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3D EVERY WEDNESDAY

Edited by F. J. CAMM

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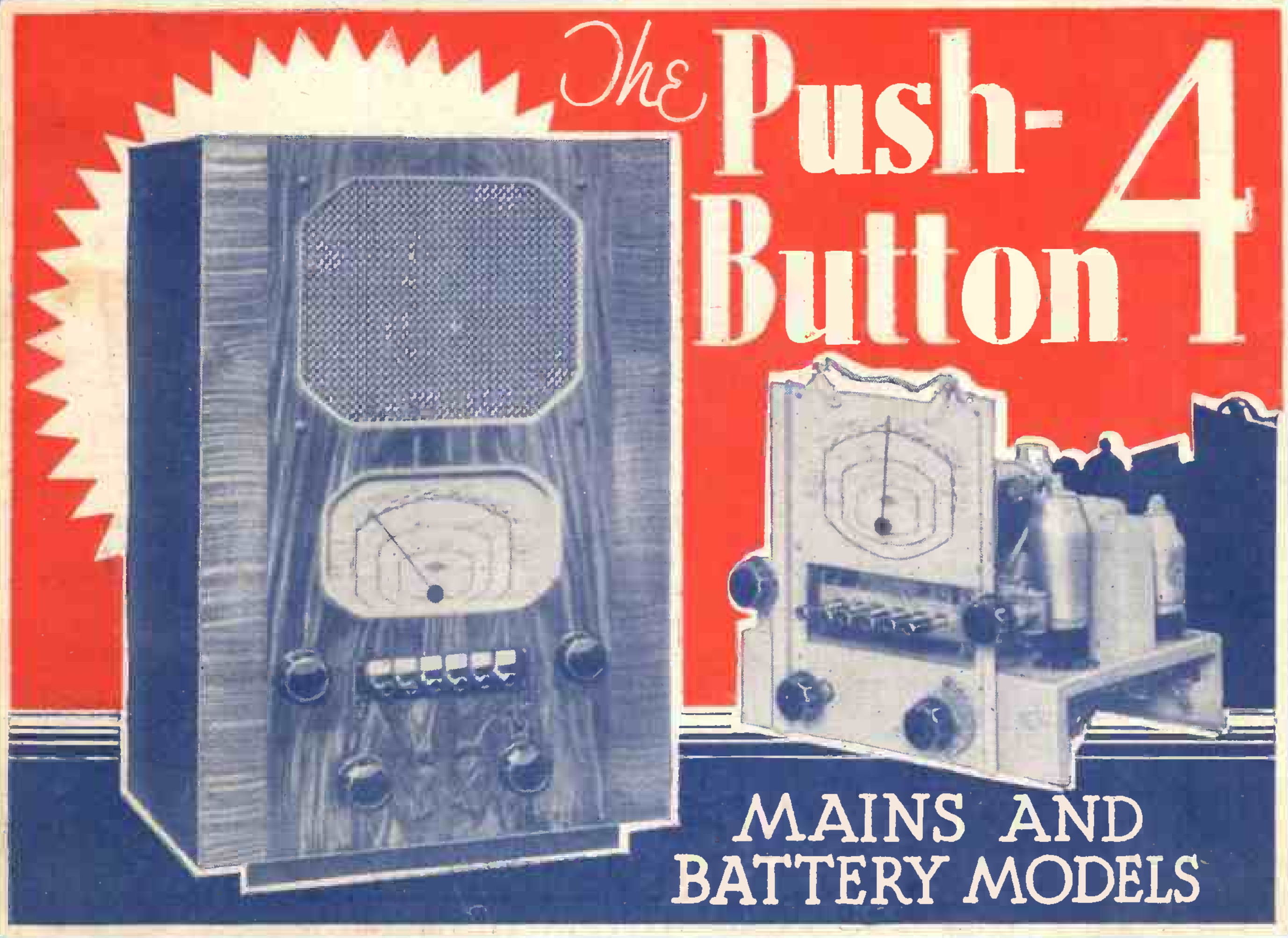
October 22nd, 1938.

AND PRACTICAL TELEVISION



MAKING A STAND-BY TRANSFORMER—

See page 123

Practical and Amateur Wireless

Edited by F. J. CAMM

Technical Staff:
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VOL. XIII. No. 318. October 22nd, 1938.

ROUND *the* WORLD *of* WIRELESS

Push-button Tuning

IN this issue we give constructional details of our new push-button receiver, a four-valver embodying the superhet circuit. As we have pointed out in various articles on the subject of automatic station selection—or push-button tuning as it is now commonly known—there are various methods by which the station selection may be carried out. In our last push-button set a special form of mechanism was incorporated in which pre-set condensers were used as the station selectors. Whilst this is a sound scheme and is employed in many commercial receivers, there is much to be said for the form of tuning in which the normal tuning condenser is moved to the station settings. The motor-tuned receivers embody this scheme, the condenser being turned by an electro-motor, and in another form a dial (similar to the automatic telephone dial) is employed and this turns the condenser. In the new sets described in this issue another type of mechanism is used, and by means of cams the tuning condenser is rocked from one position to another as the buttons are operated. Thus stations settings are very definite, and tuning cannot vary. You may be certain of always getting a station at its correct tuning setting when the buttons are operated. Full details will be found commencing on page 135.

Italian Design

THE Italian Radio Exhibition which closed at the end of last month was very successful, but an important point which was noticed was that only a dozen sets incorporated automatic tuning. In all of these, ten stations were provided for, and in one case a novel eight-band receiver was seen in which eight buttons were provided and each of these gave a station on one of the bands, thus providing sixty-four stations in all by means of eight buttons.

W2XAD Power Increase

CONSTRUCTIONAL alterations are now complete and the modified transmitter at W2XAD is expected on the air at the end of this month. The new power rating is 100 kW compared with the original 18 kW, and it is hoped that greatly improved reception will be experienced in this country as a result of the change.

Streamlined D.F. Aerial

THE new Marconi streamlined D.F. aerial has now been fitted to the first British machine—the Lockheed Electra which carried the Prime Minister on his first visit to Herr Hitler. This machine is equipped with a complete Marconi installation of short and medium-wave transmitters and receivers.

No Royal Variety Broadcast

IT is announced, now definitely, that no broadcast of the Royal Variety Performance can be permitted. This is stated to be the result of a petition by the Theatrical Managers' Association and the Cinematograph Exhibitors' Association arising out of the loss of trade during the last broadcast of this important event. It is stated that the loss would undoubtedly lead to unemployment among artists and others connected with the theatrical profession.

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"Jam" From America

FOR the first time, an authentic American "jam" session is to be broadcast by the B.B.C. on November 5th. It will last for forty minutes and it is stated that the players will include such well-known artists as Bob Hackett, "Fats" Waller, Gene Krupa, Joe Marsala, Benny Goodman, and Mezz Mezzrow. For the benefit of those who do not know what a "jam session" is, it may be stated that it is a gathering of performers who play without music and who improvise on well-known tunes, taking it in turns to play the solo lead. The performance is entirely impromptu.

"Snowdon"

A DRAMATIC feature in three episodes, which will deal with the Snowdon of history and of legend, will be broadcast in the Welsh programme on October 26th. The production will be by T. Rowland Hughes.

Making a Film

CECIL FORD, on October 26th, will tell Northern Ireland listeners some of his experiences in making a film in Ireland. He was at one time a medical student with a predilection for the stage and decided to abandon the attraction of the latter for the hard work of the former, when he was tempted with a film offer.

Another Thriller

IN a country cottage some thirty miles outside London a young couple are packing up for a journey to the Continent. The wife is hypersensitive, and the husband takes criminology as his pastime. The eeriness of a partially-dismantled house plays on the nerves of the newly-married wife. This is the basis of a new thriller to be broadcast on October 20th, in the Regional programme.

Brass Band Question Time

THE series called "Brass Band Question Time," which began last spring, will shortly be resumed in the Midland programme. Denis Wright, the well-known composer and adjudicator, will again answer questions sent in by brass band enthusiasts. The principal subject for discussion on October 24th will be rehearsals, and points raised will be illustrated by the Coventry Colliery Band in a Birmingham studio.

ROUND the WORLD of WIRELESS (Continued)

Italy's Powerful S.W. Transmitters

ON October 28th, the new Italian short-wave transmitting station at Prato Smeraldo, near Rome, will be officially inaugurated. It will be one of the most powerful and best equipped stations in Europe. The power of the two present transmitters, each of 25 kW, will be increased to 50 kW, and other improvements are also being introduced. These two transmitters will work on wavelengths between 15 and 25 metres.

The most important development in the new Prato Smeraldo station will be the installation of two new 100 kW short-wave transmitters, equipped with all modern improvements, which will work on wavelengths between 25 and 50 metres.

U.S.A. and the Crisis

IT is reported that during the international crisis American listeners were kept informed hourly of the developments. Talks, from all points of view, of the various aspects of the situation, and "on-the-spot" reports from the European cities most vitally affected were broadcast throughout each day.

Canadian Radio Network

WORK on the Canadian Broadcasting Corporation's new 50-kW transmitter at Watrous, Saskatchewan, is being speeded up. It is stated that the station will cost about £50,000, and will serve listeners in Saskatchewan.

The 5 kW station at Lulu Island, near Vancouver, is to be modified in order to provide better listening facilities for inland British Columbia.

A.R.P. in the West

PROGRESS in Somerset will be discussed by G. U. Farrant, chairman of the A.R.P. Sub-Committee of the Somerset County Council, on October 27th in the Western programme. This is the second talk in the series.

Winning Military Band to Broadcast

WITH a programme including the test-piece of the competition, the winning band in the eighteenth Military Band Championship to be held at Belle Vue, Manchester, on October 8th will broadcast on October 23rd.

New B.B.C. Appointment

WE are informed that the Rev. J. W. Welch, Ph.D., will succeed the Rev. F. A. Iremonger, D.D., as Director of Religion from April 1st, 1939. Since 1935, Dr. Welch has been Principal of St. John's College, York. At the end of the War he was serving with the H.A.C., and on leaving the Army entered Knutsford Ordination Test School. From 1921 to 1926, he studied at Sidney Sussex College and Westcott House, Cambridge, and in 1926 he was

INTERESTING and TOPICAL NEWS and NOTES

ordained to a curacy of Gateshead Parish Church.

From 1929 to 1935, Dr. Welch was Educational Missionary and Government Supervisor of Mission Schools in Southern Nigeria. In 1932 he became Master of Education (Dunelm), and in 1936 Doctor of Philosophy (Cantab.). He is now 38 years of age.

Mr. C. H. Middleton, the popular radio broadcaster on gardening subjects.

Dr. Iremonger, who is retiring, has been in charge of the Corporation's religious work since May, 1933.

"A La Carte"

ANOTHER mixed menu of light fare will be provided in "A La Carte," on October 28th, when the artists will be Jack Train, comedian; the Three Nomads, in close harmony; Dorothy Holloway, in a "Lady Leamington" sketch; and Ruby Taylor and Frances Keyte, in piano duets. This broadcast will be given in the Western programme.

Bath Radio Pageant

ON October 20th, a feature programme will be broadcast in honour of the reopening of Bath Assembly Rooms. The programme has been prepared by Froom Tyler, whose radio play, "Terror from the Sea," was recently revived in the Regional programme with marked success. Bath's long and brilliant story through the centuries will be presented as a "pageant for radio," and the principal feature will be Bath in its eighteenth-century glory under its benevolent dictator, Beau Nash.

Variety from Bedford

THEATRE variety on October 25th will be broadcast from the Royal County Theatre, Bedford, where Frank Terry is presenting a new revue, "The Pleasure Cruise." Mr. Terry's concert party has broadcast over a hundred times.

Organ Recital from Leeds

ONE of the cinema organ recitals to be broadcast to Northern listeners during the next few weeks is that by Cecil Chadwick who, on October 25th, will be at the organ of the Paramount Theatre, Leeds, to give a programme of popular tunes.

An Intimate Revue

MARTYN C. WEBSTER will act as compère of an intimate revue entitled "Between You and Me and the Mike" to be broadcast on October 24th. The artists will be: Courtney Hope, of Wellingborough; Mary Pollock and Joan Carter; Hugh Morton; Fred Forgham and Hal Bryant; with Harry Engleman and Leila Brittain at two pianos.

New Philips Colour Cartoon

IN our issue dated 15th October we referred to a new cartoon film to be issued by Messrs. Philips Lamps. Unfortunately, this film was erroneously described as a George Pal puppet production, and we are now informed by Messrs. Philips that this is actually a colour cartoon produced by Fischerkösen.

SOLVE THIS!

PROBLEM No. 318

Atkins decided to convert his two-valve battery receiver into an all-mains model, and accordingly obtained an H.T. battery eliminator and a trickle charger. He connected the charger across the accumulator for the L.T. supply, and replaced the H.T. battery by the unit. As he also wished to dispense with the grid-bias battery he connected a variable resistance between the G.B. negative terminal of the transformer and earth. He was uncertain of the exact value needed and accordingly fitted a 10,000-ohm variable component with a view to adjusting this to obtain the desired voltage. He found, however, that very distorted signals were received. Why was this? Three books will be awarded for the first three correct solutions opened. Address your envelope to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 318 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, October 24th, 1938.

Solution to Problem No. 317

When Matthews mounted his resistance on the metal chassis he overlooked the fact that the spindle was "live," and as this was joined to the arm which was in turn joined to the anode, he was earthing the anode via the chassis. He could have used the component by including insulating washers in the mounting.

The following three readers successfully solved Problem No. 316 and books are accordingly being forwarded to them:

B. Reynard, 50, Balfour Road, North End, Portsmouth.
J. A. West, "Normandy," New Street, Castle Bromwich, Birmingham.
M. Brading, 5, River View, Renwerris Lane, Falmouth, Cornwall.

In the Solution to Problem No. 315 the printers transposed the words 'triode' and 'pentode.' The solution should, of course, have read '. . . replace the output pentode by a triode.' The correct prize winners were as announced in the following issue.

Making a Stand-by Transformer

A Practical Article giving Constructional Details of a Spare Mains Transformer for the Experimenter

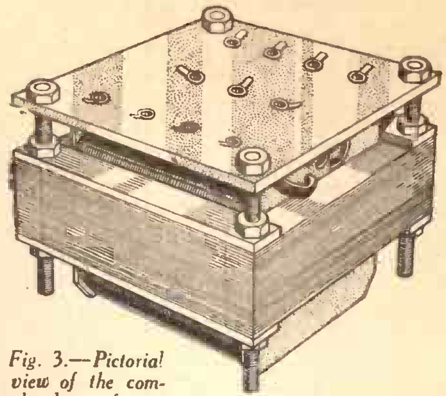


Fig. 3.—Pictorial view of the completed transformer.

THERE must be many amateurs who from time to time have required a spare mains transformer, and who, for lack of sufficient data, have been unable to construct this useful accessory.

In the design of the transformer to be described, the usual requirements of the enthusiast have received careful attention, and the unit will be found suitable for most purposes, whether it be for a P.A. amplifier, the experimental home receiver, or even a spare power pack for loudspeaker field supply.

The permissible mains voltage variation on any public supply system is $\pm$ 6%, and in view of this the primary tapping system has been simplified in line with the usual practice in commercial components.

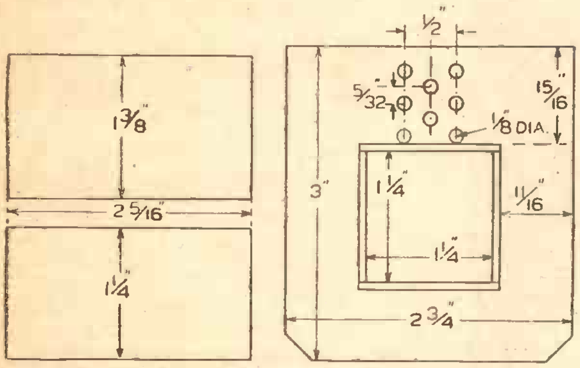


Fig. 1.—The end cheeks and core strips for the former.

Tappings

The primary is therefore tapped at 207½, 222½ and 237½ volts, thus enabling the transformer to be used on any 50-cycle supply between 200 and 250 volts pressure.

Full-wave rectification, with its consequent simplification of the smoothing system is specified, and a 4-volt winding will deliver up to 8 amps. for valve heaters without undue heating up.

The complete specification may therefore be briefly tabulated, as follows:

Primary, Tapped for 207½, 222½, 237½ volts.

H.T. Secondary, Tapped for 350-0-350 volts, delivering 300v 100mA. D.C.

Rectifier heater, 4 volts at 2.5 amps.

Valve heater, 4 volts at 8 amps.

The total power consumption, assuming an efficiency of 80%, is calculated from the secondary dissipation.

Primary Watts $=(300 \times .1)+(4 \times 2.5.)+(4 \times 8) \times \frac{100}{80}=90.$

The primary current is determined by $\frac{W}{E}=\frac{90}{207\frac{1}{2}}=.43$ amp.

The fundamental formula for the turns per volt figure is $\frac{1}{\text{turns per volt}}=4.44 \times 10^{-5} \times f \times$ core section $\times$ flux density, and in this case works out to 4.5 turns per volt.

We can safely assume a current density of 2,000 amps. per sq. inch for the conductors, so that the necessary data may conveniently be tabulated as on this page.

The most convenient bobbin for home constructors is probably the layer-wound type, each separate winding following on top of the preceding one and being insulated from it with oiled silk or varnished linen.

Former Construction

Dimensions for a former of this type are given in Fig 1, and it should be realised that this item needs as much care in construction as the winding process. The former is constructed of 1/16in. sheet bakelite, but any good quality fibre will suit.

The end cheeks are made first. The most satisfactory method of cutting the centres will be to drill the square out, and then file up to fit. The holes for lead-out wires should be drilled after the centres are cut. The four strips forming the tunnel of the former must be fitted carefully into position, and the assembly should be rigid when completed.

If a semi-liquid fixative is used, the edges in contact must be roughened with a coarse grade of glasspaper to obtain a better surface for adhesion. A wooden mandrel must be provided for winding, since the strain of manipulating the thick secondary wires may cause the former to collapse. A suitable type is shown in Fig 2, but the constructor can, with the exercise of a little ingenuity, readily improve on this device.

It cannot be too strongly urged that the former must be soundly constructed and assembled. Hasty work usually results in the completed winding collapsing when being ironed up.

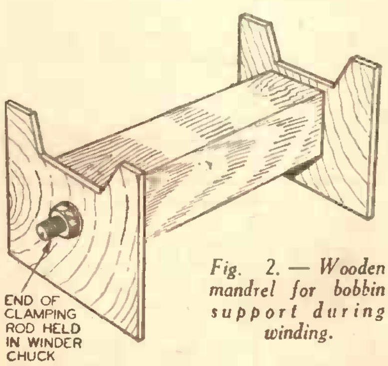


Fig. 2. — Wooden mandrel for bobbin support during winding.

Construction is started by arranging the wire reel conveniently for feeding and having all material to hand before actually starting work. The items required may read like a polar explorer's stock list, but they will all be found necessary as the winding progresses.

You will require Chatterton's compound, solder, soldering iron, resin flux, oiled silk or Empire cloth, Systoflex sleeving, scissors, pencil, paper, glasspaper, and a small amount of insulating varnish.

Windings

The heavy gauge wires are wound first, and are usually the most troublesome. Starting with 16 gauge D.C.C. enough wire must be threaded through the left-hand cheek to allow for connection to the panel.

Ten turns are wound on carefully, the wire being straightened as it feeds off the reel. On completing the tenth turn, wind the remaining nine turns back over the first layer, and bring both ends of the winding through the same cheek.

The heater windings must be prevented from touching the rectifier heater secondary, since a high potential exists between these two. This is best achieved by securing the "turn-back" with a strip of tape, holding it down with a dab of Chatterton's compound.

The rectifier heater winding is then wound in a similar manner, but starting from the opposite side; the ends are terminated through the right cheek of the former.

WIRING DATA

Winding	Current	Volts	Turns	Wire Gauge	Covering
Primary	.43 A	207½ 222½ 237½	935 1,000 1,065	.018 in. (26 S.W.G.)	Enamelled single silk
H.T. Secondary	.1 A	350 350	1,500 1,500	.0092 in. (34 S.W.G.)	Enamelled single silk
Rectifier heater	2.5 A	4.2	19	.056 in. (17 S.W.G.)	D.C.C.
Valve heater	8.0 A	4.2	19	.064 in. (16 S.W.G.)	D.C.C.

A prevalent cause of transformer failure is breakdown between windings. Over the two heater coils, therefore, put on two layers of oiled silk or Empire cloth, ensuring that all turns of the secondary windings are adequately covered. Exercise particular care that at no place is the primary winding liable to slip down between the insulating layers, and the bakelite cheeks of the former.

To the start of the primary a flexible lead is made by twisting together several strands of thin wire and soldering them to the main 26 gauge winding. This operation may leave sharp edges which are apt to penetrate the insulation covering the joint. Ensure that the soldering is smoothly finished, and cover with a small fold of tape before proceeding with the winding.

(Continued on page 130)

The Amateur Transmitter

In this Article, the Oscillator and its Function, Making a Simple Test Chassis, and Instructive Experiments are Dealt With - - - - By L. O. SPARKS

THE first essential of any transmitter is a generator of suitable electrical oscillations; and the most simple generator, so far as the amateur is concerned, is the thermionic valve.

This type of oscillator, in its most elementary form, is not unknown to all constructors. Any detector valve employing reaction can produce oscillations which usually indicate their existence by producing, among other effects, a howl or whistle in the loudspeaker.

Such oscillations are undesirable, and not suited for the purpose in question, for it is vital, from the transmitting point of view, for the oscillations to conform to definite pre-determined standards, the most essential of which is constancy of frequency.

Oscillators can be classified under two main headings, namely, those which depend on inductive coupling to provide the necessary feed-back to create the oscillations, and those which make use of capacity coupling.

It is not possible in this article to deal in detail with all types of valve oscillators; therefore, readers should study Chapter IV of "Wireless Transmission for Amateurs" (price 2s. 10d. post free), which gives circuits and operating data of all the various types.

The circuit most suited for the early experiments of the beginner is shown in

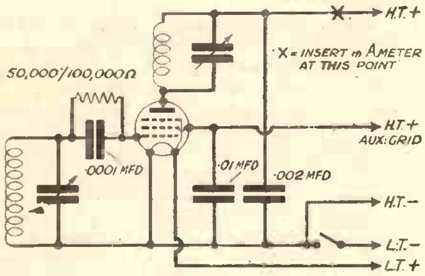


Fig. 1.—The fundamental T.P.T.G. oscillator circuit without crystal control.

Fig. 1. It is known as the "tuned-plate tuned-grid" oscillator, and it depends for its operation on capacity coupling, this being provided by the internal capacity of the valve.

As the name implies, tuned circuits are used in the grid and anode circuits, a state of oscillation being produced when both of these are tuned to a common frequency.

A slight variation of Fig. 1 is shown in Fig. 2, where it will be seen that the grid circuit is not tuned. The arrangement is known as the "T.N.T." circuit, and to enable the desired conditions to be produced with only one tuning control, the grid coil has to be designed and constructed so that its inductance and self-capacity are sufficient to approach the resonant point through which the anode circuit can be tuned.

Chassis Layout

In Fig. 3 is shown the layout of a simple chassis. If a chassis is not available, then a baseboard can be used, but whichever method of construction is adopted, it would be as well to start with fresh material, as it will be put to good service later on.

On the chassis are mounted two brackets for supporting two variable condensers; behind these are fixed three valveholders, two four-pin and one five-pin, the latter being in the centre. These are intended for coil and valveholders, and they should be so located that the leads from the condensers to the coils and from the coils to the valve are kept as short and direct as possible, without cramping the components too much. The dimensions given for the chassis should be taken as a guide. No inductive coupling between the coils must take place. The other components required to start with include a grid condenser and leak, a small by-pass condenser—mica dielectric—and, say, a switch. It is assumed that the constructor has by him a good milliammeter, preferably of the multirange type or, failing this, one having a maximum reading of 50 mA. The object of the chassis layout is to provide a means of carrying out tests with as many oscillator circuits as possible, with the minimum of trouble, and for this reason it is advisable to make use of battery-operated valves.

At this stage, one is not concerned with power output. In fact, every precaution must be taken to see that the oscillations produced are not capable of causing interference to nearby listeners.

Oscillator Circuit

The theoretical circuit of the first test oscillator can be taken from Fig. 1, with the addition of the milliammeter which must be connected in series with the anode H.T. supply, to indicate the variations in the current in that circuit.

The two variable condensers can be .0001 mfd. or .00015 mfd., or values approaching these. They are not critical, at this stage, as the frequency of the oscillations is not of vital importance, *provided* it is within the amateur band.

Coils

The coils can be standard four-pin short-wave components, the two having identical windings. Home-constructed components can, of course, be used, provided that the formers on which they are wound are of good quality. The same stipulation applies to the grade of variable condensers.

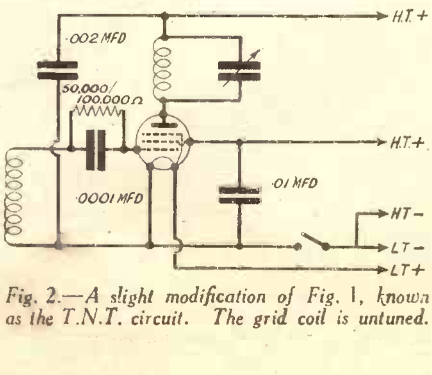


Fig. 2.—A slight modification of Fig. 1, known as the T.N.T. circuit. The grid coil is untuned.

For various reasons, the valve should be of the pentode type. Any efficient L.F. type will do so long as the maker's figures for maximum anode current are not exceeded.

When the constructional work has been completed, valve and coils fitted, and batteries connected, switch on and watch the meter. What will happen? This must be found out by carrying out systematic experiments, making adjustments, noting behaviour of anode meter, and recording your observations.

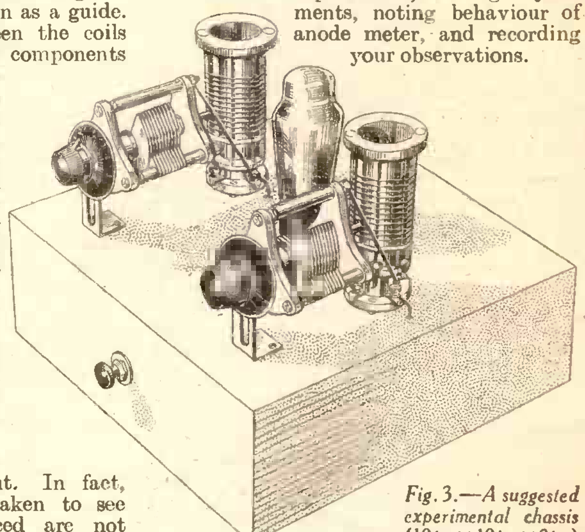


Fig. 3.—A suggested experimental chassis (10in. × 10in. × 3in.) to be used for tests with different oscillator circuits.

See how the tuning of the circuits effects things; note the sharp variations in anode current, and then apply the simple test given below.

Make a coil of wire, just sufficiently large to pass over and along the anode coil, and solder the ends to a small screw-type holder of the pocket lamp type. For safety's sake, cover the wire, which should be of 16 or 18 gauge, with a piece of systoflex and into the holder fit a low-consumption bulb. Fuse bulbs rated at 60 mA up to pocket-lamp bulbs can be tried, the final selection depending on the valve in use, the H.T. applied and the power generated.

Tests should be made by passing the loop over and down the anode coil. Note the results and at the same time watch the anode current meter.

After making observations with the components specified, try varying the value of the grid-leak and the ratio of inductance to capacity of the anode tank circuit.

Different screen voltages for a given anode voltage should also be tried, but in keeping with the other experiments the meter and lamp loop must be used and noted.

One word of warning regarding the construction of the chassis. If a metal or Metaplex chassis is used, the bracket supporting the anode tank tuning condenser must be insulated, otherwise a short-circuit will result.

Next week we will deal with the things which should happen with the circuit in question, and thus provide the means of checking observations.

The "P.W." Deaf Aid

New Valve Types have Recently Been Released which may be Used to Improve the Performance of the Deaf Aid

By W. J. DELANEY

This is the complete deaf aid.

IN June last we described a useful two-valve deaf aid in which two triodes were employed. In the original model a 1.5-volt. biasing cell was used in conjunction with the microphone, and subsequently we gave details for improving the sensitivity by using a higher voltage for this purpose. It will be found that with the higher voltage the background noise from the mike becomes greater and in some cases this may be found a disadvantage. It is, however, highly desirable that the maximum degree of amplification shall be obtained with a hearing aid of this type, but at the time it was not possible to obtain any greater amplification without either using more valves or using a higher voltage H.T. battery. Both of these would have meant a general increase in the size of the aid, and in the majority of cases the size is of the greatest importance. Messrs. Mullard now announce the issue of two new Midget deaf-aid valves, one of the screened-grid type and the other a power valve.

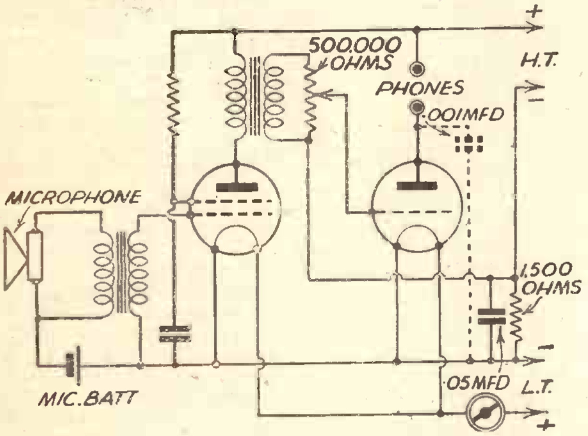


Fig. 1.—Modified theoretical circuit of the deaf aid.

It is thus now possible to increase the amplification without seriously modifying the design of this useful little aid, in most cases the necessary increase in amplification being obtained merely by replacing the first valve by the new S.G. model.

Screen-grid L.F. Stage

There are two methods of using an ordinary S.G. valve as an L.F. component—one of which is simply to connect it in circuit with a high-impedance anode load, and the other in which the valve is used as a triode by strapping screening-grid and anode. In this way a lower impedance is obtained with a fairly high amplification factor, but the characteristics are considerably changed. The L.F. quality is not nearly so good when this connection is used with the particular valve referred to, but in most cases high-quality of amplification is not needed. For speech and for all normal purposes where reproduction takes place through ordinary headphones high quality is not needed and, in fact, cannot be obtained without very special types of apparatus. Accordingly, it is possible to use the valve in this way in the P.W. Aid. In this case the circuit will remain unchanged, and the S.G. pin of the valveholder is simply joined to the top cap of the valve, the simplest way of doing this being to connect a short length of flex to the S.G. terminal and to take this through a hole in the chassis. An ordinary top-cap connector is then joined to the end of the flex and the valve is plugged in, in place of the original valve, and the top cap connected. This gives a substantial increase in amplification, and it will be found in the majority of cases that with this valve in use the bias on the mike may be reduced to the original 1.5 volts, thus giving approximately the same degree of amplification but with a reduction in the general background noise. The sensitivity of the mike is obviously reduced, and thus it will be necessary to speak closer to it, or to place the aid closer to a radio set where it is used primarily for amplifying the normal speaker signals.

Normal Circuit Arrangement

If it is desired to use the valve as a normal S.G. component it will be necessary to obtain another by-pass condenser (a value of .01 mfd. will be suitable) and a 10,000 ohm half-watt resistance. The S.G. terminal is that which on the original valve was the anode and thus the resistance must be joined between this terminal and the H.T. positive line, whilst the lead from the transformer must be disconnected from that terminal and joined instead to the top cap of the valve. Lead B on the original wiring diagram is the H.T. positive line, joined to one side of the transformer primary, and thus the resistance must be joined between this point and the "anode" terminal, with the by-pass condenser joined from the latter to the common negative line. The most appropriate positions are shown in Fig. 2, and it will be found that there is just room for these beneath the chassis. The lead from the transformer will then have to be lengthened

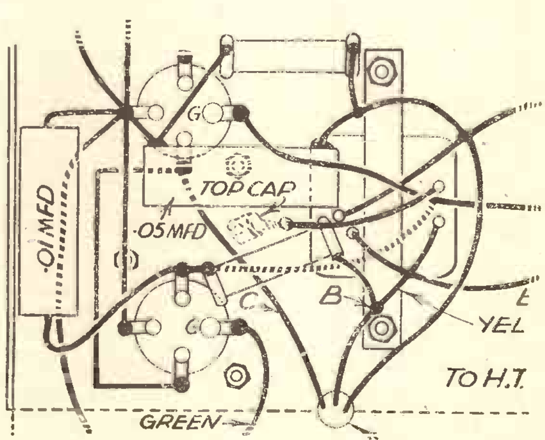
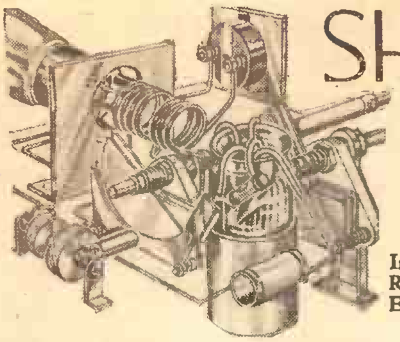


Fig. 2.—How the original wiring is altered to adopt the circuit shown in Fig. 1.

and taken through a hole in the chassis and provided with a top-cap connector as in the previous instance.

The amplification will not be so great as would be obtained if the anode load impedance were increased and the only way to do this is to use a parallel-fed

(Continued on page 142)



SHORT-WAVE SECTION

AN EXPERIMENTAL BAND-SPREAD FOUR-VALVER

In This Article Sufficient Data is Given to Enable Readers to Undertake the Construction of an Efficient Receiver in Experimental Form, for Use in Conjunction With a Moving-coil Speaker.

LOUDSPEAKER reception of world-wide short-wave broadcasting and telephony is an attractive proposition, but many associate this class of reception with powerful mains-operated multi-stage receivers of the superheterodyne type, and of high output. This idea is a mistaken one, as it is possible for those who have suitable components to hand to build a receiver capable of providing satisfactory results.

Fig. 1 shows the theoretical circuit diagram. It consists of a stage of untuned high frequency, followed by a regenerative detector, and two stages of low-frequency amplification, both being transformer-coupled. It will be noted that a high-value variable resistance is wired across the grid to the earth line. The value of this resistance is important. If too low in value a considerable reduction in volume will result, whilst too high a value will cause erratic control.

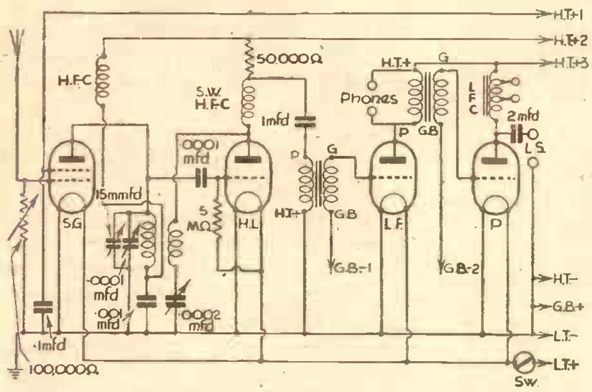


Fig. 1.—The theoretical circuit referred to in this article.

This resistance controls the signal input, aids stability, and also safeguards against overload, and consequent distortion.

Resistance-fed transformer coupling combines the advantages of transformer and R.C.C., and in this instance the first L.F. stage is resistance-fed transformer-coupled. In addition, L.F. output choke arrangements are also included, and consequently stability, other things being equal, is assured.

Referring to the circuit, to use straight transformer coupling in both stages, and cutting out the L.F. choke, will result in incurable instability, and is therefore inadvisable.

Naturally, we desire in the interests of general utility to cover as wide a range of wavelengths as possible. The H.F. chokes used therefore should be chosen from amongst the 10-metres or below, to 160-metres types.

Band Spreading

In a receiver of this type ease of tuning is essential, and this is provided by the simple yet efficient parallel method of band-spreading, a 15 mmfd. Raymart type condenser being used. The amount of spread depends upon personal requirements, and the band-spread condenser can be modified.

For example, on the 40-metres band it should be about 80 degrees. Standard 4-pin coils should be used. If it is desired to use home-made ones these should be wound to standard and published data. Do not build an experimental receiver, and incorporate experimental coils, for obvious reasons.

Layout of Components

Whilst a good circuit is desirable, so also is a good layout, in which we must avoid the bunching of components, yet keep wiring short and direct. Fig. 2 shows a suitable layout. It will be noted that the cores of the respective L.F. transformers are at right angles to each other in order to reduce the possibilities of interaction, and consequent instability. This also applies to the L.F. choke, the metal shrouds of which should be earthed.

The basic form of construction used, and recommended, is that of a complete metal chassis and panel assembly, but, if desired, foil-lined plywood may be used.

The H.F. chokes and fixed condensers, etc., may be fitted on the underside of the chassis, or supported by the associated wiring, whilst baseboard or chassis-type valveholders can be used.

The general arrangement of panel components assures that wiring will be kept reasonably short and direct. Owing to the fact that the physical dimensions of components as used by individual experimenters will differ, slight modifications in layout may be necessary.

A receiver of this type will provide reasonably good volume but, if desired, the power valve may be replaced by an L.F. pentode. In any case, good class L.F. transformers should be used, the second being of a higher ratio, for example, seven to one if a pentode is used.

Operation

With regard to operation, this is with but one exception exactly as in the case of an 0-V-1 receiver, the exception being that the volume control is of the pre-detector type, and must be used with discretion. The mistake that a fully open volume control means full volume in all instances, should be avoided. The purpose of this system is to avoid detector overload and consequent distortion.

I do not advise the use of headphones on four valves, unless the input is reduced. In doing so, however, the sensitivity is also reduced. It is better, therefore, to use the three-valve output, and retain the higher standard of sensitivity. An L.F. volume control could, of course, be incorporated as a refinement, if desired.

A four-valve receiver built along the lines suggested in this article, and used in conjunction with an H.T. battery eliminator, will prove to be an ideal DX set which, at a later date, could be converted to T.R.F. at comparatively low cost.

Voltage Adjustment

In conclusion, just a few remarks concerning voltage adjustment. The relation between the screen and anode of the H.F. S.G. valve is important and is a matter for experiment. The following data will help. H.T. + 3—120 to 150 volts; H.T. + 2—100 volts; H.T. + 1—50 to 80 volts.

Once the correct operating voltages have been found, attention can be paid to band-coverage and calibration. Slow motion dials should be fitted to the tuning and reaction condensers, respectively, in the interests of easy operation and reaction control.

The pre-detector volume control should be fully open for the reception of the weaker transmissions, but will require adjustment on powerful European transmissions in order to avoid distortion.

If it is desired to experiment with the detector stage, from a point of view of the quality obtained when the detector is partly-loaded, fully loaded, or over-loaded, it will be desirable to fit an L.F. volume control, and this may be the standard half-megohm component joined across the L.F. transformer secondary.

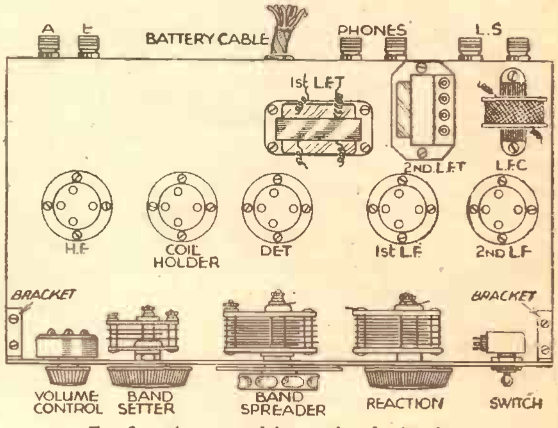


Fig. 2.—A suggested layout for the 4-valver.

ON YOUR WAVELENGTH

By Thermion

The Crisis

NOW that the palpitating hearts of those poor creatures who suffered a severe attack of nerves because they imagined that a war was about to take place have returned to their normal habitats, wireless dealers all over the country are being inundated with requests to take back the goods, such as wireless sets, surplus of batteries, accumulators and torches which were purchased as a result of the panic. I advise those dealers to have nothing to do with such a system. Many of these pitiable people were buying up stocks with an idea of creating a local "corner," and retailing the goods at a fabulous profit.

A Clean Up

MR. OGILVIE, according to a report, promises to make some drastic changes in the B.B.C. In the first place he does not feel that it is proper for members of the B.B.C., most of whom are well paid, to spend their time flirting with outside jobs, and using their position with the B.B.C. to obtain jobs in the theatres and in journalism. As soon as the air has advertised their names sufficiently they desert the B.B.C. I wish him success in that venture, for neither the theatre nor journalism has room for these hot-house creations, which may appear to be the genuine bloom but lack the sweet fragrance and the characteristics of the real flower. I am glad to know also that Mr. Ogilvie promises to improve the programmes. The revenue of the B.B.C. is three and a half million pounds a year, so it should be able to do something worthy of the change.

This rich country of ours, which can afford to give three per cent. of the total national revenue to Czechoslovakia, should also remember that charity begins at home.

Unnecessary Programme Cuts

H. W. P., of Chipstead, claims a portion of my space for the following:

"I should be grateful if you would allow me to comment on the words of S. M. F., under the heading 'Unnecessary Programme "Cuts" by B.B.C.' I agree that the B.B.C. should use more discretion in the 'fading out' of programmes, and heartily endorse his opinion of the case in question, i.e., that delaying the Epilogue would not seriously disorganise the programme.

"But I definitely dislike the way in which the writer criticises the Epilogue itself in an unnecessarily scornful manner. The 'prayers' he speaks of are in reality portions of Scripture read by experienced broadcasters such as the Rev. Iremonger, or one of the announcers.

"There is much too much criticism of the B.B.C. Sunday programmes, which are perfectly balanced and suitable to the day which should be treated differently from the others, because it is a day of rest, and appointed as the day on which we should all specially devote ourselves to the worship of God. Let those who scorn Christianity and all appertaining to it remember that 'God is not mocked.'

"At least, let them show a spirit of fairness and pay some respect to those who wish to believe in the Bible. A belief which has flourished for close on 2,000 years cannot be the 'dope' and 'trash' which the superior modern being would like to make it.

"This is a spontaneous outburst prompted by S. M. F's letter, and the first time I have written to you. PRACTICAL AND AMATEUR WIRELESS is a fine magazine, and your column an especially good part of it."

I am sorry, but I do not subscribe to the obsolete views expressed in this letter.

Prize

I OFFER a prize of a book to be selected by the competitor from our list of wireless publications for the best letter entitled "What I would do if I were Director-General of the B.B.C." These letters should contain constructive criticism, and not be merely critical. If you feel that something is wrong you should make suggestions as to how it should be put right. I shall act as judge and my decision is final, of course. Address letters to me and mark the words "Competition" in the top left-hand corner. I must receive them not later than October 31st, and letters should not exceed 300 words in length. I shall also award a number of consolation prizes.

The Clubs

NOW that the wireless season from the point of view of the constructor is in full swing, I hope that all of my unattached readers will join a club; if there is not one in your district I hope you will do your best to form one. Most other hobbies have their clubs, and I would ask secretaries not to make the club programme entirely technical. Do not forget the annual dinner, dances, and social evenings; they all help to keep the club spirit alive. Members do not wish always to be hearing lectures on the functions of thermionic valves. Clubs should also be discriminating in their selection of lecturers. A number of wireless firms are glad to oblige by sending skilled people to lecture at local clubs, but they require plenty of notice. Let your club work to a plan, and well ahead, so that the members know well in advance what dates to keep open. Above all, charge a reasonable subscription, not too low, to keep out the undesirable element. Avoid cliques. Expel members who do not turn up for four weeks in succession. Make it a privilege to belong to the club. You will only keep the members together if you have a good programme.

Helping the Blind.

THOSE people who help the blind through the medium of the National Institute for the Blind may rest assured that their contributions are being well administered. The Institute's report for the past year, a copy of which I have just received, shows a record of service which seems to cover every need of the sightless population, beginning in infancy when the blind baby enters a Sunshine Home, and continuing to an old age of peace in the special homes for this purpose.

A new venture during the year was the erection of a school journey centre for children from elementary schools for the blind. For those young people who would normally go to a public school, the Institute has two fine establishments of the kind—Worcester College for the boys, and Chorleywood College for the girls. The curriculum is that of any ordinary public school, and some of the students pass on to the universities.

As a result of such opportunities, many blind people are now able to enter certain professions, and become useful members of the community. One branch of training by the Institute has given the public the service of a body of expert blind masseurs, whose blindness is said to be an actual asset in their work.

Perhaps the Institute's most spectacular achievement is in the field of literature. During the year more than 800,000 copies of embossed volumes and periodicals were issued, the 25 periodicals including magazines, technical journals, and four weekly newspapers. There was steady progress also in the production of talking-books. At the end of the period, the talking-book library contained 183 titles and circulated 200 sets of records weekly.

In connection with the "Wireless for the Blind" fund, which was founded by the National Institute for the Blind, it is gratifying to note that during the year over 6,000 loud-speaker sets and relay installations were issued, which made it possible to meet the new need for sets, and to make a substantial advance towards replacing obsolete headphone sets with loud-speaker sets of modern design. The total number of sets supplied by the Fund since its inception in 1929 has now reached 36,500, of which more than 18,000 are still headphone sets. The sets are distributed through the local societies, which install them in the homes of the blind, and maintain them where necessary.

More Humour (?)

I HAVE received the following letter from G. H., of Bourne End:

"I wonder if the following humorous (?) howlers and other types of sayings of one of my friends will bring a smile to your weary features?

(i) A Thermopile is Thermion's banking account.
(ii) Thermodynamics, Thermion at work. (Horrible thought Thermostatics.)
(iii) Hysteresis, the result of over-excitement.
(iv) Earthed conductor, the sequel to the case of the Murdered Bus Driver.
(v) Anions are things one finds in a garden.
(vi) A post office box is a large cylindrical object painted red and found at street corners.
(vii) A floating battery is a number of guns on a ship.

"He would also like to know if they used Gauss's Theorem when designing gas masks.

"After that I think I might make an approximate reversion to normality, and say how much I enjoy reading your articles, and hope that you will continue to write until you are in a state of R.I.P. or A.R.P., or whatever the current term will be then.

"Should your article fail to appear one week I shall know that my modest epistle has had a perverse effect upon your nerves, which must be sorely tried by some of the literature which arrives for your perusal."

Notes from the Test Bench

Silly Mistakes

WE have before dealt with the problems which can arise when slips or silly mistakes are made in wiring. A very common instance of this is when a receiver has been overhauled or otherwise examined and when re-installed the listener forgets to connect the aerial and earth and spends much time and thought in trying to locate a fault which does not exist. An instance of this occurred recently where a receiver had been sent in by a reader as it failed to give satisfactory results. The output was a push-pull stage (Q.P.P. double valve) and flexible leads were led out of the chassis for connection to the speaker. There were three leads, two for the anodes and one H.T., and the constructor had knotted one of these—obviously to indicate the H.T. positive lead. When the receiver was tested it certainly gave very bad results, and after an inspection it was discovered that the knotted cord was one anode lead and thus the speaker had been wrongly connected. When properly joined up results were up to standard.

High-resistance Joints

MOST constructors are aware that high-resistance or poor joints can cause troubles in a receiver, but in certain cases it is possible for such a joint completely to prevent signals from being obtained. An example of this occurred recently when a superhet was being serviced. The receiver had worked when first made, but signals had weakened and finally stopped. The wiring was examined from point to point and all components tested, without locating the trouble. Finally, it was discovered that a connection in the anode circuit of the oscillator stage was very badly made, a corrosive flux having been used, and a high resistance had developed, sufficiently bad to prevent the valve from oscillating. As the set was a superhet this obviously prevented it from working.

Wiring Interaction

IN most houses the electric-light wiring runs through metal conduit in the walls, and as this conduit is earthed little hum is picked up should any radio apparatus be placed near it. Where cab-tyre wiring is employed, however, it is possible to pick up hum by speaker leads, aerial or earth leads, or even on the set wiring, if the set is placed close to the wall where such wiring is buried. A case recently occurred where a listener kept hearing a loud buzz at odd intervals and eventually found that his indoor aerial ran parallel with the electric-bell wiring in the next house.

8¾ Million Wireless Licences

IT is interesting to note that 642,047 wireless receiving licences were issued by the Post Office during September. This figure represents a net increase of 68,294 in the number of licence holders during the month after making allowance for expired licences and renewals. This is over 100 per cent. greater than the increase established in August. The total number of licences in force at the end of September, 1938, was 8,758,050 as compared with 8,347,240 at the end of September, 1937, an increase during the year of 410,810. During the month there were 480 successful wireless prosecutions.

Television at Work

WHAT is, perhaps, the most popular feature of television, "Picture Page," reaches its 180th edition on November 3rd. In it, famous people are interviewed, interesting occupations are demonstrated, and there is so much entertainment material in the series that it has been decided to include it in the new broadcast feature called "Television at Work."

Thomas Woodrooffe, of the B.B.C.'s Outside Broadcast Department, will go to Alexandra Palace with the intention not only of arranging for listeners on the sound side of broadcasting to hear "Picture Page," but also to describe exactly how it is being televised. He will tell listeners all about the studio and the various television gear; what is going on outside the picture that television viewers are seeing. The studios are not unlike a small cinema set. They are equally hot and possibly more tense.

Practical Television

October 22nd, 1938. Vol. 3. No. 122.

Activities Abroad

THAT this country is maintaining her television lead is readily established by referring to the reports of activities in other parts of the world. Czechoslovakia had started a close investigation of the television position, but the recent national crisis has now relegated this to the background. In Germany, although a good exhibition effort was made in Berlin, the authorities are experiencing difficulty with the working of the new 441-line transmitter. It broke down during the Berlin show, and for two or three days a reversion to the 180-line standard was made. Preparations are now being made to put the studios in service, but since all the technical staff are under the jurisdiction of the Post Office it makes it difficult for the programme staff, who are under another body, to work in close co-operation. The same thing happened in the early days of broadcasting, and adjustments will have to be made to ensure really harmonious working. Belgium so far has not taken any steps to establish a television service, and at their recent exhibition no mention was made of any development in this connection. After a promising start, Italy seems to have reached a state of impasse, and the work being undertaken in Russia is being kept specially secretive at the moment. At the Paris exhibition, although several television receivers were on show, only one or two were priced, and these varied from 5,000 to 11,000 francs. The pictures were of good quality, but at the moment there does not seem a great desire on the part of the manufacturers to take advantage of the Eiffel Tower service. This may be due to the short programme hours, which so far only total six hours per week, while there is no satisfactory schedule like that operating from Alexandra Palace. In America the R.C.A. are certainly spending a good deal of time and money in carrying out field tests and relays, while in addition the public are now being given the opportunity of witnessing demonstrations, and official guides describe the equipment. Apart from the marketing of one small picture receiver, however, there has been no effort to make a real breakaway from experiment as opposed to some form of public service. It is felt generally that the New York exhibition which opens in the spring of next year will signalise some meritorious move in this direction, but until then the American public will have to be patient and hope that the service, when it does commence, will have justified the interminable delays which now seem to be irrevocably linked with television in that country.

Special Screens

IN aiming at the development of brighter pictures both for domestic receivers, and big screen work, there are many inventors who are pinning their faith in incandescent screens, as distinct from those which make use of the principles of fluorescence. Each scheme has its own set of inherent difficulties, and these are in turn being eliminated gradually with the result that before long it should be possible to make a direct comparison between the pictures reconstituted by either method. In the case of the incandescent screens it is most important to prevent the heat generated at each elemental area from spreading to neighbouring points, as this only results in a blurring of the picture with a consequent loss of the finer detail. Special woven

Ruby Moule, an attractive seventeen-year-old Brixton girl, was a recent "discovery" of Television, being described as "the ready-made television girl" by Gerald Cock, the Television Director. Now, after being given many television engagements by the B.B.C., she is to be given a chance in filmdom, in the shape of a film-test. In our illustration Miss Ruby Moule is seen busy ironing at her Brixton home. She is unspoiled by the publicity.

screens have been tried with a fair degree of success, but there is another type in which tiny spirals of special wire, treated subsequently by chemical action and heat, are built up in elemental form. It is claimed that by this method the subsequent electronic bombardment brings about a very rapid rise to conditions of incandescence and this has the two-fold purpose of preventing heat spread and also reduces the "lag" effect which is another inherent defect of this type of picture formation.

Varying Designs

IT is both interesting and instructive to compare and contrast the varying number of receiver designs which have been employed in the sixty or so types of television sets which are now on the market. For this purpose no notice need be taken of the projection type cathode-ray tube models, as obviously they are in a class by themselves both from the point of view of picture size and cost. Taking a rough survey of the sixty models it was found that less than 25 per cent. had provision for indirect viewing. In the early days of the sets used for the high-definition service, picture observation via a mirror inclined at 45 degrees was quite popular. It was soon noticed, however, that some of the mirrors used were too thick, and this gave an annoying double image which resembled a ghost or the so-called "ringing" effect. This has been cured by using surface-silvered mirrors, but they are rather costly, and must not be subjected to the ordinary glass-cleaning processes, or the silvering will be ruined. Then, again, some of the side supports which held the mirror-accommodating lid in its correct position tended to narrow the angle of vision. Most of these objections have now been overcome, however, and many of the television receivers having a radiogram incorporated resort to this method for showing the picture, and the results are certainly very good. Another important reason for indirect viewing was the length of the cathode-ray tube itself. This made cabinet design very awkward and clumsy when the tube was mounted horizontally, and many manufacturers had projecting covers at the back of the set to protect the electrode section of the tube which invariably protruded for the space of a few inches.

A Measure of Doubt

THE newer short-length tubes have now cleared this difficulty, and in an endeavour to reduce cabinet size, and works cost, very many artifices have been resorted to so as to position the various chassis components in the space around the tube which a year or so ago was wasted. The tube is now almost invariably integral with the vision, sound or time-base generator chassis and arranged in such a way that possible servicing can be undertaken with relative ease. This is a big step forward, and much of the cheapening of prices which became apparent at Olympia was a direct result of this shortening of the cathode-ray tube, and more careful disposition of the chassis round the glass bulb. A much bigger electrical strain is being placed on the time-base generator as a result of this short-tube design, however, and it is known that some manufacturers have viewed this change with doubt as to its serviceability over a long period of time. A much stronger deflecting pulse is necessary in order to cover the picture area and sweep.

Televiews

Real Enterprise

THE B.B.C. outside broadcasts television department are to be congratulated for the enterprise they have shown recently in bringing television to the fore as a medium for the dissemination of up-to-date news. The departure and arrival of the Prime Minister at Heston aerodrome is a case in point. Although carried out at short notice, coupled with adverse weather conditions, the cameras were on the spot, and enabled viewers to witness scenes which no verbal description on the ordinary broadcast band could have made so vivid. There is no doubt that similar events will occur, although it is hoped they will be the result of more pleasant circumstances, and it is certain that the O.B. department will be ready to show their initiative, and have the vans ready to broadcast the events for home visual consumption. All this work must be coupled with the very ambitious programme which has been drawn up for employing the two outside broadcast van units during the autumn months. No doubt, the weather will play a big part in ensuring the complete success, or otherwise, of the items selected when judged from the point of view of picture quality in the home, but that in no way detracts from the initiative of the staff who are making a gallant effort to prove the value of television as a real news medium. The pleasure of watching an event recorded on celluloid, and shown subsequently on a news reel in a cinema, is tempered very materially by the knowledge that the result has been learned beforehand from the newspaper or wireless. Much of the thrill of expectancy is missing, and this is where television scores so heavily over its film rival.

Mr. Fred Hartley, whose broadcasting and recording quintet is well-known, has just bought a car. Nothing remarkable about that—except that the car is a 1901 De Dion Bouton. The reason is that Mr. Hartley is to enter for the London-Brighton "Old Crocks" race in November. Recently the occupants of Broadcasting House were astonished to see the musician arrive in splendour in the old veteran. In the illustration Mr. Fred Hartley and his wife are seen arriving at Broadcasting House in the De Dion Bouton car.

A Super Electron Microscope

A FEW weeks ago the attention of readers was drawn to a new form of electron microscope in which the usual principles of electron image formation and focusing were combined with the storage principles of the Iconoscope camera mosaic, so as to produce images of good brilliance and detail under conditions of imperfect illumination. It is now learned that in Germany a super-electron microscope has been manufactured by Siemens and Halske which gives a degree of magnification hitherto thought impossible. The normal electronic magnification is one of 2,000 diameters, but for special work the accelerating voltage is raised to 100,000 volts. Under these extreme conditions the degree of magnification becomes 30,000 diameters, which is about six times as great as that furnished by the best optical methods. It is for this reason that considerable research is being directed towards this offshoot of television. It is realised that for certain forms of medical investigations, advanced physics research, and many astronomical applications, a microscope of this character is invaluable, and will enable improvements to be made on the results obtained hitherto by optical means. Apart from work with ordinary forms of visible illumination, the electron microscope has the added advantage of being workable with either infra-red or ultra-violet illumination. It is merely a case of changing the photo-electric character of the cathode surface so that it is responsive to light in either region of the spectrum scale. Furthermore, the cost of a high magnification instrument with considerable versatility should be much less than an optical equivalent having a more restricted use.

MAKING A STAND-BY TRANSFORMER

(Continued from page 123)

Primary

Then wind on the first 935 turns of the primary, feeding the wire evenly over the whole surface to be covered. The winding face should be kept as level as possible, so do not "lump" the turns. When 935 turns are on, clean the wire and make the first tap, paying special attention to the soldering. Cover the lead-out wires with sleeving, and always make the taps on the top of the former between the broad flanges.

From this 207½ volt tapping, wind on 65 more turns and make the second tapping, then continue with a further 65 turns to finish the primary. The completed winding is covered with two layers of oiled silk as before.

Finally, the H.T. secondary is wound, the three connections being taken out on the opposite side to the primary taps. Two more layers of cloth cover the secondary winding and the whole is fairly heavily doped with a good insulating varnish.

Remove the mandrel before doping, however, or your work will be wasted.

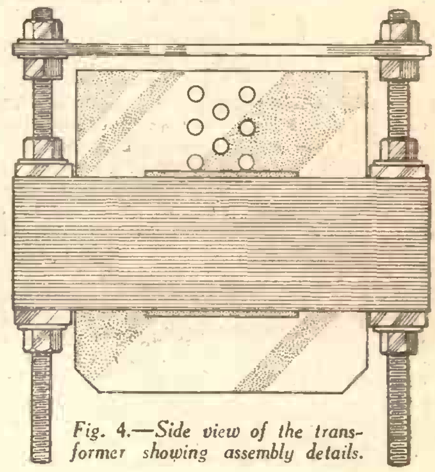


Fig. 4.—Side view of the transformer showing assembly details.

Ironing

Dry out the completed bobbin thoroughly for several hours before ironing up. If convenient, leave it to dry overnight before the fire, or stand it on a sheet of newspaper over the hot-water storage tank.

The former illustrated will require approximately 90 pairs of .014in. stampings, type 99, obtained from Magnetic and Electrical Alloys, Ltd., of Wembley, Middlesex.

These may be assembled in threes, but the stray field is lessened by interleaving the "T" and "U" pieces alternately.

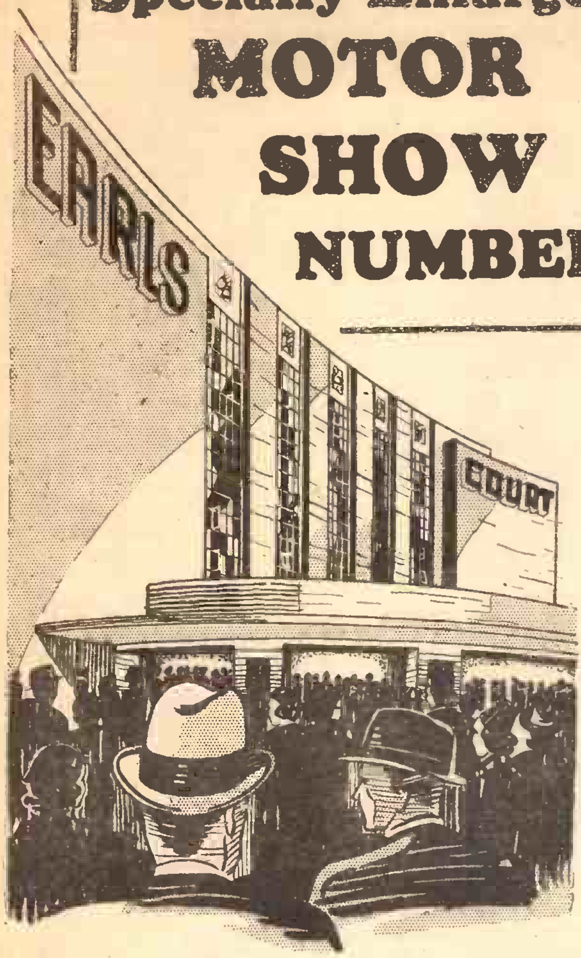
A skeleton framework is used for assembly. The terminal panel is of ⅛in. bakelite sheet, the connections from the windings being taken through Systoflex sleeving to the appropriate tags on the panel. Finally, the irons are given a coat of varnish to prevent rust.

It may be observed that the calculated voltage for the heaters is in excess of the specification. This is merely to compensate for I R drop in the windings when on load.

Finer Points of Construction

In conclusion, it may be as well to recapitulate the finer points of construction. The wire must be wound with an even tension and speed in winding is to be deprecated. Careful work will ensure a firm bobbin without stray loops of wire to be tucked away. Do not attempt to distort the bobbin when wound, or it will probably collapse.

Specially Enlarged MOTOR SHOW NUMBER



THIS week's specially enlarged PRACTICAL MOTORIST is a fully illustrated and alphabetically arranged guide to the Earls Court Show. Latest developments in engines and coachwork, and all new accessories are described and explained. At the Exhibition this Show Guide will be invaluable, and if you cannot visit the Show it will bring Earls Court to you!

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'THE PIECE YOU HAVE JUST CUT OFF. NOW WHEN THE WINTER COMES AND ALL THE LEAVES HAVE FALLEN, YOU CUT OFF, NOT MERELY THE LITTLE SHOOT

E37b

. . . and then the set goes DEAD

and you say

'NEXT TIME I'LL FIT Exide AND Drydex RADIO ACCUMULATORS AND DRY BATTERIES'

Exide tells you with the Charge Indicator when juice is getting low—instead of waiting for the thing you most want to hear and *then* fading away. And Exide's only proper companion in any set is Drydex—the H.T. battery that lasts so long and fades so very gradually that it, too, gives you plenty of warning. Exide and Drydex are the pair that ***still keep going when the rest have stopped.***

From reputable dealers and Exide Service Stations. Exide Service Stations give service on every make of battery. The Chloride Electrical Storage Company Ltd. (Exide and Drydex Batteries), Exide works, Clifton Junction, nr. Manchester. Also at London, Manchester, Birmingham, Bristol, Glasgow, and Belfast.

A Car Radio Hint

How to Safeguard the Accumulator from Overload

MOST commercial car radios draw from the accumulator about 5 amps. This is usually dealt with in one of two ways: (1) By leaving the carefully balanced charging rate of the dynamo alone, and running the risk of a flat battery, or (2) by adjusting the control brush to cover extra current required; this method may, however, have the unfortunate result of buckling the battery plates if the radio is not in constant use. A glance at Fig. 1 will explain how to overcome this "snag" of car radio.

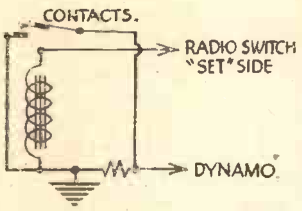


Fig. 1.—The idea outlined in this article for battery protection.

The Relay

An old 6-volt cut-out, which may be obtained from any "car breaker," will serve this purpose admirably. The only modification necessary is simply to remove the heavy current winding, taking care not to damage the fine voltage winding or the points; this will leave you with an excellent relay designed to stand up to constant use without overheating. Should the constructor wish to build the relay from parts found in any "junk box," the fundamental details are shown in Fig. 2. Approximately 18 layers of 60 turns each of the specified wire will be suitable.

The Resistor

This, again, may be found among the "stock in trade" of any reader. A little experimenting will soon ascertain the correct value to give the desired drop. A 1.5 ohm 10-watt radio resistor will drop the current 5 amps. when radio is "off"; it is not recommended to go beyond this value, as some generators tend to reverse polarity when a resistance of greater magnitude is placed in the earth lead.

Mounting and Wiring

Once the relay is ready it only remains to solder the connections. If an old cut-out is used a cover will be provided, but if the constructor has assembled the relay it would be advisable to "can" it in order to protect it from condensed oil, dust, etc. Fig. 3 indicates the method of mounting the resistance on the relay cover B, and also the whole on the strap, or brush-inspection cover of the dynamo A. With this cover off the dynamo brushes are accessible, and once the earthed brush is recognised it is a simple matter to remove the brush holder and insert some insulating washers underneath to insulate the whole from earth on the "pot" of the dynamo. From this brush-holder an insulated wire should be taken out of the dynamo at any convenient point to one side of the resistor, which is also connected to the upper point of the relay. While the brush-inspection cover is removed the "third" or "control" brush can be adjusted to give the extra 5 amps which will be needed when the radio set is in use, and automatically earthed when the radio switch is in "off" position. It is to this switch (dead side) that the only wire connecting the unit to the set is needed.

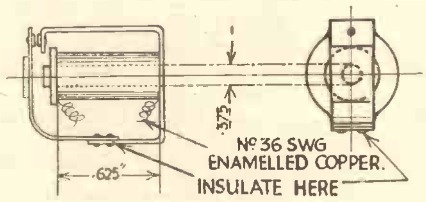


Fig. 2.—Constructional details of the relay.

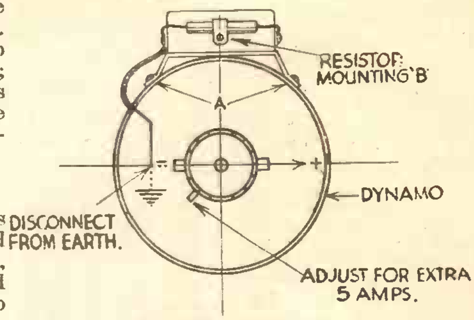


Fig. 3.—Mounting the parts on the dynamo.

A little experimenting with resistance and brush position may be necessary to attain the desired result, i.e., with engine revs. equal to 30 m.p.h., and all lights and radio "on" (or off), the ammeter should remain in central position.

IMPORTANT BROADCASTS OF THE WEEK

NATIONAL (261.1 m. and 1,500 m.)
Wednesday, October 19th.—Symphony Concert from the Queen's Hall, London.
Thursday, October 20th.—Variety from the Lyceum Theatre, Sheffield.
Friday, October 21st.—Special concert programme.
Saturday, October 22nd.—Music Hall programme.

REGIONAL (342.1 m.)
Wednesday, October 19th.—Variety from the New Hippodrome Theatre, Coventry.
Thursday, October 20th.—Concert Party programme, from the Royal Hall, Harrogate.
Friday, October 21st.—Orchestral programme.
Saturday, October 22nd.—Chamber Music.

MIDLAND (297.2 m.)
Wednesday, October 19th.—Variety from the New Hippodrome Theatre, Coventry.
Thursday, October 20th.—The House of Grevis, a play.
Friday, October 21st.—Old Time Dance Music.
Saturday, October 22nd.—Orchestral programme.

NORTHERN (449.1 m.)
Wednesday, October 19th.—Music of the People: A concert by Wigan Folk.
Thursday, October 20th.—Robert Owen, a radio biography.
Friday, October 21st.—Speech from the University, Durham.

TELEVISION FEATURES

Outside Broadcasts

A WEEK'S series of outside broadcasts from the grounds of Alexandra Palace will be opened on the afternoon of October 22nd by viewers being taken on a tour of one of the mobile television units. Studio cameras will picture the complete operation of the unit arriving outside the Palace and setting up its equipment as if it were about to televise an outside feature.

Viewers will have the opportunity of seeing the four vans which make up a unit—the transmitter, the power van for generating current where this is not available from mains supply, the scanning van, and the fire escape aerial which can be run up to a height of eighty feet in about 30 seconds. Cables will be run out and cameras and microphones set up, and once this has been done the engineers will hand over to the producer waiting to begin the transmission. The total weight of the four vans of the outside broadcast unit is over 30 tons.

Saturday, October 22nd.—Spotlight on Sport: Arsenal v. Preston North End—an eye-witness account from London.

WEST OF ENGLAND (285.7 m.)
Wednesday, October 19th.—The Use of the Land.—2, The Government and Agriculture, a discussion.
Thursday, October 20th.—Bath, feature programme.
Friday, October 21st.—Choral programme.
Saturday, October 22nd.—Personal Relationships.—3, The Employer and his Secretary, a dialogue.

WELSH (373.1 m.)
Wednesday, October 19th.—Macbeth, a tragedy by William Shakespeare (in Welsh).
Thursday, October 20th.—Orchestral concert.
Friday, October 21st.—Night Express.—1, Night Express Murder: a radio serial in six episodes, based on L. A. Knight's novel, Night Express Murder.
Saturday, October 22nd.—Concert Party programme.

SCOTTISH (391.1 m.)
Wednesday, October 19th.—Students' Songs: choral programme.
Thursday, October 20th.—Gaelic Concert.
Friday, October 21st.—Organ music from the Capitol Cinema, Aberdeen.
Saturday, October 22nd.—Band concert.

A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA

READERS WRINKLES

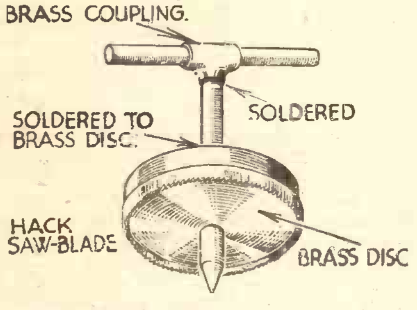
THE HALF-GUINEA PAGE

A Circular Cutting Tool

HERE is a useful dodge for cutting large holes in a metal chassis. All that is needed to make it is a hacksaw blade (about $\frac{1}{2}$in. wide), some sheet brass or steel ($\frac{1}{16}$in. thick), and some metal rods about $\frac{3}{16}$in. diameter.

Two brass discs are cut, slightly less than the required diameter of the hole. A length of hacksaw blade is cut off just sufficiently long to allow it to go round the discs and meet without overlapping. Holes are then drilled in the centres of the discs to allow a pointed rod to be soldered in. The blade is soldered round the discs, leaving about $\frac{1}{8}$in. of blade projecting at the bottom. The handle can be a tap wrench, or it can be made as shown in the sketch.

To use the tool, first drill a hole in the centre of the required hole so that the pointed end of the central rod can be inserted. Using this as centre the tool is rotated backwards and forwards until the metal is cut through.—D. TWIVEY (Market Rasen, Lincs).

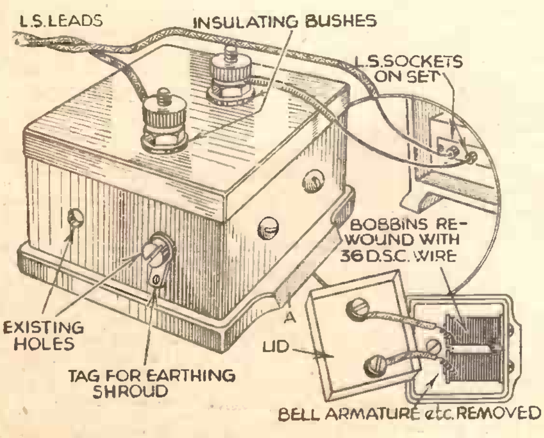


A handy tool for cutting large-diameter holes in a metal chassis.

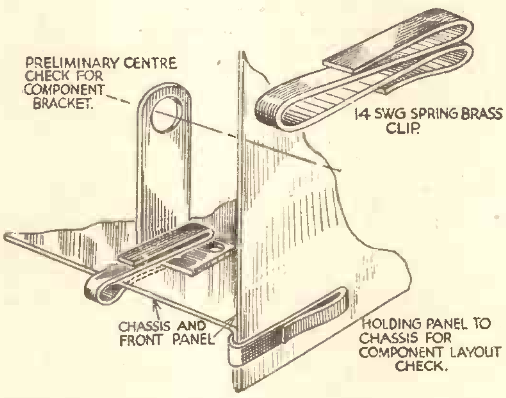
A Simple Output H.F. Filter Unit

WHEN dismantling an iron-clad type electric bell the other day, it occurred to me that I might take advantage of the casing for the construction of an output loudspeaker filter unit.

Removing the armature movement and rewinding the bobbins until they were full, with 36 d.s.c. wire, constituted the means of obtaining the H.F. chokes. By retaining the iron pole pieces a winding capacity to earth was obtained by taking the earth lead to a solder tag fitted to the side of the shroud, as illustrated. The easily removable lid provided the mount for the terminals, and two ebonite insulating bushes ensured adequate protection against short circuit. As will be seen from the drawing, the connections to the receiver are very simple, and when connecting up, the unit should preferably be inside the cabinet with the earth connection obtained from the usual socket. —B. N. DAVIES (Royston).



A useful output H.F. filter unit can be made as shown here.



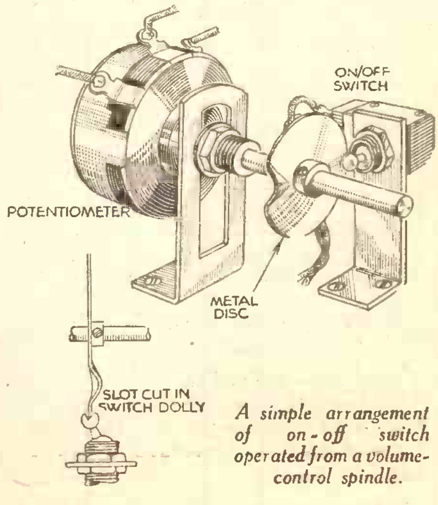
Many uses can be found for these handy clips.

A Dodge for Metal Chassis Construction

IT is often necessary to retain in position one or more components when working out the design of a new chassis, and recently I resorted to the use of some hastily made clips in aluminium for use in the manner illustrated. These clips proved, however, to be too weak, being made of 16 s.w.g., but the value of a set of these made of suitable sheet brass soon became apparent. I obtained some strip brass, cut a number of different lengths, and bent the clips to the shape required. Now, when I require to position, say, a condenser mounted on an adjustable bracket, it is a very simple matter, and the comparisons to be made with regard to the other component positions is facilitated. The holding in position of the front panel, and chassis, as illustrated, is another of the advantages to be found in the use of this simple clip system. —H. L. ATKINSON (Olney).

A Dual-control Device

MANY constructors who have a volume control with a long spindle, may wish to use the volume control as an on-off switch in addition to its usual function. This is quite a simple matter, the only parts needed, besides the volume control and toggle switch, are one disc of metal (thin brass plate), about $1\frac{1}{4}$ to $1\frac{1}{2}$in. diameter, with a hole in the centre to correspond with the size of the volume-control spindle; and one brass bush with fixing screw. The circular plate, which is soldered to the brass bush, is indented, as shown, to form a cam which engages in a slot cut in the switch dolly. The method of mounting the parts is clearly indicated in the accompanying sketch.—R. JOHNSON (Lancaster).



A simple arrangement of on-off switch operated from a volume-control spindle.

Leaves from a Short-wave Log

Finland's Bigger Voice in the Ether

THE results of broadcasts on short waves of the Lahti programmes have proved so satisfactory that the Suomen Yleisradio has applied to the Finnish Government to add a 50-kilowatt short-wave transmitter to its radio network. In regard to medium waves, Abo is to be endowed with the 40-kilowatt transmitter formerly used at Lahti, and the power of the Viborg station is to be doubled.

Short-wave Station for Lithuania

THE 60-kilowatt short-wave transmitter which is being erected near the capital (Kaunas), for the re-broadcast of the long-wave programmes, is nearing completion, and should begin to test within the next few weeks. The channels allotted for this service are: LYZ2, 31.5 m. (9.523 mc/s); LYZ3, 25.21 m. (11.9 mc/s); and LYZ4, 19.61 m. (15.3 mc/s). The 7-kilowatt long-wave station LYX, 1,961 m. (153 kc/s) is to be replaced by a 120-kilowatt transmitter at a cost of roughly £36,000.

A Call from West Africa

IT is reported that a short-wave transmitter has been opened by the French Colonial authorities at Macenta, in French Guinca (West Coast of Africa); it was officially inaugurated at the beginning of September. The call-signs are: TXC5, 51 m. (5.882,3 mc/s); TXC6, 40.5 m. (7.407 mc/s); and TXC7, 34.5 m. (8,695 mc/s).

Will Radio Luxembourg Relinquish Long Waves?

ACCORDING to the Lucerne Plan Radio Luxembourg was allotted a channel in the lower medium-wave band but has always broadcast on its present channel. As the Parliament of the Grand Duchy has approved the decisions taken at the recent Cairo Radio Conference at which this question was again raised, it will be interesting to see whether Luxembourg's high-power station will agree to an altered frequency, or whether it will still continue to work on the long-wave band.

Norway Orders Two 100-kilowatters

THE Stavanger station, at present working on 20 kilowatts, is to be given a transmitter five times that power; the new plant will be erected at Ullanhaug, in the vicinity of that city. Work has also been started on the 100-kilowatt station to be erected at Vigra. It is hoped that both transmitters will be working in the early spring of 1939.

Radio Tunis

THE 30-kilowatt broadcasting station which the French authorities have built at Dedjeida (near Tunis, North Africa) is now testing daily on 345.6 m. (868 kc/s) between G.M.T. 10.00-12.00, and from 18.00-20.00. It had been hoped to carry out the inaugural ceremony on October 2nd, but in view of the international political situation it has been postponed to a later date. The power of the station can be increased to 40 kilowatts at short notice.

Radio Tananarive Tries Out New Channels

FRENCH wireless papers report that Radio Tananarive (Madagascar) has abandoned its former wavelength of 49.96 m. to work on 31.96 m. (9.385 mc/s), and 27.36 m. (10.965 mc/s). The transmissions are now made between G.M.T. 05.30-05.45; 08.30-09.30, 15.00-16.00 on weekdays, and on Sundays from G.M.T. 07.30 09.00 only.

Another Spanish Wavelength

RADIO REQUETE DE VITTORIA (Spain), a Nationalist station formerly operating on 42.69 m. (7.027 mc/s) is now broadcasting daily from G.M.T. 17.30 on 25.02 m. (11.991 mc/s).

Ankara Now Tests Daily

TAP, Ankara (Turkey), is now carrying out experimental broadcasts every day at G.M.T. 10.00, and again at G.M.T. 20.00, on 31.7 m. (9.465 mc/s). Announcements are made in English, French and German, the call being: *This is Radio Ankara, Experimental Station.* All reception reports should be addressed to Poste de Radiodiffusion TAP, Direction Générale des Postes, Télégraphes et Téléphones Ankara (Turkey).

New Polish Short-waver

DURING the recent international crisis transmissions were heard from a Polish station on 48.86 m. (6.14 mc/s). In official lists this channel is allotted, amongst others, to a 5-kilowatt station under construction at Torun (Poland), and possibly the plant may have been brought into operation.

Another French Harmonic

RADIO NORMANDIE is occasionally heard on about 30 m. This would appear to be the 7th harmonic, namely, about 30.37 m. (9.877 mc/s).

Powerful Signals from Bogota

BROADCASTS from HJN, Bogota (Colombia), can now be tuned in at good strength towards G.M.T. 23.00 nightly. The station giving its call as *Radio Nacional de Bogota* works on 49.5 m. (6.06 mc/s) with a power of 1 kilowatt. Announcements are made in the Spanish language with an occasional call in English. All reception reports should be addressed to Radio Nacional HJN, Ministerio de Correos y Telegrafos, Bogota (Colombia). The distance from London is approximately 5,290 miles.

Philippine Programme Schedule

KZRM, Manila, operates daily from G.M.T. 10.00-15.00 on 31.35 m. (9.57 mc/s). It is best to tune it in on Sundays when W1XK, Millis, working on the same channel, starts one hour later.

New American Transmitter

AFTER many weeks of exhaustive tests, the new 50-kW. transmitter, KNX, at Torrance, California, was recently put into service. Linked with the KNX studios in Hollywood, the new transmitter completes one of America's most elaborate broadcasting units.

Short-wave Enthusiasts to Call London

THE greatest short-wave radio link-up in history is to take place in London next month. Amateurs in all parts of the world who have short-wave transmitting licences are co-operating with the International Short-wave Club to call Olympia from November 2nd to 26th.

Postcards are already being dispatched to short-wave enthusiasts overseas inviting them to state the hours most suitable to them for transmission, so that it will be possible to announce to visitors the times and from what countries messages may be expected.

The Club is arranging to establish a new receiving station—Olympia—on a site covering 370 sq. ft. in the Leisure Section in the Empire Hall. The station will be equipped with some of the latest and most efficient types of receiver, constructed by members of the Club, covering ultra-short and short wavelengths, and will be used to ascertain the possibilities of radio reception in this vast steel-framed building.

Before November 2nd British transmitters will be chatting to far-off friends about arrangements for the link-up. Listeners in this country who possess receivers covering the short waves will be able to listen to these conversations. At the same time, they can qualify for an interesting competition which will be run in connection with the Club scheme. Ordinary listeners are to be invited to see how many stations they can log during certain hours.

In addition to amateur short-wave broadcasts the recognised short-wave stations in America, South America and Australia will be broadcast from the I.S.W.C. stand during the above period.

PERSONAL PARAGRAPHS

MR. D. W. YOUNG has been appointed manager of the radio department of the Bath branch of Duck, Son and Pinker, Ltd., the well-known music and radio house. For the past five years he has been manager of the radio service department, and he now replaces Mr. S. R. Lewin, who has been promoted to the managership of the Bristol premises.

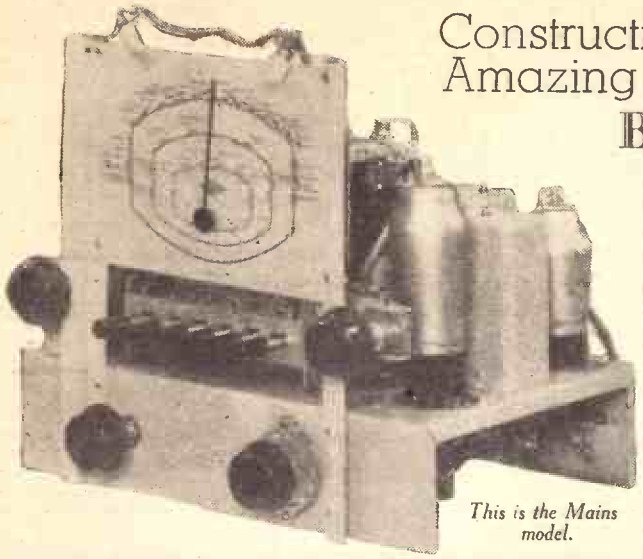
MR. BERT BRYAN has purchased the radio business of H. Austin Storry, Ltd., of Southsea. He is the brother of Mr. Harry Bryan, the well-known managing director of Selecta Gramophones, Ltd.

MR. ALBERT E. PROUD, South Wales representative for Decca Radio and Television, Ltd., has changed his private address to "Deloraine," Heathwood Road, Cardiff.

THE PUSH-BUTTON 4

Constructional Details of this New Amazing 4-valve Superhet Receiver

By F. J. CAMM



This is the Mains model.

THE double-sided blueprint given with this week's issue represents my latest effort to satisfy the tug-of-war between those in favour of battery and mains receivers. It represents, too, the culmination of many months of work and experiments with push-button systems, and continues my practice of only placing before my readers designs which I can personally guarantee.

For the first time in the history of radio journalism you have a double-sided blueprint, and thus I hope to satisfy everyone of those many thousands of constructors who continue to build receivers because they know that they can obtain more lasting results and better performance than from the average commercial receiver of comparable price. These two receivers will enhance the high reputation already enjoyed by PRACTICAL AND AMATEUR WIRELESS receivers; they are also intended to signalise the passing of another PRACTICAL AND AMATEUR WIRELESS Birthday—our sixth! Readers have not the same large choice of wireless journals which they had when this journal first appeared on the market, and because of the acquisition to our ranks of many thousands of new readers as a result of other journals falling by the way, I want to assure every reader of this journal that I am conscious of my responsibility to produce receivers which are satisfactory in every way.

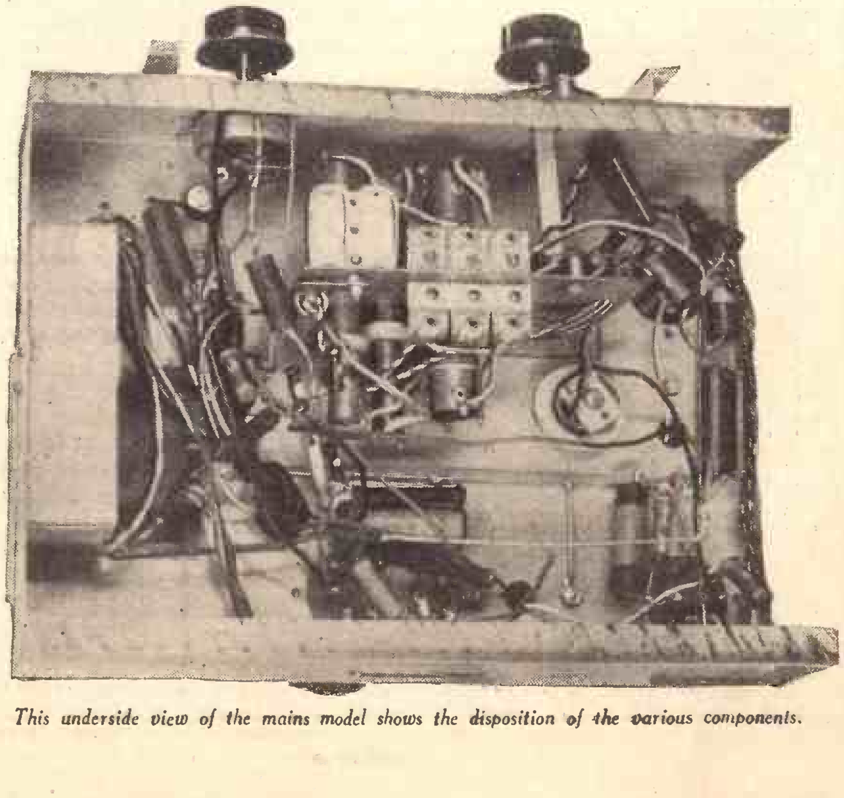
I do not publish details until the minutest factor satisfies me. I launch these two new receivers with my personal backing that they will do what I claim for them, and again that backing is supported by my personal guarantee to test and adjust free of charge any receiver which a reader builds from the specified parts, if he is unable to make the receiver substantiate those claims. It is a policy which I made one of the foundation stones of this journal, and the fact that the journal is still in existence and as virile as ever is evidence of the soundness of that policy. This policy is supported by another almost equally as important, namely, that of specifying only those parts which are the successful links in the chain of design. I merely ask that you use those parts so that you will obtain the same successful results. Do not destroy the balance of the circuit by taking liberties with that list! It may seem an unimportant matter, but a component which introduces a longer lead may also introduce complications and instability which will cause you hours of work, and finally you will find that you will have to chase those defects right through the circuit in an unsuccessful endeavour to chase them out of it.

I have done that work for you. All of the bugs have been chased out of the Push-button Four, and you should use the components and their arrangement exactly as printed here, and shown on the blueprint.

The Circuit

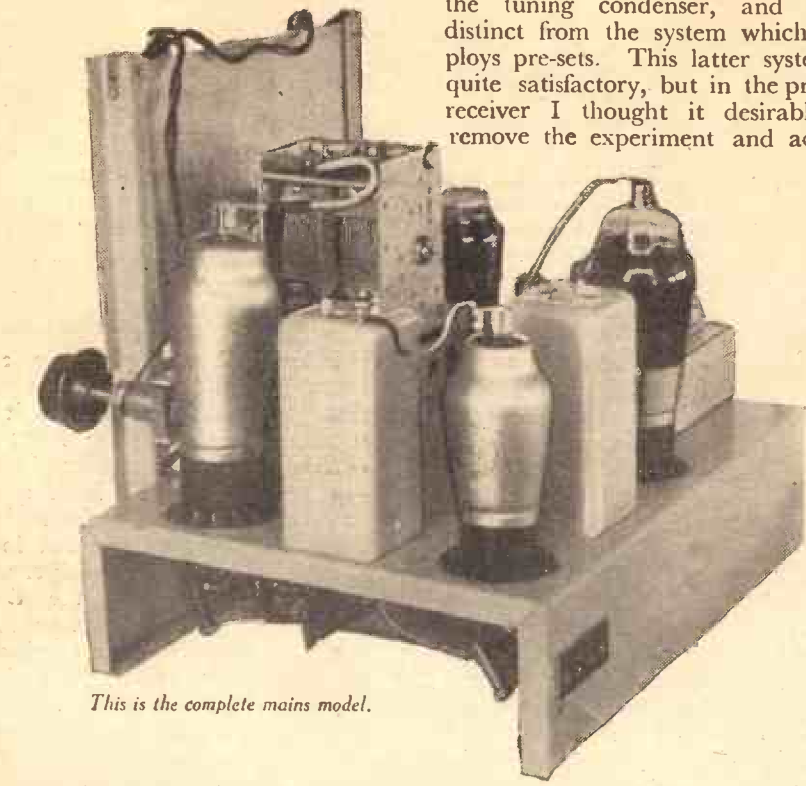
I have already given in earlier issues brief details of this receiver, and you will observe that it is a superhet. employing the latest type of combined frequency changing valve—a triode-pentode. Both sets are four-valvers, although the mains set has a rectifying valve; but in this, a combined double-diode-pentode is employed as against the double-diode-triode and separate pentode of the battery set. Mains valves are relatively more efficient, and thus the performance does not suffer due to the loss of one stage of amplification.

One of the bugbears encountered by the home constructor in making an all-wave set is that usually a number of coils and separate padding condensers are required. In this receiver I have selected a unit with the coils already mounted on a special plate with their associated



This underside view of the mains model shows the disposition of the various components.

trimmers. The coils are of the 3-range type, covering approximately 19 to 55 metres, 200 to 550 metres, and 850 to 2,000 metres.



This is the complete mains model.

A large station-name scale measuring no less than 7in. by 5in. is employed, and it is accurately calibrated for use with these coils and the tuning condenser specified.

The push-button mechanism is of the mechanical type which operates the tuning condenser, and it is distinct from the system which employs pre-sets. This latter system is quite satisfactory, but in the present receiver I thought it desirable to remove the experiment and adjustment necessary with this system. In the present system accurate tuning is guaranteed under all conditions, for it also incorporates an ingenious clutch mechanism which throws out the push-button gear when it is desired to change over to manual tuning. This clutch can be operated by a flick of the finger.

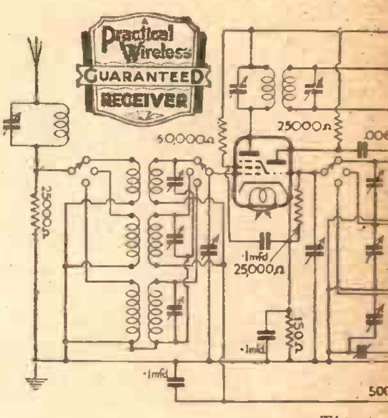
Notice that there is tone control on both sets. It is a tone control which operates over wide limits of frequency and thus enables the listener to adjust the tone according to the nature of the transmission, and to his own inclinations in that respect.

Interference is taken care of by the intermediate-frequency filter in the aerial circuit, which prevents interference on a wavelength corresponding to the I.F. used. This is a common failing with some modern receivers. Fading troubles are prevented by means of full A.V.C. in both of the receivers.

Notwithstanding all of these advantages the receiver is comprised of a most compact assembly, the chassis being less than 12in. in length and only 8½in. wide. The construction has been specially simplified.

Constructional Details

The theoretical circuit has already been explained, and all that now remains is to cover the various constructional features. The accompanying illustrations show how the receiver is built up, the chassis, push-button unit, tuning dial, coil unit, etc., all being supplied as separate items. The following remarks apply to both the mains and battery receivers, but where any special reference is needed it will be covered separately. Assuming that all of the parts have been obtained, the first thing is to mount the coil unit and the filter unit on the chassis with the bolts provided. The



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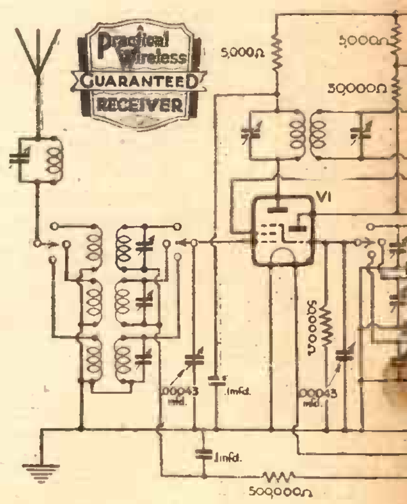
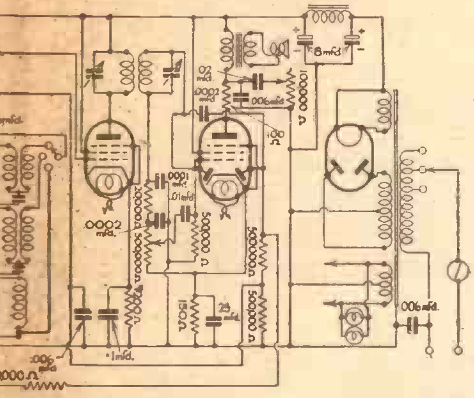


The battery

DETAILED LIST OF COMPONENTS FOR THE MAINS MODEL

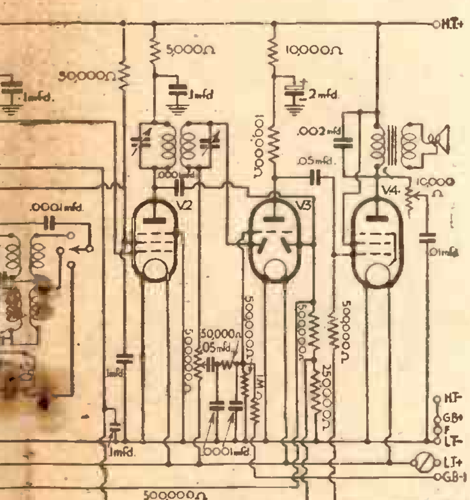
One enamelled steel chassis 11¾in. by 8½in. by 2¾in., with aerial-earth strip fitted, 5s. 6d. (Peto-Scott).
One special all-wave tuning unit with switches, filter unit, etc., type P.B.4, 18s. 6d. (Peto-Scott.)
One 6-pt. push-button mechanism with station plate, knob, buttons and escutcheon, 20s. (Peto-Scott.)
One two-gang bar-type condenser, .00043 mfd. each section, with special mounting bracket, 4s. 6d. (Peto-Scott.)
One station-named scale and drive, brackets, driving drum, pointer and cord, 4s. (Peto-Scott.)
One special potentiometer mounting bracket, 4d. (Peto-Scott.)
Two I.F. transformers, types BP.122 and BP.123, 7s. 9d. each. (Varley.)
One mains transformer, type P.B.4, 20s. (Heayberd.)
Fixed condensers:
  One at .0001 mfd., type 451, 1s. (T.C.C.)
  One at .0002 mfd., type 451, 1s. (T.C.C.)
  Four at .006, type M, 1s. 6d. each. (T.C.C.)
  One at .01 mfd., type 451, 1s. (T.C.C.)
  One at .02 mfd., type 451, 1s. (T.C.C.)
  Three at .1 mfd., type 341, 1s. 4d. each. (T.C.C.)
  One 8-8 mfd. electrolytic, type 712/3, 6s. (T.C.C.)
  One 25 mfd. electrolytic, type FT, 1s. 6d. (T.C.C.)
Fixed resistors:
  One at 100 ohms, 1-watt type, 1s. (Erie.)
  Two at 150 ohms, 1-watt type, 1s. each (Erie.)
  One at 200 ohms, ½-watt type, 1s. (Erie.)
  One at 20,000 ohms, ½-watt type, 1s. (Erie.)
  Three at 25,000 ohms, ½-watt type, 1s. each. (Erie.)
  One at 50,000 ohms, 1-watt type, 1s. (Erie.)
  Four at 500,000 ohms, ½-watt type, 1s. each. (Erie.)
Four valveholders, three 7-pin and one 5-pin, types V1 and V2, 3s. (Clix).
One volume control 100,000 ohms, Lab. type, 3s. (Erie.)
One volume control, 500,000 ohms, with on/off switch, 3s. 6d. (Erie.)
Two dial lamps 6.3 volts .3 amp., 9d. each. (Bulgin.)
Three top-cap connectors, type P.41, 2d. (Bulgin.)
Connecting wire, length of screened braid, mains flex and plug, 5s. (Peto-Scott.)
Four valves:
  One type TX4. (Tungsram.)
  One type VP4-B. (Tungsram.)
  One type DDPP4B. (Tungsram.)
  One type APV4. (Tungsram.)
  One energised loudspeaker, Type EM/PB. (W.B.)

blueprint will be of assistance in showing the correct way round for the coil unit, although it will be found that to enable the switch to be fitted there is only one position for the coil unit. The filter unit is bolted to the chassis just in front of the coil assembly, and the switch-locating plate is next bolted to the front runner of the chassis. In this connection note carefully that the switch-locating plate and the moving plate on the switch must both be accurately aligned, and therefore the flat operating



the mains circuit.

spindle should be first placed in the switch unit, turned to its maximum position in a clockwise or an anti-clockwise direction, and the locating plate then so placed on the chassis that the switch may be operated over the full movement. This is so that there are two "clicks" as the switch is turned in either direction. When

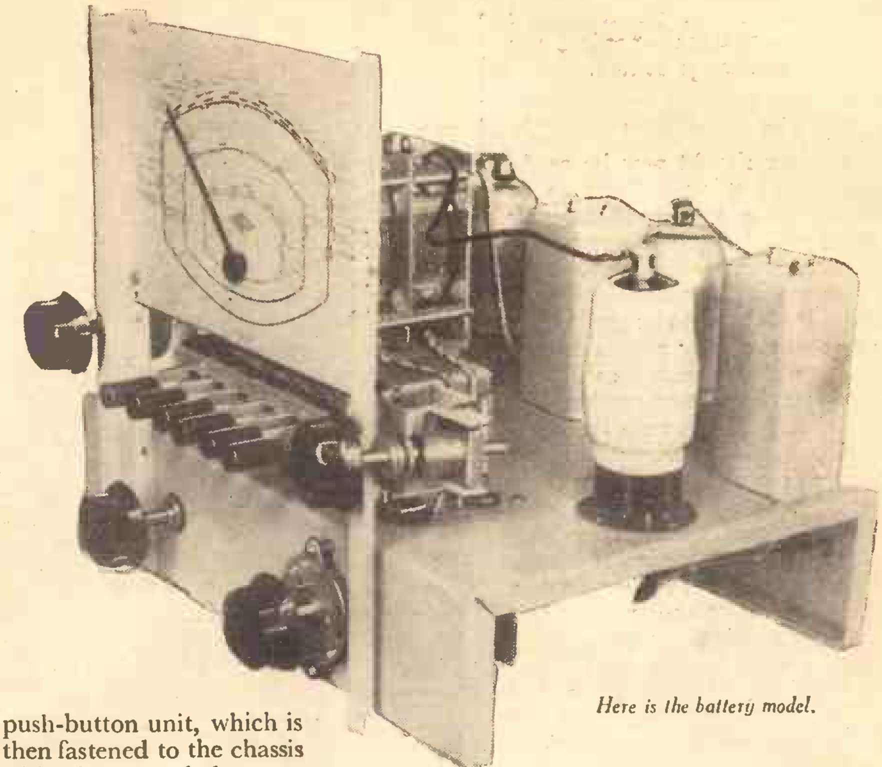


theoretical circuit.

this type of switch has been employed in previous receivers we have found that some constructors fail to attend to this point, with the result that they cannot obtain either the short or the long-wave band.

Mounting the Condenser

The gang condenser is supplied with a special mounting bracket, and it should be bolted to the top of the



Here is the battery model.

push-button unit, which is then fastened to the chassis with the two bolts provided, placing the rubber washers on each side of the chassis. Next screw on the two runners which hold the dial, but do not fit the dial just yet. The special driving drum should now be fitted to the condenser spindle and the cord attached to the drum by passing through the two holes provided and knotting on the inside. The cord should be taken down and round the right-hand spindle so that it is fairly tight when the right-hand spindle is pushed to its right-hand position. It will be noted, of course, that this spindle is on a rocking bracket so that it may be pushed to the right or left. (When the automatic push-button mechanism is in use the knob has to be pushed to the left.)

When this part of the assembly has been completed the I.F. transformers, and the mains transformer in the case of the mains model, may be mounted,

DETAILED LIST OF COMPONENTS FOR BATTERY MODEL.

One enamelled steel chassis, 11½in. by 8¾in. by 2¾in., with aerial-earth strip fitted, 4s. 6d. (Peto-Scott).
One special all-wave tuning unit with switches, filter unit, etc., type P.B.4, 18s. 6d. (Peto-Scott).
One 6-pt push-button mechanism with station plate, knob, buttons and escutcheon, 20s. (Peto-Scott).
One two-gang bar-type condenser, .00043 mfd. each section, with special mounting bracket, 4s. 6d. (Peto-Scott).
One station-named scale and drive, brackets, driving drum, pointer and cord, 4s. (Peto-Scott).
One special potentiometer mounting bracket, 4d. (Peto-Scott).
Two I.F. transformers, types B.P.122 and B.P.123, 7s. 9d each (Varley).
One volume control, 500,000 ohms, with on-off switch (Lab. Type), 3s. 6d. (Erie).
One volume control, 100,000 ohms (Lab. type), 3s. (Erie).
One fuse-holder, type S.E.S.38, 4½d. (Bulgin).
One fuse bulb, 9d. (Bulgin).
Four valveholders, type V1 and V2, two 5-pin and two 7-pin, 3s. 6d. (Clix).
Fixed condensers:
Four at .0001 mfd., type 690 W, 8d. each (Dubilier).
One at .002 mfd., type 4601/S, 1s. (Dublier).
One at .01, type 4601/S, 1s. (Dubilier).
Two at .05 mfd., type 4602/S, 1s. 3d. each (Dubilier).
Five at .1 mfd., type 4603/S, 1s. 4d. each (Dubilier).
One at 2 mfd., type 3016 (Electrolytic), 1s. 6d. each (Dubilier).
Fixed resistors:
Three at 5,000 ohms, ½-watt type, 1s. each (Erie).
One at 10,000 ohms, ¼-watt type, 1s. (Erie).
Two at 30,000 ohms, ½-watt type, 1s. each (Erie).
Two at 50,000 ohms, ¼-watt type, 1s. each (Erie).
One at 100,000 ohms, ¼-watt type, 1s. (Erie).
One at 250,000 ohms, ¼-watt type, 1s. (Erie).
Five at 500,000 ohms, ¼-watt type, 1s. each (Erie).
One at 1 megohm, ¼-watt type, 1s. (Erie).
Three top-cap connectors, type P.41, 2d. (Bulgin).
Length of flex, wire for connection, length of screened braid, screws, etc., 3s. 6d. (Peto-Scott).
Four valves:
One TP23 (Mazda).
One 210 VPT (Cossor).
One 210 DDT (Cossor).
One 220 HPT (Cossor).

after which the valveholders and the large mains-smoothing condenser may be fitted in their correct positions. The small special bracket for the volume control is next attached on the left of the dial-mounting bracket, and the tone-control potentiometer attached to the chassis runner in a line with the wave-change switch.

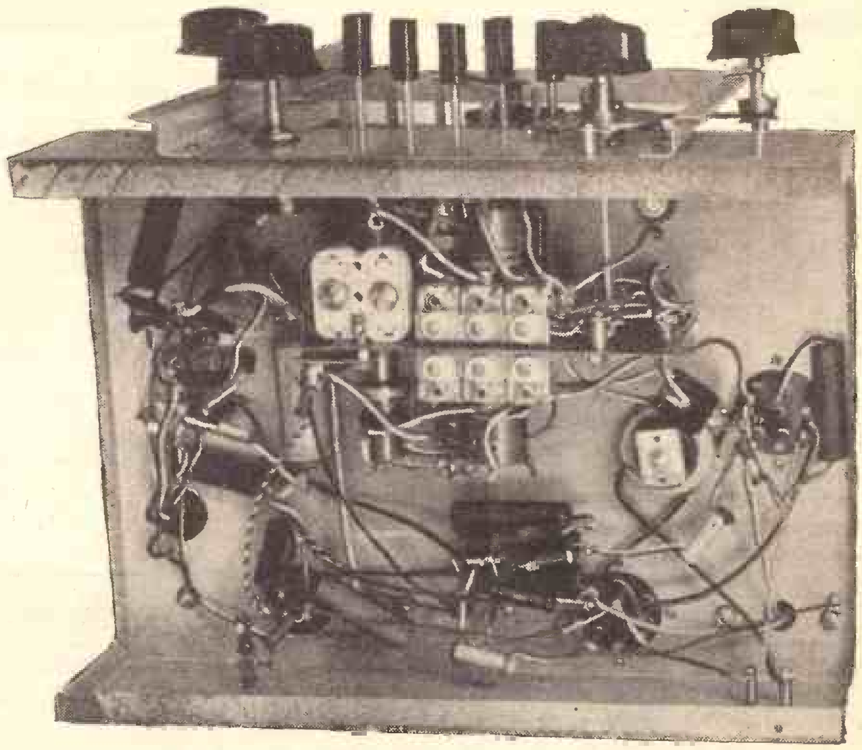
Wiring Details

The receiver should now be ready for wiring, and this will have to be carried out in a systematic manner to prevent omission of wires or wrong connections. The coil unit is supplied ready wired, but one or two additional leads have to be made to it, and these are clearly shown in the blueprint, which should, as in all cases of receiver construction, be studied in conjunction with the theoretical circuit. It is easily possible to mistake a component such as a fixed condenser, where two or more have identical values in a circuit, and by referring to the theoretical diagram when a given point is to be wired, a cross-check is obtained which will prevent any ambiguity which might eventually lead to trouble.

In the battery wiring diagram one wire on the chassis has been shown as an open line, as distinct from the solid line used for the remainder of the wiring. This is the earth return lead to which various components are joined, and a similar wire is found in the mains version. This lead should be made with a length of bare tinned copper wire, as heavy in gauge as possible—say, 16 or 18 S.W.G. Make certain that it is quite clean before mounting, and then join it to the soldering tags shown on the wiring diagram. Note that it is joined to the mounting plate of the coil unit. By connecting a soldering lug to the bolts holding down the I.F. transformer you remove the necessity of scraping away the enamel on the chassis to earth the screening cans of these components, and the bare wire is taken up through a hole in the chassis and soldered to the wiping contact on the two-gang condenser to ensure that a reliable earth connection is obtained from this component. In this way the chassis is not relied upon for earthing purposes, and more stable operation is ensured.

Two leads are soldered to the lower tags on the gang condenser for subsequent connection to the coil unit, but if you do not possess one of the small soldering irons which will go into the space available, you will have to attach these leads before the gang condenser is mounted on the push-button unit. As the resistances are all of the colour-coded type it may be advisable to repeat here the colour code which is employed for these components. The body is taken as the first figure, then the tip colour, and finally the dot which will be found on the body. Thus the small resistances with a green body, a black tip and a yellow spot have a value of 5, plus one nought, plus four noughts, or in other words, 500,000 ohms.

Colour	Figure	No. of Noughts
Black ..	0	None
Brown ..	1	0
Red ..	2	00
Orange ..	3	000
Yellow ..	4	0000
Green ..	5	00000
Blue ..	6	000000
Violet ..	7	—
Grey ..	8	—
White ..	9	—


Underside view of the battery model of the Push-button 4.

The fixed condensers are all clearly marked with their respective values, and the only point which should be emphasised is that in the 25 mfd. electrolytic used in the mains set the red ring (also marked with a series of plus signs) should be joined to the cathode of the valve and the other end joined to the common earth wire. The two red and the black leads from the rectangular 8-8 mfd. condenser in the mains set are clearly identified on the blueprint. In the battery receiver the electrolytic condenser is also connected so that the negative side is joined to the earth wiring.

Mounting the Condenser

When the wiring is completed the dial may be attached by ordinary paper-fasteners or with bolts and nuts on the "Z" runners provided—holes being found provided for this purpose. All that is necessary is to see that the hole in the centre of the dial coincides with the spindle of the condenser, and then the point may be pushed over this and temporarily locked with the set-screw provided. The condenser vanes should be turned "all-in" and the point locked so that it points to the highest reading on the scale.

THE VERSATILE DIODE

In this Article the Functions and Uses of the Diode Valve are Clearly Explained

It has often happened that technical progress has apparently rung the death knell of some particular device, only for further technical progress to bring it back into use again, and it is to be assumed that we have not seen the last of such occurrences.

One of the most striking examples is that of the diode valve. The diode has, of course, had a long run where H.T. rectification is concerned, but we are referring to the low-voltage diode, or diode detector. This example is of particular interest, because the diode was the very first of all valve types to come into practical use. The arrival of the triode put the receiving diode completely out of use, and for a long time it appeared to be as extinct as the dodo. Yet to-day we find that not only is the diode to be regarded as practically the standard type of detector in receivers that have adequate pre-detector amplification, but we depend upon the action of diodes to produce auto-control effects that were not even dreamed of in the days when the diode first came into use. Admittedly, present-day diodes are a great improvement on the original valves, which were of low-vacuum type, but it cannot be denied that, in making the diode such an important device of modern radio, we have resurrected something from the "dark ages."

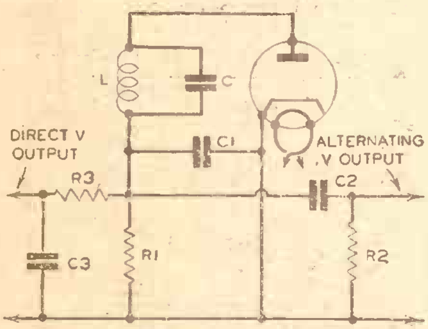


Fig. 2.—A.C. and D.C. components are shown here and suggested values are :—R_1=0.5 meg. ; R_2=2 meg. ; R_3=1 meg. ; C_1=.0001 mfd. ; C_2=.01 mfd. ; C_3=.05 mfd.

The Diode as Demodulator

Fig. 1 is the fundamental diode detector circuit. LC is the radio-frequency input circuit, and the R.F. voltage developed across this circuit is applied between anode and cathode of the diode, via the condenser C1. The diode will conduct only when its anode is positive with reference to the cathode (strictly speaking, we should say only when the anode is not more negative to cathode than about 1 to 1½ volts, dependent upon the particular valve). Rectification will take place, and with an unmodulated R.F. input a steady direct current will flow through the load resistance R1. The direction of electron movement through R1 will be from the LC end to the cathode end, and the direct voltage produced across R1 will therefore act as a potential difference between anode and cathode, the anode becoming negative to cathode.

With a modulated R.F. input the current in the load resistance and, therefore, the voltage across it, will rise and fall with the modulation variations of R.F. amplitude. The potential difference across R1 will now be a fluctuating direct voltage, but it is legitimate to regard this as corresponding to

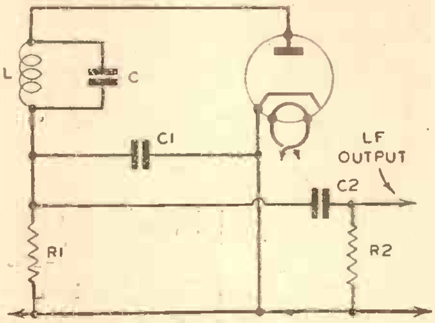


Fig. 1.—The fundamental diode circuit.

a steady voltage upon which is superimposed an alternating voltage. It is the latter which forms the output voltage where a stage of detection is concerned, and in the circuit of Fig. 1 it is applied to the succeeding valve via C2.

The modern diode has come into favour as a detector mainly because of its comparative freedom from amplitude distortion. It is necessary, if freedom from distortion is desired, that the R.F. input should not be too small. The rectification characteristic of a diode is remarkably straight except for low input voltages (when it is decidedly curved).

Producing a "Control" Voltage

A number of features of modern radio practice demand that the signal itself shall develop a direct voltage, dependent upon the carrier amplitude of the signal but independent of the modulation, and that this voltage shall be employed for certain control purposes.

The most common and familiar example of all is that of automatic volume control (A.V.C.), in which the direct voltage referred to is used for negative biasing in the grid circuits of the pre-detector stages so that the H.F. gain of the receiver becomes dependent upon the carrier strength of the signal, the gain automatically falling with increase of carrier amplitude and rising with decrease of the latter.

The fact that the effective impedance that a valve sets up between its electrodes is a factor that influences the characteristics and behaviour of the circuits associated with the valve is not new knowledge and, from the early days of valves, it has been recognised that valve input and output impedances must be allowed for in circuit design work. It is only in recent years, however, that the idea of using a valve deliberately for resistive or reactive shunting purposes and, further, of automatically controlling the magnitude of the shunt effect has become an idea of great practical utility.

A valve arranged to act as an automatically controlled damping shunt on a tuned circuit represents a simple case of automatic selectivity control. Again, by making a valve act as a capacity shunt on an oscillator circuit it becomes possible to influence the generated frequency of the oscillator, and to obtain automatic frequency control.

With all these automatic systems it is

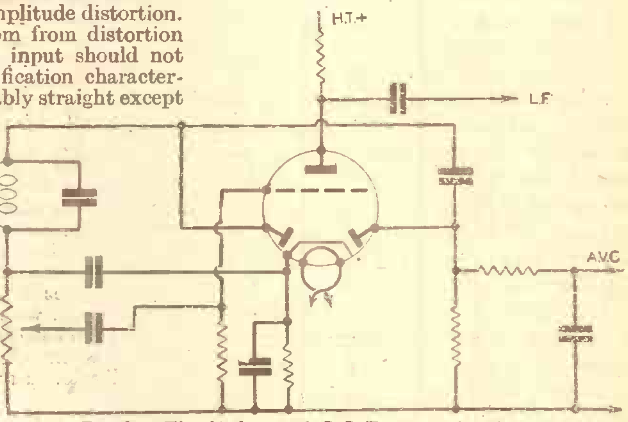


Fig. 3.—The fundamental D.D.T. circuit for A.V.C.

essential that the controlling valve shall have a grid biasing voltage that is in some way dependent upon the carrier amplitude in one or more H.F. circuits, and that is just where the diode comes in.

It has been mentioned above that, with a modulated R.F. input, the voltage across the diode load resistance can be analysed into two components: (1) steady direct and (2) alternating. It is comparatively easy to pick out one of these components to the exclusion of the other. With reference to Fig. 1, C2 forms a complete block to the direct voltage component but the succeeding valve will receive the alternating component with little loss, provided a suitable choice of values is made for C2 and R2. The direct voltage can be made an output voltage, too, by using a suitable filter.

Fig. 2 shows how both the alternating and the direct voltage components can be picked up for separate external application. The arrangements as regards the alternating voltage output are similar to those of Fig. 1. The direct voltage is picked up through R3, R3 C3 forming a filter which passes D.C. but effectively filters out the A.C.

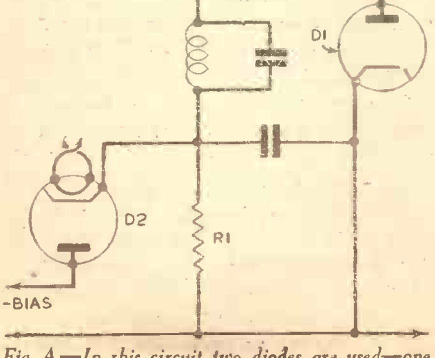


Fig. 4.—In this circuit two diodes are used—one for the signal rectification and one for bias.

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Average component values are shown in the caption to Fig. 2.

Delayed Rectification

It is necessary with many modern diode applications that a diode should keep out of action until the R.F. input has reached a certain pre-determined amplitude level. Such "delayed" action is easily arranged by applying negative bias to the diode anode (relative to its cathode). With a biased diode the positive alternations of applied R.F. voltage will have at least to equal the bias voltage before the valve will come into action, and a "delay" of any desired degree can be secured by appropriate adjustment of the bias voltage.

The most common example is that of delayed A.V.C. This demands two diodes: one, with no bias, for the normal signal detection, and the other, with bias, for the production of the auto-control voltage. A fundamental circuit, using a double-diode-triode valve, is shown in Fig. 3. This circuit provides diode signal detection, delayed A.V.C., and L.F. amplification. Note that the resistance in the cathode lead provides bias both for the triode and the A.V.C. diode.

Signal Muting (Q.A.V.C.)

The diode figures prominently in many circuit arrangements that have been devised for completely suppressing all signals (or interference) below a certain amplitude, thus giving silence while the

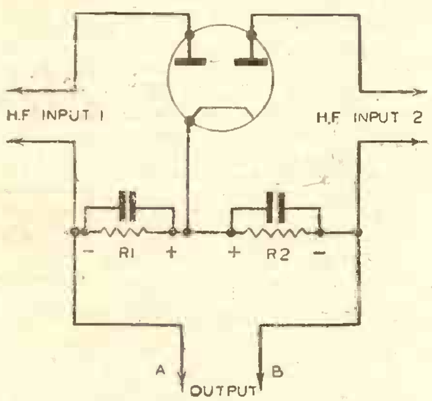


Fig. 6.—Here the two diodes of a double-diode valve are used separately on two H.F. inputs.

receiver's tuning is being adjusted from one signal of "worth while" amplitude to another.

One method of doing this would be to bias the signal detector diode so heavily that no signal could, of itself, bring the detector into action. A second diode could be biased just sufficiently to delay its rectification until the input amplitude was the desired value required to open up reception. If the bias voltage for the signal detector were derived from a resistance in the cathode circuit of a triode it would be a simple matter to use the rectified voltage of the second diode as grid bias on the triode, drastically cutting the anode current of the latter, and thus removing the bias which has been throttling the signal detector.

A "Delayed" Resistance Shunt as Limiting Circuit.

With the anode held more negative than 1 to 2 volts the resistance of a diode is practically infinite. The application of a positive potential to the anode, however, causes the valve to become conductive and with a sufficient positive potential on the anode the internal resistance can be made to drop to a comparatively low value.

In Fig. 4, D1 is a signal detector having R1 as its load resistance. Across R1 is shunted another diode valve, D2. The anode of D2 is biased negatively (preferably adjustable by manual control). The diode D2 is so connected up that the rectified voltage produced across R1 by the signal diode, D1, tends to make the cathode of D2 negative with reference to its anode or, what amounts to the same thing, to make the anode of D2 positive with reference

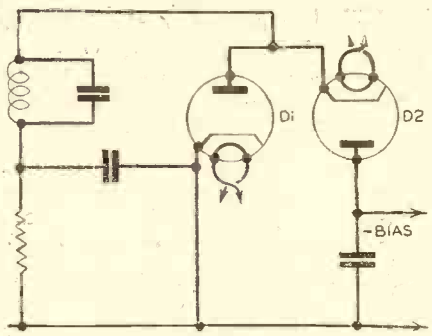


Fig. 5.—A signal limiter built round two diodes.

to cathode. While an R.F. input is being applied to D1, therefore, the actual potential difference between anode and cathode of D2 will be the difference between the biasing voltage and the voltage produced across R1 by D1, while the actual polarity of the resultant voltage on D2 will depend upon which of the two component voltages is the greater.

So long as the rectified signal voltage across R1 is less than the bias voltage on D2 the latter will be non-conductive, and will have negligible shunting effect on R1. Whenever the rectified voltage across R1 exceeds the bias on D2, however, the anode of the latter will become positive with reference to the cathode, and D2 will become conductive, heavily shunting R1. Fig. 4 thus represents a limiting circuit, D1, which, with its associated load resistance, will be able to handle signals normally only when these are below a certain amplitude. For any input above this value D2 will come into play and drastically reduce the detector output. As it stands, the circuit of Fig. 4 is unsuitable for broadcast work, but for morse reception it can be usefully employed to cut down the effects of bad interference, particularly that caused by high amplitude pulses of short duration.

Opposed Detection

Limiting produced by directly-opposed detectors is no novelty. Old-hand marine operators will remember a receiver of 1916 vintage which used two crystal detectors in opposition for limiting purposes.

Fig. 5 shows a modern version of the idea in which two diode detectors are arranged in such a way as to rectify oppositely. If the two detectors have identical characteristics, and one were not biased there would, of course, be no reception at all, but it will be observed that one diode, D2, has a "delay" bias upon it.

So long as the input amplitude keeps below the delay voltage, D2 will be kept out of action and D1, with its load resistance will function normally. When D2 is brought into play, however, by any input that exceeds the bias voltage, its rectification, being opposite to that of D1, will cut the output.

This limiter, too, is unsuitable for broadcast reception in the simple form shown in Fig. 5, but it has useful applications for communication work.

Differential Detection

In Fig. 6 the two diodes D1 and D2, forming the two halves of a double diode valve, are shown as separately operating on two independent H.F. inputs. In the diagram the + and − marks indicate the polarities of the rectified voltages produced across the two load resistances, R1 and R2, by D1 and D2, respectively. The two diodes have a common cathode, and it is easy to appreciate from Fig. 6 that if output leads (A and B) are taken from the diode anode ends of R1 and R2, respectively, that the resultant output voltage will always be the difference between the voltage across R1, and the voltage across R2; moreover, the polarity of the resultant voltage between A and B will depend upon which of the two component voltages is the greater.

Assuming similar diode characteristics and equal load resistances it should be obvious that an arrangement such as that of Fig. 6 provides discrimination between the two H.F. inputs in so far as the value and polarity of a "control" voltage taken off AB is concerned. If the two H.F. inputs are equal, the voltages across R1 and R2, respectively, will be equal, and the voltage between A and B will be zero. If H.F. input (1) exceeds H.F. input (2) a voltage will be set up between A and B which will be the greater, the greater the difference between the two H.F. inputs, and B will be positive to A. If, however, H.F. input (2) exceeds H.F. input (1), then A will be positive to B.

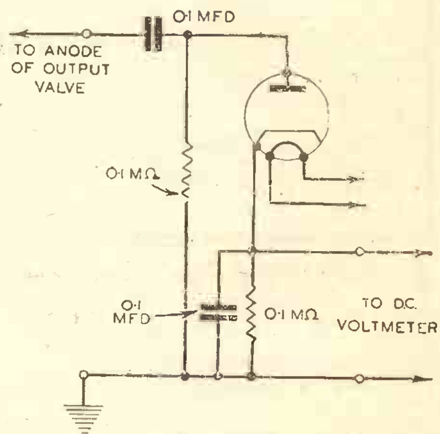


Fig 7.—A successful output meter rectifier using a diode valve.

A differential system such as this has very important application in auto-frequency control systems.

The Diode as Output Meter Rectifier

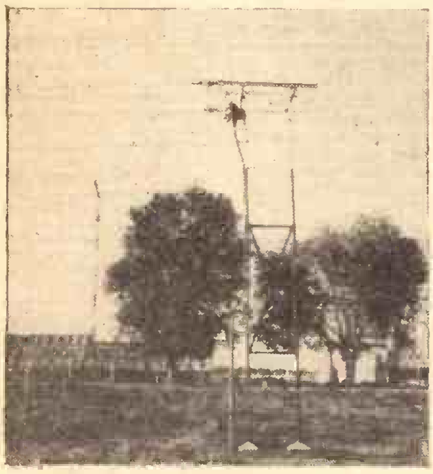
In illustration of the versatility of the diode it can be mentioned that it can be used as a rectifier for an output meter.

This may be welcome news to some readers who possess a D.C. voltmeter, and would like to be able to use the latter as an output meter (for ganging work, etc.). Fig. 7 illustrates a circuit that has been very successfully employed.

The Trichinopoly 5-kW Station

THE new 5-kW medium-wave station, to be opened in January, 1939, embodies a number of recent technical developments which have not previously been used in broadcasting, except at the Bombay, Lahore, and Delhi stations.

The studio station (Trichy) is being connected with the transmitting station by special telephone wire circuits so that the



The special lines drawn from the Trichy Shrivayan Electric Corporation.

programme originating in the studios, centrally placed in the town, could be led into the transmitting station, and there radiated. The transmitting station is located at the sixth mile in Trichy-Tanjore Road, so that the signal strength will be sufficient at all times to overcome all electrical and atmospheric disturbances.

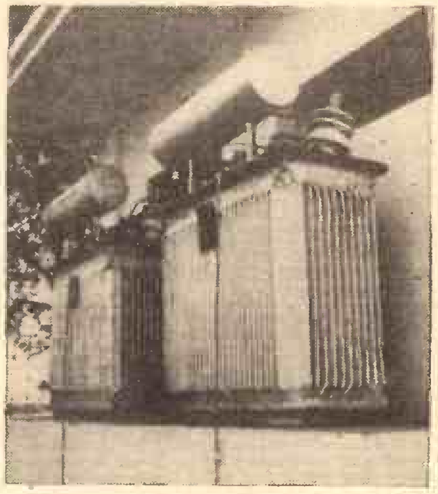
Air-cooled Valves

The Trichy station is intended to give a first-grade direct service to Trichy, and for a station of this power (5 kW) the distance it should be located from a city does not vary appreciably with the range of ground conductivities met with in practice. The wave therefore travels a greater distance along the earth before reaching the city, and is influenced to an appreciable extent by the ground conductivity.

The 5 kW medium-wave transmitter in Trichy is the second station of this power to be put into operation with air-cooled valves. The power limit for stations with air-cooled valves has been about 2 kW. Above this, power valves with water-cooled anodes have been employed.

The use of water cooling involves considerable additional complications, which it is very desirable to avoid, such as pumps, water-cooling systems, and water piping, from the valves to the pumps and cooling system.

In the Trichy equipment the valves are used with air blast cooling. Four valves are used in the radio-frequency output stage, and four valves in the main manipulator stage. The smaller valves in low-powered stages are cooled by natural air circulation.



The transformers that supply power to station.

The A.I. Radio Station.

The Aerial System

In the past the aerial system of a broadcasting transmitting station has generally taken the form of two masts supporting an aerial wire centrally located between them. The essential difference between the masts themselves and the vertical aerial wire being that whereas the masts are not insulated from the earth, the aerial wire was insulated. If the mast could be insulated from the earth it could evidently itself act as the radiating element. This is the present and latest model of aerial for broadcasting transmitting stations. It is such a mast that has been used in Trichy. Its use has been made mechanically possible by the development of suitable ceramic insulators having at the same time the required electrical properties, and great strength in compression. The economic advantage of this development is very evident as a single mast only is required instead of two, and there is no mechanical load to be withstood at the top of the single mast, whereas the horizontal pull required to hold up the aerial system on the two-mast system may be several tons in magnitude, and hence require a considerably heavier design of mast. By a suitable choice of a mast height the service area of a high-power broadcasting system may be considerably improved, and an increase of direct ray field strength obtained. The modulation system is high power Class B.

THE "P.W." DEAF AID

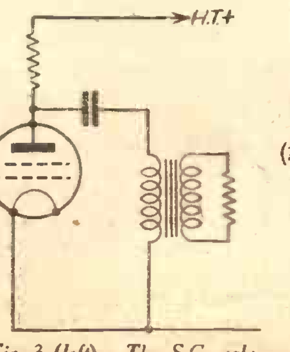
(Continued from page 125)

L.F. transformer arrangement. Unfortunately the maximum effects are not obtainable without increasing the size of the H.T. battery and space does not permit of this. However, for those who wish to experiment in this direction a resistance from 50,000 to 150,000 ohms may be used, with a small tubular condenser of about .01 mfd. as the coupling component. The new circuit arrangement is seen in Fig. 3 and although the voltage drop through the resistance greatly lowers the voltage on the valve anode, the effect of the change is fairly well marked. If a larger case can be adopted, and the question of portability does not arise, it is possible to use a much larger H.T. battery and to obtain greatly improved results from this particular stage, leaving the voltage on the output valve at the maximum of 40 recommended by the makers. It may be pointed out that the new valves are not screened as in the case of the original valves, but no difficulty will be experienced from this in the particular model referred to.

The Output Stage

In the output stage it is then possible to use the new power valve, the original output valve, or the original first valve, each of which has its own points of merit. For quality the new output valve should be used, whilst for increased amplification the original first valve may be employed. In the latter case the bias resistance should be modified, a value of 850 ohms having been found suitable. For the new valve the original bias resistance may be left in circuit or one of 1,000 ohms may be used.

One or two queries have been raised regarding the type of condenser used across this bias resistance, and whether an electrolytic component would be preferable. In this circuit, however, no advantage would be obtained by replacing the condenser which was originally specified. It must be remembered that the earpiece cannot obviously give quality of reproduction comparable with a loudspeaker of modern design.



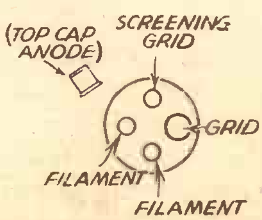


Fig. 3 (left). The S.G. valve may be parallel-fed as shown.
Fig. 4 (right). Connections to the valve-holder of the S.G. valve.

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1 Peto-Scott 2-gang Bar type condenser, .00043 mfd. with mounting bracket		4	6
1 Peto-Scott Station-name scale complete with drive, brackets, drum pointer and cord		4	0
1 Peto-Scott special potentiometer bracket		0	4
2 Varley I.F. transformers type BP.122 and BP.123..		15	6
1 500,000 ohms volume control with on/off switch ..		2	6
1 100,000 ohms volume control		2	0
1 Fuseholder and fuse bulb		0	9
4 Valveholders, (2) 5-pin and (2) 7-pin		1	3
4 .0001 mfd. fixed condensers		1	8
9 Tubular condensers, .002, .01, (2) .05, (5) .1 mfd.		5	8
1 2 mfd. electrolytic condenser		1	0
5 ½-watt resistors, (3) 5,000, (2) 30,000 ohms ..		1	8
11 ¼-watt resistors, 10,000, (2) 50,000, 100,000, 250,000, (5) 500,000, 1 meg.		3	10
3 top cap connectors		0	2
Length of flex, connecting wire and length of screened braid		3	6
KIT "1" CASH OR C.O.D. ..	£4	5	0

4 Specified valves £1-16-0

KIT "2" comprising all components as Kit "1," but with 4 British matched and guaranteed valves, with characteristics to Mr. Camm's specifications. Cash or C.O.D., £5/12/6 or 9/9 down and 12 monthly payments of 9/9.

PB4 SPEAKER.—Special offer. Limited supply of well-known makers P.M.'s with 8in. cone and matching transformer, 15/-. Terms available when purchasing with other goods.

PETO-SCOTT CABINET, as specified, £1/7/6. Cash, C.O.D., carriage paid or add 2/6 to kit deposit and payments.

A.C. MODEL

N.T.S. KIT "1."—Comprising all first specified Peto-Scott and Varley components, with new-type heavy-duty B.T.S. mains transformer with voltage selector incorporated; wire flex and screws, etc. Cash or C.O.D. £6/6/0 or 11/- down and 12 monthly payments of 11/-.

4 matched, tested and guaranteed British valves, 32/6 or add 2/9 to deposit and monthly payments.

A.C. PB4 Speaker.—Special offer Rola energised type, with matching transformer, 12/6.

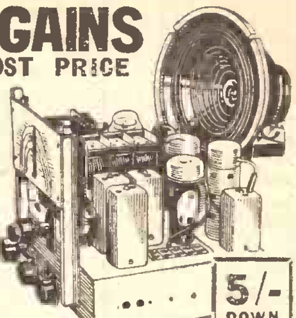
SEND FOR COMPLETE LISTS COVERING ASSEMBLED PRESS-BUTTON A.C. AND BATTERY CHASSIS AT BARGAIN PRICES.

● N.T.S. CHASSIS BARGAINS

REPLACE YOUR OLD SET AT LESS THAN COST PRICE

5-VALVE ALL-WAVE R/GRAM CHASSIS

WITH VALVES LESS SPEAKER. List Value £8:18:6. **BARGAIN £4:17:6**



GUARANTEED FULLY TESTED. This 1939 6-stage all-wave super-heterodyne provides wonderful selectivity and quality reproduction on radio and gramo. 3 wavebands 18-2,100 metres. Illuminated station-name dial, similar to illustration. A.V.C., Tone Control, 3 watts output. Size 11½" l., 8½" h., 8¾" deep. Pick-up sockets. Complete with all valves, knobs and escutcheon. For A.C. mains 200/250 v., 40-100 cycles. Yours for 5/- down and 18 monthly payments of 6/3.

Or with matched moving-coil speaker, £6/5/0 cash or C.O.D., or 5/- down and 18 monthly payments of 7/11.

5/- DOWN

4-VALVE BATTERY MODEL

List Value £7:7:0 BARGAIN 79/6

Amazingly efficient 4-valve S.G. Bandpass Class "B" output chassis giving volume equal to a mains set. 3 wavebands 18-2,100 metres. Station-name dial as illustrated above. Wonderful range. Low H.T. consumption. Yours for 5/- down and 15 monthly payments of 6/- or with matched speaker, £4/19/6 or 6/- down and 15 monthly payments of 7/6.

ALL-MAINS MODEL

WITH VALVES AND SPEAKER

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N.T.S. KITS VALVES FREE!!

Effective wave-range 9-200 metres

SHORT-WAVE ALL-WAVE

4-VALVE S.G. BANDSPREAD S/W KIT

COMPLETE KIT LIST VALUE £4:19:6 **BARGAIN 49/6**

Complete as illustrated with coils for 12-94 metres and British matched S.G. Det., L.F. and Pentode valves **given free.** A magnificent receiver for efficient short-wave work. **Selling in thousands.** Kit with easy-to-follow instructions is yours for 3/6 down and 12 monthly payments of 4/3.

3-VALVE BANDSPREAD MODEL. Again bandspreading plays its all important part in the simplification of short-wave reception on this splendid N.T.S. receiver. Complete kit with 3 coils, transformer, FREE set of British Det, L.F. and Pentode valves and instructions. List value £4/7/6. BARGAIN 42/- or yours for 2/6 down and 12 monthly payments of 3/9.

ALL-WAVE "WORLD" S.G.3 KIT

Wave-range 9-2000 metres. Designed for famous B.T.S. self-locating inductors. Amazing station-getter on the short, medium and long waves. Kit absolutely complete with 10 coils, station-name dial, chassis and **FREE** S.G., S.G., and Pentode valves. List value £4 12s. 6d. **BARGAIN 47/6** or yours for 4/- down and 12 monthly payments of **4/4.**

WORLD S.G.4, a more ambitious model with Pre H.F. S.G.; Det., S.G. audio and Pentode output. All components supplied extra to 3-valve version including station-name dial. 4 valves given FREE. Cash or C.O.D., 42/- or 2/6 down and 12 monthly payments of 3/9. Required coils special offer, 10 B.T.S. coils list value 27/-. Bargain 17/6. Or add 1/6 to deposit and payments.

FREE Get your Copy NOW

The new N.T.S. radio booklet contains useful data for constructors and full descriptions, with photographs, of the complete range of Bandspread and "World" kits, amplifiers, famous-name sets and chassis, everything available at amazing bargain prices. **POST COUPON NOW.**

● NEW 5-IN-1 ALL-WAVE PENTA-KIT

LIST VALUE £4:10:0 BARGAIN 42/-

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SPECIAL NEW OFFER.—Bargain parcels comprising universally ready-drilled brand-new steel chassis, transformer, 6 resistances, fixed condensers, 2- or 3-gang tuning condenser, reaction condenser, potentiometer, and coil; for **battery** or **mains** sets. State which when ordering. Amazing value for constructors and servicemen; will save you £ £ £'s. Yours for 4/11, post 9d. **Order early.**

● 3 MATCHED Battery Type VALVES

2-volt type (2 S.G. H.F.'s and one Output Pentode); List value 35/-. YOURS FOR 5/6 only, POST FREE. 3 valve-holders, data and circuits given FREE. Ideal valves for experimental purposes, Short Wave, and All-Wave receivers and replacement. Secure your set NOW.

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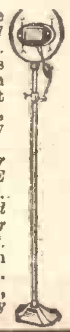
New 4-valve class "B" amplifier for speech and gramo. Full output requires 150 v. H.T. battery or ordinary 120 v. battery for lower output. Ideal for boosting up battery sets. Supplied assembled and fully tested with 4 British valves, ready for use. List value £4/4/- **BARGAIN 55/-** or 4/6 down and 12 monthly payments of 4/9.

7-WATT A.C. AMPLIFIER only. 4-valve push-pull circuit. Undistorted output 7 watts. For microphone or pick-up. Size 7½in. high, 4in. wide, 10in. long. For A.C. Mains 200/250 volts, 40/80 cycles. Complete with 4 valves, ready for immediate use. List Value, £4/10/0. **BARGAIN,** Cash or C.O.D., £3/10/0, or 5/- down and 12 monthly payments of 6/3.



MICROPHONES. *Transverse current type for use with above amplifiers, OR FOR USE WITH YOUR PRESENT RADIO. Faithful reproduction at all musical and speech frequencies. Complete with transformer and ready for instant attachment.* **Table Model,** 25/-, or 2/6 down and 10 monthly payments of 2/6. **Telescopic Floor Model, 2 Gns.,** or 2/6 down and 12 monthly payments of 4/-.

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This handsome clock with YEAR'S GUARANTEE is yours at an absolute give-away price. Precision, silent movement. Beautiful french-polished case 7" x 6". Modern face with second, minute, and hour hands. For A.C. mains only 200/250 volts 50 cycles.

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Self-capacity and Self-inductance

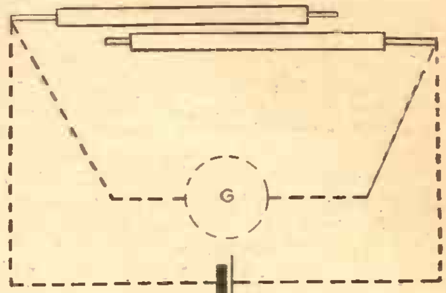


Fig. 1.—Two parallel wires form a small condenser, which can be charged and discharged.

A Simple Explanation of the Desirability and Otherwise of Capacity and Inductance in Coils, Chokes, Condensers, and Resistors

by The Experimenters

CAPACITY—more correctly capacitance—is the property possessed by a component for "storing" electricity. Self-capacity is defined similarly, except that it generally refers to the capacity existing within one component (usually a condenser) instead of between two separate parts, such as two connecting wires, or between one component and another. Additionally, the term self-capacity is most frequently applied in radio parlance to capacity which is unwanted or unnecessary. Thus it is customary to speak of the self-capacity of a coil, while referring simply to the capacity of a condenser.

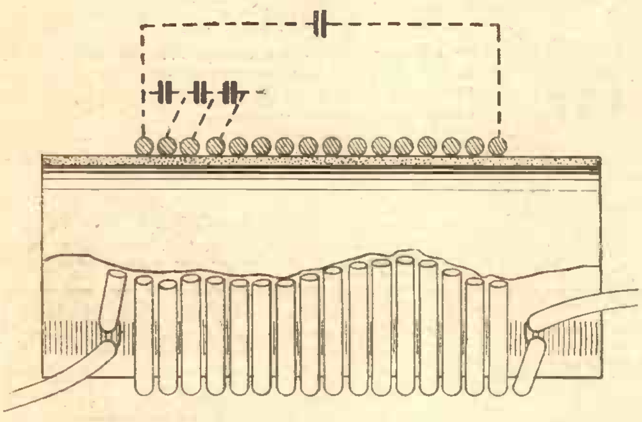


Fig. 2.—Capacity between adjacent turns of a coil is equivalent to connecting a small condenser in parallel with the winding.

Inductance can be briefly defined as the "electrical inertia" of a component; the tendency of that component to resist sudden changes of the current passing through it. Self-inductance is the inductance possessed by a single component and, in the same way as self-capacity, the term is most frequently used when dealing with the unwanted inductance. The inductance possessed by a condenser, for example, would normally be described as self-inductance.

The above brief explanations should not be considered as highly accurate in the technical sense; the definitions are rather those developed by common usage. They do, at any rate, serve our present purpose when we consider the effects of self-capacity and self-inductance on the behaviour of different components in wireless receiver circuits.

Simple Condenser

A simple condenser, having a certain amount of capacitance, can be formed by laying two wires side by side, as shown in Fig. 1. The wires are insulated from one another, and if a battery were connected between the two wires a certain amount of electricity would be stored because the air or other insulation between them would be subjected to an electrical stress. That electricity *is* stored could be proved by disconnecting the battery and connecting a very sensitive galvanometer in place of it; a small reading would be obtained.

Although the wires are insulated from each other, the insulation would not prevent the passage of high-frequency current, as is well known by short-wave experimenters who often use a simple condenser of this kind between the aerial lead-in and the input tuning coil. Due to the alternating current of a signal the condenser is constantly charged and discharged, the fluctuating potential of the lead-in being transferred to the coil.

Coil Self-capacity

From this simple outline it will be appreciated that capacity must exist between the turns of a coil. This is shown in Fig. 2, where dotted condensers are used to represent the capacity between the turns. From this it is evident that a coil must have a certain amount of self-capacity. The actual capacity can be reduced by increasing the space between the turns and by using wire of smaller gauge. Unfortunately, however, both of these expedients have disadvantages: increasing the spacing makes the coil unduly long and also reduces the inductance for any given length of winding. To compensate for the loss of inductance a greater length of wire must be used, so that resistance losses arise. By using thinner wire the area is cut down but resistance losses are again increased.

Practical Data

Somewhere between the two extremes can be found a fairly "happy medium." Thus, for short-wave coils it is usually very satisfactory to use wire of about 22-gauge and to space the turns by a distance equal to the diameter of the wire. For medium-wave coils wire of about 30-gauge is suitable and the turns can be placed side by side. In winding long-wave coils still smaller-gauge wire—about 36—can be used and the turns arranged in hank fashion. Even then it is better to place them approximately in layers so that turns near to opposite ends of the winding are not close together; this is because the capacity effect is increased when the two adjacent wires are at widely-differing potentials. Another practical method of reducing self-capacity of a long-wave winding is by separating the winding into three or four sections in series. The two points just raised are illustrated in Fig. 3.

Self-capacity and Tuning Range

But after reading the above you might ask what ill effect self-capacity in a coil produces. One of the most serious in tuning coils for the broadcast ranges, as well as in short-wave coils, is that the tuning range with a given condenser is restricted. The wavelength to which a coil-condenser circuit tunes is proportional to the product of the capacity and inductance in parallel. Therefore the widest tuning range is obtained when the capacity variation is greatest. In other words, the lower the minimum capacity for any given maximum the greater the capacity ratio and the greater the tuning "coverage." In this respect the design of the tuning condenser cannot be overlooked, because if it has a comparatively high minimum capacity this is almost equivalent to a high coil self-capacity.

Self-capacity is also troublesome, if it reaches a high value, in H.F. chokes. The purpose of these is to impede the passage of H.F. current whilst allowing an easy path to L.F. and direct current. But since

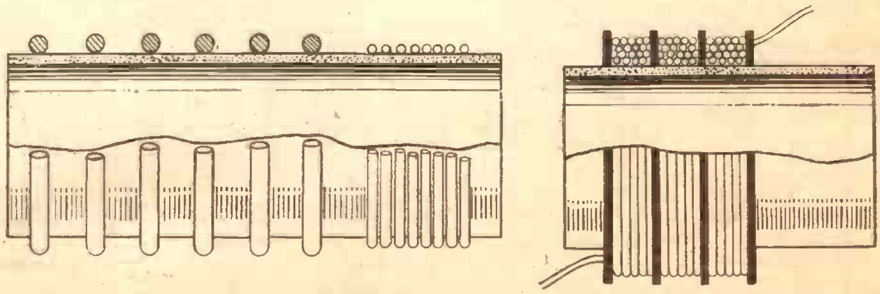


Fig. 3.—Self-capacity of a coil can be reduced by increasing the spacing of the turns, using finer gauge wire or, in the case of a pile winding, by dividing the winding into a number of sections.

a capacity provides a fairly easy path for H.F., a choke with a high inductance value might be of little use if its self-capacity is also high. To a lesser degree the same argument can be applied to an L.F. transformer or L.F. choke, which should offer a high impedance to L.F. currents, but not to direct current. This is one important factor which limits the useful step-up ratio for which an L.F. transformer can be designed. If the ratio is very high there must be a large number of secondary turns; and a larger number of turns means a higher self-capacity.

Condenser Self-inductance

Self-inductance is an essential in coils, chokes, and transformers, but in condensers it is generally a nuisance. Thus, if the by-pass condenser between the screening grid and earth shown in Fig. 4 had an appreciable capacity it would not provide the required low-impedance path to earth for H.F. currents. All condensers have a certain amount of inductance, but those described as "non-inductive" have so low a value that it can be ignored for most practical purposes. Nevertheless, if a capacity of .1 mfd. were suitable in the position indicated in Fig. 4 when the receiver were intended for medium- and long-wave reception only, it would generally be desirable to reduce the capacity to .01 mfd. if the set were required principally for short-wave work. It is not simply because a smaller capacity is better for short waves, but because a smaller self-inductance is a practical essential in the interests of efficiency. At the same time it will be remembered that the impedance or reactance of a condenser becomes less as the frequency of the current applied to it is increased. For example, a .01-mfd. (non-inductive) condenser has a reactance of about 15 ohms at 1,000 kc/s.—equivalent to 300 metres—and of only 1.5 ohms at 10,000 kc/s.—or 30 metres.

It is because of the higher self-inductance of older type condensers that nearly all patterns of fixed condenser now used for wireless work are of the so-called non-inductive type; due to their design the self-inductance is insufficient to be any detriment.

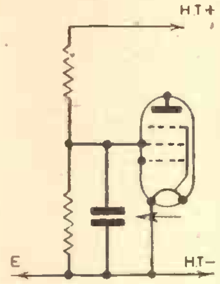
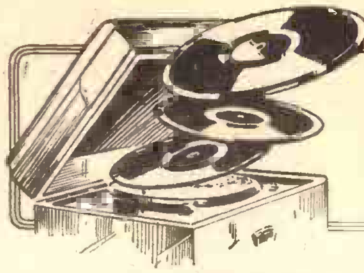


Fig. 4.—The condenser indicated by an arrow should have a low self-inductance.

Self-inductance of Resistors

Self-inductance is a term that can also be applied to resistors of certain types. It is clear that if a resistor is made from a spiral or coil of resistance wire it must have self-inductance comparable to that of a coil. The inductance is not of any consequence when the resistor is used in a D.C. circuit for voltage-dropping, or in the heater circuit of an A.C./D.C. circuit, but it might prove very troublesome if used in the anode circuit of an R.C. coupled detector valve in a short-wave circuit, as a potentiometer in a screening-grid circuit, or as a by-pass resistor in a "bottom-capacity" band-pass filter. In both cases its impedance (resistance to alternating current) would vary over wide limits instead of remaining constant. In exceptional cases the inductance value might be such as to tune the resistor to a particular frequency within the range handled; at that frequency the component would offer an almost infinite impedance.



Impressions on the Wax

A REVIEW OF THE LATEST GRAMOPHONE RECORDS

H.M.V.

ERNEST LOUGH, who as a Temple Church chorister made the famous recording of "Hear My Prayer," is steadily building up a reputation for natural, unforced singing. His baritone voice is attractive, and both the songs on his latest record, Quilter's "Now Sleeps the Crimson Petal" and Tchaikovsky's "None but the Weary Heart," will please his admirers—*H.M.V. B* 8792.

Gigli sings a popular Neapolitan song Tosti's "Marechiare" and Rossini's "La Danza"—*H.M.V. DA* 1650. The tune of this Tarantella is familiar to all who have seen the ballet "La Boutique Fantasque." Richard Crooks is very pleasing in two straightforward ballads, "To one Away" and "All my Heart"—*H.M.V. DA* 1653.

One would hardly link the name of Benny Goodman with eighteenth-century chamber music. Still, "believe it or not," he joins with the Budapest String Quartet in Mozart's Quintet in A (K 581) for clarinet and strings. It proves Benny Goodman to be a musician of the very highest class and an exponent of the clarinet in chamber music—*H.M.V. DB* 3576-78.

Light Music

THERE is an unusually large choice for those for whom "the tune's the thing." "The Fleet's Lit Up" is established at the London Hippodrome as a big success, and the original artists of the theatre cast have recorded the hits exclusively for H.M.V. Frances Day sings "How do you do, Mister Right?" and "It's a lovely"—*H.M.V. B* 8790, Adele Dixon and Ralph Reader have a catchy duet "Hide and Seek," and "Mary Read" is sung by Adele Dixon with chorus—*H.M.V. B* 8791. All the best tunes from the show are played in a bright selection by Geraldo's London Hippodrome Orchestra—*H.M.V. C* 2028. Frances Day has another record of two of the song hits of the moment: "Music, Maestro, Please" (introduced in the new Palladium Crazy Show, "These Foolish Things") and "A-tisket, A-tasket."—*H.M.V. B* 8793.

John Garrick, who is regarded as the rising star of musical comedy, makes an excellent impression in his first H.M.V. record of two songs from "Maritza"—"Vienna so Gay" and "Hey Gipsy, play Gipsy"—*H.M.V. B* 8787, and Maxine Sullivan continues her unique syncopated versions of popular songs with "L'amour, Toujours L'amour" and "St. Louis Blues"—*H.M.V. B* 8789. A feature of the latest record by the Comedy Harmonists is the clever use of vocal accompaniments in which the voices support the piano with a most intriguing effect. They sing di Capua's "Ah! Maria, Mare" and "Guitarren, spielt auf," a jolly song of the student type—*H.M.V. B* 8794. The Three Musketeers extract a lot of fun from a song that used to be a stock favourite at homely parties, "The Old Bassoon." This is coupled with the melodious "Ballerina," in which they are assisted by Rae Jenkins' Buskers—*H.M.V. BD* 586.

There is a first class playing and recording in the record by the Coldstream Guards Band of "Under the Double Eagle" march and "The Forge in the Forest," and Reginald Foort serves up his own arrangement of some of Mendelssohn's Melodies on the B.B.C. Theatre Organ—*H.M.V. BD* 587.

Swing and dance music are particularly rich in good tunes. Jack Hylton and his Orchestra commence a new series of H.M.V. records, and there are the first of the records made by "Fats" Waller during his recent visit to this country. Several of the best tunes of the moment are also available in strict dance tempo without vocal, so that you can take your choice.

Decca and Brunswick

THE thought of the Gay 'Nineties cheers one up in these 'ungay' days. The eminent Frank Luther parades before us three discs, *Decca F* 6791-3. the choicest selection of songs from the Gay 'Nineties, and he sings them perfectly. Frank Luther is assisted by his wife, Zora Layman and The Century Quartet.

"Music, Maestro, Please" on *Decca F* 6777 is a new tune that shapes well for being a "hit," and is played by Lew Stone and his Band with Al Bowlly as the vocalist. The coupling is "The Red Maple Leaves." Greta Keller, too, has recorded "Music, Maestro, Please" on *Decca F* 6783, and she couples it with "Lamplight."

One complete work is published this month, and it is a first recording of a very important musical work—The Bruckner String Quintet in F Major. This is a big scale work of symphonic dimensions. A leaflet written specially for Decca by Dr. Mosco Carver (who knew Bruckner personally) deals very fully with the Bruckner Quintet. It is played by the Prisca Quartet on *Decca X* 220-5.

On *Brunswick* [*O* 2640 and *O* 2641 are recorded three tunes from the film "Dr. Rhythm," which stars Bing Crosby. "On the Sentimental Side" can be regarded as the big tune, but the other three are excellent numbers featuring Bing Crosby.

Rex

YOU will like Gracie Fields' recording of "Love Walked In" and "Music, Maestro, Please" on *Rex* 9377, and Billy Cotton and his band have made two excellent records—*Rex* 9371-2 which include a couple of popular tunes "A-tisket, A-tasket" and "The Red Maple Leaves." Sandy Powell, the popular radio comedian, is extremely funny in a comedy sketch "Sandy Buys a House"—*Rex* 9380, and Maxwell Stewart's Ballroom Melody play "I Won't Tell a Soul" (slow fox-trot) and "I'm Sorry I Said I Love You" (waltz), both of which are in strict dance tempo—*Rex* 9373.

NOTES FROM THE TRADE

New Clix Lamp Adaptors

BRITISH MECHANICAL PRODUCTIONS, LTD., who are, of course, responsible for the wide range of Clix components, are now taking over the manufacture and marketing of the complete range of "Safeways" products. Two items of interest to the radio amateur are illustrated herewith, and are two-way light adaptors, by means of which an ordinary electric lamp and a radio set or other apparatus may be connected to a single lighting point. In one of these adaptors, both points are independently operated, as distinct from the usual pattern where it is only possible to switch off one point. In the second model suspended cords enable the switching to be carried out without stretching or getting on a chair or otherwise reaching up to an awkwardly situated lamp-holder. Two springs are fitted at the top of the cords and hold them away from the lamp, and this also prevents the beads at the end of the cords from jumping up and hitting the lamp when switching on or off—a failing with some other types of cord-operated switches. This particular device costs 2s. 9d. and the former costs 2s. 3d. The simple type with a single switch is also available at 1s. 10d.

These are the two Adaptors referred to in the accompanying paragraph.

Halford Radio

FOR those listeners who need a radio chassis, without cabinet, or who require a special cabinet made to some particular design, the Halford products should appeal. Special cabinets are available, made to period designs or to suit existing furnishing lay-outs, and the special Phantom XV radio chassis represents a very high standard in modern radio design. This has twin circuit control, giving superhet arrangements for long-range listening, or a straight circuit for quality. Dual intermediate frequencies are used so that the best I.F. for a given wave-band may be adopted, and the chassis, complete with 12in. speaker, costs 55 guineas. With 16in. Super Cinema speaker, the price is 75 guineas. The output is rated at 20 watts.

Servisol Microphone

A TRANSVERSE-CURRENT microphone, measuring 4¾in. by 2¾in. by 1¾in. and claimed to have a very fine response curve, is announced by Servisol, Ltd., of 64, Myrtle Street, Liverpool, at 15s. The case is finished in cellulose enamel in a stone-yellow tint and the diaphragm-protecting grille is finished in red. Four eyelets are fitted to facilitate mounting, and a special matching transformer, mounted on a base to hold a 9-volt biasing battery, is available at 6s. An important claim is that feedback does not occur when the mike is used in the same room as the speaker, even at high volume levels.

New Ferranti Car Aerial

AN addition has been made to the Ferranti range of car radio aerials, and the new model is designed for under-chassis mounting. It consists of a tinned steel tube ½in. in diameter and about 4ft. in length. It is fixed in position by means of a heavy canvas ribbon, rubberised to prevent absorption of moisture. To avoid the aerial rod striking obstructions, the front end is curved, and as the rod is suspended and not rigidly fixed it will ride obstructions without damage. The price is 10s. 6d., and full instructions for fitting and connecting are supplied with it.

Mazda Valve Changes

EDISON SWAN ELECTRIC announce some changes in the voltage ratings of the SP41 (H.F. Pen.) and the AC/6Pen (tetrode output) valves. The operating conditions of the two valves are not different, and it will be remembered that the former valve is designed specifically for use in the H.F. and I.F. stages of television receivers and similar equipment. The anode of the output valve is at the top of the valve so that it may more readily withstand peak voltages such as may be met with in the output stage of a time base for magnetic scanning.

"Autostil" Distiller

SERVICE agents and battery-charging operators will be interested in the "Autostil" water distiller, which is available from Runbaken Electrical Products. This avoids the storage of carboys and the other difficulties attendant upon the use of distilled water at charging stations. The distiller is electrically operated, entirely automatic, and only requires to be filled with ordinary tap water. The output of distilled water is guaranteed chemically pure, and the apparatus switches off automatically if the supply of tap water is not replenished. The output is one pint of distilled water per hour and the consumption 500 to 600 watts. With electricity at ¾d. per unit, the cost of the distilled water would be approximately 3d. per gallon. The standard model costs £7 10s. and the non-automatic model is £6 10s. The overall dimensions are 2ft. by 1ft. 8in., with a depth of 10¾in. It weighs 16½lbs. The apparatus may also be used for medicinal purposes, and an additional charge of 10s. is made for the necessary modifications.

LETTERS FROM READERS

The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

Inventors!

To Thermion:

SIR,—Continuing my "bombardment," I must thank you for the insertion, *in extenso*, of my letter *re* Diomagnetic Spring-controlled Aerial Invention! I hope it tickled many other readers. Up to now, you have only known me as an inventor, and a poet???? The sketch will convince you that I am also an artist (of sorts). If it tickles you a bit, and even causes the stern and austere visage of that Great Annihilator of Inventors, Mr. Camm, to register a fleeting smile, I will be more than repaid.

Poor inventor. He must be feeling very indignant with PRACTICAL AND AMATEUR WIRELESS and my humble self this week! But if it prevents him from wasting any more of his money, we are both amongst his best friends.

In dashing off my little cartoon, I have had to take it for granted that Mr. McC. is from *beyond the "Border."*

Help, help! I can feel myself going all loopy again! A fresh attack! Forgive me, I must *get it off my chest!*

If McC. should be Scotch it's not such a botch,
But if from the Emerald Isle,
The stuff that he spills about all his ills
Should be written in different style.

There! Out of breath a little, but otherwise all right again.

Cheerio!—K. T. H. (Birkenhead).

A Reader's Thanks

SIR,—I wish to thank all those who answered my request for a correspondent, which appeared in the October 1st issue of PRACTICAL AND AMATEUR WIRELESS, and regret that I cannot answer everyone separately.—S. W. SALT (Surbiton).

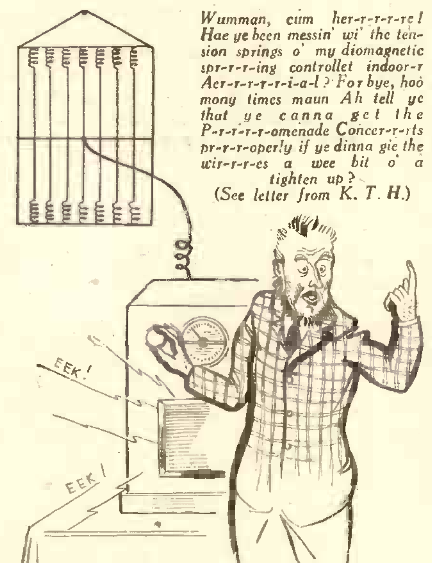
An Experimental Set

SIR,—I only began to take your journal this year, and much enjoy its contents, for I find there is always something to be gained from its pages. I have had a receiver (S.W.) some time now, and am wondering if the method I have adopted for coupling the H.F. stage to the detector is the best. The set is as follows:

H.F. pentode with separate reactor valve, triode detector, parallel-fed transformer coupled to pentode, choke coupled to output terminals. I am using 6-pin coils (Eddystone) for both H.F. and Det.

The aerial is coupled to coil through a J.B. neutralising condenser, and the anode of the H.F. pentode receives its potential through an S.W. H.F. choke, its output being transferred through another J.B. neutralising condenser to the primary of the detector 6-pin coil. I notice in most of the S.W. receivers in your paper a pentode or S.G. valve is used as detector. I get jolly good selectivity from the arrangement I am using. I understand the H.F. pentode is more sensitive as detector than a triode. I have tried running the H.T. to anode of H.F. pentode through primary of 6-pin coil, but although signal strength is greatly improved, selectivity falls off terribly.

Tuning is by J.B. S.W. special condensers—.0001 mfd. Reaction on both circuits is applied by .00015 mfd. Polar. The whole receiver is built on an aluminium chassis, with all wiring underneath. Coilholders and valveholders are on D9 insulation pillars;



Wumman, cum her-r-r-r-re! Hae ye been messin' wi' the tension springs o' my diomagnetic spr-r-r-ing controllet indoor-r Aer-r-r-r-r-i-a-l? For bye, hoo mony times maun Ah tell ye that ye canna get the P-r-r-r-omenade Concer-r-rts pr-r-r-operly if ye dinna gie the wir-r-r-es a wee bit o' a tighten up?
(See letter from K. T. H.)

grid coupling conds., .00005 mfd., coupled direct across coil holders and valveholders. I mostly use headphones, although the nearer broadcast stations in Europe simply tear through.

I am not appending a log, as I have done little listening this year so far, I mean the latter part. What I have done has been mostly on 10 metres. I don't know whether the 10m. band is very active yet; I switched on on the 21st of last month and the first 10m. signal was W6NLS calling G6DH, Essex. I listened to this contact for some time. I have heard several W4 and 5 and 1 and 2s, but these are about all; of course, I haven't listened a lot, but last year on the same date I logged a good number of 10m. chaps. I had thought maybe the set had deteriorated with standing during the summer. (Of course, it's a battery set.) You must excuse me if my remarks are apt to be incoherent. Well, I had better say 73's to you. I will just name the valves in order; also I have not verified any stations I have logged.

Hivac VP215; reactor valve, Hivac L210; det., Mazda L2, met.; output, Hivac Harries Y220.

I may say I have no means of exchanging ideas here, as although I know the district well I have not come across any pals who are interested in messing about with S.W. receivers.—H. ALLANSON (Freckleton, nr. Preston).

A DX Log from N. Ireland

SIR,—I include the prefixes of stations received at the Home QRA (Belfast) in my school holidays. They are all on 20m. and all 'phone except the CR7 which was on C.W.

CE, CN1, CN8, CO, CR7, CT1, CT2, CX; EA, EA9, EI, ES; F3, F8, FA, FI8, FT4; G, GI, GM, GW; HA, HB, HC, HH, HK; I; J2, J6; K4, KA; LA, LU, LX, LY; NY; OA, OH, OK, ON, OQ5, OZ; PA, PK, PY; SM, SP, SU, SV; TF, TI; U; VE1, 2, 3, 4; VK2, 3, 4, 7; VO, 1, 2, 6; VP1, VP2, VP3, VP6, VP9, VQ4, VR6, VS7, VU; W1, 2, 3, 4, 5, 6, 7, 8, 9; XE; YR, YU, YV, ZB, ZE1. The RX was an 0-v-Pen., with a Hivac SG220SW as detector. The antennas were indoor doublet and outdoor inverted "L" about 25ft. high.—T. D. ALDWELL (Armagh, N. Ireland).

Radio Ankara

SIR,—I have just received an acknowledgment of my report to Radio Ankara. This station informed me that I was the first listener who had reported the action of the S.W. transmitter.

The details of the transmitters are as follows:

15,195 kc/s and 9,465 kc/s on the short wave, and 183 kc/s on the long wave. Announcements will be made in English.

The long-wave transmitter has a power of 120 kW. All QSLs should be addressed to: Radio Ankara. Türk Mükendisler, 5, No Lu Oda, Atatürk Urani, Yeni Sehir, Ankara, Turkey.—P. S. (Croydon).

CUT THIS OUT EACH WEEK.

Do you know

—THAT an ordinary flash-lamp bulb may be illuminated by the radiations from an ordinary oscillating coil.

—THAT the efficiency of a receiver with H.F. stages is affected considerably by the efficiency of the earth system.

—THAT when adding a valve to convert a single stage into a push-pull stage for signal-handling reasons, the additional H.T. load must be borne in mind.

—THAT the above point is of especial interest to those listeners who use a mains unit.

—THAT ordinary moving-coil speakers may be joined in parallel to improve response.

—THAT in cases such as the above the two speakers should be chosen with different response curves.

The Editor will be pleased to consider articles of a practical nature suitable for publication in PRACTICAL AND AMATEUR WIRELESS. *Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor,* PRACTICAL AND AMATEUR WIRELESS, *George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.*

Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

Radio Clubs and Societies

Club Reports should not exceed 200 words in length and should be received First Post each Monday morning for publication in the following week's issue.

DOLLIS HILL RADIO COMMUNICATION SOCIETY

AT the meeting on October 4th, Mr. A. Turner (G2XO), described the difficulties encountered in the very early days of wireless telegraphy, and began his lecture on "Short-wave Transmitters and Receivers," which will be resumed at a later date.

The following programme has been arranged:
November 1st, Mr. D. N. Corfield (G5CD), lecture and demonstration on the alignment of superhet receivers.
November 15th, Mr. A. Turner, M.I.R.E. (G2XO), continuing his lecture on "Short-wave Transmitters and Receivers."
November 29th, Junk Sale.
December 13th, Exhibition of home-constructed apparatus.
December 27th, no meeting on this evening.

Meetings are held at Braintcroft Schools, Warre Road, N.W.2, at 8.15 p.m., and visitors are always welcome. Membership fee is 2s. 6d. yearly from date of joining, and further particulars may be obtained from the Hon. Sec., Mr. E. Eldridge, 79, Oxgate Gardens, Cricklewood, N.W.2.

THE CROYDON RADIO SOCIETY

THE following are a few important dates in the Croydon Radio Society's programme for the immediate future:
Tuesday, October 25th, Loudspeaker night.
Tuesday, November 1st, Mullard Valve Lecture (subject to confirmation).
Tuesday, November 8th.—Lecture and Demonstration by Mr. Stuart Davis of the Davis Cinema, Croydon. Recording and Quality reproduction with his new amplifier will take place.

PRACTICAL AND AMATEUR WIRELESS readers are particularly invited to the loudspeaker night on October 25th. A very representative collection of members' own construction, and commercial models will be compared, and some instructive results are expected. Complete programmes until Christmas are set out in the new fixture card which is available for any interested reader of this paper. Hon. pub. sec., E. L. Cumbers, Maycourt, Campden Road, S. Croydon.

RADIO, PHYSICAL AND TELEVISION SOCIETY

DURING the 1937-38 session the society held 31 meetings, of which 27 were lectures. A successful field-day was held in the Dorking district, and a few weeks ago a party of members visited Croydon Aerodrome Transmitting Station and afterwards visited the Aerodrome itself, and saw some of the receiving apparatus. Although most of the lectures have dealt with radio there have been a number of lectures upon other scientific subjects, including chemistry, electric furnaces and the rubber plantation industry. Many of the radio lectures have been upon ultra-short wave and micro-wave transmitters and receivers.

The committee are now making arrangements for the 1938-39 session, which is about to commence. Interesting lectures are being arranged, and it is anticipated that the forthcoming session will be better and more interesting than ever.

New members will be especially welcome at this time of the year. There is no entrance fee, and an annual subscription of 7s. 6d. entitles one to many privileges which include free technical advice, free morse instruction, free translation from or into various languages, and free calibration of instruments. Further particulars can be obtained from the hon. secretary at the society's headquarters, 72a, North End Road, W.14, or new members are invited to call at headquarters any Friday evening at 8.15 p.m. without formality.

BRADFORD SHORT-WAVE CLUB

THE third annual general meeting was held on Friday, October 7th, when the officers were elected for season 1938/9, as follows: Secretary, G. Walker; Treasurer, V. W. Sowen; Chairman, E. J. Simonard; with H. Simpson and R. Hudson also on the committee, whilst J. S. Johnson (G3KB) was elected to take charge of the construction committee. Rapid strides are being made with the club's transmitter, and it is expected to be ready for 'phone operation this week.

Dates so far booked for the winter syllabus are: Friday, November 11th, G6XL, "Transmitting Antennas." Friday, December 16th, Mr. A. C. Mallinson: "Mains Transformer Construction," etc.

All particulars regarding the club may be obtained from the secretary, and a hearty welcome is extended to anyone interested to visit the club at its clubrooms, Bradford Moor Council School, Killinghall Road, Bradford, every Friday evening. Hon. Sec., G. Walker, 33, Napier Road, Thornbury, Bradford, Yorks.

THE EXETER AND DISTRICT WIRELESS SOCIETY

AT the last meeting of the above society, held on Monday, October 3rd, various members brought along their short-wave sets for demonstration, discussion and trial. Several interesting sets were brought, and members were particularly interested in those operated on ultra-high frequencies, i.e., 56 mc/s and 112 mc/s. Both straight and super-regenerative sets were shown and tried. A slight alteration in programme has been arranged, which is that Messrs. Voigt are giving a demonstration of their loudspeakers on November 21st. This is one of the most interesting lectures that the society has ever been able to obtain, and it is hoped that members will come in full force. Meetings are held every Monday at 8 p.m., at 3, Dix's Field, Exeter, and all those interested should get in touch with the secretary, Mr. W. Ching, 9, Sivell Place, Heavitree, Exeter.

EASTBOURNE AND DISTRICT RADIO SOCIETY

ON Tuesday, October 4th, a meeting of this society was held at the Cavendish Senior School. Experiments with the society's 5-metre transmitter were conducted, and it was shown how it could be quite quickly adapted for battery operation. It was decided to fix an aerial for the transmitter at the Cavendish Senior School.

There was also a display chassis, shown by Mr. T. G. R. Dowsett, of a McMichael Model 135 A.C. superhet. The circuit consisted of a triode-pentode, working as oscillator and first detector respectively, variable-mu H.F. pentode working as I.F. amplifier, a double-diode working as second detector, and A.V.C. rectifier, followed by a pentode-output valve, and, of course, the usual full-wave rectifier. Hon. Sec., T. G. R. Dowsett, 48, Grove Road, Eastbourne, Sussex.

ASHTON AND DISTRICT AMATEUR RADIO SOCIETY

THIS recently-formed society continues to flourish and the membership now totals 27. At a meeting held on September 28th, suggestions were invited for the purpose of formulating the winter programme. A list was compiled setting out the subject in which each member was particularly interested, and from the resulting material lectures will be given by competent members. The treasurer (G3NX) brought along a midget CO Tx., measuring 6in. by 6in. by 6in. This has been specially built for portable use in the summer, and with an input of .8 of a watt from 120-volt battery H.T., several QSO's have been made on C.W. on 7 mc/s.

More enthusiastic members are required, and interested amateurs desiring to join should either communicate with the secretary or attend at the clubroom at the "Commercial Hotel," Old Street, Ashton-under-Lyne. Meetings are held every alternate Wednesday at 8 p.m. Secretary, K. Gooding (G3PM), 7, Broadbent Avenue, Ashton-under-Lyne, Lancs.

SOUTHEND AND DISTRICT RADIO AND SCIENTIFIC SOCIETY

THIS society, with visitors from the Ilford, Brentwood, Romford and Welwyn societies, recently held their all-night direction-finding contest. About 50 enthusiasts in 15 cars set out at midnight to find the transmitter; Mr. Pugh was the only one successful, and found the apparatus in the excellent time of 3 hours 23 minutes. The transmitter was reached by going along a grass lane for half a mile, the lane then ran out of a wood, across a clearing and into the wood again. At the edge of the clearing and the wood a ditch ran parallel, and twelve yards from the clearing; the transmitter was concealed in the ditch with a coat, and some brushwood over it. The apparatus was remotely controlled from a tent in the middle of the wood. These tests concluded with breakfast and a general exchange of experiences.

The society has just been fortunate enough to find a room for the meetings, which is situated in the centre of Southend. Transport from any part of Essex would bring members within a hundred yards of the new meeting place in the Southend High Street. It is hoped that we shall now have the support of many enthusiasts who live in outlying districts. Hon. Secretary, J. M. S. Watson (G6CT), 23, Eastwood Boulevard, Westcliff-on-Sea, Essex.

Practical and Amateur Wireless
BLUEPRINT SERVICE

These Blueprints are drawn full size.

Copies of appropriate issues containing descriptions of these sets can in some cases be supplied at the following prices, *which are additional to the cost of the Blueprint.* A dash before the Blueprint Number indicates that the issue is out of print.

Issues of Practical Wireless	..	4d. Post Paid.
Amateur Wireless	..	4d. ,, ,,
Practical Mechanics	..	7½d. ,, ,,
Wireless Magazine	..	1/3 ,, ,,

The index letters which precede the Blueprint Number indicate the periodical in which the description appears: Thus P.W. refers to PRACTICAL WIRELESS, A.W. to *Amateur Wireless*, P.M. to *Practical Mechanics*, W.M. to *Wireless Magazine*.

Send (preferably) a postal order to cover the cost of the blueprint and the issue (stamps over 6d. unacceptable) to PRACTICAL AND AMATEUR WIRELESS Blueprint Dept., George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

PRACTICAL WIRELESS

	Date of Issue	No. of Blueprint
CRYSTAL SETS.		
Blueprints, 6d. each.		
1937 Crystal Receiver	9.1.37	PW71
The "Junior" Crystal Set	27.8.38	PW94
STRAIGHT SETS. Battery Operated.		
One-valve: Blueprints, 1s. each.		
All-wave Unipen (Pentode)	—	PW31A
Beginner's One-valver	19.2.38	PW85
The "Pyramid" One-valver (HF Pen)	27.8.38	PW93
Two-valve: Blueprints, 1s. each.		
Four-range Super Mag Two (D, Pen)	—	PW36B
The Signet Two (D & LF)	24.9.38	PW76
Three-valve: Blueprints, 1s. each.		
The Long-range Express Three (SG, D, Pen)	24.4.37	PW2
Selectone Battery Three (D, 2 LF (Trans))	—	PW10
Sixty Shilling Three (D, 2 LF (RC & Trans))	—	PW34A
Leader Three (SG, D, Pow)	22.5.37	PW35
Summit Three (HF Pen, D, Pen)	—	PW37
All Pentode Three (HF Pen, D (Pen) Pen)	29.5.37	PW39
Hall-Mark Three (SG, D, Pow)	12.6.37	PW41
Hall-Mark Cadet (D, LF, Pen (RC))	16.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-wave Three)	13.4.35	PW49
Genet Midget (D, 2LF (Trans))	*June '35*	PM1
Cameo Midget Three (D, 2 LF (Trans))	8.6.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen)	—	PW53
Battery All-Wave Three (D, 2 LF (RC))	—	PW55
The Monitor (HF Pen, D, Pen)	—	PW61
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW62
The Centaur Three (SG, D, P)	14.8.37	PW64
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.36	PW69
The "Colt" All-Wave Three (D, 2 LF (RC & Trans))	5.12.36	PW72
The "Rapide" Straight 3 (D, 2 LF (RC & Trans))	4.12.37	PW82
F. J. Camm's Oracle All-Wave Three (HF, Det, Pen)	28.8.37	PW78
1938 "Triband" All-Wave Three (HF Pen, D, Pen)	22.1.38	PW84
F. J. Camm's "Sprite" Three (HF Pen, D, Tet)	26.3.38	PW87
The "Hurricane" All-Wave Three (SG, D (Pen), Pen)	30.4.38	PW89
F. J. Camm's "Push-Button" Three (HF Pen, D (Pen), Tet.)	3.9.38	PW92
Four-valve: Blueprints, 1s. each.		
Sonotone Four (SG, D, LF, P)	1.5.37	PW4
Fury Four (2 SG, D, Pen)	8.5.37	PW11
Beta Universal Four (SG, D, LF, Cl. B)	—	PW17
Nucleon Class B Four (SG, D, (SG), LF, Cl. B)	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen)	—	PW34C
Battery Hall-Mark 4 (HF Pen, D, Push-Pull)	—	PW46
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	26.9.36	PW67
All-Wave "Corona" 4 (HF Pen, D, LF, Pow)	9.10.37	PW79
"Acme" All-Wave 4 (HF Pen, D (Pen), LF, Cl. B)	12.2.38	PW83
The "Admiral" Four (H.F. Pen., H.F. Pen., D, Pen. (R.C.))	3.9.38	PW90
Mains Operated.		
Two-valve: Blueprints, 1s. each.		
A.C. Twin (D (Pen), Pen)	—	PW18
A.C.-D.C. Two (SG, Pow)	—	PW31
Selectone A.C. Radiogram Two (D, Pow)	—	PW19
Three-valve: Blueprints, 1s. each.		
Double-Diode-Triode Three (HF Pen, DDT, Pen)	—	PW23
D.C. Ace (SG, D, Pen)	—	PW25
A.C. Three (SG, D, Pen)	—	PW29
A.C. Leader (HF Pen, D, Pow)	—	PW35C
D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A
Armada Mains Three (HF Pen, D, Pen)	—	PW38
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen)	11.5.35	PW50
"All-Wave" A.C. Three (D, 2 LF (RC))	—	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)	—	PW53
Mains Record All-Wave 3 (HF Pen, D, Pen)	5.12.36	PW70
All-World Ace (HF Pen, D, Pen)	28.8.37	PW80
Four-valve: Blueprints, 1s. each.		
A.C. Fury Four (SG, SG, D, Pen)	—	PW20
A.C. Fury Four Super (SG, SG, D, Pen)	—	PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)	24.7.37	PW45
Universal Hall-Mark (HF Pen, D, Push-Pull)	9.2.35	PW47
A.C. All-Wave Corona Four	6.11.37	PW81
SUPERHETS.		
Battery Sets: Blueprints, 1s. each.		
£5 Superhet (Three-valve)	5.6.37	PW40
F. J. Camm's 2-valve Superhet	13.7.35	PW52
F. J. Camm's £4 Superhet	—	PW58
F. J. Camm's "Vitesse" All-Waver (5 valver)	27.2.37	PW75
Mains Sets: Blueprints, 1s. each.		
A.C. £5 Superhet (Three-valve)	—	PW43
D.C. £5 Superhet (Three-valve)	1.12.34	PW42
Universal £5 Superhet (Three-valve)	—	PW44
F. J. Camm's A.C. £4 Superhet 4	31.7.37	PW59
F. J. Camm's Universal £4 Superhet 4	—	PW60
"Qualitone" Universal Four	16.1.37	PW73
SHORT-WAVE SETS.		
One-valve: Blueprint, 1s.		
Simple S.W. One-valver	9.4.38	PW88
Two-valve: Blueprints, 1s. each.		
Midget Short-wave Two (D, Pen)	—	PW38A
The "Fleet" Short-wave Two (D (HF Pen), Pen)	27.8.38	PW91
Three-valve: Blueprints, 1s. each.		
Experimenter's Short-wave Three (SG, D, Pow)	30.7.38	PW30A
The Prefect 3 (D, 2 LF (RC and Trans))	7.8.37	PW63
The Band-Spread S.W. Three (HF Pen, D (Pen), Pen)	1.10.38	PW68
PORTABLES.		
Three-valve: Blueprints, 1s. each.		
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	—	PW65
Parvo Flyweight Midget Portable (SG, D, Pen)	19.6.37	PW77
Four-valve: Blueprint, 1s.		
"Imp" Portable 4 (D, LF, LF, Pen)	19.3.38	PW86
MISCELLANEOUS.		
S.W. Converter-Adapter (1 valve)	—	PW48A

AMATEUR WIRELESS AND WIRELESS MAGAZINE

CRYSTAL SETS.		
Blueprints, 6d. each.		
Four-station Crystal Set	23.7.38	AW427
1934 Crystal Set	—	AW444
150-mile Crystal Set	—	AW450
STRAIGHT SETS. Battery Operated.		
One-valve: Blueprints, 1s. each.		
B.B.C. Special One-valver	—	AW387
Twenty-station Loudspeaker One-valver (Class B)	—	AW449
Two-valve: Blueprints, 1s. each.		
Melody Ranger Two (D, Trans)	—	AW388
Full-volume Two (SG det., Pen)	—	AW392
Lucerne Minor (D, Pen)	—	AW426
A Modern Two-valver	—	WM409
Three-valve: Blueprints, 1s. each.		
Class B Three (D, Trans, Class B)	—	AW386
New Britain's Favourite Three (D, Trans, Class B)	15.7.33	AW394
Home-built Coil Three (SG, D, Trans)	—	AW404
Fan and Family Three (D, Trans, Class B)	25.11.33	AW410
£5 5s. S.G.3 (SG, D, Trans)	2.12.33	AW412
Lucerne Ranger (SG, D, Trans)	—	AW422
£5 5s. Three: De Luxe Version (SG, D, Trans)	19.5.34	AW435
Lucerne Straight Three (D, RC, Trans)	—	AW437
"Wireless League" Three (HF Pen, D, Pen)	3.11.34	AW451
Transportable Three (SG, D, Pen)	—	WM271
Simple-tune Three (SG, D, Pen)	*June '33*	WM327
Economy-Pentode Three (SG, D, Pen)	*Oct. '33*	WM337
"W.M." 1934 Standard Three (SG, D, Pen)	—	WM351
£3 3s. Three (SG, D, Trans)	*Mar. '34*	WM354
1935 £6 6s. Battery Three (SG, D, Pen)	—	WM371
PTP Three (Pen, D, Pen)	—	WM389
Certainty Three (SG, D, Pen)	—	WM393
Minitube Three (SG, D, Trans)	*Oct. '35*	WM396
All-Wave Winning Three (SG, D, Pen)	—	WM400
Four-valve: Blueprints, 1s. 6d. each.		
65s. Four (SG, D, RC, Trans)	—	AW370
"A.W." Ideal Four (2 SG, D, Pen)	16.9.33	AW402
2HF Four (2 SG, D, Pen)	—	AW421
Crusader's A.V.C.4 (2HF, D, QP21)	18.8.34	AW445
(Pentode and Class B Outputs for above: Blueprints 6d. each)	25.8.35	AW445A
Self-contained Four (SG, D, LF, Class B)	*Aug. '33*	WM331
Lucerne Straight Four (SG, D, LF, Trans)	—	WM350
£5 5s. Battery Four (HF, D, 2LF)	*Feb. '35*	WM381
The H.K. Four (SG, SG, D, Pen)	*Mar. '35*	WM384
The Auto Straight Four (HF Pen, HF Pen, DDT, Pen)	*Apr. '36*	WM404
Five-valve: Blueprints, 1s. 6d. each.		
Super-quality Five (2HF, D, RC, Trans)	—	WM320
Class B Quadradyne (2 SG, D, LF, Class B)	—	WM344
New Class B Five (2 SG, D, LF, Class B)	—	WM340
Mains Operated.		
Two-valve: Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C.	—	AW403
Economy A.C. Two (D, Trans) A.C.	—	WM286
Unicorn A.C.-D.C. Two (D, Pen)	—	WM394
Three-valve: Blueprints, 1s. each.		
Home Lover's New All-electric Three (SG, D, Trans) A.C.	—	AW383
S.G. Three (SG, D, Pen) A.C.	—	AW390
A.C. Pentaquester (HF Pen, D, Pen)	23.6.34	AW439
Mantovani A.C. Three (HF, Pen, D, Pen)	—	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen)	*Jan. '36*	WM401
Four-valve: Blueprints, 1s. 6d. each.		
All Metal Four (2 SG, D, Pen)	*July '33*	WM326
Harris' Jubilee Radiogram (HF Pen, D, LF, P)	*May '35*	WM386
SUPERHETS.		
Battery Sets: Blueprints, 1s. 6d. each.		
Modern Super Senior	—	WM375
'Varsity Four	*Oct. '35*	WM395
The Request All-Waver	*June '36*	WM407
1935 Super Five Battery (Superhet)	—	WM379
Mains Sets: Blueprints, 1s. 6d. each.		
Heptode Super Three A.C.	*May '34*	WM359
"W.M." Radiogram Super A.C.	—	WM366
PORTABLES.		
Four-valve: Blueprints, 1s. 6d. each.		
Midget Class B Portable (SG, D, LF, Class B)	20.5.33	AW389
Holiday Portable (SG, D, LF, Class B)	—	AW393
Family Portable (HF, D, RC, Trans)	22.9.34	AW447
Two H.F. Portable (2 SG, D, QP21)	—	WM363
Tyers Portable (SG, D, 2 Trans)	—	WM367
SHORT-WAVE SETS—Battery Operated.		
One-valve: Blueprints, 1s. each.		
S.W. One-valve converter (Price 6d.)	—	AW329
S.W. One-valver for America	—	AW429
Rome Short-Waver	—	AW452
Two-valve: Blueprints, 1s. each.		
Ultra-short Battery Two (SG det., Pen)	*Feb. '36*	WM402
Home-made Coil Two (D, Pen)	—	AW440
Three-valve: Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans)	—	AW355
Experimenter's 5-metre Set (D, Trans, Super-regen)	30.6.34	AW438
Experimenter's Short-waver (SG, D, Pen)	*Jan. 19, '35*	AW463
The Carrier Short-waver (SG, D, P)	*July '35*	WM390
Four-valve: Blueprints, 1s. 6d. each.		
A.W. Short-wave World-Beater (HF Pen, D, RC, Trans)	—	AW436
Empire Short Waver (SG, D, RC, Trans)	—	WM313
Standard Four-valver Short-waver (SG, D, LF, P)	*Mar. '35*	WM383
Superhet: Blueprint, 1s. 6d.		
Simplified Short-waver Super	*Nov. '35*	WM397
Mains Operated.		
Two-valve: Blueprints, 1s. each.		
Two-valve Mains Short-waver (D, Pen) A.C.	—	AW453
"W.M." Band-spread Short-waver (D, Pen) A.C.-D.C.	—	WM368
"W.M." Long-wave Converter	—	WM380
Three-valve: Blueprint, 1s.		
Emigrator (SG, D, Pen) A.C.	—	WM352
Four-valve: Blueprint, 1s. 6d.		
Standard Four-valve, A.C. Short-waver (SG, D, RC, Trans)	*Aug. '35*	WM391
MISCELLANEOUS.		
Enthusiast's Power Amplifier (1/6)	—	WM387
Listeners' 5-watt A.C. Amplifier (1/6)	—	WM392
Radio Unit (2v.) for WM392	*Nov. '35*	WM398
Harris Electrogram (battery amplifier) (1/-)	—	WM399
De-Luxe Concert A.C. Electrogram	*Mar. '36*	WM403
New Style Short-wave Adapter (1/-)	—	WM388
Trickle Charger (6d.)	*Jan. 5, '35*	AW462
Short-wave Adapter (1/-)	—	AW456
Superhet Converter (1/-)	—	AW457
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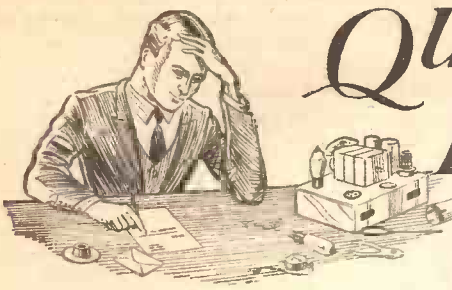
The W.M. A.C. Short-wave Converter (1/-)	—	WM408



QUERIES and ENQUIRIES

Valve Type Numbers

"I should be glad if you could identify for me the type of valve marked A.C./T.P. What is the price of this?"—A. A. H. (Harmondsworth).

UNFORTUNATELY valve nomenclature has not yet been standardised. Certain makers do adopt reference letters which indicate the type of valve, but in many cases it is impossible to tell what type of valve is indicated by reference to its type number. The letters T.P. in this case indicate a triode-pentode frequency changer, and in most cases the letter "P." indicates a power valve; P.P. a super-power valve; Q.P. or Q.P.P. a quiescent push-pull double pentode; H.L. a general-purpose type; and V.P. a variable-mu H.F. pentode. From this no doubt you will be able to follow other valve types. The T.P. costs 11s. 6d.

Corona 4

"Having partially made the Corona 4, and having to put it away for some time, I now find that the Trlogen coils are unobtainable. As I wish to make this set, can you recommend any other make of coil that would suit for this receiver?"—J. C. (New Malden).

UNFORTUNATELY there is no similar type of coil now on the market and you will see that the blueprints for this and similar sets have been withdrawn on this account. There are other all-wave coils, but they are not complete with switching and do not incorporate the same terminal arrangements, and we are thus unable to recommend any substitutes in this particular case.

L.F. Instability

"For some time now I have been troubled with a continuous whistle in my straight three battery set which does not increase or decrease when either the tuning dial or the reaction is turned. Can you tell me what can be the cause of the trouble?"—A. J. H. (S.E.1.).

AS the noise does not vary when controls are operated it would indicate that the trouble is due to L.F. instability. This is usually cured by reversing the connections to the secondary of the L.F. transformer feeding the output valve. A grid-stopping resistance may sometimes be included in the output grid lead with advantage.

A.C. Mains and D.C. Set

"I have a D.C. set and should like to know if this can be adapted to work on A.C. mains, and if so, by what method and approximate cost of conversion?"—W. C. A. (Douglas, I.O.M.).

IT is possible to use a D.C. set with A.C. mains by connecting a special mains unit between the mains and the set. As yours is a commercial receiver, however, we advise you to write to the makers, who may be able to recommend a suitable unit and also inform you whether any special precautions are necessary in this particular case.

RULES

We wish to draw the reader's attention to the fact that the Queries Service is intended only for the solution of problems or difficulties arising from the construction of receivers described in our pages, from articles appearing in our pages, or on general wireless matters. We regret that we cannot, for obvious reasons—

(1) Supply circuit diagrams of complete multi-valve receivers.
(2) Suggest alterations or modifications of receivers described in our contemporaries.
(3) Suggest alterations or modifications to commercial receivers.
(4) Answer queries over the telephone.
(5) Grant interviews to querists.

A stamped addressed envelope must be enclosed for the reply. All sketches and drawings which are sent to us should bear the name and address of the sender.

Requests for Blueprints must not be enclosed with queries as they are dealt with by a separate department.

Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. The Coupon must be enclosed with every query.

Admiral 4 Receiver

"I am endeavouring to construct the Admiral 4-valve receiver. Firstly, is it possible to use two straight pentodes in place of the variable-mu H.F. pentodes for the H.F. stages? Secondly, in the theoretical circuit a 1-mfd. condenser is shown between H.T.+ and earth, but I cannot find this in the wiring diagram."—R. J. F. (North Harrow).

ALTHOUGH it is possible to use straight valves in such a set the use of variable-mu components is highly desirable. Cross-modulation and other troubles are likely to be experienced with simple valves, and furthermore overloading of the second valve or of the detector will take place at your address unless the H.F. input is satisfactorily controlled. The condenser referred to is merely a smoothing component across the H.T. supply and although it is not absolutely essential, it should be used to avoid troubles from the H.T. battery when this becomes run down. The value is not actually critical and any value up to 4 mfds. may be used.

Mains Complications

"Your recent note on mains voltage-conversion has prompted me to send the following query. I wish to build a receiver which is designed for operation from 110 volts A.C./D.C., and my mains are 240 volts D.C. Is it possible for me to put a higher resistance in the mains lead and thus get the set to work normally, or would the higher voltage which would be flowing through the rectifier portion of the valves upset operation and thus necessitate the addition of further resistances and condensers?"—L. R. J. (Dalston, N.1).

AS the receiver is of the Universal mains type you could use it with the higher voltage mains by connecting a suitable line cord between it and your mains. Such a cord may be obtained from Messrs. Henry Ford Radio, Ltd., to whom we advise you to write for details. Their address is 22, Howland Street, Tottenham Court Road, London, W.1.

Replies in Brief

The following replies to queries are given in abbreviated form either because of non-compliance with our rules, or because the point raised is not of general interest.

W. J. D. (Burnham-on-Crouch). You could dismantle the present apparatus and use the neon, but otherwise it is unsuitable. The device mentioned gave a frequency of 1,000 c.p.s.

A. F. H. (Chichester). The cost would be approximately £6 10s., exclusive of valves.

A. R. (Doncaster). Sixty Tested Wireless Circuits and the Service Manual would be ideal for your purpose.

P. L. W. (Blackheath). Faulty cathode-insulation is the commonest cause of the trouble mentioned. Have the valves tested.

F. R. B. (Wythall). Pen A4 costs 10s. 6d., F.C.4 is 11s. 6d., 1W.3 is 9s., 2D4A is 5s. 6d., and VP4B is 10s. 6d.

L. B. (Bethnal Green). There is no blueprint for the set in question.

M. A. W. (Gorey, Co. Wexford). The apparatus mentioned could be used, but it should preferably be joined to the extension sockets or in other words fed from an output filter circuit. Perhaps it would be as well to communicate with the makers regarding the most satisfactory way of using the combination.

G. F. Q. (Liverpool, 17). We think you refer to the Argon Charger in which a special Argon rectifying valve was employed. This was described in our issue dated May 28th last.

D. B. B. (Edgware). A faulty condenser or a leaky electrolytic by-pass condenser may be the cause of the trouble, but as it is a commercial receiver you should have it serviced by the makers.

W. N. (Ward End). For an Artificial Aerial the licence is 10s. per annum. You must obtain this before you can obtain the full licence. Write to the Engineer-in-Chief, Radio Branch, G.P.O., Armour House, London, E.C., for full details and application form.

H. T. (Tamworth). The arrangement should be satisfactory, but some experimental work may have to be carried out in order to find a satisfactory layout. At the address mentioned you should get good results from the London stations.

L. T. W. (Birmingham). Without further details of the set we cannot advise definitely. In some cases instability sets in when the earth is removed and this, acting in a similar manner to reaction, boosts signal strength.

G. F. S. A. (Rugby). The cost of Kit A is £2 4s. 6d. The address is 77, City Road, E.C.1.

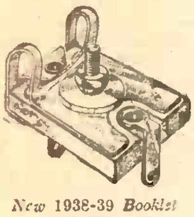
E. F. (North Harrow). We have no details and the coils are obsolescent. We suggest you write to the makers who may still be able to supply data sheets.

R. A. (Feltham). The rectifier will need an input of at least 8 volts and, therefore, you must have this output on your transformer. An L.T. 7 or an L.T. 4 rectifier could be used.

The coupon on page iii of cover must be attached to every query.

For Short and Ultra S/W Work!!!

In the recently published Catalogue of CLIX Components, amateurs and experimenters will find an excellent range of Frequentite (Ceramic) components for use in Television work and in all low-loss high efficiency circuits. Send for a copy now and please mention "Practical Wireless."



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W.B. 8in. Permanent Magnet Speakers at one-third Cost. Extension Type (no Transformer), 7/6. Standard Type (with Transformers), 12/6.

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ALL goods previously advertised are standard lines, still available. Post card for list free.
VAUXHALL UTILITIES, 163a, Strand, W.C.2. Over Denny's the Booksellers. (Temple Bar 9338.)

BANKRUPT Bargains. List free. All brand new goods. HSP. 1938 12 gn. A.C. mains superhets, 5 v., £5 10s. HSP. 5 v. all-wave 14 gn. A.C. superhets, 1938, £6 10s. Portadyne 5 v. A.C. and A.C./D.C. superhets, all-wave, 1938, £5 10s. Spencer 5 v. all-wave A.C./D.C. 4-band superhets, 12½ gns. 1938, £6 10s. Decca 5 v. all-wave transportables, A.C./D.C., 1938, 90s. Truphonic 1938 all-wave 11 gn. A.C. and A.C./D.C. superhets, £6 17s. 6d. Ferguson 5v. all-wave A.C./D.C. chassis, complete speaker and valves, 75s. Full stock valves all types; components. State requirements please.—Butlin, 6, Stanford Avenue, Brighton.

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NEW VALVES in Cartons.—6A7, 6F6, 6B7, 6A6, 6A4, 47, 35, 42, 2A6, 2A3, 2A7, 2B7, all at 2/6 each; also many British.—G.W.3.K.Y, Brixton Mount, Holyhead.

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Model No. 8110, 5-valve A.C./D.C. Superhet Receiver.
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WANTED.—Tapped aerial Lewcos coil.—13, Exbury Road, S.E.6.

MISCELLANEOUS

ALL-WAVE 5-valve superhet, Midget, frame aerial, universal 200-250 v., £6. Cheap.—St. John, 13, Collingham Road, S.W.5.

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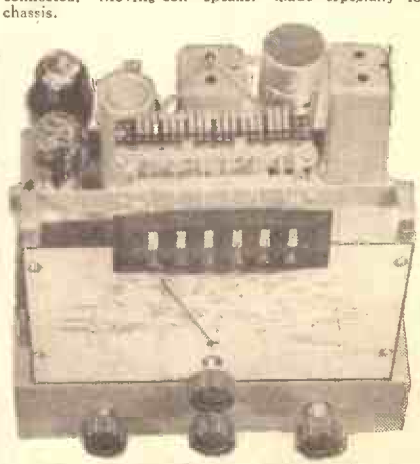

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