220/240v. 50 cycle solenoid with laminated core so very silent in operation. Closes 4 circuits each rated at 10 amps. Extremely well made by a German Electrical Company. Overall size 2½ x 2 x 2in. \$2-20 each.



1 REV. PER MINUTE MOTOR WITH GEAR-BOX

Made by the famous Camberlain & Hookham Ltd. These could be made to drive clock or similar. Really robust reliable unit. Price \$1-10 each.

AUTO-ELECTRIC CAR AERIAL

with dashboard control switch—fully extendable to 40in or fully retractable. Suitable for 12V positive or negative car. Supplied complete with fitting instructions and ready wired dashboard switch. \$2-25 plus 25p post and insurance.



MAINS TRANSISTOR POWER PACK

Designed to operate transistor sets and amplifiers. Adjustable output 5v., 9v., 12 volts for up to 500mA (class B working). Takes the place of any of the following batteries: PP1, PP3, PP4, PP6, PP7, PP9 and others. Kit comprises: mains transformer rectifier, smoothing and load resistor, condensers and instructions. Real snip at only \$1-10, plus 20p postage.

MINIATURE WAFER SWITCHES

2 pole, 2 way—4 pole, 2 way—3 pole, 3 way—4 pole, 3 way—2 pole, 4 way—1 pole, 2 pole—2 pole, 6 way—1 pole, 12 way. All at 25p each.

DRY FILM LUBRICANT

Dry Film Lubricant. In aerosol can for easy application and for putting lubricant into places where the normal oil can cannot reach. Home and everyday uses. We have purchased a large quantity of these from the Liquinator and are able to offer them to you at about half of the original list price. 85p per 8 oz. can or 12 cans for \$2 post paid. The lubricant is I.C.I. fluon L169.

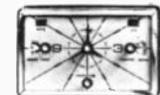
MULTI-SPEED MOTOR

Six speeds are available 500, 850 and 1,100 r.p.m. and 8,000, 12,000 & 18,500 r.p.m. Shaft is ½ in. diameter and approximately 1 in. long. 230/240v. Its speed may be further controlled with the use of our Thyristor controller. Very powerful and useful motor size approx. 2 in. dia. x 5 in. long. Price \$7-9p plus 23p postage and insurance.



SLIDE SWITCHES

Slide Switch. 2-pole changeover panel mounting by 90 63A. screws. Size approx. 1in x ½ in rated 250V lamp. 8p each. 10 for 75p. Ditto as above but for printed circuit 6p each, 10 for 63p. Sub Miniature Slide Switch, DPDT 10mm (½ in approx.) between fixing centres. 80p each or 10 for \$1-90. 8P Change over spring return 250V 1 amp. 11p.



ISA ELECTRICAL PROGRAMMER

Learn in your sleep: Have radio playing and kettle boiling as you awake—switch on lights to ward off intruders—have warm house to come home to. All these and many other things you can do if you invest in an electrical programmer. Clock by famous maker with 15 amp. on/off switch. Switch-on time can be set anywhere to stay on up to 6 hours. Independent 60 minute memory jogger. A beautiful unit. Price \$2-15 + 20p p & p or with glass front chrome bezel 83p extra.

I CHIP RADIO

Ferranti's latest device ZN414—gives results better than superhet. Supplied complete with technical notes and circuits. \$1-35 each. 10 for \$12.

HI-Q TUNER COMPONENTS

For experimenting with the ZN414. KIT NO. 1. Plessey Miniature Tuning Condenser with built in LW switch and 8 ferrit slab and litx wound MW coil and wave change switch. 75p. KIT NO. 2. Air spaced tuning condenser 6 ferrit rod litx wound MW and LW coils and wave change switch, 94p. KIT NO. 3. Air spaced TC with slow motion drive 8 ferrit rod, with litx wound LW and MW coils and wave change switch. \$1-10. KIT NO. 4. Fernsbility tuner with fast and slow motion drive and LW loading coils and wave change switch. 50p.

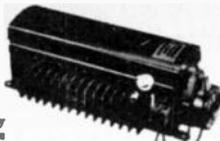
HOOR MINUTE TIMER

Made by Smiths. Complete with control knob and calibrated dial. Useful in kitchen, office, dark-room, etc. Bargain at 55p.



HONEYWELL PROGRAMMER

This is a drum type timing device, the drum being calibrated in equal divisions for switch setting purposes with trips which are infinitely adjustable for position. They are also arranged to allow 2 operations per switch per rotation. There are 15 changeover micro switches each of 10 amp type operated by the trips these 15 circuits may be changed per revolution. Drive motor is mains operated 5 revs per min. Some of the many uses of this timer are Machinery control, Boiler firing, Dispensing and Vending machines, Display lighting animated and signs, Signalling, etc. Price from makers probably over £10 each. Special snip price \$2-23 plus 25p post and insurance. Don't miss this terrific bargain.



THIS MONTH'S SNIP

WALL THERMOSTATS. Made by the famous Smiths Instrument Co. called Colourstat. Wall mounting and in a handsome plastic case. (Cream and beige). Adjustable by slider (lockable) and may be set to control temperatures from around freezing through to 50°C. The slide panel is engraved and indicates (frost) (warm) (very warm), etc. The thermostat will control heaters, etc. up to 15 amp at normal mains voltage and is ideal for living room, bedroom and greenhouse, etc. Price \$1-65. Don't miss this!

TEACH IN '74

A new beginners series started with the October issue of this magazine, we will be supplying all the parts for this. The initial kit covering all components required for the first 6 months is available post and VAT included—price \$7. A special feature about our version of this kit is the 4½" x 3" meter 0-100uA meter. As the author says, a large meter is so much easier to read than a small one.

BABY SNATCH ALARM AUTO-WATER FOR PLANTS TREMEO UNIT

To receive parts for these and other feature projects, send the quoted approximate amounts and any cash adjustment can be made later.

TANGENTIAL HEATER UNIT

This heater unit is the very latest type, most efficient, and quiet running. Is as fitted in Hoover and blower heaters costing £15 and more. We have a few only. Comprises motor, impeller, 2kW. element and 1kW. element allowing switching 1, 2 and 2kW. and with thermal safety cut-out. Can be fitted into any metal line case or cabinet. Only needs control switch, \$2-85. 2kW. Model as above except 2kW. \$2-75. Don't miss this. Control Switch, 44p plus VAT P. & P. 40p.



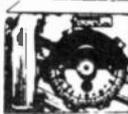
PORTABLE RADIO CASE DE-LUXE

A similar size to the above but a more expensive design. Used with the Good Companion de-luxe model. \$2-20 plus 50p post and insurance.



24hr. REPEATING TIME SWITCH

Made by Smiths these are A.C. mains operated. NOT CLOCKWORK. Ideal for mounting on rack or shelf or can be built into box with 13A socket. 2 completely adjustable time periods per 24 hours. 5 amp change-over contacts will switch circuit on or off during these periods \$2-78 post and ins. 23p. Additional time contacts 55p pair.



SWITCH TRIGGER MATS

So thin is undetectable under carpet but will switch on with slightest pressure. For burglar alarms, shop doors, etc. 24in x 18in \$1-60. 13in x 10in \$1-11.



HORSTMANN 'TIME & SET' SWITCH

(A30 Amp Switch.) Just the thing if you want to come home to a warm house without it costing you a fortune. You can delay the switch on time of your electric fires, etc. up to 14 hours from setting time or you can use the switch to give a boost on period of up to 3 hours. Equally suitable to control processing. Regular price probably around \$5. Special snip price \$1-45 Post and ins. 23p.



KETTLE ELEMENTS

Made by the famous A.E.I. Co. Complete with washers and combined fixing ring and plug shroud. Normal 2 round pin and flat pin earth connection and overload reset push button. 2 Models—1½ in (approx.) suitable for G.E.C., Hotpoint, Swan and other similar models—1½ in (approx.) suitable for G.E.C., Hotpoint, etc. All quick boil 2½kW elements at 240V. Price \$1-85.



BATTERY CONDITION TESTER

Made by Mallory but suitable for all batteries made by Ever Ready and others, most of which are zinc carbon types but also mercury manganese—lead—silver oxide and alkaline batteries may be tested. The tester puts a dummy load on the battery and the meter scale indicates the condition depending upon which section the pointer rests. The section reads "replace", "weak" or "good". The tester is complete in its case, size 3½" x 6½" 2" x with leads and prods. Price \$2-80 plus 20p postage.

12 WAY SUB-MINIATURE MULTI-CORE CABLE

7-0076 copper cores each core F.V.C. insulated and of different colour. F.V.C. covered overall and approx. 3/16in. thick. Price \$25p per yard.

SNAP ACTION SLIDE SWITCH

Rated 6a. 240v. Made by Arrow. Type fitted in the handles of electric drills, banders, etc. 5p each. 10 for 54p.



EDUCATIONAL KITS — all with pictorial instructions



THIS BALANCE KIT FREE. Engle educational kits. Japanese made, these are excellent value for money. We do not expect to be able to repeat this offer once stocks are sold. Brief description of each kit is given below and with 3 kits or more we give FREE an accurate 11 piece balance kit. Price of kits 44p each post paid. Special price for all 7 kits \$2-00 with free balance kit.

KA2 Lens Kit. Eleven parts, including candle, one concave lens, one convex lens, stage and slit frame, etc. Watch light rays bend as they pass through different lenses.

KA3 Water Pump Kit. Thirteen parts. Top of pump is transparent so that operating parts may be observed. Small parts are brightly coloured to be seen easily while working. Three types of pump may be made: Lift Pump, Force Pump and

Force Pump with reservoir and nozzle.

KA4 Buzzer Kit. Eleven parts. Transparent covers allow the operation of buzzer to be seen. Illustrates and teaches how

electronagnetism with an automatic switch results in an operating buzzer.

KA7 Electro-Magnet Kit. Fifteen parts, includes compass. Makes two electro-magnets, one with one layer of wire and one with several layers of wire. Picks up tacks, nails and any small parts showing how magnetism works.

KA8 Current and Resistance Kit. Twenty-nine parts, including bench and light bulb. Conduct interesting and educational projects to learn the application of "OHMS LAW" and see the difference in current and resistance with different types and lengths of wire.

KA9 Bell Kit. Eight parts, including bell and push button switch. Build a complete electric bell and see how the hammer is triggered to make the bell ring.

KA10 Morse Key Buzzer and Bell Kit. 25 part kit, easy to construct, simple to operate.

MINIATURE SEALED RELAY

American made. Our Ref. No. REL. A1. Measures only 1" wide x 1" thick and 1" high and it's a double change over, we don't know the contact rating but estimate this at 3/5 amps. The coil resistance is 600 ohms and 9-12 volt will close it. Ideal for models and miniaturised equipment. It's a plug in relay but we supply complete with base. Price 25p including base.



TELEPHONES

Complete as illustrated. Save your legs, time and temper, simply by putting in some telephones. Ex. G.P.O. not new—but guaranteed in good condition and serviceable. Supplied with diagram and instructions showing how to connect. 3 types available as illustrated less internal bell \$1 each. Ditto with bell but less dial \$1-25 each. As illustrated with dial and bell \$1-50 each. Post etc. 50p each.



BAKELITE INSTRUMENT CASE

Size approx. 6½" x 3½" x 2" deep with brass inserts in four corners and bakelite panel. This is a very strong case suitable to house instruments and special rigs, etc. Price 54p each. pax lid 11p extra.



TELESCOPIC AERIAL

for portable, car radio or transmitter. Chrome plated—six sections, extends from 7½ to 47in. Hole in bottom for 6BA screw. 48p. KNUCKLED MODEL FOR F.M. 55p



TREASURE TRACER

Complete Kit (except wooden battery) to make the metal detector as the circuit in Fractional Wireless, August issue. \$2-80 plus 20p post and insurance

IMMERSTON HEATERS BY REMPOY

Standard fitting for domestic water tanks, made by the famous Remploy Company. Complete with sealing washers suitable for 200-240 volts A.C. Depth into tank 11". 2kw or 3kw \$1-65 plus 20p each post and insurance.

MAINS OPERATED SOLENOIDS

Model TTS—small but powerful 1" pull—approx. size 1½" x 1½" x 1½". 60p. Model 400/1 ½" pull. Size 2½" x 2" x 1½". 83p. Model TT10 1½" pull. Size 3" x 2½" x 2½". \$1-98 plus 20p post and insurance.



AUDIDTRONIC MODEL ATM.1

Top value 1000 o.p.v. pocket multimeter.
Ranges: 0/10/50/250/1000V. A.C. and D.C.
DC Current 0-1mA/100mA.
Resistance 0/100k ohms.
Decibels -10 to +22dB.
Size 80 x 60 x 28mm.
Complete with test leads.
£2.85. Post 15p.



RUSSIAN 22 RANGE MULTIMETER

Model U437 10,000 o.p.v. A first class versatile instrument manufactured in U.S.S.R. to the highest standards. Ranges: 2.5/10/50/250/1000V D.C. 2.5/10/50/250/500/1000V A.C. DC Current 100mA/1/10/100mA/A. Resistance 300 ohms/3/30/300Ω/3mΩ. Complete with batteries, test leads, instructions and sturdy steel carrying case. £4.95. P. & P. 25p



MODEL TE-200

20,000 O.P.V. Mirror scale, overload protection. 0/5/25/125/1,000V. D.C. 0/10/50/250/1,000V. A.C. 0/50μA/5mA. 0/50kΩ/500kΩ/5MΩ. 0/20 to +62dB. £4.95. P. & P. 15p.



MODEL TE-300

30,000 O.P.V. Mirror scale, overload protection. 0/5/15/60/300/1,200V. A.C. 0/50μA/5mA/60mA/300mA/600mA. 0/8kΩ/80kΩ/500kΩ/5MΩ. 0/20 to +62dB. £7.50. P. & P. 15p.



U4312 MULTIMETER

Extremely sturdy instrument for general electrical use. 687 o.p.v. 0/3/15/75/300/600/1500/3000/6000V D.C. and 75mV. 0/3/15/75/300/600/1500/3000/6000V A.C. 0/300μA/1.5/6/15/60/150/600mA/1.5/6 AMP. A.C. 0/200Ω/3kΩ/30kΩ. Accuracy DC 1%. AC 1.5%. Knife edge pointer, mirror scale. Complete with sturdy metal carrying case, leads and instructions. £8.75. P. & P. 25p.



MODEL 500

30,000 O.P.V. with overload protection, mirror scale. 0/5/25/100/250/500/1,000V. D.C. 0/2.5/10/25/100/250/500/1,000V. A.C. 0/50μA/5/50/500mA. 12 amp. D.C. 0/60kΩ/6 Meg. 60 Meg Ω. £10.50. Post paid. Leather Case £1.75



MODEL C-7080 EN

Giant 6" mirror scale. 20,000 o.p.v. 0/25/1/1/2.5/10/50/100/250/1000/5000V. D.C. 0/2.5/10/50/100/250/1000/5000V. A.C. 0/150μA/1/10/100/500mA/10 amp. D.C. 0/2kΩ/200kΩ/20 meg -20 to +50 dB. £13.95. Post 35p.



Model S-100TR MULTIMETER/TRANSISTOR TESTER

100,000 o.p.v. mirror scale/overload protection. 0/12/6/3/12/30/120/600V DC. 0/6/30/120/600. V A.C. 0/12/600μA/12/300mA/12 AMP DC. 0/10 K/1 MEG/100 MEG. -20 to +50dB. 0 01-2 MPD. Transistor tester measures Alpha, beta and Ico. Complete with batteries, instructions and leads. £14.95. P.P.P 25p.



KAMODEN 72 200 MULTITESTER

High sensitivity tester. 200,000 o.p.v. Overload protection. Mirror scale. Ranges: 0/100/1/3/30/120/600/1,200V. D.C. 0/1/2/10/50/100/200/300/1,200mA. A.C. 0/6μA/1.2mA/120mA/600mA/12A. D.C. 0/12A. A.C. -20 to +63dB. 0/2K/200K/2 meg/200 meg ohms. £16.95. Post 30p.



TMK LAB TESTER.

100,000 O.P.V. 6jin. Scale Buzzer Short Circuit Check. Sensitivity: 200000 O.P.V. D.C. 5kV/ Volt A.C. D.C. Volts: 5, 2.5, 10, 50, 250, 1,000 V. A.C. Volts: 3, 10, 50, 250, 500, 1,000V. D.C. Current: 10, 100μA, 10, 100mA, 0.25, 1.0 amp. Resistance: 1K, 10K, 100K, 10MEG, 100MEG Ω. Decibels: -10 to +49 db. Plastic Case with Carrying Handle. Size: 7 1/2in. x 6 1/2in. x 3 1/2in. £19.95. P. & P. 25p.



HIDKI MODEL 700X

100,000 O.P.V. Overload protection. Mirror scale. 3/6/12/21/5/3/6/12/30/60/120/300/600/1,200V DC 1.5/3/6/12/30/60/150/300mA 15/300μA/5/6/30/60/150/300mA 6/12 A. D.C. 2K/200K/2 Meg/20 Meg ohm -20 to +63dB. £14.95. P. & P. 20p



370 WTR MULTI-METER

Features A.C. current ranges. 20,000 o.p.v. 0/5/25/10/50/250/500 1000 V. D.C. 0/2.5/10/50/250/500/1000V AC 0/50μA/1/10/100mA/1/10 Amp D.C. 0/100mA/1/10 Amp AC 0/5K/50K/500K/5 meg/ 60 meg. -20 +62db. £17.50. P. & P. 25p.



KAMODEN HM 350 TRANSISTOR TESTER

High quality instrument to test Reverse Leak current and DC current. Amplification factor of NPN, PNP, transistors, diodes, SCR's etc. 4" x 1 1/2" clear scale meter. Operates from internal batteries. Complete with instructions, leads and carrying handle. £18.50. Post 30p.



MODEL 449A IN CIRCUIT TRANSISTOR TESTER

Checks true A.C. beta/in. Checks Ico. Checks diodes SCR, etc. Beta III 10 - 500. LO 2 - 60. Ico 0-5000μA. 220/240V A.C. operation £17.50. Post 25p.



LB3 TRANSISTOR TESTER

Tests Ico and β. PNP/NPN. Operates from 9v battery. Complete with all instructions, etc. £3.95. P. & P. 20p.



LB4 TRANSISTOR TESTER

Tests PNP or NPN transistors. Audio indication. Operates on two 1.5v batteries. Complete with all instructions, etc. £4.50. P. & P. 20p.



TE-40 HIGH SENSITIVITY A.C. VOLTMETER

10 meg. input 10 ranges: 0/1/3/30/1/3/15/150/1000/300V. R.M.S. 6cps-12 Mhz. Decibels -40 to +50dB. Supplied brand new complete with leads and instructions. Operation 230V. A.C. £17.50. Carr. 25p.



TE-65 VALVE VOLTMETER

28 ranges D.C. volts 1.5-1,500V. A.C. volts 1.5-1,500V. Resistance up to 1,000 megohms/200/240V. A.C. operation. Complete with probe and instructions. £17.50. P. & P. 30p. Additional probes available: R.F. £2-12; H.V. £2.50.



MODEL AT201 DECADE ATTENUATOR

Frequency range 0-200KHz. Attenuator 0-111db. 0.1db step. Impedance 600 ohms. Max. input power 30dbm. Size 180 x 90 x 55mm. £12.50. Post 37p.



KAMODEN HM. 720B F.E.T. V.O.M.

Input impedance 10 meg ohms. Ranges: 0/25/1/2.5/10/50/250/1000V. D.C. 0/2.5/10/50/250/1000V. A.C. 0/25μA/2.5/25/250 mA D.C. -20 to +62dB 0/5K/50K/500K/5meg 500meg ohms. £14.95. Post 30p



TMK MODEL 117 F.E.T. ELECTRONIC VOLTMETER

Battery operated, 11 meg input, 28 ranges. Large 4 1/2" mirror scale. Size 6 1/2" x 4 1/2" x 2 1/2". DC VOLTS 0.3-1200V AC VOLTS 3-300V R.M.S. 8.0-800V P.P. DC CURRENT 12-12mA. Resistance up to 2000Ω ohm. Decibels -20 to +51dB. Complete with leads/instructions. £17.50. P. & P. 20p.



KAMODEN HMG-500 INSULATION RESISTANCE TESTER

Range 0-1000 Meg-ohms, 500 Volt. Battery operated. Wide range clear meter 4 1/2" x 4". Complete with de-luxe carrying case, batteries, instructions. £19.95. Post 30p



BELCO AF-5A SOLID STATE SINE SQUARE WAVE C.R. OSCILLATOR

Size 18 x 200 x 100 mm; Square 18 x 20, 000 Hz Output max. 10 dB. (10 K ohms) Operation internal batteries Attractive 2-tone case 7 1/2" x 5" x 2". Price £17.50. Carr. 17p.



TO-3 PORTABLE OSCILLOSCOPE

3in. tube, Y amp. Sensitivity 0-1v p-p/CM. Bandwidth 1.5 cps-1.5 MHz. Input imp. 2 meg Ω 20pF X amp. sensitivity 0.9v. p-p/CM. Bandwidth 1.5cps-800kHz. Input imp. 2 meg Ω 20pF. Time base 5 ranges 10 cps 300 kHz. Synchronization. Internal/external. Illuminated scale 140 x 215 x 330 mm. Weight 10 1/2lb. 220/240V. A.C. Supplied brand new with handbook £52.50. Carr. 50p.



CI-5 PULSE OSCILLOSCOPE

For display of pulsed and periodic waveforms in electronic circuits. VERT. AMP. Bandwidth 10MHz. Sensitivity at 100KHz VRMS/mm. 1-25; HOR. AMP. Bandwidth 500KHz. Sensitivity at 100KHz, V RMB/mm. 3-25; Preset triggered sweep 1-3,000μsec.; free running 20-200,000Hz in nine ranges. Calibrator pips. 220 x 350 x 430mm. 110-230V. AO operation. £39.00. Carr. paid.



RUSSIAN CI-16 DOUBLE BEAM OSCILLOSCOPE

6 Mc/s Pass Band. Separate V1 and V2 amplifiers. Rectangular 5in x 4in. C.R.T. Calibrated triggered sweep from 2 μsec. to 100 mill-sec. per cm. Free running time base 50 cps-1 mc/s. Built-in time base calibrator and amplitude calibrator. Supplied complete with all accessories and instruction manual £87. Carr. Paid.



TE-16A TRANSISTORISED SIGNAL GENERATOR

5 ranges 400KHz-30mHz. An inexpensive instrument for the handyman. Operates on 9v battery. Wide easy to read scale. 800KHz modulation. 5 1/2 x 8 1/2 in. Complete with instructions and leads. £8.87. Post 25p.



MODEL U4311 SUB-STANDARD MULTI-RANGE VOLT AMMETER

Sensitivity 330 ohms/Volt AC and DC. Accuracy 0.5% D.C. 1% AC. Scale length 165mm. 0/300/750μA 1.5/3/7.5/15/30/75/150/300/750mA/1.5/3/7.5/15/30/75/150/300/750V. 20/75/150/300/750mA/1.5/3/7.5/15/30/75/150/300/750V DC 0/750mV/1.5/3/7.5/15/30/75/150/300/750V AC. Automatic cut out. Supplied complete with test leads, manual and test certificates. £49.00. Post 50p.



TMK MODEL TW-50K

45 ranges, mirror scale, 50K/Vol. D.C. 5K/Volt. A.C. D.C.: Volts 125, 25, 1.25, 2.5, 5, 10, 25, 50, 125, 250, 500, 1000V. A.C. Volts: 1.6, 3, 5, 10, 25, 50, 125, 250, 500V. D.C. Current: 25, 50μA, 2.5, 5, 25, 50, 250, 500mA, 5, 10amp. Resistance: 10K, 100K, 1 MEG, 10 MEG Ω. Decibels: -20 to +81.5db £28.50. P. & P. 17p.



MODEL TE.15 GRID DIP METER

Transistorised. Operates as Grid Dip, Oscillator, Absorption Wave Meter and Oscillating Detector. Frequency range 440Kc/s-280Mc/s in 6 coils. 500μA Meter. 9V battery operation. Size 180 x 80 x 40mm. £15.00. Post 20p.



ARF-300 AF/RF SIGNAL GENERATOR

All transistorised, compact, fully portable, AF sine wave 18 Hz to 220 KHz. AF square wave 18 Hz to 100 KHz. Output sine / square 10v. P-P. RF 100 KHz to 200 MHz. Output 1v maximum. Operation 220/240V. A.C. Complete with instructions and leads. £29.50. Post 50p.



TE22 SINE SQUARE WAVE AUDIO GENERATORS

Size: 20cps to 200 kc/s on 4 bands. Square: 20cps to 50 kc/s. Output impedance 5,000 ohms, 200/250V. A.C. operation. Supplied brand new and guaranteed with instruction manual and leads. £17.50. Carr. 37p.



240° Wide Angle ImA Meters

MW 1-6 60mm square £3.97
MW 1-8 80mm square £4.97
P. & P. 15p.



POWER RHEOSTATS

High quality ceramic construction. Windings embedded in vitreous enamel. Heavy duty brush wiring. Continuous rating. Wide range available ex-stock. Simple hole fixing. In. dia. shafts. Bulk quantities available. 25 WATT. 10/25/50/100/250/500/1000 ohms. £1.15 P. & P. 10p.
50 WATT. 10/25/50/100/250/500/1000/2500 or 5000 ohms. £1.82 P. & P. 10p.
100 WATT. 1/5/10/25/50/100/250/500/1000 or 2500 ohms. £2.34. P. & P. 15p.



AUTO TRANSFORMERS

0/116/250V. Step up or step down. Fully shrouded. 80 W £2.35 P. & P. 18p
150 W £3.00 P. & P. 18p
300 W £4.00 P. & P. 23p
500 W £5.80 P. & P. 33p
1000 W £8.25 P. & P. 38p
1600 W £11.25 P. & P. 43p
2250 W £19.00 P. & P. 50p
5000 W £40.00 P. & P. 81

ALL PRICES ARE SUBJECT TO 10% VAT



HIGH QUALITY CONSTRUCTION KITS
 Appointed stockists at all branches
 Complete with comprehensive, easy to follow instructions, and covered by full guarantee
 Post and packing 15p per kit

AF30 Mono transistor amplifier	£4.80
AF30 Mono transistor pre-amplifier	£2.81
AF310 Mono amp for use two for stereo	£5.91
A75 Automatic light control	£2.58
AT30 Photo cell switching kit	£5.80
AT50 400W Tr. ac light dimmer speed control	£4.80
AT55 1300W Tr. ac light dimmer speed control	£5.70
AT56 2300W Tr. ac light dimmer speed control	£6.80
AT60 Psychodic light control 1 stage change	£7.80
AT65 Psychodic light control 3 channel	£14.55
HE61 Medium wave trans. unit	£3.33
HF75 FM transistor receiver	£2.88
HF310 FM tuner unit	£15.81
HF325 De Luxe FM tuner unit	£24.12
HF330 Stereo decoder for HF310 HF325	£9.96
HF395 Amp. for amp. for AM FM bands	£1.77
GP310 Stereo pre-amp for use with 7- AF310	£21.21
GU320 T. mono unit for guitar etc.	£7.50
NI10 P. ver. supply 100 ma 9V stab. 12V unstab.	£6.15
NI200 P. frequency stabilized power supply	£12.51
NI305 T. P. ver. amplifier 12 15V AC DC 1.6V 15V 9V DC	£4.50
NI310 P. ver. supply 240V AC 7A 18V DC	£4.80
NI315 P. ver. supply 240V AC 4.5 15V DC	£9.57

NEW FROM JOSTY KIT!

'Amateur Electronics'—The professional book for the amateur—covers the subject from basic principles to advanced electronic techniques.

OUR PRICE £8.30, complete with circuit board for making the kits listed below.

AE1 100W output stage	£1.85
AE2 Pre-amplifier	£1.28
AE3 Diode-receiver	£2.00
AE4 Flasher	£1.09
AE5 Astable multivibrator	£1.05
AE6 Monostable multivibrator	£1.08
AE7 RC generator	£1.08
AE8 Base filter	90p
AE9 Treble filter	90p
AE10 CCIR filter	90p

230 VOLT A.C. 50 CYCLES RELAYS

3 sets of changeover contacts at 5 amp rating, 40p each. P. & P. 12p (100 lots £80. Quantities available.



"YAMABISHI" VARIABLE VOLTAGE TRANSFORMERS

Excellent quality at low cost. All models—Input 230V. 50/60 c/s. Variable output 0-360V.

MODEL S-260 GENERAL PURPOSE BENCH MOUNTING

1 Amp	8-75	30p
2.5 Amp	10-00	35p
5 Amp	14-70	37p
8 Amp	19-85	50p
10 Amp	28-10	75p
12 Amp	39-50	100p
20 Amp	81-25	125p
25 Amp	78-50	180p
40 Amp	108-10	150p



MODEL S-260B Panel Mounting.

1 Amp	8-75	30p
2.5 Amp	10-00	35p



Carriage and Packing Extra

REFLEX HORN SPEAKER RUH.6



Built in driver unit. Impedance 16 ohm. Power rating 10 watt. Response 380-7000Hz. Approx. size 6" x 6". Weatherproof and shock proof.

OUR PRICE £4.97 P. & P. 30p.

BVD.5 VERNIER TUNING DIAL



Approx. 7-1 ratio planetary drive vernier dial. Log scale 0-180 degrees. Blank scales 1 to 5. Scale width 4 1/2". Dial size 5" x 3". Overall size 7 1/2" x 4 1/2" x 1 1/2" deep including knob and coupling. 1/2" dia. shaft.

OUR PRICE £1.62 P. & P. 15p.

MP7 MIXER PREAMPLIFIER



5 microphone inputs each with individual gain controls enabling complete mixing facilities. Battery operated. 9 1/2" x 5" x 3". Inputs Mics: 3 x 3mV 50K; 2 x 3mV 600 ohm. Phono meg. 4mV 50K. Phono ceramic 100mV 1 meg. Output 250mV 100K.

Our Price £8.97 P. & P. 20p

SEW CLEAR PLASTIC PANEL METERS

USED EXTENSIVELY BY INDUSTRY, GOVT. DEPTS., EDUCATIONAL AUTHORITIES, ETC.

Over 200 ranges in stock—other ranges to order. Quantity discounts available. Send for fully illustrated brochure.

Type SW.100 100 x 80 mm.

50µA	£4-15
50-50µA	£4-95
100µA	£4-95
100-100µA	£4-95
500µA	£4-95
1mA	£4-95
20V. D.C.	£4-95
50V. D.C.	£4-95
300V. D.C.	£4-95
1 amp. D.C.	£4-95

Type SD.830 82.5mm x 110mm Fronts

10mA	£4-10
50mA	£4-10
100mA	£4-10
500µA	£4-10
1mA	£4-10
1 amp.	£4-10
5 amp.	£4-10
10 amp.	£4-10
5V. D.C.	£4-10
10V. D.C.	£4-10
100µA	£4-10
100-100µA	£4-10
200µA	£4-10
500µA	£4-10
1mA	£4-10
5mA	£4-10

Type SD.640 63.5mm x 85mm Fronts

50µA	£4-05
50-50µA	£4-05
100µA	£4-05
100-100µA	£4-05
500µA	£4-05
1mA	£4-05
10 amp.	£4-05
5V. D.C.	£4-05
10V. D.C.	£4-05
100µA	£4-05
1mA	£4-05
5mA	£4-05
10mA	£4-05
50mA	£4-05
100mA	£4-05

Type MR.45P. 2in. square fronts

50µA	£4-70
50-50µA	£4-85
100µA	£4-85
100-100µA	£4-85
200µA	£4-85
500µA	£4-85
1mA	£4-85
100-500µA	£4-85
5mA	£4-85
10mA	£4-85
50mA	£4-85
100mA	£4-85
1 amp.	£4-85

"SEW" EDUCATIONAL METERS

50µA	£4-75
50-50µA	£4-85
100µA	£4-85
100-100µA	£4-85
200µA	£4-85
500µA	£4-85
1mA	£4-85
100-500µA	£4-85
5mA	£4-85
10mA	£4-85
50mA	£4-85
100mA	£4-85
1 amp.	£4-85

Type ED.107. Size overall 100mm x 90mm x 105mm

A new range of high quality moving coil instruments ideal for school experiments and other bench applications. 3" mirror scale. The meter movement is easily accessible to demonstrate internal working. Available in the following ranges:

50µA	£4-90	15V d.c.	£4-95
100µA	£4-40	20V. d.c.	£4-95
50-50µA	£4-40	50V. d.c.	£4-95
1mA	£4-95	300V. d.c.	£4-95
1-10mA	£4-95	Dual range of 500mA/5A d.c.	£7-00
1A d.c.	£4-95	1/15A d.c.	£7-00
5A d.c.	£4-95	5V/50V d.c.	£7-00
10V d.c.	£4-95	5/15V d.c.	£7-00

PS.1000B REGULATED POWER SUPPLY

Solid state. Output 6, 9 or 12 volt DC up to 3 amps. Meter to monitor current. Input 220/240V A.C. Size 4" x 3 1/2" x 6 1/2". £11.97. P. & P. 25p.

Our Price £7-50 P. & P. 15p

Type MR.85P. 4 1/2in. x 4 1/2in. fronts

100µA	£4-80
500µA	£4-80
1 amp.	£4-80
5 amp.	£4-80
15 amp.	£4-80
30 amp.	£4-80
10V D.C.	£4-80
20V D.C.	£4-80
50V D.C.	£4-80
150V D.C.	£4-80
300V D.C.	£4-80
15V. A.C.	£4-80
300V. A.C.	£4-80
VU Meter	£4-85
1 amp. A.C.*	£4-80
5 amp. A.C.*	£4-80
10 amp. A.C.*	£4-80
20 amp. A.C.*	£4-80
30 amp. A.C.*	£4-80

Type MR.52P. 2 1/2in. square fronts

50µA	£4-50
50-50µA	£4-50
100µA	£4-50
100-100µA	£4-50
200µA	£4-50
500µA	£4-50
1mA	£4-50
10V. D.C.	£4-50
20V. D.C.	£4-50
50V. D.C.	£4-50
150V. D.C.	£4-50
300V. D.C.	£4-50
15V. A.C.	£4-50
300V. A.C.	£4-50
5 Meter 1mA	£4-50
VU Meter	£4-55
1 amp. A.C.*	£4-50
5 amp. A.C.*	£4-50
10 amp. A.C.*	£4-50
20 amp. A.C.*	£4-50
30 amp. A.C.*	£4-50

Type MR.65P. 3 1/2in. x 3 1/2in. fronts

50µA	£4-70
50-50µA	£4-75
100µA	£4-75
100-100µA	£4-75
200µA	£4-75
500µA	£4-75
1mA	£4-75
10V. D.C.	£4-70
20V. D.C.	£4-70
50V. D.C.	£4-70
150V. D.C.	£4-70
300V. D.C.	£4-70
15V. A.C.	£4-70
300V. A.C.	£4-70
5 Meter 1mA	£4-70
VU Meter	£4-75
50mA A.C.	£4-70
100mA A.C.	£4-70
200mA A.C.	£4-70
500mA A.C.	£4-70
1 amp. A.C.*	£4-70
5 amp. A.C.*	£4-70
10 amp. A.C.*	£4-70
20 amp. A.C.*	£4-70
30 amp. A.C.*	£4-70

"SEW" EDGWISE METERS

Type PE.70. 3 1/2in. x 1 1/2in. x 2 1/2in. deep	£4-80
50µA	£4-75
50-50µA	£4-80
100µA	£4-80
100-100µA	£4-80
200µA	£4-80
500µA	£4-80
1mA	£4-80
10V. D.C.	£4-80
20V. D.C.	£4-80
50V. D.C.	£4-80
150V. D.C.	£4-80
300V. A.C.	£4-85
VU Meter	£4-85



***MOVING IRON— ALL OTHERS MOVING COIL**
 Please add postage

Type MR.38P. 1 1/2 3/2in. square fronts

200mA	£4-25
300mA	£4-25
500mA	£4-25
750mA	£4-25
1 amp.	£4-25
2 amp.	£4-25
5 amp.	£4-25
10 amp.	£4-25
3V. D.C.	£4-25
10V. D.C.	£4-25
15V. D.C.	£4-25
20V. D.C.	£4-25
50V. D.C.	£4-25
100µA	£4-45
100-100µA	£4-45
200µA	£4-45
500µA	£4-45
500-500µA	£4-45
1mA	£4-45
1-10mA	£4-45
2mA	£4-45
5mA	£4-45
10mA	£4-45
20mA	£4-45
50mA	£4-45
100mA	£4-45
150mA	£4-45

Type SD.460 46mm x 59.5mm Fronts

50µA	£4-80
50-50µA	£4-80
100µA	£4-75
100-100µA	£4-75
200µA	£4-75
500µA	£4-75
1mA	£4-75
5mA	£4-75
10mA	£4-75
50mA	£4-75
100mA	£4-75
500mA	£4-75

"SEW" BAKELITE PANEL METERS

Type MR.65. 3 1/2in. square fronts	£4-80
2 amp.	£4-80
5 amp.	£4-80
15 amp.	£4-80
30 amp.	£4-80
50 amp.	£4-80
5V. D.C.	£4-80
10V. D.C.	£4-80
20V. D.C.	£4-80
50V. D.C.	£4-80
150V. D.C.	£4-80
300V. D.C.	£4-80
500V. A.C.	£4-80
500mA A.C.*	£4-80
1 amp. A.C.*	£4-80
5 amp. A.C.*	£4-80
10 amp. A.C.*	£4-80
20 amp. A.C.*	£4-80
30 amp. A.C.*	£4-80
50 amp. A.C.*	£4-80
VU Meter	£4-85

Type S-80 80 mm. square fronts

50µA	£4-80
50-50µA	£4-80
100µA	£4-80
100-100µA	£4-80
200µA	£4-80
500µA	£4-80
1mA	£4-80
1-10mA	£4-80
5mA	£4-80
10mA	£4-80
50mA	£4-80
100mA	£4-80
500µA	£4-80
1 amp.	£4-80



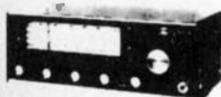
MCA. 230 AUTOMATIC VOLTAGE STABILISER
 Input 95 125 VAC or 175, 250VAC. Output 120VAC or 240VAC. 200VA rating. £11.97. Carr. 50p.

SEND SAE FOR NEW 6 PAGE SEMI CONDUCTORS & VALVES LIST

ALL PRICES ARE SUBJECT TO 10% VAT

GWS G.W. SMITH & CO (RADIOS LTD)

UR-1A RECEIVER



4 Bands covering 550 Kc/s-20 Mc/s. FET, 8 Meter. Variable BFO for 88B. Built-in Speaker, Bandspread, Sensitivity Control, 220/240 v. A.C. or 12 v. D.C. Brand new with instructions.

Our Price £25.00 Carr. 37p

TRIO 9R59DS RECEIVER



4 bands covering 550 Kc/s to 20 Mc/s continuous and electrical bandspread on 10, 15, 20, 40 and 80 metres. 8 valve plus 7 diode circuit. 4/8 ohm outputs and phone jack. SSB-CW, ANL, Variable BFO, 8 meter. Sep. bandspread dial. IF frequency 445 Kc/s, audio output 1.5w. Variable BF and AF gain controls 115/250 v. A.C. with instruction manual.

Our Price £49.50 Carr. Paid

TRIO JR599 RECEIVER



9 wavebands covering 1.6-29.7MHz 144-146MHz and 10-00MHz WWW, SSB, CW, AM and FM. AF output more than 1 watt. 8 Meter. Squelch control. BFO. Variable BF and AF controls. 4-16 ohm output and phone jack. Power requirements 100/240v. AC. 12-14v. DC. Size 270 x 140 x 310mm.

Our Price £155.00 Carr. Paid

BELTEK W5400 CAR TRANSCIEVER



Build state mobile transciever for 12v DC neg. use. Transmits and Receives on any 12 of 26 channels between 144 and 146MHz. Power output 10w and 1w switchable. Controls: Volume/on/off, squelch channel selector, internal 3" speaker. Complete with dynamic mike, PTT switch, three sets of crystals for 144-146MHz, 144-90 MHz, 146-00MHz, mounting bracket and instructions. Size approx. 150 x 70 x 290mm.

Our Price £75.00 P & P 50p

TRIO JR310 SSB RECEIVER



Covers 3-5, 7, 14, 91, 28, 28.5 and 29.1 MHz bands and WWW 15MHz. SSB, AM and CW. AF output more than 1 watt. Crystal controlled BFO for 88B. 8 meter. ANL etc. AC 110/120-220/240v. Size 230 x 179 x 310mm.

Our Price £75.00 Carr. Paid



UNR 30 RECEIVER



4 Bands covering 550 Kc/s-20 Mc/s B.F.O. Built-in Speaker 220/240 v. A.C. Brand new with instructions.

Our Price £15.75 Carr. 37p

LAFAYETTE HA-600 RECEIVER



General coverage 150-400 Kc/s, 550 Kc/s-30 Mc/s, FET front end, 2 mech. filters, product detector, variable B.F.O., noise limiter, 8 Meter Bandspread, RF Gain, 220/240 v. A.C. or 12 v. D.C. Brand new with instructions.

Our Price £50.00 Carr. 50p

TRIO TR2000 TRANSCIEVER

Fully transistorised portable VHF Transciever. Will transmit and receive on 6 channels between 144-146MHz. 1 watt transmitter, 12v DC internal or external supply. Built in charger for ni-cad cells. Power/volume switch, squelch control, channel selector, mike socket, earphone/external speaker socket. Complete with microphone, 144-48, 144-72 and 145-32 crystals. Size 134 x 58 x 180mm.

Our Price £79.50 Carr. Paid

TRIO TSS15/PSS15 TRANSCIEVER



High quality T8515 SSB/CW amateur band receiver covering 80, 40, 20, 15 and 10 metre bands with P8515 power supply and speaker unit. Transmits/receives frequency 8.5-29 MHz. Output 1.5 watts. Power requirements 110-220/240v. AC. Sizes: T8515 330 x 195 x 240mm. P8515 200 x 165 x 249mm.

Our Price £210.00 Carr. Paid

SWR METER—Model SWR-3

Handy SWR Meter for transmitter antenna alignment, with built-in field strength meter. Accuracy: 5%, Impedance: 52, Indicator: 100µA DC, full scale 5 section oscillating antenna. Size: 145 x 50 x 60 mm.

OUR PRICE £4.25 P. & P. 25p

AUDIOTRONIC AMR-900 GLOBAL AM/FM PORTABLE RADIO

10 wavebands covering AM: 535-1605 KHz, LW: 150-280 KHz, MW: 1.6-4.0 MHz, SW: 1.6-8 MHz.

8 MHz. SW3: 8.0-1.6 MHz, SW2: 18-24 MHz, FBI: 20-30 MHz, PBB2: 146-174 MHz, FM 89-108 MHz, AIR: 108-136 MHz. Features time zone map and timing dial. Large clear scale. Telescopic aerial and built in aerial. AFC or FM. 6" x 4" speaker and personal earpiece. Battery/main operation. Size: 245 x 133 x 305mm. **OUR PRICE £36.00** P. & P. 50p.

SH628 STEREO HEADPHONES



Outstanding value. Soft ear-pads, adjustable headband. 8-16 ohms. 20-20,000 Hz. Complete with lead and stereo plug.

Our Price £1.87 P. & P. 30p

LH025 STEREO HEADPHONES



Lightweight headphones with padded earpieces. 4-16 ohms. 20-20,000 Hz. Complete with 4 ft. cord and plug.

Our Price £1.97 P. & P. 30p

TE1018 DE-LUXE MONO HIGH IMPEDANCE HEADSET



Sensitive 22 ohm dynamic headset with soft earpads. Impedance 2,600 ohms (d.c. 800 ohms). Frequency response 200-4,000 Hz.

Our Price £2.25 P. & P. 30p

BH.001 HEAD SET AND BOOM MICROPHONE



Moving Coil. Ideal for language teaching, communications. Headphone imp. 16 ohms. Microphone imp. 200 ohms.

Our Price £4.95 P. & P. 30p

DH025 STEREO HEADPHONES



Wonderful value and excellent performance combined. Adjustable headband. 8 ohm impedance. 20-12,000 cps. Complete with lead and plug.

Our Price £2.25 P. & P. 30p

HAND-HELD 2-WAY WALKIE-TALKIES



SKYFON—100MW. £84.95 pair. P902—2 CHANNEL 300MW. £88.50 pair. P1003—3 CHANNEL 1 Watt £71.95 pair. LICENCE REQUIRED FOR OPERATION IN U.K.

AUDIOTRONIC DIGITAL RADIO ADC.1



Covers AM 540 - 1600 KHz. FM 88 - 108 MHz with AFC Illuminated dial. 24 hour alarm setting. Wake up to the sound of music or loud buzzer. Sleep switch will automatically turn off radio etc. Internal speaker plus socket for earpiece or pillow speaker. AC 240v. Size 254 x 92 x 178mm. Complete with earpiece, and operating instructions. **OUR PRICE £12.50** P. & P. 50p.

SPECIAL BARGAIN! PHONIC 10 TWO WAY SPEAKER SYSTEM

Matched pair of compact bookshelf speakers of unique design incorporating 2" high frequency tweeter and 6" woofer. 8 ohms impedance. 10 watts power handling. Size 348 x 228 x 110mm.

GWS SPECIAL PRICE £9.95 per pair. P. & P. 50p plus VAT.

AUDIOTRONIC AHA101 STEREO HEADPHONE AMPLIFIER

All silicon transistor amplifier operated from magnetic ceramic or tuner inputs with twin stereo headphone outputs and separate volume controls for each channel. Operates from 9v battery. INPUTS: 6mV/100mV. OUTPUT: 60mV per channel.

Our Price £7.50 P. & P. 20p

AUDIOTRONIC AR.1000 SPORTSMAN AM/FM POLE BTRARADIO

5 wavebands covering AM 535 1065KHz, FM 88-106MHz, AIR 108-136MHz, PB 147-174MHz, WB 162.5MHz. Large horizontal slide dia with logging scale. Slider volume and squelch controls. 7 section telescopic aerial for FM and min. in ferrite bar for AM. AFC. Sln. speaker. Earpiece socket. Size 153 x 79 x 219mm. Battery/main operation. **OUR PRICE £11.50** P. & P. 25p.



AUDIOTRONIC AMB.500 MULTIBAND RADIO

5 wavebands covering MW 535-1600 KHz and FM 88-175MHz. All transistor. Battery or mains operation. Built in aerial and 6 section telescopic aerial. **OUR PRICE £11.50** P. & P. 25p.



BINATONE DS100 DIGITAL CLOCK

240v. mains operation. Tough case with large clear numbers for hours, minutes and seconds. Approx. size 6 1/2" x 3" x 3 1/4". **OUR PRICE £4.50** P. & P. 30p.

AUDIOTRONIC ACP.8 8 TRACK CAR PLAYER



12v neg. earth. Slider controls for Volume, Tone and Balance. Channel selector button with red pilot lamp, with speakers, mounting brackets and instructions. **Our Price £12.50** P & P 40p

AUDIOTRONIC DOLBY 'B' NOISE REDUCTION UNITS

Reduce tape hiss by 8dB at 600Hz, 4dB at 1900Hz and 10dB for all frequencies above 3000Hz. Size 16 1/2" x 8" x 3 1/4". AC 200/250v



PROCESS FOUR

For use with semi-professional tape recorders. Freq. res. 30Hz-20KHz ± 2dB. S/N better than 70dB. Full source tape monitoring. Record/Replay metering. Switchable multiplex filter. Supplied with test tape. **Our Price £50.00** P & P 50p

PROCESS TWO

For use with cassette and tape recorders. Freq. res. 30Hz-20KHz ± 2dB. Off tape monitoring. Switchable multiplex filter. Two Dolby calibration meters. S/N better than 70dB. Supplied with test cassette or tape as required. **Our Price £34.50** P & P 50p

FM TUNER CHASSIS

6 TRANSISTOR HIGH QUALITY TUNER. SIZE ONLY. Double tuned discriminator. Ample output to feed most amplifiers. Operates on 9V battery. Coverage 88-108MHz. Ready built ready for use. Fantastic value for money. **Our Price £5.95** P. & P. 20p



A1018 FM TUNER

Specification as above chassis but complete in cabinet with on/off switch. Size 7 1/2" x 5 1/4" x 6". **Our Price £9.65** P & P 30p



AUDIOTRONIC AM/FM Portable Radio AR3000

4 wavebands covering FM 87 - 108 MHz, MW 510 - 1605 KHz, LW 145 - 285 KHz, SW 5.8 - 12.5 MHz. Push button wave change plus AFC and on/off. Thumbwheel tuning. Slider volume and tone controls. Earphone socket. Built-in and telescopic aerials. Car aerial socket. Battery/Main operation. **OUR PRICE £14.95** P. & P. 50p



AUDIOTRONIC ACR3500 CAR RADIO



Manual tuning of Medium and Long waves. 12v pos. or neg. earth. Complete with speaker, mounting brackets and instructions. **Our Price £6.50** P & P 50p

SAVE UP TO 33 1/3% OR MORE! GWS

SUPER AKAI HI-FI BARGAINS CS35 Stereo Cassette Recorder



For conventional or Chromium Dioxide tape. 4 track record/playback. Volume and tone controls. Frequency response 40-16kHz (using CrO2 tape), distortion better than 2%, wow and flutter better than 0.2% RMB. Complete with pair of matching Akai CS85 speakers.

Rec. Price £96.10 **£56.50** P.&P. OUR PRICE 50p
MICROPHONES (P. & P. 50p)
ADM Dynamic (pair) £7.50

AUDIOTRONIC AHP-8D 8 Track Stereo Tape Deck

Can be used with most hi-fi amplifiers. Push button track selector and illuminated track indicators. Attractive cabinet with black and silver trim. Output level 750mV. AC 220/240V.

OUR PRICE **£11.95** P. & P. 50p.

AUDIOTRONIC AHP-8A 8 Track Stereo Tape Player



Incorporates built in amplifiers giving 2 1/2 + 2 1/2 watts rms output. Push button track selector, illuminated track indicators, slider controls for volume, balance and tone. Attractive cabinet with black and silver trim. Output impedance 8 ohms. AC 220/240V.

OUR PRICE **£17.25** P. & P. 50p.

SPECIAL PURCHASE! BSR 8 TRACK PLAYER CHASSIS

Famous BSR 8 track chassis as used in Model TD88 complete with silver and black escutcheon ready to fit into cabinet. Output 125mV. AC 240v. Overall size approx. 185 x 215 x 80mm.

OUR PRICE **£8.95** P. & P. 50p.

AUDIOTRONIC ACD.660 Stereo Cassette Deck



A beautifully styled 4 track stereo deck with an outstanding specification offered at a remarkably low price. Incorporates a host of features including switchable noise filter normal/chrome tape selector, twin VU meter, slider record/playback level controls, front panel headphone socket, recording indicator lamp, phono/DIN line input sockets, 3.5mm mike input sockets etc. etc. Frequency response 100-8kHz (100-12kHz CrO2) 8/N-45dB. Crosstalk 45dB. Separation-35dB. Noise limiter-6dB at 10kHz. Complete with phono connecting leads.

OUR PRICE **£39.50** Carr. & Ins. 50p

AUDIOTRONIC ACR.14 Battery Mains Cassette Recorder

Portable twin track mono recorder with automatic recording level control. Built in speaker. Earpiece socket. Input for radio or record player.

Fast forward and rewind. Output 500mW. AC 220/240V or 6V DC operation. Complete with remote control microphone, mains lead, earpiece and batteries.

OUR PRICE **£10.50** P. & P. 50p.

PORTABLE CASSETTE RECORDER

Instant recording and playing. Piano key controls. Automatic level control. Built in speaker. Complete with remote control microphone, carrying case and shoulder strap.

OUR PRICE **£8.50** P. & P. 50p.

AUDIOTRONIC LOW NOISE CASSETTES

Top Hi-Fi quality in library cases

TYPE	5	10	25
C60	£1.29	£2.53	£5.99
C90	£1.85	£3.62	£8.99
C180	£2.29	£4.48	£10.63

P. & P. 15p. Cassette Tape Head Cleaner 30p

3-STATION INTERCOM KE.630



Master and two sub stations. Can be used on desk or wall mounted. Complete with cable and batteries.

Our Price **£5.25** P & P 50p

MINUTEMAN MM3 POCKET CALCULATOR



Size only 4 1/4" x 3" x 1". 8 digit display with overflow and error indicators. Floating decimal. Add, subtract, multiples and divides. Chain and mixed calculations. Constant factor for series multiplication or division. Complete with batteries, instructions and case.

OUR PRICE **£23.95** P. & P. 25p

MINUTEMAN MM3M

as above with addition of memory key, per cent key and a fixed or floating decimal. Complete with rechargeable batteries, AC adaptor, instructions and case.

OUR PRICE **£28.50** P. & P. 25p

NEW! SINCLAIR BRIDGE CALCULATOR



To build yourself. Complete kit of parts with step by step instructions to build a full specification pocket sized calculator.

OUR PRICE **£24.95** P. & P. 50p.

(Also available ready built Rec. Price £29.95)

OUR PRICE **£27.20** P. & P. 25p

AUDIOTRONIC Stereo Headphones

LSH 20 Individual volume controls

Stereo mono switch. 8 ohms. 40-19,000 Hz. £3.50 P & P 30p

LSH 30 Open back type.

Individual tone and volume controls. 8 ohms. 20-20,000 Hz. £5.00 P & P 30p

LSH 40 Two way speaker system.

Individual volume controls. 8 ohms. 20-20,000 Hz. £6.95 P & P 30p

LSH 60 3" speaker unit.

8 ohms. 20-20,000 Hz. Complete with zipped carrying case. £8.50 P. & P. 30p

LQH.400 4-channel dynamic headphones.

Each earpiece has 4 drive units. 4-32 ohms. 20-20,000 Hz. £9.95 P. & P. 30p

LSH 50 Electro-static with self powered energiser and control unit with headphone/speaker selector.

4-32 ohms. 20-24 000 Hz. £15.95 P. & P. 30p

RECORD DECKS

Carriage and Packing 50p

B.S.R. McDONALD

CL14 Mini	£3.95
CL19 Mono	£5.50
CL17	£7.00
510/TPD1	£13.95
610	£10.55
610/TPD1	£15.45
710	£21.15
810	£26.30
MP60	£8.25
MP60/G800	£10.70
MP60/TPD1	£13.20
MP60/TPD2	£11.25
HT70	£11.60
HT70/G800	£14.25
HT70/TPD1	£21.55

CONNOISSEUR

BD1 Kit	£9.10
BD1 Chassis	£11.35
BD2/8A U2/Chassis	£22.70
BD2/8A U2/Plinth/Cover	£28.20

GARRARD

2025 T	£6.35
2025 TC/K840A	£6.95
8P25 III	£9.25
8P25111/G800	£10.95
8P25/M75-6	£13.90
AP76	£18.00
868B	£14.50
8L85B	£11.15
8L72B	£17.75
8L85B	£31.15
401	£24.35
ZERO 100A	£34.10
ZERO 100S	£31.40
Zero 100 8B	£27.00

GOLDRING

G99	£22.50
G101P/C	£22.50
GL89/2	£15.75
GL72	£25.45
GL72/P	£25.45
GL75	£32.20
GL76P	£41.65
GL78P/C	£56.25
GL85P/C	£72.00

RECORD DECK PACKAGES

Complete units with Stereo cartridge ready wired in plinth cover.

GARRARD

2025 TC/9TAHCD	£11.35
8P25 111/G800	£18.50
8P25 111/M44E	£17.95
8P25 111/M44-7	£17.50
8P25 111/M65E	£18.50
8P25 111 Module/M75-6	£19.45
AP76/G800	£26.45
AP76/G800E	£28.85
AP76/M44E	£27.70
AP76/M44-7	£27.20
AP76/M65E	£26.30
AP76/M75ED	£34.90
AP76/M75EJ	£30.90
AP76 Module M75-6	£29.10
868B Module/M75-6M	£32.50
AP76 Module M75-6	£33.20
ZERO 100S Module/M93E	£44.15
Zero 1008B Module/M75-6M	£44.20

B.S.R. McDONALD

210/8C7M	£7.40
MP60/G800	£18.50
MP60/TPD1/G800	£15.80
MP60/M44-7	£17.50
HT70/TPD1/G800	£19.20

GOLDRING

GL72/G800	£34.20
GL76/G800	£39.10
GL75/G800E	£41.55
GL78/G800	£42.45
GL78/G800E	£44.95

New Sinclair Hi-Fi Modules

PROJECT 80	
Z40	£4.30
Z60	£5.50
STEREO 80	£9.50
AFU	£3.95
P25	£6.30
P28	£6.30
P29 Mains transformer	£4.05
Project #05	£20.97

DIGITAL CLOCK MECHANISM DT.55B



Features 24 hour alarm setting with built-in buzzer. On/off and auto alarm 'sleep' switch. Illuminated rotary dial with hours, minutes and seconds. Automatically turns off TV, radio, light, etc. and with auto setting will switch on again when required. AC 240v. operation. Switch rating 250v. 3A.

OUR PRICE **£5.95** P. & P. 30p.

EMI LOUDSPEAKERS

Model 350. 13" x 8" with single tweeter/crossover. 20-20,000 Hz. 15 watt RMS. Available 8 or 15 ohms. £7.25 each. P. & P. 37p.

Model 450. 13" x 8" with twin tweeter/crossover. 55-13,000 Hz. 8 watt RMS. Available 8 or 15 ohms. £3.62 each. P. & P. 26p.

SPECIAL OFFER! STEREO SPEAKERS

Matched pair of stereo bookshelf speakers. Deluxe teak veneered finish. Size 14 1/2" x 9" x 7 1/2". 8 ohms. 8 watt RMS. 16 watt peak. Complete with DIN lead.

Our Price **£12.95** Carr. 50p

SPECIAL OFFER! FRUSTRATED EXPORT ORDER PHILCO FORD MODEL 5245 MAINS TAPE RECORDER

2 track BSR deck with push button controls for easy operation. Tape counter and volume control. Complete with hand microphone. Direct recording lead, 1200' reel of tape & spare spool. 200/250V AC operation. Fully guaranteed. OUR PRICE £17.50. C & P 75p.

PHILCO FORD MODEL 5248 MAINS TAPE RECORDER

4 track, 2 speeds (3 1/2 i.p.s. & 1 1/2 i.p.s.). Piano key type control, recording level meter, volume & tone controls etc. Complete with hand microphone, direct recording lead, 1800' of tape with spare spool. 200/250V AC operation fully guaranteed. OUR PRICE £27.50. C & P 75p.

LONDON'S LARGEST STOCKS INCLUDING PRODUCTS BY-



Prices on request or send S.A.E. for full Discount List

ALL EQUIPMENT IS FULLY GUARANTEED AND COVERED BY 12 MONTHS FREE SERVICE!

G.W.S.MITH & CO (radio) LTD

PERSONAL CALLERS WELCOME AT ANY OF OUR RETAIL BRANCHES

CENTRAL LONDON 257/8, Tottenham Court Rd. W.1. Tel: 01-580 0870 Tottenham Court Rd. W.1. Tel: 01-537 2332 77, Tottenham Court Rd. W.1. Tel: 01-536 3715 87, Tottenham Court Rd. W.1. Tel: 01-580 3739 21, Old Compton Street. W.1. Tel: 01-437 9369 3, Leslie Street, W. C.2. Tel: 01-437 8204 34, Leslie Street, W. C.2. Tel: 01-437 9155 118, Edgware Road, W.2. Tel: 01-723 0789 193, Edgware Road, W.2. Tel: 01-723 8211	ESSEX 313, Edgware Road, W.2. Tel: 01-262 0387 382, Edgware Road, W.2. Tel: 01-723 4194 152/3, Fleet Street, E. C.4. Tel: 01-353 2833 378, Harrow Road, W.9. Tel: 01-284 9530	SURREY 86, South Street, Romford. Tel: Romford 20218 1046, Whitgift Centre, Croydon. Tel: 01-881 3027 27, Eden Street, Kingston. Tel: 01-546 7845 32, Hill Street, Richmond. Tel: 01-948 1441
--	--	--

ALL BRANCHES OPEN 9 a.m. - 6 p.m. MONDAY TO SATURDAY

HEAD OFFICE and MAIL ORDER DEPARTMENT
UNIT 4, THE HYDE INDUSTRIAL ESTATE, THE HYDE, LONDON NW9 6JW
TELEPHONE 01-205 3735

PRICES SUBJECT TO 10% VAT

Order with confidence by Post-but remember to add 10% VAT to total value of order including carriage and packing and send cash with order. PLEASE PRINT NAME & ADDRESS CLEARLY IN CAPITALS.



TELEPHONED ORDERS ACCEPTED FROM ACCESS and BARCLAYCARD HOLDERS



CREDIT TERMS FOR PERSONAL CALLERS (on sales of £50 and over).

All prices correct as at 28-10-73 but subject to change without notice E & O L

Everyday Electronics Classified Advertisements

RATES: 9p per word (minimum 12 words). Box No. 20p. extra. Semi-display—£6.00 per single column inch. Advertisements must be prepaid and addressed to Classified Advertisements Department, "EVERYDAY ELECTRONICS," I.P.C. Magazines Ltd., Fleetway House, Farringdon Street, London EC4A 4AD.

RECEIVERS and COMPONENTS

TUNBRIDGE WELLS, components from Teleservice, 108 Camden Road, Tunbridge Wells, Kent. Telephone 31803.

COMPONENTS GALORE. Pack of 500 mixed components manufacturers surplus plus once used. Pack includes Resistors, carbon and W.W., capacitors various, transistors, diodes, trimmers, potentiometers etc. Send £1+10p p. and p. c.w.o. to CALEDONIAN COMPONENTS, Strathore Road, Thornton, Fife.

MUST GO! Electronic components. Pots, resistors, capacitors, etc. Send large stamped, addressed envelope for list. P. FASOLI, 28 Middleham Street, Manchester M14 7NG.

MINIATURE HIGSTAB RESISTORS
5% 1W 22Ω to 2.2M E12 series 10 each value. Total £10. £3.

ANTEX X25 25W SOLDERING IRON
R.R.P. £1.92. Our Price £1.57.
BC107 10p. BC108 9p. BC109 10p. 1N914 4p. 8 pin 741 30p.

NEK ELECTRONICS (E3)
28, Carnegie Road, St. Albans, Herts.
Please add 10p P. & P. Mail order only.

MINI MAINS TRANSFORMER 30 x 30 x 37mm. Cool, quiet, British. Pri. 220/250V. Type MT3 3-0-3V rms, 300mA, £1. MT7, 7-0-7V, 120mA, £1. VAT included. Use MT3 for 3V or 6V rectified d.c., MT7 for 9V or 18V. Circuits supplied. Mail order only, UK post 5p per order. Amatronic Ltd., 396 Selsdon Road, South Croydon, Surrey CR2 0DE.

COMPUTER PANELS 5-BC108; DIODES 4-55p (10p); WIRE ENDED NEONS 10-50p (5p); SILICON DIODES 680V 1A 10-35p (5p); 3 ASSORTED M.C. METERS 2"-3" £1-15 (27p); SILVER MICA CAPS 100 assorted 55p c.p.; POLYSTYRENE CAPS 100 assorted 75p c.p., your choice 2p each. FOUR WAY PIANO KEY SWITCH with interlock 35p (7p). 71b ASSORTED COMPONENTS 21-65 c.p.; 21b ASSORTED COMPUTER PANELS 21-65 c.p.

J.W.B. RADIO
2 Barnfield Crescent, Sale, Cheshire M33 1NL. Postage in brackets. Mail order only.

RESISTORS, 1/4 watt 5% 1p each, 9p for 10, 80p for 100. Lists 5p, post 10p plus 10% VAT. Chris Smith Components, 31 Priory, Neston, Cheshire.

DESOLDERWICK
SOLDER-ABSORBING WICK

Approx 1 cm. completely desolders a P.C.B. joint. Use with any 20-40W soldering iron. 30cm. Pack 25p inc. P./P. etc. Multipack. Four lengths of wick in various widths 80p inc. P./P. etc.

ORIENTATION LIMITED
Coverack, Cornwall.

EDUCATIONAL

TECHNICAL TRAINING in Radio, TV & Electronics thro' world-famous ICS. For details of proven home-study courses write ICS (Dept. 731A), Intertext House, London SW8.

SERVICE SHEETS

SERVICE SHEETS for Televisions, Radios, Transistors, Tape Recorders, Record Players, etc., from 5p with free Fault-Finding Guide, S.A.E. orders/enquiries. Catalogue 15p. Hamilton Radio, 47 Bohemia Road, St. Leonards, Sussex Telephone Hastings 29066.

FOR SALE

TIMBER Plywood cut to your requirements. **GENERAL WOODWORK SUPPLIES**, 76-80, Stoke Newington High Street, N16 5BR.

EXPERIMENTERS! Hundreds of unusual items cheap. Catalogue 51/2p. Grimsby Electronics, 64 Tennyson Road, Cleethorpes, Lincs. (Mail Order Only).

PROFESSIONALLY made Tutor Board. Varnish insulation. All main holes drilled. £1 incl. p&p. B. H. Malme, 'Newhaven', Mill Lane, East Runton, Norfolk.

TIMBER & PLYWOOD for tutor board drilled, glued ready for assembly. £1 postage included. Mail order only. J. Lhane, Oristown, Ceanannus Mor, County Meath, Eire.

WANTED

NEWNES RADIO and TV Servicing books wanted. From 1960-1966, £2 paid per copy by return post, any quantity bought. Bells' Television Services, Albert Place, Harrogate, Yorks. Telephone 0423 86844.

BOOKS

WORLD RADIO TV HANDBOOK 1974 (published December), £3.15. Delivered direct from Denmark if ordered now. How to Listen to the World (late October), £2. Postage and VAT included. Every order acknowledged immediately. David McGarva, PO Box 114, Edinburgh EH1 1HP.

RADIO BOOK SERVICE

Handbk of Transistor Equip & Substitutes..... 45p
Boys Bk of Crystal Sets and Simple Circuits..... 25p
How to make FM & TV Aerials, Bands 1, 2, 3..... 25p
Radio Servicing for Amateurs..... 25p
Transistor Test Equip & Servicing Manual..... 30p
Transit Circuits for Radio Controlled Models..... 45p
Modern Transistor Circuits for Beginners..... 45p
Electronic Novelties for the Motorist..... 55p
Manual of Electronic Circuits for the Home..... 55p

All prices include postage & packing

Dept E, 40 Elwill Way, Beckenham BR3 2RZ

MISCELLANEOUS

BEGINNERS, we exist for you. Instruction, components, constructional kits. Send S.A.E. to Electrolern, Lyburn Lodge, Nomansland, Wiltshire.

CONSTRUCTION AIDS. Screws, nuts, spacers, etc., in small quantities. Aluminium panels punched to spec. or plain sheet supplied. Fascia panels etched aluminium to individual requirements. Printed circuit boards-masters, negatives and boards, one-off or small numbers. Send 6p for list. **RAMAR CONSTRUCTOR SERVICES**, 29 Shelbourne Road, Stratford-on-Avon, Warks.

ALUMINIUM BOXES			
	For Veroboard	ADD 10% VAT	
AD7	2 1/2"	5 1/2"	29p + P&P 8p
AD8	4"	4"	29p + P&P 8p
AD9	4"	2 1/2"	29p + P&P 8p
AD10	4"	5 1/2"	35p + P&P 8p

PROFESSIONAL CASES from £1.50.

ADFONIC

18 Yew Lane, Ashley,
New Milton, HANTS BH25 5BA
CWO. Mail Order Only.
Component Catalogue FREE.

OMNI-DETECTORS

(Featured ★ TV ★ Radio ★ Net. Press)
Ancient art of Dowsing in Modern Guise. Thrill to new discovery in this over-looked aspect of the Electro-Magnetic Spectrum. A LABORATORY IN A SINGLE PACK. Treasure Hunter Use Omni-Detectors to—
* Locate ANY buried substance, ANY depth.
* Save hours of fruitless searching—MAP-DOWSING pinpoints search area before you leave home.
* Limitless other uses.
Dowsing used in World War 2 and by USA troops in Vietnam to locate underground springs, tunnels, mines.
Send only £2.99 + 15p p. & p. for unique pack of 4 dowsing instruments (non-electronic) and explicit 40-page manual to sole suppliers—Omni-Detector Co., (Dept. EE), 27, Latham Road, Twickenham, Middx. TW1 1BN.

RADIO & TELEVISION AERIAL BOOSTERS £2.95p, five television valves 45p. 50p bargain transistor packs, bargain £1 resistor and capacitor packs. UHF-VHF televisions £7.50, carr. £1.50p. S.A.E. for 3 leaflets. **ELECTRONIC MAIL ORDER (BURY) LTD.**, Bridge Street, Ramsbottom, Bury, Lancs.

P.E. SYNTHESISER KNOB KIT

Complete kit as Feb. issue £3.91 post free
43 knobs, 7 calibrated discs.
OE LUXE KIT as above but £5.89 post free
calibrated for programming

Inclusive postage and V.A.T.

RE-AN PRODUCTS LTD.
Burnham Road, Dartford, Kent
Tel.: Dartford 20705

DON'T LOOK

unless you can resist the temptation to get these super 'attention-getters':
★ Pocket-sized **MAXI-VOLT** Big 1/2 inch Spark Generator (instant 15,000 volts). Ready-made, needs no batteries. Carry it around anywhere. Only weighs about 3 oz. (85g.) send £1.35 for your Maxi-Volt now!

★ **Unique TRANSMITTER/RECEIVER** Kit. No licence examinations or tests required to operate this transistorised equipment. Easy to build. Get transmitting. Send £5.90 for yours now!

★ **Psychedelic MINI-STROBE** Kit. Take a pocket-sized lightning storm to Disco's and parties. 'Brain-freeze' 'em with vari-speed stop-motion flashes. Includes super case too. Send £2.20 now!
(All prices include V.A.T., packing, and postage.)

Send remittance to:
BOFFIN PROJECTS,
4 CUNLIFF ROAD,
STONELEIGH, EWELL, SURREY
(Mail order only)
Or for more details, send 15p for lists, plus free design project sheet.

COMPUTER PANELS

Type E: 4 OC29, 4 ACY18, 8 other transistors 35 diodes etc £1(10p); Type H: 12 ASZ20 + 178 other components 60p(10p); Type M: 17 silicon transistors, 2 trim pots, etc 50p (8p). 12 High quality panels including IC's, trim pots, power transistors etc £2(25p); 3lbs lower quality £1(25p); 7lbs £2(40p); 5lbs £12(c/p). **COMPUTER TAPE:** 1" x 1200' on 1" NAB spool 60p (25p); 3" x 1800' on 101" NAB spool in case 60p (40p).

71b BARGAIN PARCELS

Hundreds of NEW resistors, capacitors, pots, switches, crystals, PC boards etc, loads of odds & ends. Only £1-65(37p).

CASED AMPLIFIERS

4 valve amplifier with tone and volume controls giving 3 watts output into the 74" 32 speaker. Oak-faced cabinet 14" x 13" x 9" also contains non-standard tape deck. Mains operated, tested in good working condition. Only £3 (£1 up to 200 miles, £1-20 over). Suitable cassettes £1(25p); spare heads 40p. Amplifier chassis only, complete and tested £1-95 (40p)

NEW COMPONENTS: 741C 32p, BC107 6p; 2N3055 35p; OC140 25p; OC170 15p; BCY72 8p. **VAT NOT INCLUDED—ADD 10% TO TOTAL.** Carriage in brackets, small parts 4p. SAE list, enquiries.

GREENWELD ELECTRONICS [EE8]

24 Goodhart Way, West Wickham, Kent
Shop at 21 Deptford Broadway, SE8
Tel: 01-492 2005 and 38 Lower Addiscombe Rd., Croydon. Callers most welcome.



£12-65

A precision tool using a combination of balanced and compressed oxygen or microox. Gives a flame of pencil lead thickness. Adjustable temperatures up to 5,000°F. Lights instantly, no priming. Cuts metals, welds, brazes and solders, etc. gold and silver. Ideal for electronics and electrical engineering, jewellers, clock-makers, silversmiths. Up to 40 mins operation using fuel supplied. Replacement set of 2 microox and 1 butane cylinders £1-45 inc. post, with instructions. Our price £12-65 35p P.A.P. Send £13-00.

BINOCULAR MAGNIFIER



£6-65

See close-up work with less eye strain and fatigue. Lightweight adjustable headband. Powerful optically ground lenses from Continental glassworks. Can be worn over normal glasses. An essential aid in electronics, home and modelling, stamp collecting, jewellers, watchmakers and any fine work 2x magnification, £6-65 + 40p p. & p. 3x model 65p extra. State model.

JOHN DUDLEY & CO. LTD. (Dept EE5), 301 Cricklewood Lane, London, NW2. Tel.: 01-458 5917. Callers Welcome.

If you have difficulty in obtaining

Everyday Electronics

Please place a regular order with your newsagent or send 1 year's subscription (£2-35) to:—

Subscription Department,
Everyday Electronics,
Tower House,
Southampton Street,
London, WC2E 9QX

ELECTRONI-KIT

Electronic fun for all ages

THE MOST VERSATILE ELECTRONICS KITS

All components are beautifully encapsulated in unbreakable transparent plastic blocks. Perfect connections are made WITHOUT SOLDERING, SCREWING OR WIRING.

INCREDIBLE VALUE. Build, dismantle and re-build projects any number of times and invent your own experiments too.

COMPLETELY SAFE, Instructive and FUN - all kits operate from 9 V. battery only.

VALUABLE MANUALS included with every kit. NO PREVIOUS KNOWLEDGE IS REQUIRED, even with the largest kits.

Kit 2A: radios, amplifiers, microphones, alarms, Morse code etc. 30 experiments £4-95

Kit 35: 20 plus electronic birds, cats, siren organs, metronomes, light & sound, alarms, etc. 100 experiments £14-50

Kit 36: as 35 plus solar cell projects and complete sophisticated control panel, etc. 105 experiments £17-75

Kit 40: as 36 plus Relay & Meter project—ameter, volt., resist., water purity, ion conc., volume., Output., field intensity., illuminometer etc. 150 experiments £24-25

Add-on parts and manuals as required.

UNIVERSITY & HOSPITAL LABS. are using our large kits for PRACTICAL as well as demonstr. purposes.

All prices include Battery, VAT & P.A.P. Cheque/P.O. (or 5p. for catalogue) to 1

Satisfaction guaranteed

ELECTRONI-KIT LTD. 408 St. John's Street, London, EC1. (01-278 4579)

Please mention

EVERYDAY ELECTRONICS

when replying to Advertising

INTER-LOCKING PLASTIC STORAGE DRAWERS



Newest, neatest system ever devised for storing small parts and components: resistors, capacitors, diodes, transistors, etc. Rigid plastic units, interlock together in vertical and horizontal combinations. Transparent plastic drawers have label slots/1D + 2D have removable Space divider. Build up any size cabinet for wall, bench or table top. **SINGLE UNITS** (5" x 2 1/2") £1-40 Dozen, **DOUBLE UNITS** £2-30 Dozen, **TREBLE (3D)** £2-50 for 8 **DOUBLE TREBLE 2** drawers in one outer case (6D2) £3-60 for 8 **EXTRA LARGE SIZE (6D1)** £3-40 for 8.

PLUS QUANTITY DISCOUNTS! Order £10 and over Deduct 5% in the £. Order £20 and over Deduct 7 1/2% in the £. Order £30 and over Deduct 10% in the £. Pack./Post./Carr.: Add 35p to all orders under £10. Orders over £10 P/P/C free.

PLEASE ADD 10% VAT TO TOTAL REMITTANCE

(Dept. EE12), 124 CRICKLEWOOD BROADWAY, LONDON N.W.2

FLAIRLINE SUPPLIES

JOSTY KITS SPECIAL OFFER

To celebrate our introduction to this famous range of Danish kits we are offering them free of VAT and postage. All models are available. For prices see the Radio Supplies advert or send an s.a.e. to us.

BATTERY ELIMINATOR BARGAIN

The most versatile eliminator ever offered. Input from AC mains. Output selected by switch is 3, 4, 5, 6, 7, 5, 9 and 12V DC at 500 mA. ONLY £3-66 (58p)



NEW SINCLAIR CAMBRIDGE CALCULATOR

ONLY £28-48 (£3-00) Fully built

SINCLAIR EQUIPMENT



Project 605 £19-80 (£2-30)
Pro 80 AFU £5-38 (74p), Pro 80 tuner £8-95 (£1-10)
240 £4-25 (63p) Stereo 80 Preamp £8-53 (£1-05)
260 £5-38 (74p) Project 80 decoder £5-69 (77p)
230 £3-56 (55p) Stereo 60 £7-68 (98p)
250 £4-38 (65p) Trans for PZ8 £2-95 (50p)
PZ5 £3-47 (57p) 2000 Amp £28-98 (£3-00)
PZ8 £8-38 (63p) PZ8 £8-48 (84p)
AFU £4-48 (64p) Q16 speaker £5-98 (79p)

PROJECT 60 KIT £2-70 (40p)
Our extremely popular kit contains the extra capacitors, diu pins and sockets, cable and fuse-holder needed to complete Project 60.

IC RADIO CHIP TBA851 £2-10 (32p)
The World's most advanced IC radio chip. Contains RF Amp, oscillator, mixer, IF Amps, wide range AGC circuitry and voltage stabilizer. With data £2-10 (32p). Send S.A.E. for free leaflet. A kit of resistors, capacitors and IF filters is available to go with the chip for £1-75 (29p).

SINCLAIR SUPER IC12 £2-10 (43p)

Supplied complete with free 44 page instruction booklet and printed circuit



IC12 DELUXE KIT
Includes all parts for the printed circuit and volume, bass and treble controls needed to complete the mono version £1-58 (39p). Stereo model with balance control £2-50 (46p).

BASIC KIT FOR THE IC12
Contains components for P.C. board and volume and simple tone controls. Mono version £1-25 (24p). Stereo model with balance control £2-98 (40p).

IC12 POWER KIT
A set of components to construct a 28V 0.5 Amp power supply £2-47 (50p).

LOUDSPEAKERS FOR THE IC12
5" x 8 ohm £1-10 (67p). 5" x 8" 8 ohm £1-55 (37p). 10" x 6" 15 ohm £2-20 (44p).

IC12 PREAMPLIFIER KITS
Type 1 for magnetic pickups, mica and tuners, Mono model £1-30(24p). Stereo model £2-30 (34p). Type 2 for ceramic or crystal pickups. Mono model 60p (17p). Stereo £1-20 (23p).

SEND SAE FOR FREE LEAFLET ON KITS

S-DECS AND T-DECS

S-DECS £1-44 (25p)
T-DECS £2-68 (40p)
μ-DEC A £3-10 (43p)
μ-DEC B £5-94 (71p)



SWANLEY ELECTRONICS

32 Goldsel Rd., Swanley, Kent
Please add the sum shown in brackets after the price to cover the cost of post and VAT. Official credit orders from local authorities and school etc., welcome. Lists 10p. Mail order only. No callers, please.

YATES ELECTRONICS (FLITWICK) LTD

DEPT. E.E., ELSTOW STORAGE DEPT.
KEMPSTON HARDWICK,
BEDFORD.

C.W.O. PLEASE. POST AND PACKING
PLEASE ADD 10p TO ORDERS UNDER £2.

Catalogue which contains data sheets for most of the
components listed will be sent free on request.
10p stamp appreciated.

Callers Welcome Mon. to Sat. 9 a.m. 5 p.m.

PLEASE ADD 10% VAT

RESISTORS

1/4W Iskra high stability carbon film—very low noise—capless construction.
1/4W Mullard CR25 carbon film—very small body size 7.5 x 2.5 mm.
1W 2% ELECTROSIL TRS.

Power watts	Tolerance	Range	Values available	1-99	100+
1/4	5%	4-7Ω-2.2MΩ	E24	1p	0-8p
1/4	10%	3-3MΩ-10MΩ	E12	1p	0-8p
1/4	2%	10Ω-1MΩ	E24	3-5p	3p
1/4	10%	1Ω-3.9Ω	E12	1p	0-8p
1/4	5%	4-7Ω-10MΩ	E12	1p	0-8p
1/4	10%	1Ω-1MΩ	E12	6p	3-5p

Quantity price applies for any selection. Ignore fractions on total order.

DEVELOPMENT PACK

0.5 watt 5% Iskra resistors 5 off each value 4-7Ω to 1MΩ.
E12 pack 325 resistors £2.40. E24 pack 650 resistors £4.70.

POTENTIOMETERS

Carbon track 5kΩ to 2MΩ, log or linear (log 1/2W, 11n 1/2W).
Single, 12p. Dual gang (stereo), 40p. Single D.P. switch, 24p.

SKELETON PRESET POTENTIOMETERS

Linear: 100, 250, 500Ω and decades to 3MΩ. Horizontal or vertical P.C. mounting (0-1 matrix).
Sub-miniature 0-1W, 5p each. Miniature 0-25W, 7p each.

TRANSISTORS

AC107	15p	AF126	20p	8F115	25p	OC42	12p	2N3707	12p
AC126	12p	AF139	32p	BF173	20p	OC44	12p	2N3708	10p
AC127	15p	AF178	20p	BF178	32p	OC70	12p	2N3709	11p
AC128	15p	AF180	40p	BF178	32p	OC70	12p	2N3710	11p
AC131	12p	AF181	40p	BF179	32p	OC71	12p	2N3711	11p
AC132	12p	BC107	12p	BF180	32p	OC72	12p	2N3819	32p
AC136	15p	BC108	12p	BF181	32p	OC81	12p	2N4062	12p
AC187	22p	BC109	12p	BF194	14p	OC82D	12p	2N4286	20p
AC188	22p	BC147	12p	BF195	14p	2N2646	60p	2N4287	20p
AD140	80p	BC148	12p	BF197	15p	2N2904	20p	40360	35p
AD149	45p	BC149	12p	BF200	32p	2N2926	10p	40361	35p
AD161	33p	BC157	14p	BFY50	20p	2N3054	58p	40362	40p
AD162	36p	BC158	14p	BFY51	20p	2N3055	60p	40408	40p
AF114	20p	BC159	14p	BFY52	20p	2N3702	13p	ZTX108	15p
AF115	20p	BC187	22p	BUY105	225p	2N3703	12p	ZTX300	15p
AF116	20p	BD131	75p	OC26	45p	2N3704	13p	ZTX302	20p
AF117	20p	BD132	75p	OC28	50p	2N3705	12p	ZTX500	15p
AF118	38p	BD133	75p	OC35	50p	2N3706	11p	ZXT503	20p

ZENER DIODES

400mW 5% 3-3V to 30V, 12p. | WIRE WOUND POTS. 3W, 10, 25, 50Ω and decades to 100kΩ, 35p.

DIODES

DIODES RECTIFIER	Signal	Power
BY127	OA85	7p
IN4001	OA90	5p
IN4002	OA91	5p
IN4004	OA202	7p
IN4006	IN4148	5p
IN4007	BA114	8p

BRUSHED ALUMINIUM PANELS

12in x 6in, 25p; 12in x 2 1/2in, 10p; 9in x 2 1/2in, 7p

SLIDER POTENTIOMETERS

86mm x 9mm x 16mm, length of track 59mm.
SINGLE 10K, 25K, 100K log. or lin. 40p.
DUAL GANG 10K + 10K etc. log. or lin. 60p.
KNOB FOR ABOVE, 12p.
FRONT PANEL, 65p.

18 Gauge panel 12in x 4in with slots cut for use with slider pots. Grey or matt black finish complete with fixings for 4 pots.

THERMISTORS

VA10555	15p
VA10665	15p
VA1077	15p
R53	£1.35

THYRISTORS

2N5060	50V 0-8A	30p
2N5064	200V 0-8A	47p
106F	50V 4A	40p
106D	400V 4A	35p

MULLARD POLYESTER CAPACITORS C296 SERIES

400V: 0-001μF, 0-0015μF, 0-0022μF, 0-0033μF, 0-0047μF, 21p, 0-0068μF, 0-01μF, 0-015μF, 0-022μF, 0-033μF, 3p, 0-047μF, 0-068μF, 0-1μF, 4p, 0-15μF, 6p, 0-22μF, 7p, 0-33μF, 1p, 0-47μF, 13p.

150V: 0-01μF, 0-015μF, 0-022μF, 0-033μF, 0-047μF, 0-068μF, 3p, 0-1μF, 3p, 0-15μF, 4p, 0-22μF, 5p, 0-33μF, 6p, 0-47μF, 7p, 0-68μF, 11p, 1-0μF, 13p.

MULLARD POLYESTER CAPACITORS C280 SERIES

250V P.C. mounting: 0-01μF, 0-015μF, 0-022μF, 3p, 0-033μF, 0-047μF, 0-068μF, 3p, 0-1μF, 4p, 0-15μF, 0-22μF, 5p, 0-33μF, 6p, 0-47μF, 8p, 0-68μF, 11p, 1-0μF, 13p. 1-5μF, 20p, 2-2μF, 24p.

MYLAR FILM CAPACITORS 100V

0-001μF, 0-002μF, 0-005μF, 0-01μF, 0-02μF, 2p, 0-04μF, 0-05μF, 0-068μF, 0-1μF, 3p, 1μF, 4p.

CERAMIC DISC CAPACITORS

100pF to 10,000pF, 2p each.

ELECTROLYTIC CAPACITORS

(μF/v) 1/63, 1-5/63, 2-2/63, 3-3/63, 4-7/63, 6-8/40, 6-8/63, 10/25, 10/63, 15/16, 15/40, 15/63, 22/10, 22/25, 22/63, 33/6-3, 33/16, 33/40, 47/4, 47/10, 47/25, 47/40, 68/6-3, 68/16, 100/4, 100/10, 100/25, 150/6-3, 150/16, 220/4, 220/16, 220/6-3, 220/10, 47/63, 100/40, 150/25, 220/25, 330/10, 470/6-3, 7p, 68/63, 150/40, 220/40, 330/16, 1000/4, 10p, 470/10, 680/6-3, 11p, 100/63, 150/63, 220/63, 1000/10, 12p, 470/25, 680/16, 1500/6-3, 13p, 470/40, 680/25, 1000/16, 1500/10, 2200/6-3, 18p, 330/63, 680/40, 1000/25, 1500/16, 2200/10, 3300/6-3, 4700/4, 21p.

SOLID TANTALUM BEAD CAPACITORS

Value	1μF	2μF	32μF	16V	12p
0-22μF	35V	2-2μF	35V	32μF	16V
0-47μF	35V	4-7μF	35V	47μF	6-3V
1-0μF	35V	10μF	25V	100μF	3V

VEROBOARD

Value	0.1	0.15
2 1/2 x 3 1/2	22p	16p
2 1/2 x 5	24p	24p
3 1/2 x 3 1/2	24p	24p
3 1/2 x 5	27p	27p
17 x 2 1/2	75p	57p
17 x 3 1/2	100p	78p
17 x 5 (plain)	—	82p
17 x 3 1/2 (plain)	—	60p
17 x 2 1/2 (plain)	—	42p
2 1/2 x 5 (plain)	—	12p
2 1/2 x 3 1/2 (plain)	—	11p
Pin insertion tool	52p	52p
Spot face cutter	42p	42p
Pkt. 50 pins	20p	20p

JACK PLUGS AND SOCKETS

Standard screened	18p	2-5mm insulated	8p
Standard insulated	12p	3-5mm insulated	8p
Stereo screened	35p	3-5mm screened	13p
Standard socket	15p	2-5mm socket	8p
Stereo socket	18p	3-5mm socket	8p

D.I.N. PLUGS AND SOCKETS

2 pin, 3 pin, 5 pin 180°, 5 pin 240°, 6 pin
Plug 12p. Socket 8p.
4 way screened cable, 15p/metre.
6 way screened cable, 22p/metre.

BATTERY ELIMINATOR

£1.50
9V mains power supply. Same size as PP9 battery.

LARGE (CAN) ELECTROLYTICS

1600μF	64V	74p	2500μF	64V	80p	4500μF	16V	50p
2500μF	40V	74p	2800μF	100V	£2.60	4500μF	25V	£1.68
2500μF	50V	58p	3200μF	16V	50p	5000μF	50V	£1.10

HIGH VOLTAGE TUBULAR CAPACITORS—1,000 VOLT

0-01μF	10p	0-047μF	13p	0-22μF	20p
0-022μF	12p	0-1μF	13p	0-47μF	22p

POLYSTYRENE CAPACITORS 160V 21%

10pF to 1,000pF E12 Series Values, 4p each.

SMOKE AND COMBUSTIBLE GAS DETECTOR—GDI

The GDI is the world's first semiconductor that can convert a concentration of gas or smoke into an electrical signal. The sensor decreases its electrical resistance when it absorbs oxidizing or combustible gases such as hydrogen, carbon monoxide, methane, propane, alcohol, North Sea gas, as well as carbon-dust containing air or smoke. This decrease is usually large enough to be utilized without amplification. Full details and circuits are supplied with each detector.
Detector GDI, £2. Kit of parts for detectors including GDI and P.C. board but excluding case. Mains operated detector £5-20. 12 or 24V battery operated audible alarm £7-30. As above for PP9 battery, £6-40.

PRINTED BOARD MARKER

97p
Draw the planned circuit onto a copper laminate board with the P.C. Pen, allow to dry, and immerse the board in the etchant. On removal the circuit remains in high relief.

LARGE RANGE ITT/TEXAS IC's NOW IN STOCK

PRICES ARE CALCULATED ON TOTAL NUMBER ORDERED REGARDLESS OF MIX

1-11	12-24	25-99	100+	7448	185	175	170	165	74118	100	82	73	64
7400	18	16	14	7450	18	16	14	13	74121	43	40	38	36
7401	18	16	14	7451	18	16	14	13	74141	30	28	26	24
7402	18	16	14	7453	18	16	14	13	74145	150	140	135	130
7403	18	16	14	7454	18	16	14	13	74150	330	280	250	220
7404	20	18	16	7460	18	16	14	13	74151	110	100	95	89
7405	20	18	16	7470	30	28	25	24	74153	120	110	105	95
7406	40	36	32	7472	30	28	27	23	74154	200	180	170	160
7407	56	50	44	7473	40	36	36	23	74155	150	120	100	85
7408	36	30	27	7474	40	36	32	28	74156	130	120	100	96
7409	36	30	27	7475	58	52	50	49	74180	185	136	112	105
7410	18	16	14	7476	40	36	32	30	74190	195	190	185	180
7411	23	21	18	7480	100	95	90	85	74191	195	190	185	180
7412	36	30	27	7481	125	115	110	105	74192	200	190	180	164
7413	34	28	26	7482	100	95	90	85	74193	200	180	170	150
7414	34	28	26	7483	100	95	92	85	74196	200	190	180	170
7416	45	43	39	7484	120	115	110	105	74197	200	195	180	170
7420	18	16	14	7485	250	245	240	230					
7421	36	30	27	7486	48	42	37	33					
7426	32	29	23	7490	75	67	60	52					
7430	20	18	16	7491A	100	92	85	79					
7432	40	36	32	7492	75	70	65	60					
7440	20	18	16	7493	75	68	60	52					
7441	80	75	70	7494	95	90	85	80					
7442	80	75	70	7495	105	100	95	90					
7													

FREE!

Over 150 ways to engineer a better future

HIGHER PAY

A BETTER JOB

SECURITY

find out how in just 2 minutes

That's how long it will take you to fill in the coupon. Mail it to B.I.E.T. and we'll send you full details and a free book. B.I.E.T. has successfully trained *thousands* of men at home - equipped them for higher pay and better, more interesting jobs. We can do as much for YOU. A low-cost B.I.E.T. home study course gets results fast - makes learning easier and something to look forward to. There are no books to buy and you can pay-as-you-learn.

Why not do the thing that really interests you? Without losing a day's pay, you could quietly turn yourself into something of an expert. Complete the coupon (or write if you prefer not to cut the page). No obligation and nobody will call on you... but it could be the best thing you ever did.

Others have done it, so can you

"Yesterday I received a letter from the Institution informing that my application for Associate Membership had been approved. I can honestly say that this has been the best value for money I have ever obtained - a view echoed by two colleagues who recently commenced the course".—Student D.I.B., Yorks.

"Completing your course, meant going from a job I detested to a job that I love, with unlimited prospects".—Student J.A.O. Dublin.

"My training with B.I.E.T. quickly changed my earning capacity and, in the next few years, my earnings increased fourfold"—Student C.C.P., Bucks.

FIND OUT FOR YOURSELF

These letters - and there are many more on file at Aldermaston Court - speak of the rewards that come to the man who has given himself the specialised know-how employers seek. There's no surer way of getting ahead or of opening up new opportunities for yourself. It will cost you a stamp to find out how we can help you. Write to B.I.E.T. Dept. BEE 23, Aldermaston Court, Reading RG7 4PF.



Practical Radio & Electronics Certificate course includes a learn while you build **3 transistor radio kit.**

Everything you need to know about **Radio & Electronics** maintenance and repairs for a **spare time income** and a **career** for a better future.



CUT OUT THIS COUPON
Tick or state subject of interest. Post to address below.

<input type="checkbox"/> MECHANICAL Society of Engineers—A.M.S.E. (Mech.) <input type="checkbox"/>	<input type="checkbox"/> DRAUGHTSMANSHIP Institute of Engineers Designers (A.M.I.E.D.) <input type="checkbox"/>	<input type="checkbox"/> A.B.T. Clerk of Works <input type="checkbox"/>
<input type="checkbox"/> Institute of Engineers & Technicians (A.M.I.E.) <input type="checkbox"/>	<input type="checkbox"/> General Draughtsmanship <input type="checkbox"/>	<input type="checkbox"/> Construction Surveyors Institute—L.C.S.I. CITY & GUILDS <input type="checkbox"/>
<input type="checkbox"/> CITY & GUILDS Gen. Mech. Eng. <input type="checkbox"/>	<input type="checkbox"/> Elec. Draughtsmanship <input type="checkbox"/>	<input type="checkbox"/> General Building (all branches) <input type="checkbox"/>
<input type="checkbox"/> Maintenance Eng. <input type="checkbox"/>	<input type="checkbox"/> Architectural Draughtsmanship <input type="checkbox"/>	<input type="checkbox"/> Heating & Vent. Inst. Clerk of Works <input type="checkbox"/>
<input type="checkbox"/> Welding <input type="checkbox"/>	<input type="checkbox"/> Technical Drawing <input type="checkbox"/>	<input type="checkbox"/> Site Surveying <input type="checkbox"/>
<input type="checkbox"/> Gen. Diesel Eng. <input type="checkbox"/>	<input type="checkbox"/> ROAD & TELE-COMMUNICATIONS CITY & GUILDS. Radio, TV/Telecoms. <input type="checkbox"/>	<input type="checkbox"/> Health Engineering <input type="checkbox"/>
<input type="checkbox"/> Sheet Metal Work <input type="checkbox"/>	<input type="checkbox"/> Gen. Radio & TV Eng. <input type="checkbox"/>	<input type="checkbox"/> Road Construction Quantities. Estimates Hydraulics Structural Eng. <input type="checkbox"/>
<input type="checkbox"/> Eng. Inspection <input type="checkbox"/>	<input type="checkbox"/> Radio Amateurs Exam <input type="checkbox"/>	<input type="checkbox"/> GENERAL Agricultural Eng. <input type="checkbox"/>
<input type="checkbox"/> Eng. Metallurgy <input type="checkbox"/>	<input type="checkbox"/> Radio Servicing <input type="checkbox"/>	<input type="checkbox"/> Council of Eng. Institutions <input type="checkbox"/>
<input type="checkbox"/> ELECTRICAL & ELECTRONIC Society of Engineers—A.M.S.E. (Elec.) <input type="checkbox"/>	<input type="checkbox"/> Colour TV <input type="checkbox"/>	<input type="checkbox"/> Farm Science <input type="checkbox"/>
<input type="checkbox"/> CITY & GUILDS Gen. Electrical Engineering <input type="checkbox"/>	<input type="checkbox"/> AUTOMOBILE & AERONAUTICAL Institute of the Motor Industry <input type="checkbox"/>	<input type="checkbox"/> Plastics <input type="checkbox"/>
<input type="checkbox"/> Electrical Installations <input type="checkbox"/>	<input type="checkbox"/> A.M.I. MAA/IMI CITY & GUILDS Auto Eng. <input type="checkbox"/>	<input type="checkbox"/> Supplementary courses for Nat. Certificates. <input type="checkbox"/>
<input type="checkbox"/> Electrical Maths <input type="checkbox"/>	<input type="checkbox"/> Gen. Auto Eng. <input type="checkbox"/>	<input type="checkbox"/> G.C.E. — choose from 58 'O' & 'A' level subjects. <input type="checkbox"/>
<input type="checkbox"/> Computer Electronics <input type="checkbox"/>	<input type="checkbox"/> Motor Mechanics <input type="checkbox"/>	<input type="checkbox"/> Coaching for many exams, including C & G and assistance in ONC/HNC. <input type="checkbox"/>
<input type="checkbox"/> Electronic Eng. <input type="checkbox"/>	<input type="checkbox"/> Auto Diesel Eng. <input type="checkbox"/>	
<input type="checkbox"/> Practical Radio & Electronics (with kit) <input type="checkbox"/>	<input type="checkbox"/> Garage M'ment. <input type="checkbox"/>	
<input type="checkbox"/> MANAGEMENT & PRODUCTION Institute of Cost & Management Acctnts. <input type="checkbox"/>	<input type="checkbox"/> ARB Aero Engineering Certs. <input type="checkbox"/>	
<input type="checkbox"/> Computer Programming <input type="checkbox"/>	<input type="checkbox"/> Gen. Aero Eng. <input type="checkbox"/>	
<input type="checkbox"/> Works M'ment. <input type="checkbox"/>	<input type="checkbox"/> CONSTRUCTIONAL Society of Engineers—A.M.S.E. (Civ.) <input type="checkbox"/>	
<input type="checkbox"/> Work Study <input type="checkbox"/>	<input type="checkbox"/> Institute of Building—L.I.O.B. <input type="checkbox"/>	
<input type="checkbox"/> Gen. Production Eng. <input type="checkbox"/>		
<input type="checkbox"/> Estimating & Planning <input type="checkbox"/>		
<input type="checkbox"/> Storekeeping <input type="checkbox"/>		
<input type="checkbox"/> Management Skills <input type="checkbox"/>		
<input type="checkbox"/> Quality Control <input type="checkbox"/>		

POST TODAY FOR A BETTER TOMORROW

To B.I.E.T., Dept. BEE 23 QN Aldermaston Court, Reading RG7 4PF BEE 23

NAME _____
Block Capitals Please
ADDRESS _____

OTHER SUBJECTS _____
AGE _____

Accredited by C.A.C.C.

BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY

Published approximately the third Friday of each month by IPC Magazines Ltd., Fleetway House, Farringdon Street, London, E.C.4 4AD. Printed in England by Index Printers Ltd., Dunstable, Beds. Sole Agents for Australia and New Zealand—Gordon & Gotch (A/Sia) Ltd. South Africa—Central News Agency Ltd. Publisher's Subscription Rate (including postage): For one year to any part of the world £2.35. Everyday Electronics is sold subject to the following conditions, namely that it shall not, without the written consent of the Publishers first given, be lent, resold, hired out or otherwise disposed of by way of Trade at more than the recommended selling price shown on the cover, and that it shall not be lent, resold or hired out or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade, or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever.

Henry's

DONT RELY ON YOUR MEMORY BUY NOW AT BARGAIN PRICES
Order your latest Henry's Catalogue Price 55p post paid complete with Discount Vouchers



You pay less VAT with Henry's Low Prices

BUILD THE TEXAN

Now built and used by thousands of satisfied customers. Features slim design overall size in cabinet 15 1/2" x 2 1/2" x 6 1/2". 6-IC's, 10 transistors, stabilisers Gardners low field transformer, Fibre Glass PC Panel, complete chassis work. Now available built and tested as well as in kit form. **HIGH QUALITY & STABILITY ARE PREDOMINATE FEATURES — DEVELOPED BY TEXAS ENGINEERS FOR PERFORMANCE, RELIABILITY AND EASE OF CONSTRUCTION, FACILITIES.** On/off switch indicator, headphones socket, separate treble, bass, volume and balance controls, scratch and rumble filters, mono/stereo switch, input selector: Mag. P.U., Radio Tuner, Aux. Can be altered for Mic., Tape, Tape-head, etc. Construction details Ref. No. 21 30p. Distributed L. Henry's throughout UK. FREE—Teak cabinet with complete kit.



20 + 20 WATT IC STEREO AMPLIFIER
As featured by Practical Wireless 1972

Kit price **£28.50** (+VAT +50p carr/packing) or built and tested **£35.00** (+VAT +50p as illustrated).

EARN YOURSELF EASY MONEY, WITH PORTABLE DISCO EQUIPMENT

- DISCO MINI** A complete portable disco, fitted mixer/preamp, 2 decks all facilities. **£98.50**
As above but with Slider Controls **£118.50**
100 watt amplifier for above **£42.50**
SL100 100 watt mixer/amplifier with slider controls **£69.00**
R50 50 watt mixer/amplifier **£49.50**
R100 100 watt mixer/amplifier **£57.50**
DISCO AMP 100 watt mixer/amplifier chassis unit. **£69.50**
DISCO MIXER/PREAMPLIFIERS (OP for up to 6-100 watt amplifiers)
SDLI (rotary controls) **£49.50**
SDLII (slider controls) **£58.50**
DISCO VOX (slider controls) the complete disco preamp **£69.50**
DJ100 100 watt power amplifier for above **£42.50**
DJ30L 3 channel 3kw sound to light **£31.50**
DJ40L as 30L plus built in microphone **£41.95**
DIMAMATIC 1 kW adjustable speed auto dimmer **£25.00**
Carlsboro Reverberation Unit **£44.00**
SCENE STROBE **£19.00**. **ROAD STROBE** **£25.00**. **SUPER STROBE** **£45.**
Disco anti-feedback microphone **£11.95**
Cote 150 watt liquid wheel projector **£22.50**
150 watt QI liquid wheel projector **£50.00**
150 watt QI cassette wheel projector **£50.00**
Spare Effects and liquid cassettes large range of patterns **£6.00**
6 Inch Liquid wheels **£5.00**
Mini spot bank fitted 3 lamps **£12.95**
Auto Trillite (mini with flashers) **£17.00**
Bubblemaster with 1 gall. liquid Mixer/s/Mics/Speakers/Lighting **£41.15**
U.K.'s largest range of Disco Lighting, FREE STOCK LIST REF. No. 18 ON REQUEST.
AKG / RESLO / DJ / CARLSBORO / EAGLE MICS., STANDS, MIXERS, CABINETS, CHASSIS AND COMPLETE SPEAKER SYSTEMS, MEGAPHONES, TURNABLES, PUBLIC ADDRESS COMPONENTS.



All prices carr. paid (UK) (VAT EXTRA)
Barclaycard/Access call, write or phone your order 01-723-6963—easy terms for callers.

TEXAN STEREO SYSTEM PLUS PRICE SAVINGS



The Texan Stereo Systems include the high quality Texan Stereo amplifier assembled and ready to use. A pair of Type 200 20 watt Speaker-Tweeter systems size 21" x 12" x 10" and a choice of Garrard players built into a plinth with cover with Goldring G800 magnetic cartridge. System 25 uses Garrard SP25 Mk III and system 76 the Garrard AP76 de luxe turntable. All necessary leads are supplied.

System 25 (list approx. £109) **£79.50**
System 76 (list approx. £117) **£89.50** (plus 10% VAT and plus £1.45 carr/packing)

Barclaycard/Access, call, write or phone, your order 01 402 4736 EASY TERMS FOR CALLERS

- NEW SINCLAIR PROJECT 80**
Stereo PreAmplifier **£11.95**
Audio Filter Unit **£6.95**
Z40 15 Watt Amplifier **£5.45**
Z60 25 Watt Amplifier **£6.95**
PZ5 Mod. for I on 2 Z40 **£4.98**
PZ6 Mod. (S Tab) I on 2 Z40 **£7.98**
PZ8 Mod. (S Tab) I on 2 Z60 **£7.98**
TRANSFORMER FOR PZ8 **£2.95**

NEW FM TUNER STEREO DECODER **£11.95**
All items post paid. Best price on request.

BUILD THE NEW HENELEC STEREO FM TUNER

A completely new high stability stereo FM tuner Features variable capacity diode tuning, stabiliser power supply, IC Decoder, high gain low noise. IF stages. LED indicators. Tuning meter. AFC, easy to construct and use. Mains operated. Slim modern design with fibre glass PC, teak cabinet, etc. Available as a kit to build or ready built. Overall size 8" x 2 1/2" x 6 1/2". Produced to give high performance with a realistic price. (Parts list and constructional details Ref. No. 5 30p). Henry's are sole distributors UK and Europe.



KIT PRICE £21.00 (+ VAT)
or built and tested **£24.95 (+ VAT)**

LIVING SOUND LOW NOISE TOP QUALITY CASSETTES MADE BY EMI TAPES LTD. TO INTERNATIONAL STANDARDS ESPECIALLY FOR HENRY'S. ALL POST PAID LESS THAN 1/4 REC. PRICES COMPLETE WITH LIBRARY CASES

	3 for	6 for	10 for	25 for
C 60	£1.00	£1.80	£2.80	£6.75
C 90	£1.33	£2.57	£4.20	£10.25
C 120	£1.62	£3.15	£5.00	£12.25



Quantity and trade enquiries, invited
LEARN A LANGUAGE—complete with phrase book. German — French — Spanish — Italian £1.36 per course. £3 for any 4.

LOW COST HI-FI SPEAKERS

SPECIAL OFFERS

- EMI 13" x 8" —full range speakers (post 20p each or 30p pair)
*150TC—8 ohms Twin Cone 10 watt **£2.20** each or **£4.00** pair.
*450 10 watt C/o Twin Tweeters 3, 8 or 15 ohms **£3.50** each or **£6.90** pair.
EW 15 watt 8 ohms C/o Tweeter **£4.30** each or **£7.90** pair.
350 20 watt C/o Tweeters 8 or 15 ohms **£7.50** each or **£14.20** pair.
* Polished wood cabinet **£4.60** post 35p.



8 ohms full range (post 20p)			
FR4	4"	5 watt	£4.00
FR65	6 1/2"	10 watt	£5.50
FR8	8"	15 watt	£7.60
FR13	9 x 6"	15 watt	£6.00
BASS & MID RANGE—8 ohms (post 20p)			
AA12	5"	15 watt	£3.20
B110	5 1/2"	15 watt	£5.60
B200	8"	15 watt	£6.45
B139/2	13" x 8"	30 watt LF	£10.25
TWEETERS AND CROSSOVERS (post 20p)			
K200a	10 watt	8 or 15 ohms	£1.90
FHT6	15 watt	8 ohms	£3.20
K2011	30 watt	8 ohms	£3.75
T27	KEF		£4.25
Axcent 100	30 watt	8 ohms	£4.90
K4009	18Hz/5kHz C/o		£2.00
SN75	30Hz var. C/o		£1.75
SPEAKER KITS (carr. etc. 35p)			
20-2	8"	30 watt	£10.00 each
20-3	8"	40 watt	£15.00 each
LINTON 2		20 watt	£15.95 each
GLENDALE 3		30 watt	£28.95 pair
DOVEDALE 3		30 watt	£42.00 pair
KEF KK2		50 watt	£20.40 each
KEF KK3		50 watt	£32.00 each

BUILD YOURSELF A POCKET CALCULATOR

A complete kit, packaged in a polystyrene container and taking about 3 hours to assemble—this is the Sinclair Cambridge pocket calculator from Henry's. Some of the many features include interface chip, thick-film resistor pack, printed circuit board, electronic components pack. Size 4 1/2" long x 2" wide x 1 1/2" deep. Free of charge with the kit for the more advanced technologist is a 32-page booklet explaining how to calculate Logs, Tangents, Sines etc.



£24.95 Also available assembled ready to use. **£27.22** + VAT.

10% VAT to be added to all orders. Prices and descriptions correct at time of press. E & OE. Like a permanent job at Henry's? Experienced and trainee salesmen required. Tel. 01-402 8791. See pages 648—650 of this magazine

Henry's RADIO LIMITED
EDGWARE ROAD, W2

404-406 Electronic Components and Equipment 01-402 8381
354-356 High Fidelity and Tape Equipment 01-402 5854/4736
309 PA-Disco-Lighting High Power Sound 01-723 6963
303 Special offers and bargains store
All mail to 303 Edgware Road, London W2 1BW

Open - 9 am-6 pm
6 days a week
All stores open all day Saturday