**IMPROVED VARIABLE SELECTIVITY CIRCUIT**—See Page 419

# Practical and Amateur Wireless

AND PRACTICAL TELEVISION

3D EVERY WEDNESDAY

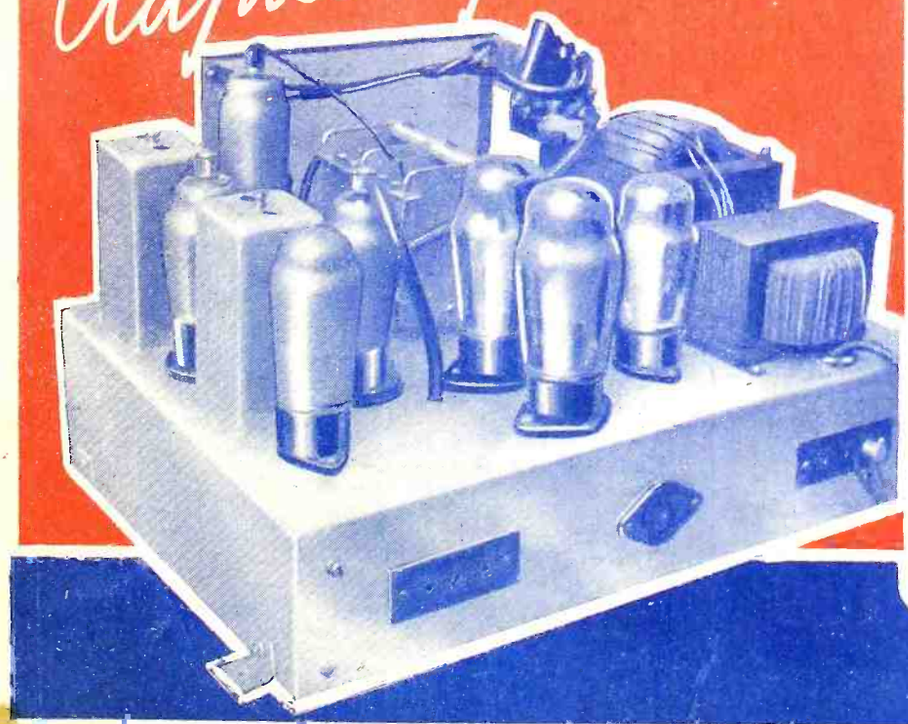
*Edited by* F. J. CAMM

*a* GEORGE NEWNES *Publication*

Vol. 14. No. 356.
July 15th, 1939.

*Adjusting and Operating*

*The* 1939 *All-Wave* SUPERHET



# A QUESTION OF VOLTAGE SEE PAGE 411

Practical and Amateur Wireless

Edited by F. J. CAMM

*Technical Staff:*
W. J. Delaney, H. J. Barton Chapple, Wh.Sch., B.Sc., A.M.I.E.E., Frank Preston.

Vol. XIV. No. 356. July 15th, 1939.

# ROUND *the* WORLD *of* WIRELESS

### America's Listeners

ACCORDING to the latest published statistics some 82 per cent. of households in the United States possess a radio receiver. This percentage represents 26,666,500 of the 32,641,000 families computed to be resident in the North American continent. Of the 18,920,000 families dwelling in cities, 91 per cent. are radio listeners, but on the land 69 per cent. only take any interest in broadcast programmes.

### Prague's Radio Journal Deposed

NO longer in the Czech programmes will you hear the call *Radio Journal, Praha*. This organisation, now controlled by the Germans, has been renamed *Tschechische Rundfunk Gesellschaft mit beschraenkter Haftung* (Czech Broadcasting Company, Limited).

### Altered Wavelength

RADIO LIEGE (Belgium), which hitherto has been working on 203.5 m. (1,474 kc/s), has now adopted 208.6 m. (1,438 kc/s). The station has been particularly active during the last few days in connection with the Liege Water Exhibition.

### Careful Identification Necessary

THE fact that so many European stations are broadcasting news bulletins and talks in languages other than their own is making the identification of transmitters a difficult one. Always wait for the call or interval signal, if the latter is familiar to you. French stations since June 19th have also initiated foreign transmissions. P.T.T., Grenoble, Nice and Marseilles broadcast daily in Italian between B.S.T. 22.45-23.00; Strasbourg, Lyons and Rennes-Bretagne in German at the same time; Lyons and Rennes in Serbo-Croatian from 23.00-23.15, and Bordeaux-Lafayette and P.T.T. Toulouse in Spanish from 22.45-23.00.

### More High-power Stations

THE German Reich has decided to increase the power of most of its transmitters in the immediate future many of them will go to 120 kilowatts, including Prague and Melnik. Norway is also busy erecting two 100-kilowatt stations at Hennesberget and Namsos; this will give the country seventeen stations with an aggregate power of 360 kilowatts. Sweden this autumn will inaugurate a new 100-kilowatt transmitter at Storatuna, in Dalecarlia.

### Radio in Iran (Persia)

THE Iranian Government has placed a contract for the construction and supply of thirteen broadcasting stations on medium waves and three on short channels; two of the latter are to be installed at Teheran.

### An Alternative Drink

IN view of the scarcity of coffee in Italy the E.I.A.R. stations include in one of their programmes a short talk in which the speaker gives recipes for the preparation of substitutes for the morning meal and after-dinner refreshment!

### That Holiday Weather

IN addition to the daily weather report during the holiday season German stations now broadcast every Wednesday a special ten-day forecast; its accuracy, however, is not guaranteed.

### ON OTHER PAGES



### "How They Become Observers"

THE Royal Air Force recently published the news that it was open to recruit air observers direct from civil life, to supplement those in training through the normal channels. The B.B.C. proposes to give listeners an insight into the training of these young observers on July 17th. One of the Corporation's officials, C. J. T. Gardner, will undertake a routine training flight on which two young observers are progressing towards the end of their training. The aeroplane and its crew and trainees will take off from Hendon and fly across country to a point 20 miles away. Here the 'plane will circle and return to Hendon. One recruit will navigate on the outward journey and the other on the return. The B.B.C. observer, with a lip microphone, will tell listeners what happens on the aerodrome at Hendon at the take-off and throughout the flight.

### Continental Exchange

IN the winter before last, Midland began an occasional exchange of programmes of like type with continental stations. Male voice choirs, chiefly composed of miners, brass bands, children's singing games and carillons (twice) have been contributed to "Continental Exchange" with France, Germany or Belgium. The Eastwood Colliery Male Voice Choir, from Nottinghamshire, will appear on July 16th for the second time in one of these programmes. It was in an exchange programme with a French miners' choir the last time; and on this occasion it will share a programme with a German choir, not necessarily of miners and probably from Bavaria. The Eastwood Choir was formed in 1920 and is conducted by Granville Mee. It has won first prizes at Cleethorpes and Birmingham Festivals.

### Radio Society of Gt. Britain.

THE R.S.G.B. announce that the Council has decided not to exhibit at the Radio Exhibition. Instead, arrangements are being made to organise a private Radio Exhibition during the period fixed for the society's 14th Annual Convention—September 21st, 22nd, and 23rd, 1939. The venue is The Royal Hotel, Woburn Place, Russell Square, London, W.C.2, and will be confined to society members only.

# ROUND the WORLD of WIRELESS (Continued)

## Welsh Motor Rally Trials

FROM all over the country enthusiastic competitors will converge on Cardiff, the finishing point of the Welsh Motor Rally, on July 20th. This is the fifth Rally which Wales has organised, and it is a tribute to the work which has been put into it that these Rallies now rank with the much older established first-class Rallies in the country. On July 21st, the spectacular eliminating tests will be held at Cardiff, when a running commentary will be broadcast by K. Rowland Harris in the Welsh programme from the course-side in Museum Avenue, Cathays Park, Cardiff.

*Gerald Cock, Director of Television, chatting to Sir Ian and Lady Fraser at the Television Party recently held in Broadcasting House.*

## Strolling Players

THE next talk in the series entitled "Running Your Own Show" will be given on July 18th by Laurence Neal. He has had ten seasons with the Fortune Players of Leicester, and will tell of the experience he has gained in a repertory of several plays, performed with a minimum of scenes in villages up and down the country. These strolling players were in their second year when he joined them. He had to take over the part of Mephistopheles in Marlowe's "Dr. Faustus" in the early days. One of the favourite plays in the repertoire of the Fortune Players is "A Winter's Tale," which they have given thirty times.

## Television Interference

IN view of the fact that diathermy apparatus causes such widespread interference on the television wavebands, it is interesting to note that the Federal Communications Commission is expected to recommend that all such apparatus should have adequate filters in the power lines and be confined to one frequency band so as to reduce the interference to a minimum.

## Finnish People's Set

FOLLOWING the popularity of the German and other "people's" receiver, a campaign is being run by Finnish newspapers calling for the adoption of a similar type of receiver for use by the population of Finland.

## INTERESTING and TOPICAL NEWS and NOTES

## Aotearoa

"AOTEAROA," title of a programme to be broadcast on August 1st, is the Maori name for the Islands of New Zealand and means "the land of the long white cloud." It is just a hundred years ago that a party of 500 colonists set sail from Gravesend for the other side of the world. The programme, which is in honour of New Zealand's centenary, has been prepared by A. L. Lloyd, who will be remembered as the author of "The Voice of the Seamen." It will be produced by Laurence Gilliam.

Special music has been composed by Leslie Woodgate, the B.B.C.'s chorus master. In addition to the special music, records of a Maori canoe song sung by a choir, and a love song sung by a Maori girl, will be included. The programme traces in dramatic form the hardships undergone by the early settlers before the Maoris were finally won over to British rule. Included in the broadcast will, it is hoped, be a short speech by the High Commissioner for New Zealand in London on the goodwill and solidarity that exists between the Mother Country and its most distant Dominion.

## SOLVE THIS!

### PROBLEM No. 356

ROGERS built a three-valve battery set which gave fairly good results, but he decided to improve reproduction by converting the last stage from transformer coupling to resistance-capacity coupling. He found a suitable condenser, anode resistance and grid leak in his spares box and used these components in place of the transformer. He connected them up exactly as shown in a diagram and then switched on. The set was tuned to the local station and signals came through for a few seconds, after which they grew distorted and finally ceased. He switched off and checked connections, but found them all in order so switched on again. The same thing happened—signals for a few seconds followed by distortion and then silence. What was the cause of the trouble? Three books will be awarded for the first three correct solutions opened. Entries must be addressed to The Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 356 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, July 17th, 1939.

### Solution to Problem No. 355

When Jackson added the resistance in series he modified the value of the potentiometer and thus altered the H.T. applied to the screen. He should have used resistances of greater wattage rating and not changed the values.

The following three readers successfully solved Problem No. 354, and books have accordingly been forwarded to them:

E. Trowell, 27, Unity Street, Sheerness, Kent; A. J. Hall, 16, Shrewsbury Fields, Shifnal, Shropshire; G. Bagrie, 24, Whittington Green, Newcastle-on-Tyne, 5.

## Organ Exchange with Radio Eireann

THE second of the series of four organ recitals exchanged between the B.B.C. and Radio Eireann, will be broacast on July 18th, from Armagh Cathedral. The organist will be Reginald West, who is well known to Ulster listeners. West began his musical career in 1914 as a chorister at Hereford Cathedral under Dr. E. R. Sinclair. Later on he was a pupil of Dr. Percy Hull, organist at Hereford Cathedral, and in 1919 he won the Sinclair Scholarship for organists. In 1921 he became deputy organist at Hereford Cathedral, and from that year until 1935 he was Music Master at Hereford Cathedral School. Since then he has been organist and master of the Choristers at Armagh Cathedral.

*Blindfold transmitter operation, to provide efficiency for night work, being carried out by Cambridge undergrads at their O.T.C. camp.*

## French Short-wave Stations

IT is stated that by 1940 two new 100 kW. short-wave stations will be put into service in France. Other stations are being built and these will bring up the total of French short-wave stations to nine.

## Sunday Broadcast by Reginald Dixon

BLACKPOOL'S popular organist, Reginald Dixon, who plays at the Tower Ballroom, will be heard by Northern listeners on July 16th. His programme will include a "Vagabond King" selection, the Waldteufel waltz, "Etincelles," and, to end the broadcast, the Sibelius tone-poem, "Finlandia."

## Songs about Smoking

"A BLAST FOR TOBACCO" is the name of a programme of songs and choruses about smoking and tobacco which is to be broadcast on July 17th. Period items of a programme which is subtitled "variations on a favourite theme" are to be sung by Hamilton Harris (bass) and a male voice octet. Some modern versions of Jacobean and old English "ayres" will be heard. Arthur Spencer, of the North Region's music department, has arranged the broadcast.

# A QUESTION OF VOLTAGE

## The Experimenters Show Here that there are Sometimes Factors which Render the Direct Application of Ohms Law Rather Difficult and Complicated. It is, however, Explained that Experimental Methods of Checking may be More Reliable than those Arrived at Mathematically

EVERY reader must by now know Ohm's Law and its general applications, but it is often evident from inquiries which we receive that there are many who overlook small practical points when making use of it. For example, consider the very simple detector anode circuit shown in Fig. 1. There is a 10,000-ohm decoupling resistor, and also a 25,000-ohm coupling resistor (for an R.C.C. inter-valve circuit). If the total H.T. voltage available is 100, you might wish to

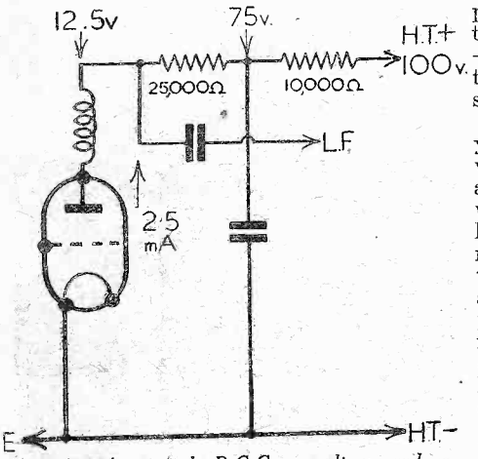



*Fig. 1.—A typical R.C.C. coupling, and a decoupling arrangement in the anode circuit of a detector valve.*

know what voltage would be applied to the detector valve; conversely, if the resistors had not already been chosen, it might be desired to know what values would be necessary to produce a certain anode voltage.

### Current Variation

On the face of it, we have here a very simple problem. We know (from Ohm's Law) that the voltage drop can be found by multiplying the current in amperes by the total resistance in ohms. But we do not know what the current is. By consulting valve tables it might be found that the average anode current of the valve in use is, say, 2.5 mA. It might, therefore, be concluded that such a figure could be used in the simple calculations. Thus, you could determine that the voltage drop across the decoupling resistor would be 2.5/1,000 multiplied by 10,000=25 volts. The voltage between the low-potential side of the decoupler and earth would consequently be 75 volts. Following the same procedure you would find that the voltage drop across the coupling resistor is 2.5/1,000 times 25,000=62.5. This means that the voltage applied to the anode (if we neglect the very low resistance of the H.F. choke) would be 12.5.

That, of course, is absurd, despite the fact that there might not appear to be any doubt that the calculations have been correctly performed. In almost every instance it would be found that the valve would perform fairly efficiently in the conditions represented by the circuit. It would also be found—if sufficiently accurate means of measurement were available—

*by The Experimenters*

that the voltage on the anode would be appreciably in excess of 12.5. Where is the fallacy, then? It is in assuming that the current is 2.5 mA. As the applied anode voltage is reduced, the current also must be reduced—and as the current is reduced the voltage drop across the resistors is smaller.

The fact of the matter is that you cannot find the actual applied voltage by simple calculation, although a fair approximation would be possible if the calculation were based on the total resistance of the resistors and valve in series. The A.C. resistance of the valve could be employed in working out, but the result would not be absolutely correct. There are few instances, however, in which a greater degree of accuracy is necessary.

### Equivalent Resistance

A more involved set of conditions is presented when dealing with a circuit of the type shown in Fig. 2. As in the Fig. 1 arrangement, it is possible to measure the anode current passing through the valve and its associated anode and cathode-circuit resistors, and knowing that the probable anode voltage can be determined by looking up a set of valve curves. In this case, of course, the bias voltage dropped across the cathode resistor must also be taken into account. Another method of looking at the question is that, since 10 mA is the current passed and the total H.T. voltage is 250, the equivalent resistance of the valve and its associated anode and cathode leads is 25,000 ohms. Then knowing the values of the anode and cathode resistors it is possible to determine the equivalent resistance of the valve, and then to estimate the voltage applied between the anode and cathode by simple proportion.

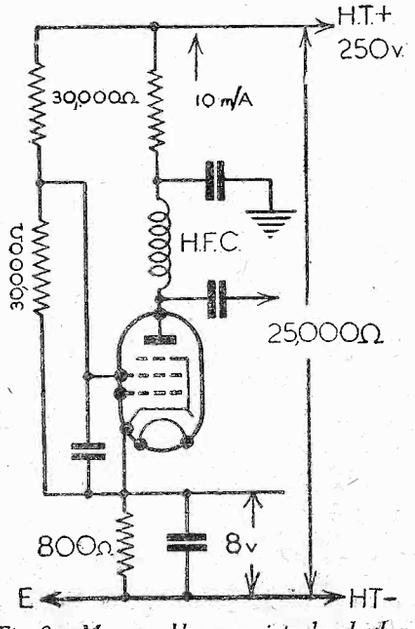



*Fig. 2.—Many problems are introduced when an attempt is made to calculate the exact S.G. voltage supplied by a potentiometer, as shown here.*

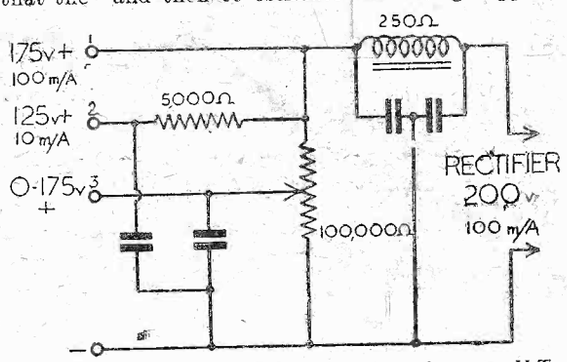



*Fig. 3.—The output from different tappings of a mains H.T. unit varies according to the load applied to all of the tappings.*

But even when doing this, there is another factor to be taken into account: the parallel resistance of the screening-grid potentiometer. Knowing that the overall resistance of resistors in parallel is the "reciprocal of the sum of the reciprocals" ($R=\frac{1}{1/r_1+1/r_2}$) it is possible to work out the individual values. Still, it's a matter that the average constructor finds very tedious and worrying. So he prefers to acknowledge the difficulty and to be guided by the results of practical experiments. We are not going to worry you here with the theory and mathematics of the thing; our purpose in writing this was, rather, to show that it is easy to make false premises and to become thoroughly confused by theoretical results unless you are technically-minded.

### S.G. Voltage

When you try to find the exact screening-grid voltage applied in a circuit of the type shown in Fig. 2 there are more snags ahead. You might assume that the voltage would be just half that between the H.T.+ line and the cathode — half of 242—since the two limbs of the fixed potentiometer are of equal value. Do not be alarmed when we point out that it is not. If there were no current passed by the screening grid the supposition would be correct, but since the screening grid *does* pass a current, we have the position of two similar resistors in series, one of which passes more current than the other. Because of this, the voltage drop across the "upper" one, which passes the greater current, is greater than across the "lower"

(Continued on next page)

## A QUESTION OF VOLTAGE

(*Continued from previous page*)

one. In other words, the screening-grid voltage is less than one-half the H.T. voltage. Here again we refuse in this article to give the full details of calculation; they have been given in previous issues for those who insist on getting to the bottom of the matter, but they are seldom of great importance to the constructor or the average experimenter who, if he is wise, will employ the values recommended by the makers of the valve employed and given in their literature.

### H.T. Supply-unit Output

Let us now turn to the output arrangements of a mains H.T. unit, as represented by the diagram in Fig. 3. The output from the rectifier we will assume to be 200 volts, 100 mA. Since there is a 250-ohm smoothing choke in series with the positive lead, the maximum output from the eliminator, at 100 mA, is 175 volts. Number 2 tapping would give 125 volts at 10 mA, since there is a 5,000-ohm resistor in series with the 175-volt lead. But if the maximum-output tapping were not being employed, the output from number 2 point would be higher. This is because there would be a voltage drop of only 2.5 across the smoothing choke when the total current load were 10 mA.

By the same reasoning, it will be clear that the voltage obtainable from No. 1 tapping would be almost 200 (197.5 to be exact) if the current taken were only 10 mA. But this assumes that current is not drawn from the other two tappings. From the points we have raised it will be clear that the voltage at any output terminal is dependent in some measure on the current taken from that point and also from all other points. In most cases the D.C. voltage from the rectifier would increase very considerably if the current load were reduced, and this would still further affect the figures given.

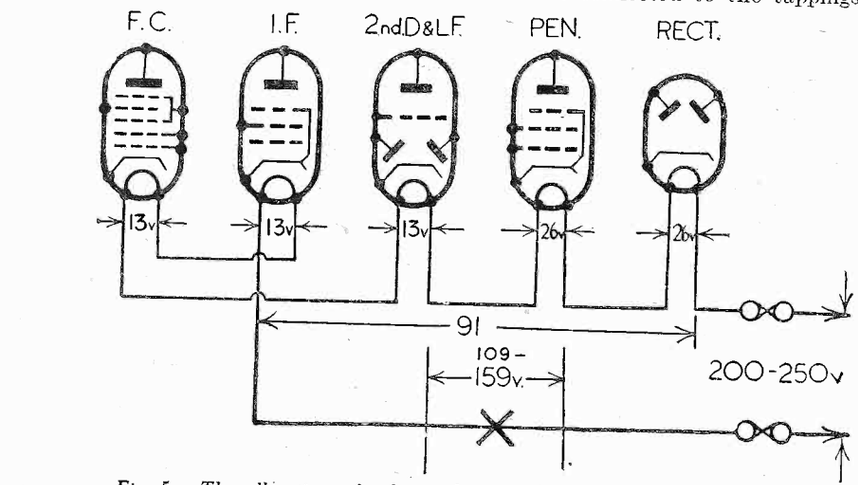



*Fig. 5.—The allocation of voltages between the heaters of the valves in an A.C./D.C. circuit.*

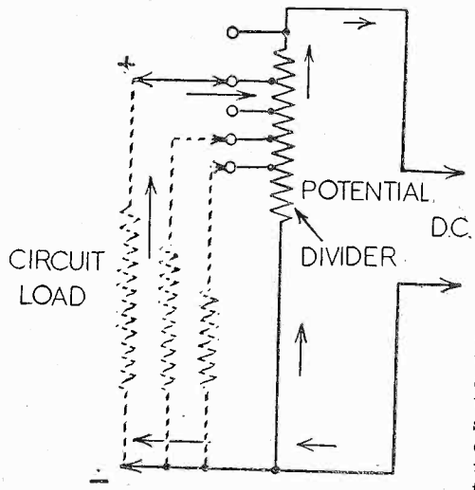



*Fig. 4.—When a potential divider is used we have, in effect, a number of resistors in parallel with each other and with parts of the divider resistor.*

### Awkward Calculations

With a potential divider (not very often used these days) as shown in Fig. 4, similar conditions apply, but with even greater force. For one thing, a current is always flowing through the resistor forming the potential divider and through each of the circuits connected to the tappings. This means that we have a number of parallel resistors forming a network which, although simple in the practical senses, is extremely complex when you start to make attempts to assess the voltage and current outputs from any of the tapping points.

Unless you are something of a mathematician we advise you to save yourself from headaches by not attempting such calculations. We confess that we shirk them whenever possible, although at times our readers have insisted on our doing the calculations to settle a wager or because some unfortunate soul has been "pipped" in an examination because of one of these nightmare calculations. By the way, we hope that the "highbrows" among our readers will not take us to task and say that we ought to be ashamed of ourselves because we are not competent to deal with these problems with absolute ease. We are not ashamed, for we lay claim to practical experience and ability rather than to mathematical honours.

### A.C./D.C. Heater Voltages

There are some voltage questions that can be settled easily, and they are problems that must be solved when designing a receiver. One of these concerns the heater circuits in an A.C./D.C. circuit, a small portion of which is shown in Fig. 5. In this case, all the heaters are wired in series, and all should be rated at the same current—it matters not whether all have the same voltage rating or not. You can find the voltage required to feed them by the simple process of adding together the voltages of the individual valves. Thus, in Fig. 5, there are three valves with 13-volt heaters, and two whose heaters require 26 volts each. When these are added together we get the total voltage of 91.

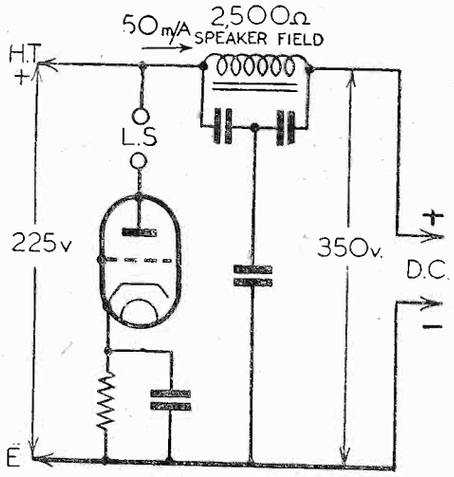



*Fig. 6.—A speaker field winding produces a pronounced voltage drop.*

The receiver has to be suitable for operation from mains voltages between about 200 and 250, so we need some form of resistor at the point marked X. By subtracting our 91 from 200 and from 250, we find that the voltage drop required is 109 to 159. We could, of course, use a tapped wire-wound resistor with a maximum value of 530 ohms (assuming the use of the usual .3-amp. valves), but a far better method is to employ a self-compensating resistor, in the form of a barretter. There is a standard type with a range of 112 to 195 volts at .3 amp., and this would be quite satisfactory in practice.

### Energised Speaker

Some constructors who propose to employ an energised moving-coil speaker overlook the fact that the field winding is of necessity responsible for a fairly heavy drop in voltage. In the example shown in Fig. 6 it is assumed that the H.T. current consumption of the receiver is 50 mA. At that current, the voltage dropped through the 2,500-ohm field winding is 125 volts, and thus the available H.T. voltage is 225, the output from the rectifier being 350 volts.

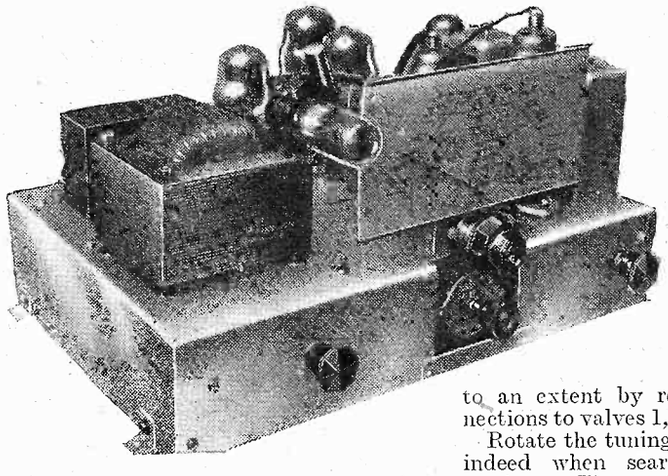
A sidelight on the voltage question here is the wattage available for energising the speaker. It can be found in one of two ways: by multiplying the current in amperes by the voltage drop; or by multiplying the ohmic resistance of the field by the square of the current. The result is 6.25 watts. This is adequate for most types of energised speaker, but in some circuits the efficient use of an energised unit might be precluded by the fact that the available current and voltage are insufficient. Most small speakers will operate fairly well when the available energising power is 3 watts or over.

## OPERATING AND ADJUSTING

# THE 1939 ALL-WAVE SUPERHET

### How to Trim and Adjust this New Receiver so as to Obtain Maximum Response

THE receiver should take a few minutes to warm up and after that, provided everything is in order as it should be, complete ganging can be effected in less than five minutes. Tune in your local



medium-wave station and use as small an aerial as possible. Adjust the trimmers on the top of the I.F. transformers to the loudest setting. Adjust them one at a time, starting from the rear. Note the reading on the dial. If it is not correct, rotate the tuning condenser nearer to its correct setting, but do not entirely lose the station, and again adjust the I.F. transformer trimmers, and repeat this until the dial reading is correct.

Now switch over to long waves and tune in Droitwich. If the medium-wave adjustments have been correctly carried out, the dial reading will be correct. If not, rotate the tuning condenser until the correct dial reading is obtained and then make the necessary adjustments to the I.F. transformer trimmers until the loudest point is found. The small adjustment needed on long waves will not affect medium-wave calibration. Having carried out these adjustments, the receiver is completed and the normal aerial may be connected.

Don't adjust the trimmers on short waves; don't adjust the tuning coil trimmers, unless it is found impossible to get correct calibration for both long and medium waves by any other way (only slight adjustment of the coil trimmers will be necessary, and this should be carried out on the medium-wave coils).

If the receiver is "dead," the fault may be traced to certain stages by touching the top caps of valves 1, 2, and 3, one at a time. Keep the volume control at maximum, and a fairly prominent click will be heard if the valve is working properly. If the set is noisy, disconnect both aerial and earth. If the noises stop, the set is not at fault. If they continue, look for faulty connections, especially in the grid circuits, and locate to an extent by removing the top connections to valves 1, 2, and 3, one at a time.

Rotate the tuning condenser very slowly indeed when searching for short-wave stations. The tuning is very sharp and it is very easy indeed to pass over a short-wave station without hearing it. Only careful tuning, listening *and patience* can master the art of long-distance listening, and we would refer readers to the articles on this subject that are appearing regularly in these pages.

### Using a Cathode-ray Tuning Indicator

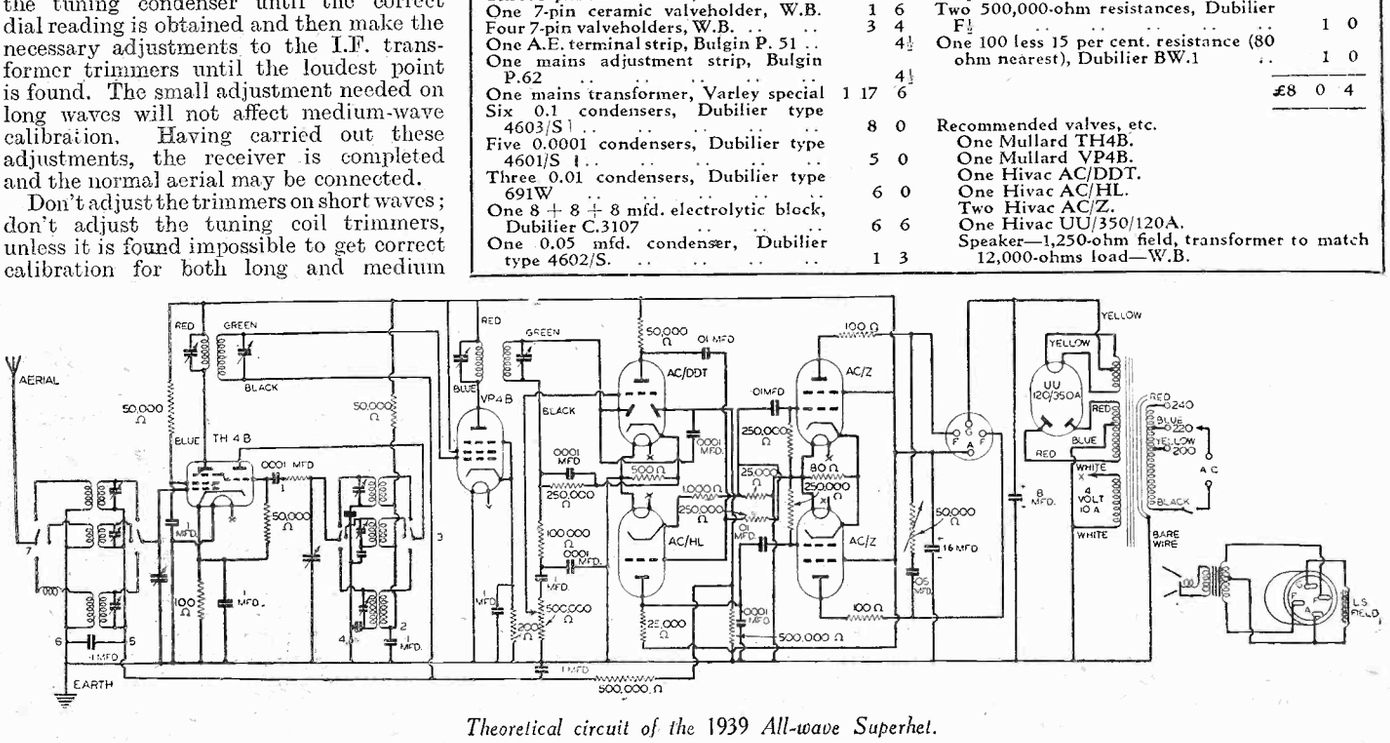
The Mullard T.V.4 electron beam tuning indicator has been used with great success with the 1939 superhet. It consists of a fluorescent screen and an indirectly-heated cathode to provide a source of electrons which on striking the target cause a glow to appear. The glow area is controlled by a third electrode connected internally to a triode amplifier so that adequate sensitivity is provided. The triode has "variable-mu characteristics," which enable good angular movement to be obtained on a weak signal without overloading on a strong signal.

The circuit used and its method of connection to the 1939 superhet were shown last week. Variation of R1 will vary the shadow angle. If the shadow angle does not increase when a reasonably weak station is tuned in, R1 may be reduced to not lower than 500,000 ohms. If the shadow overlaps before a strong station is tuned in, R1 may be increased to as much as 2 megohms.

### LIST OF COMPONENTS

| | £ | s. | d. |
|---|---|---|---|
| One J.B. Linacore all-wave tuner (mains model) | 2 | 15 | 0 |
| One Varley 465kc/s I.F. transformer type BP.122 | | 7 | 9 |
| One Varley 465kc/s I.F. transformer type BP.123 | | 7 | 9 |
| One volume control with switch, Dubilier type J. 500,000 ohm. | | 5 | 0 |
| One tone control (50,000 ohm), Dubilier type B | | 3 | 0 |
| Three 5-pin valveholders, W.B. | | 1 | 6 |
| One 7-pin ceramic valveholder, W.B. | | 1 | 6 |
| Four 7-pin valveholders, W.B. | | 3 | 4 |
| One A.E. terminal strip, Bulgin P. 51 | | | 4½ |
| One mains adjustment strip, Bulgin P.62 | | | 4½ |
| One mains transformer, Varley special | 1 | 17 | 6 |
| Six 0.1 condensers, Dubilier type 4603/S | | 8 | 0 |
| Five 0.0001 condensers, Dubilier type 4601/S | | 5 | 0 |
| Three 0.01 condensers, Dubilier type 691W | | 6 | 0 |
| One 8 + 8 + 8 mfd. electrolytic block, Dubilier C.3107 | | 6 | 6 |
| One 0.05 mfd. condenser, Dubilier type 4602/S. | | 1 | 3 |
| Four 50,000-ohm resistances, Dubilier F½ | | 2 | 0 |
| Three 100-ohm resistances, Dubilier F½ | | 1 | 6 |
| One 200-ohm resistance, Dubilier F½ | | | 6 |
| Four 250,000-ohm resistances, Dubilier F½ | | 2 | 0 |
| One 100,000-ohm resistance, Dubilier F½ | | | 6 |
| One 500-ohm resistance Dubilier F½ | | | 6 |
| One 1,000-ohm resistance, Dubilier F½ | | | 6 |
| Two 25,000-ohm resistances, Dubilier F½ | | 1 | 0 |
| Two 500,000-ohm resistances, Dubilier F½ | | 1 | 0 |
| One 100 less 15 per cent. resistance (80 ohm nearest), Dubilier BW.1 | | 1 | 0 |
| | £8 | 0 | 4 |

Recommended valves, etc.
One Mullard TH4B.
One Mullard VP4B.
One Hivac AC/DDT.
One Hivac AC/HL.
Two Hivac AC/Z.
One Hivac UU/350/120A.
Speaker—1,250-ohm field, transformer to match 12,000-ohms load—W.B.




*Theoretical circuit of the 1939 All-wave Superhet.*

# A.V.C. ELABORATIONS

## Complicated A.V.C. Circuits are Now Employed in some Modern Receivers. The Reasons and the Method of Working are Described in this Article - - By W. J. DELANEY

THE A.V.C. circuit is, as most readers are by now aware, an arrangement whereby the gain of a receiver is controlled by the incoming signal. The idea underlying the scheme is to avoid fading, and this is accomplished by using in the early stages of the receiver valves with what are known as "variable-mu" characteristics. That is to say, the amplification of the valve is dependent upon the applied grid bias, and by rectifying the H.F. component of the signal which is received, and by applying this rectified voltage to the early valves it is obvious that the input will be controlled. With a variable-mu valve maximum bias gives minimum amplification, and thus a powerful signal will reduce the gain and a weak signal will increase gain, hence the output will remain sensibly constant irrespective of variations in the input consequent upon fading.

The first point which should be obvious from the above remarks is that even the weakest carrier wave will be fed back to the early valves and thus maximum amplification will not be obtained. As, however, a very weak signal will no doubt be accompanied by a fairly heavy background of noise, it may not be desirable to receive such a station so this point is not regarded by some as important. If, however, one is searching for distant stations it is obviously desirable that the receiver should be in its most sensitive condition.

### Delayed A.V.C.

Some receivers have a switch whereby the A.V.C. action may be cut out and a manual control substituted, and this enables searching to be carried out in the desired manner, but another idea is to impose at the A.V.C. circuit a preliminary voltage which will prevent the required bias being applied to the controlled valves until a desired signal level has been reached. This is therefore known as delayed A.V.C. In some circuits this is accomplished by using a double-diode-triode valve as the rectifier, A.V.C. and L.F. valve, and making use of the bias for the triode section as the delay voltage, whilst other more complicated arrangements are also introduced. Fig. 2 shows one form in which this L.F. bias is utilised as described. Another scheme is to use a variable bias resistance so that the amount of delay may be controlled, but this is not very general now as more elaborate schemes are introduced. One of these is amplified A.V.C.

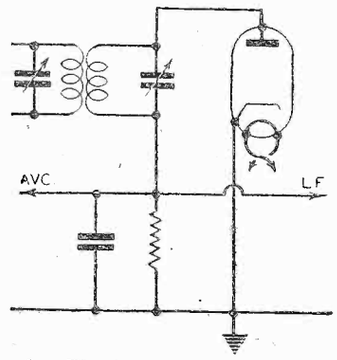



*Fig. 1.—The basic circuit for automatic volume control, using a diode.*

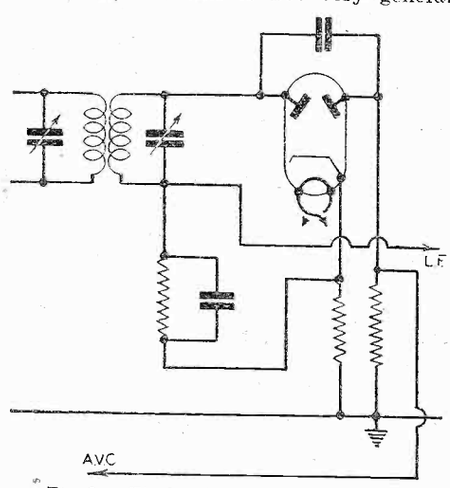



*Fig. 2.—The basic form of delayed A.V.C.*

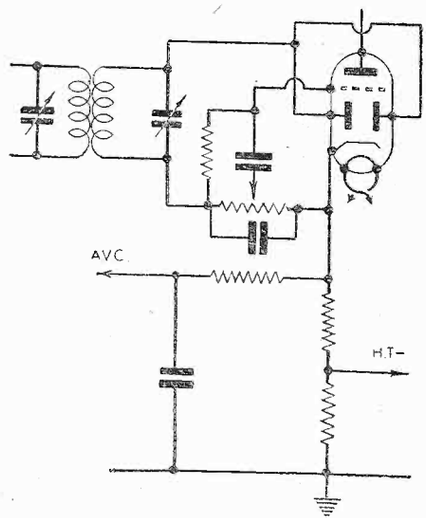



*Fig. 3.—Amplified A.V.C. using a double-diode-triode.*

### Amplifying A.V.C. Action

Certain simple types of receiver are in use where only two or perhaps three valves precede the second detector. This means that the amount of signal voltage fed to the detector is hardly sufficient to provide enough bias to give control to the valves over the necessary limits required for the counteraction of fading. It is, therefore, necessary to augment the bias voltage which is obtained, and this may be carried out by using a separate valve which is so arranged that its normal anode current is used as bias when it is "triggered" or brought into action by the preliminary bias obtained as already mentioned. It will be obvious, however, that this arrangement suffers from the drawback mentioned for the simple scheme, namely, the weakest signal will control the bias, and therefore it is desirable to introduce the delay voltage again, giving rise to delayed amplified A.V.C. There are also several different schemes by which this arrangement may be introduced, and one circuit used in a popular British receiver is shown in Fig. 3.

### Quiet Tuning

A moment's thought will reveal that a very serious defect may become prominent when any of the forms of A.V.C. already mentioned are employed. In the "no signal" condition the gain of the valves is at a maximum. Hence, when tuning through the band, background noise will rise to a maximum in between stations and this will be distressing, especially if 'phones are in use. It is true that by using a visual tuning indicator the manual L.F. gain control may be turned to control the gain until the indicator shows that a worth-while station has been located, but this is not a desirable method of working, especially for those who are anxious to make keen searches over the band for long-distance stations. Circuits have, therefore, been introduced to "mute" the receiver until a suitable carrier has been located, and these circuits are known as "Quiet A.V.C." arrangements. They may, of course, as in the previous instances, be combined to provide delay and amplification, and special valves have been introduced in some cases to enable maximum benefits of the system to be obtained. Of these the triple-diode-triode is probably the best known. The most interesting circuit which we have tried in this connection is shown in Fig. 5, recommended by Mullard for their "E" series valves. In this circuit, the valve EF6 operates as an L.F. amplifier and the triode section of the double-diode-triode provides a negative voltage which "blocks" the L.F. valve on weak signals. The L.F. voltage on the grid resistance of the diode D2 is applied through condenser C8 to the grid of the EF6. After smoothing, the negative D.C. voltage on the leak resistance controls the grid of the triode section of the first valve. The anode current of this valve flows

(Continued on page 426.)

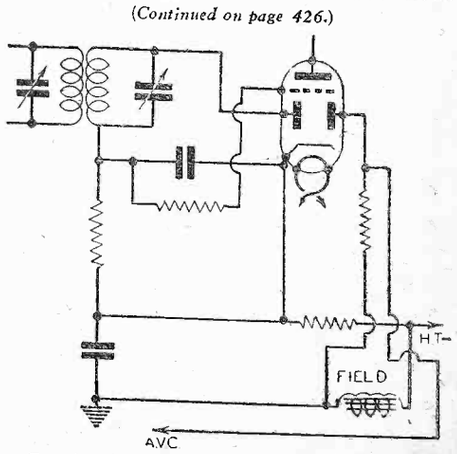



*Fig. 4.—This shows one form of amplified and delayed A.V.C.*

# ON YOUR WAVELENGTH

By Thermion

### A Smirch on the Smiths

A READER, signing himself S. Smith, has dropped a full-size blot on the family escutcheon of that famous name. He has sent me a letter without giving his address. I wish he had done so, because I should have liked to have written him concerning a suggestion he makes. He thinks that we should have a repetition of some of our early sets, such as the Fury Four, brought up to date. Mr. Smith signs himself "A Regular Reader," and he should therefore consult his back issues, where he will find that we have consistently modified our old sets when such has been found necessary owing to lack of components or because more efficient components have become available. He thinks that very few people understand theoretical circuits, that we should abolish them and give only wiring diagrams.

We shall, of course, do nothing of the sort, and if Mr. Smith after all these years is still unable to understand a theoretical diagram, wireless has failed to teach him what it should have taught him. Anyone who has been associated with wireless for more than five years, as he claims to have done, and cannot understand a theoretical diagram, cannot lay claim to be a successful amateur.

### Another Shack

MR. R. G. PERRY, of Bedminster, has sent me a picture of his shack. He tells me that the mains supply is 220 volts, and that the gear consists of two speakers—one Stentorian and one Blue Spot. The power pack delivers 100 mA at 350 volts, with four output tappings. The short-wave set covers 10 to 160 metres. It is transformer-coupled, utilising three transformers. He has two aerials, both facing E.-W. One is 20ft. high and the other 5ft. high. He keeps a supply of PRACTICAL AND AMATEUR WIRELESS and a bundle of data and interesting articles extracted from issues. The shack is 8ft. long by 5ft. wide and 8ft. high, and contains three benches. What about the photograph of your shack?

### Sceptic!

*SPECIAL NOTE.*—A correspondent recently wrote to me asking if I believed the report that a certain doctor can hear wireless signals from outside, without the aid of any apparatus whatsoever. My reply was: I dismiss the suggestion with contumely. Torch does ditto!

Doctor of medicine, skilled in arts profound,
What wondrous powers beneath thy hat are found!
Oh, wonder brain! Dispensing with a set,
Which any programme on the air can swiftly get!
Straight sets or superhets for you are quite redundant;
You just "think-in" and programmes are abundant!
Pray use this gift to aid your healing art.
No longer need we from our domiciles depart,
But stay indoors when weather's cold and airy,
Tapping our summons, "I've pain in Little Mary."
You, being always tuned in, hear our S O S,
And soon are with us per aerial express!
Ah! Heed them not, the sceptics, basely born,
Who at thy powers so rudely scoff and scorn,
And tell the world in language plain and flat
That you're not listening, but "talking through your hat"!
Oh, greedy P.M.G.! the doctor's got you beat;
He needs no licence to hear your programmes bleat!
A "wireless station" you cannot call his hat—
He'd soon demand "What are you getting at?"
He'd look at you in sorrow mixed with pain,
Put on his hat and listen in again!

. . . . . .

Unless, of course, the writer has been gulled;
The "innocents" so often have their legs well pulled.
P'raps, after all, the sceptic critic's right—
We'll still need sets for listening day or night.

### New Photo-Elements of Great Sensitivity

THE Leningrad Physico-Technical Institute has produced a new kind of photo-element of great sensitivity, said to be twenty times more sensitive than ordinary photo-elements.

While the new photo-elements are applicable for a number of purposes, they have so far been used only for the perfection of sound cinematography. The Institute, in conjunction with the "Kinap" (Cinema Apparatus) Works in Leningrad, has turned out a cinema apparatus using the sensitised photo-elements. Excellent results were obtained with the new apparatus when it was tried out at a Leningrad cinema-theatre. The usual noise and crackling was absent in the new photo-elements, due to the fact that they do not require outside electro-motive power, but work by light.

It is said that the new photo-elements will considerably simplify cinema apparatus and lower their cost of production. In the near future ten Leningrad cinemas will be equipped with the new apparatus in order to try them out on a mass scale.

So far the highly-sensitive photo-elements have been produced only at the Physico-Technical Institute, but their mass manufacture is now under consideration.

### Pioneer of Wireless Telegraphy

EVERY schoolboy knows that Marconi was the first to exploit wireless telegraphy and wireless telephony. He did not "invent" it. Many years ago when Marconi made a claim for American royalties in regard to wireless, the claim was rejected by the American courts of law on the ground that the transmission of wireless messages had been made by a Russian scientist named Popov before Marconi achieved his successes. In actual fact, Marconi took out his patent for the transmission of signals by means of electro-magnetic waves a year after Popov had successfully transmitted messages by wireless telephony.

A. S. Popov was born eighty years ago this month, in the Ural province of Russia. In his early years he had a hard struggle, but finally he managed to get to St. Petersburg University. While studying, he had to work to keep himself and his sisters, and during his last year at the University

he became an electrician. Electric lighting had just been introduced into Russia, and he was responsible for its installation in a number of St. Petersburg cafés and restaurants. Next he obtained a teaching post in the mines school of the Russian Baltic Fleet, but he spent all his free time experimenting in the field of wireless transmission. Success came in 1895, when for the first time he transmitted signals by wireless telegraphy. He proposed that the vessels of the Russian fleet should be equipped with the apparatus he had invented, but the Tsarist admirals were contemptuous of the whole idea. Not even when he successfully communicated from the shore to vessels at sea were they convinced.

Despite these rebuffs Popov and his assistant, Rybkin, who to-day is a leading professor in the Soviet Union, continued with their work of perfecting their invention. And on June 10th, 1899, Rybkin invented telephonic apparatus for the reception of spoken wireless messages.

Chance played a great part in focusing attention in Russia on Popov's work. At the end of 1899 a newly-launched Russian battleship set out from Kronstadt on a world cruise. In the Gulf of Finland the vessel ran on to a rock and stuck fast. Kronstadt was over 150 nautical miles from the scene of the diaster, and if the vessel was to be saved, some urgent means of communication was necessary. Popov's experiments were recalled, he was provided with the necessary financial resources for equipping a wireless station, and from that first wireless telegraphy station over four hundred messages were sent out.

Now Popov's work was given its due recognition. He was made an honorary electrical engineer, and an honorary member of the Russian Technical Society. His portrait and that of Rybkin even found their way on to cigarette and confectionery boxes, and their lectures were more popular than concerts given by celebrated singers. But he did not live long to enjoy his success, for he died in 1906. Some of his early apparatus, including several wireless transmitting instruments, are to be seen at the Leningrad Museum of Communications. And on the eightieth anniversary of his birth his work as a pioneer of wireless telegraphy is being fittingly commemorated in the Soviet Union.

### New Two-way Telephone

I AM interested in a new two-way radio telephone just announced by the Western Electric Company for use in police radio cars and fire departments for mobile communication. Because of its remarkable efficiency, they claim that the new equipment promises to extend the protection of short-wave radio telephone to hundreds of communities.

Police officials and technical experts who witnessed trials of the system in New York, Kansas City and other metropolitan centres have commended engineers of Bell Telephone Laboratories on the excellence of the communication. Although these tests were conducted under the most unfavourable conditions likely to be encountered, the voice came through clearly and with good volume.

I understand that two major improvements account for the new instrument's performance. First, its output has been stepped-up to fifteen watts—three times as much power as used previously. Yet almost no increased demand is made on the car's storage battery. This high efficiency is made possible by the introduction of several recently developed circuits including a coupling arrangement which transfers almost 100 per cent. of the energy from the high-frequency valves to the aerial.

The second and equally important improvement, in effect, peels the envelope of noise from around all incoming speech. Three elements in the receiving set combine to achieve this automatically. The first is an electrical network or equaliser which blocks out most electrical interference. Secondly, an improved automatic-volume-control maintains the speech at a constant level. The most interesting innovation, however, is a new type of vacuum tube relay used in the "codan" circuit.

Carrier waves from the distant station actuate this device. In the absence of a signal, the codan shuts off the output of the receiving set. As a result, almost no sound comes through the hand-set receiver or loudspeaker except during periods of transmission. Unwanted sounds, such as ignition noise created by passing motor-cars, or similar forms of electrical disturbance, produce negligible action in the codan.

Thus, in effect, the "voice" of the transmitter is made stronger and the receiving set becomes more sensitive to the voice and the voice only.

The transmitter and receiver are built in the form of two compact units which slide into slotted mounting plates attached to the floor of the car's luggage compartment. This method of installation permits either unit to be interchanged easily between various cars of a fleet or to be quickly removed to the maintenance shop for inspection.

## Notes from the Test Bench

### Battery-Charging

*MANY constructors use metal rectifiers in conjunction with a mains transformer for accumulator charging. An important point to be borne in mind in this connection is the current which is permitted to flow, and therefore an ammeter in series with the accumulator should always be used. Some rectifiers are used with a tapping on the transformer, whilst others are used with a variable series resistance, and care should be taken to follow the rectifier makers' instructions regarding the particular circuit adopted, the accumulator makers' instructions regarding the current used during charging, and the hours during which the cell is allowed to remain on charge.*

### Fuses

*IN view of the valuable protection offered by fuses, they should be more commonly employed in experimental apparatus. It is important, however, to select those which have a suitable rating for the circuit which they are designed to protect. Another point of interest is that, although they offer protection, if too many are included in a piece of apparatus, some difficulty may be experienced when one "blows" due to the difficulty of finding which one has broken down. It may be necessary to make several tests to locate the fault owing to the inclusion of too many fuses and therefore the circuit should be so wired, and an appropriate fuse used, that maximum protection is afforded with the minimum number of fuses.*

### Transmitting Coils

*PLATE or tank coils for transmitters must be wound to high efficiency and in some cases it is recommended that tubular coils be wound—that is, coils in which the windings are made from copper tubing. Whilst $\frac{1}{8}$in. tubing is suitable for small powers, it is sometimes recommended that $\frac{3}{8}$in. or $\frac{1}{4}$in. tubing be employed in the interests of rigidity and large conducting surface. When endeavouring to wind such tubing in a neat coil, bends or even cracking may take place, and therefore some steps should be taken to maintain the round cross-section of the tubing during the winding process. The simplest way of doing this is to fill the tubing with silver sand, plugging the ends so that the sand cannot be forced out. Wind the coil very carefully, easing the turns round the former, and afterwards empty out the sand by removing the plugs and rotating the coil whilst it is held at an angle.*

# CAR-RADIO CONTROLS

## In this Article Constructional Details are Given of Practical Direct and Remote Control Systems for Car-radio

THOSE readers who have made their own car-radio, or who contemplate doing so, may have had some difficulty in arranging the controls, and a suitable scale to indicate the stations.

Most car sets are mounted under the dashboard just over the passenger's feet, and to fix a scale on the front of the set with a volume control and possibly wave-change switch is not easy. Unless a very small speaker is used there is not much room left without making the set casing bigger than need be.

Controls in commercial sets are usually at one end, and flexible cables are used, but having experimented with speedometer cables I found them unsuitable and failed to get anything but a very jumpy movement. To mount an ordinary dial or circular scale on the end of the set means putting it in a place extremely difficult to see.

After trying many ideas, I eventually found two ways of doing the job, both easily made and effective, one being direct control on the set, and the other a form of remote control, the cost in either case being very small.

### Direct Control

To deal with the direct control first, a glance at Fig. 1 will give a general idea of the arrangement.

The controls are at the right-hand side of the set, and the long straight scale has a cut about ⅜in. wide. The open end of the drum is towards the outside, and has a gear wheel, about 1½in. diameter, fixed on the same centre, but about ¼in. from the drum. This is illustrated clearly in Fig. 3.

The gear and the drum are soldered to a piece of tube about 1in. long, with a grub screw to secure it to the condenser spindle,

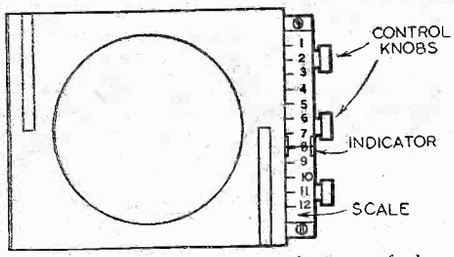



*Fig. 1.—Showing the application of the direct control arrangement to a car-radio.*

a piece of larger tube acting as a distance piece between the drum and the gear.

Four grooved pulleys are provided for the cord to travel over, their positions being shown in Fig. 2 by "BB" and "C.C."

A scale of white celluloid, ½in. wide, is fixed by brackets near to top of the case, and has a piece of tin bent along the bottom and over the top edges to act as indicator (see "A," Fig. 3), a wire soldered on the top making a hair line.

A brass bar pivoted at one end, and with a tension spring at the other, is fitted just clear of the drum, and has a bush in the centre in which revolves a pinion to drive the gear wheel, the arm and tension spring keeping them always in mesh without backlash.

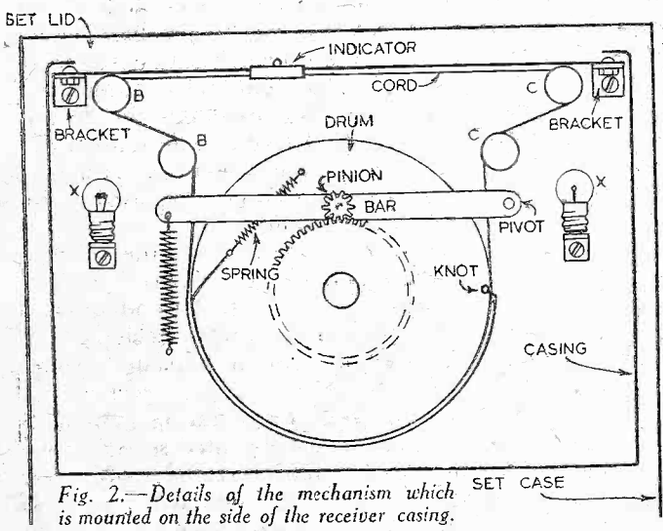



*Fig. 2.—Details of the mechanism which is mounted on the side of the receiver casing.*

### Driving Cord

The indicator is driven by a length of fishing line (20ft. for 3d.), one end having a knot and passing through the drum; it then travels half-way round, over two pulleys and under the scale, over the other two pulleys and round to the reverse side of the drum. This end also passes through a hole and is tied to a tension spring inside the drum. This is necessary to keep the cord tight, otherwise the indicator would jump.

If the indicator is made a very easy fit on the scale, turning the pinion will drive the condenser and the indicator quite smoothly.

The gear and pinion were taken from a clockwork train; clock gears would answer equally well. The pinion needs to be soldered into a piece of ¼-in. brass rod to take a standard knob.

Having got this mechanism fitted up and working, it is only necessary to fit a cover, which is secured by two screws and nuts with distance-pieces; these are not shown in the drawings.

### Illumination

If internal illumination is required, flash-lamp bulb-holders can be fitted where convenient, and wired to the battery leads; if the tuning condenser is not in the centre, then the pulleys may have to be shifted, but this is easy to arrange. The sharp edges round the holes in the drum should be removed, otherwise the cord may cut through.

After several months use the device is thoroughly satisfactory.

The same idea can very well be applied to the home set, by lengthening the cord, a scale being put at the top of the cabinet, similar to some of the latest commercial sets, and no doubt other applications will suggest themselves to readers.

### Remote Control

The other device is a form of remote control by means of two rods, the set being mounted under the dashboard and the control panel screwed to the dashboard itself. The connection between them can be a piece of ¼-in. diameter tube which controls the tuning, and a ⅛-in. diameter rod, running inside the tube, to control volume, and on-off switching. This is quite a neat job and works excellently.

Wave-change switching, if separate from the other controls, is best left for direct operation on the set itself, being only occasionally used.

There are a number of novel points in the design, one being that the set is very easily removed for servicing, leaving the controls on the car. Both tuning-condenser and volume control project at the end of the set, and bevel wheels are used to reverse the motion to right-angles.

The details of the arrangement are given in Fig. 4. The four bevel wheels are mounted on a simple frame consisting of a piece of metal bent to the shape shown at

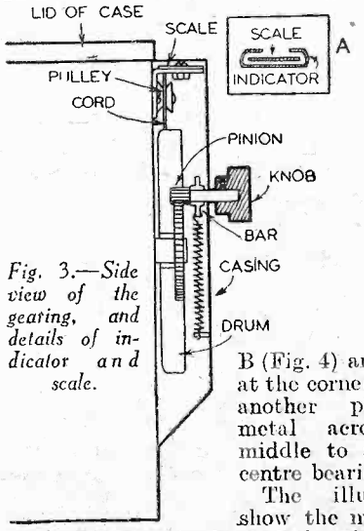



*Fig. 3.—Side view of the gearing, and details of indicator and scale.*

B (Fig. 4) and joined at the corner. It has another piece of metal across the middle to act as a centre bearing.

The illustrations show the method of mounting the wheels, and also the springs to keep them in mesh without backlash. The making and assembling of this fitment is a simple mechanical job. When finished, it is screwed to the box, and the bevel wheel screws tightened to the component spindles. A simple cover finishes this part, which is just a gear box.

*(Continued on next page)*

## CAR-RADIO CONTROLS

(*Continued from previous page.*)

### Control Panel

The control panel is fixed to the dashboard, and everything is mounted on one sheet of metal, a cover on the back enclosing the whole.

A piece of ¼in. diameter tubing long enough to reach from the panel to the tuning condenser is fitted at one end with a disc about 2in. diameter; this should be about ¼in. down the tube.

The panel plate has a ¼in. hole in the centre to take the projecting end of the tube.

This disc is driven by the friction device shown at "C," Fig. 4, and is the usual method used in radio, and needs no description.

After the ¼in. tube complete with disc is put through the hole in the plate a pointer is soldered to the top of it, and travels over a scale stuck on the top of the plate. The whole is covered by a celluloid or glass cover.

In the writer's case an old watchcase was taken, cut in half and soldered to the top of the plate, the cover of the watch, complete with glass, was then clipped on to it in the same way as it was put on to the original watch.

This glass or celluloid cover has a hole in the centre through which protrudes the inner volume control rod, which is fitted with a knob.

By fitting another pointer to this rod before fitting the glass cover it can work on the bottom half of the scale to indicate the volume setting, as shown at A, Fig. 4, and by making the pointers different lengths it would have the appearance of a clock.

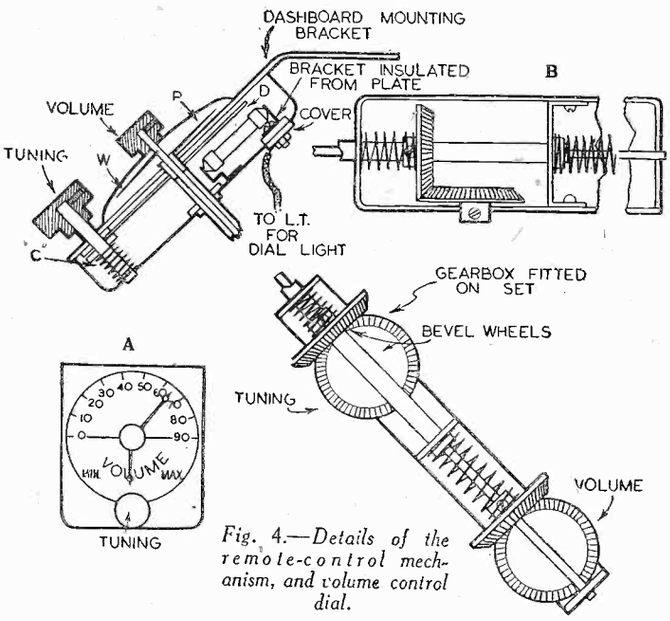



*Fig. 4.—Details of the remote-control mechanism, and volume control dial.*

A metal cover fixed to the underside of the plate encloses the control panel, and a square tobacco tin provides the right size and shape.

If the watch cover to be used has a glass face it would be best to scrap the glass and have a celluloid one fitted by a local watchmaker. Glass can be drilled but it is a very delicate job. Celluloid can be easily drilled.

Should internal illumination be required, drill a ring of small holes about ¼in. diameter just inside the half watchcase and fit a motor-car direction indicator bulb behind the plate; this will be found to provide ample light for tuning in the dark.

The direct control which is in use at the present time cost, apart from knobs, threepence for fishing line to drive the indicator; the pulleys are grooved wheels as used on curtain rails, and can be obtained at any sixpenny store.

The bevel wheels in the other device are taken from a well-known mechanical toy.

A. L. J.

# IMPORTANT BROADCASTS OF THE WEEK

*NATIONAL (261.1 m. and 1,500 m.)*
*Wednesday, July 12th.—Don Pasquale, Act 1, from Glyndebourne.*
*Thursday, July 13th.—Lucky Dip, light entertainment.*
*Friday, July 14th.—French Revolution, feature programme.*
*Saturday, July 15th.—Blackpool Tour, light entertainment.*

*REGIONAL (342.1 m.)*
*Wednesday, July 12th.—Strength of the Land, a programme in praise of the English village.*
*Thursday, July 13th.—Week-end Return, a musical comedy.*
*Friday, July 14th.—Concert Party programme.*
*Saturday, July 15th.—Marseillaise, a play.*

*MIDLAND (296.2 m.)*
*Wednesday, July 12th.—Strength of the Land, a programme in praise of the English village.*
*Thursday, July 13th.—A programme from the Library of St. Michael's College, Tenbury: orchestral and choral music.*
*Friday, July 14th.—A programme of unpublished works by Domenico Scarlatti.*
*Saturday, July 15th.—Choral programme.*

*WELSH (373.1 m.)*
*Wednesday, July 12th.—Choral programme.*
*Thursday, July 13th.—Revue of Summer (A Summary Review).*
*Friday, July 14th.—Silver Screen, a panorama of the early days of the cinema in South Wales.*
*Saturday, July 15th.—A talk by T. Richards.*

*WEST OF ENGLAND (285.7 m.)*
*Wednesday, July 12th.—Variety programme from the stage of the Palace Theatre, Plymouth.*
*Thursday, July 13th.—The Last of the Waterwitch: an account of the last square-rigged merchant vessel to fly the Red Ensign.*

### NORTHERN DIALECT POEMS WANTED

THE B.B.C in the North Region is inviting the public to take part in yet another broadcast programme, though this time the invitation is to writers of Northern dialect poetry. D. G. Bridson, feature programme producer, and himself a poet, is again arranging a programme called "The Northern Muse" — a Dialect Poetry Festival of radio, to be broadcast on the main Northern and the Stagshaw wavelengths on Monday evening, July 31st, between 8 and 8.45. He requires contributions of dialect poems for possible inclusion in this broadcast, and it is hoped that verses will be received from all the counties in the North Region; Yorkshire, Lancashire, Durham, Northumberland, Cumberland, Westmorland, Lincolnshire, Derbyshire, Cheshire, and the Isle of Man.

The poems, which should not take longer than three minutes to read, must be original, though they may have been published. There is no restriction as to subject, but it may be pointed out that in the past humorous recitations have flowed in strongly, whilst little serious poetry, a class of contribution which will be particularly welcomed, has been submitted.

Dialect poems should be sent to the B.B.C., Broadcasting House, Piccadilly, Manchester, 1, marked "Northern Muse."

*Friday, July 14th.—National Swimming Championships of England: a commentary on some of the Finals from the Minehead Swimming Pool.*
*Saturday, July 15th.—Instrumental programme.*

*NORTHERN (449.1 m.)*
*Wednesday, July 12th.—Public Enquiry: Sunday Games and Sunday Cinemas.*
*Thursday, July 13th.—Organ recital from Chester Cathedral.*
*Friday, July 14th.—Reconstruction of the Manorial Court, from Bayte Court, Bridlington.*
*Saturday, July 15th.—Boy Scouts' Sing-Song from Gosforth Park, Newcastle-upon-Tyne.*

*SCOTTISH (391.1 m.)*
*Wednesday, July 12th.—Antrim Days: A reminiscent programme of events in Scotland during the year 1896.*
*Thursday, July 13th.—Strike up the Band! New series—No. 1.*
*Friday, July 14th.—Band programme.*
*Saturday, July 15th.—Orchestral programme.*

*NORTHERN IRELAND (301.1 m.)*
*Wednesday, July 12th.—Dance Music from the Palladium Café and Ballroom, Portrush.*
*Thursday, July 13th.—Triple Bill: Julia Elizabeth, a comedy by James Stephens; Concerning Plate, a play by John Bailie, and Mrs. McAllister reads the News, a sketch by Anna McClure Warnock.*
*Friday, July 14th.—The Second Concert of Ulster Festival Prizewinners.*
*Saturday, July 15th.—Flute and Accordion Bands.*

# An Improved Variable Selectivity Circuit

## The System Described Incorporates a Three-winding I.F. Transformer, with Suitable Switching Arrangements

IT is now the practice in high-fidelity receivers to provide a switch for the purpose of varying the selectivity of the high- or intermediate- frequency circuits, so that when the station being received is very strong, compared with interfering stations, it is possible to make the selectivity of a low order so that the high frequencies in the transmission are not removed by sideband cutting. When weak stations are being received it is necessary to turn the switch to the position of maximum selectivity in order to avoid interference from stations on neighbouring channels. With such receivers it is rather difficult to tune in the required station when the switch is in the non-selective position, due to the flat-topped characteristic of the tuned circuits.

The Radio Corporation of America have designed a very interesting and simple method of avoiding this difficulty. In brief, the method consists in providing a three-winding intermediate-frequency transformer with a suitable switching arrangement for obtaining varying degrees of selectivity, a resistance being connected in series with one of the windings and being so arranged that the resistance is shorted out during the tuning operation by means of a switch operated by the tuning knob so that for all positions of the selectivity switch, a single peak characteristic is obtained thereby making the tuning very accurate.

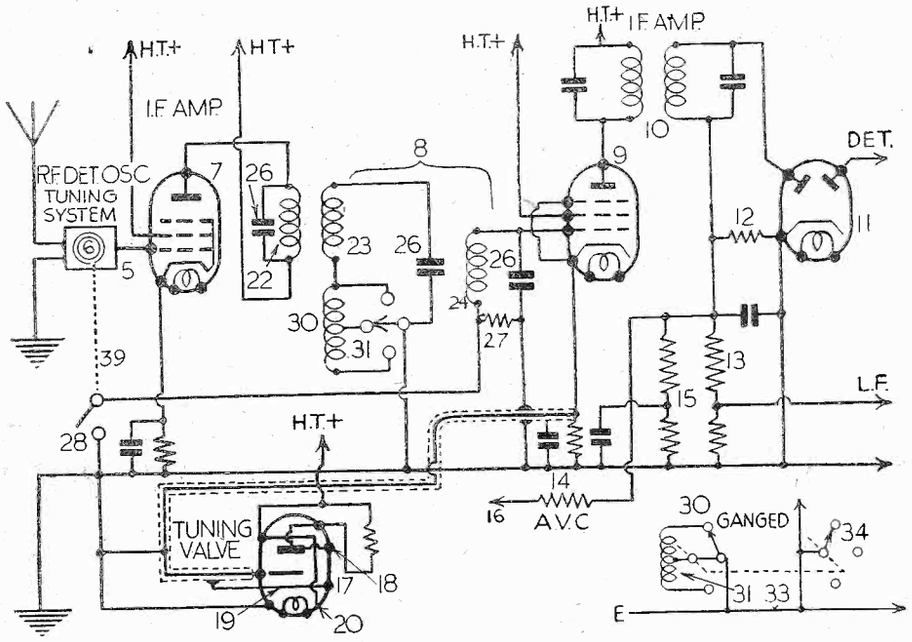



*Fig. 1 (above).—Main circuit details incorporating the selectivity scheme mentioned in this article, and Fig. 4 (right) a modification for switching purposes.*

### Oscillator Tuning System

Referring to Fig. 1, a radio receiving system is shown comprising the usual radio frequency detector, and oscillator tuning system, indicated in the rectangle 5, and provided with a manual or other suitable tuning control element 6. The tuning system supplies intermediate-frequency signals to an intermediate-frequency amplifier tube 7, which is coupled through a coupling network 8 with a second intermediate frequency amplifier tube 9 which, in turn, is coupled through a suitable tuned intermediate frequency output transformer 10 with the second detector 11.

Rectified signals from the detector appear across the output resistor 12, supplied through a resistor network 13, 14, and 15, to a suitable audio-frequency amplifier (not shown), an automatic volume control circuit 16, and a tuning indicator tube 17. The latter is of the cathode-ray grid controlled type, such as an RCA 6E5 valve in which the variable D.C. potential derived from the output resistor 12, in response to signals, controls the potential on a control element 18, which lies in the path of electrons flowing from a cathode 19 onto a fluorescent screen 20. As this type of valve is well known, and represents any suitable tuning indicating device providing an accurate tuning indication, further description is unnecessary.

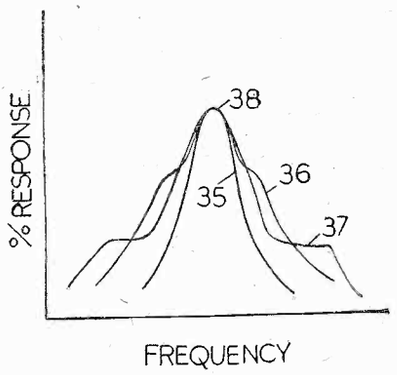
Signals applied to the intermediate frequency amplifier are subjected to the control of the network 8, which imparts to the amplifier a predetermined selectivity characteristic, and is adjustable to provide differing degrees of selectivity in any desired number of steps in each of which a sharp peak may be produced to provide a sharp tuning response.

### Coupling Network

The coupling network is arranged to provide the sharp response or peak referred to for tuning purposes regardless of the selectivity adjustment for normal reception of signals, and comprises a transformer having three windings 22, 23 and 24 arranged in axially parallel relation to each other as indicated, to provide electro-magnetic coupling between the coils or windings 22 and 23 and electro-magnetic coupling between the coils 23 and 24 as indicated. The inductance of each of the windings is adjustable by means of magnetite movable cores and each winding is tuned to substantially the same intermediate frequency by shunt tuning capacitors 26. A resistor 27 connected between the third winding 24 and the tuning capacitor 26 therefore is normally connected in series with the tuned circuit as shown, but may be shorted out by a switch 28 for reasons which will be explained later.

The second winding 23 is connected in circuit with a fourth winding 30, and a switch 31, providing additional electro-magnetic coupling between the circuit including the coil 23 and the first coil 22, the degree of coupling being controlled by the switch 31. In the position shown, the switch 31 is connected to eliminate the winding 30 from the circuit of the second coil 23 and provides two additional coupling steps, including a portion and all of the coil 30 in the circuit with the winding 23 and the shunt capacitor 26, and correspondingly decreased selectivity for the coupling network.

The winding 22 and shunt capacitor 26 provides a tuned output anode circuit for the first amplifier 7 and may be considered as the primary winding of the transformer. The winding 23 and the tuning capacitor 26 together with the winding 30, when in circuit, provides an intermediate secondary or tuned link circuit for transferring energy from the input or primary winding 22 to the output, or tertiary winding 24, which is connected to the grid circuit of the second amplifier 9.



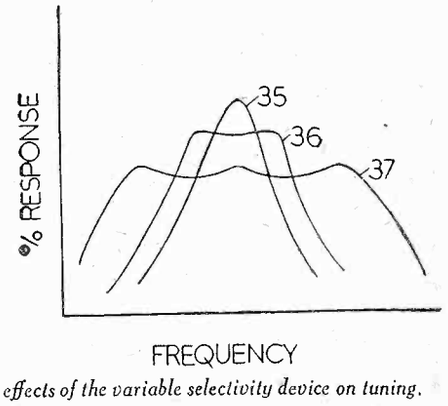




*Fig. 2 (left) and Fig. 3 (right).—Curves showing the effects of the variable selectivity device on tuning.*

(Continued on page 420)

## AN IMPROVED VARIABLE SELECTIVITY CIRCUIT

(*Continued from previous page*)

The transformer arrangement shown is known as a three-circuit intermediate frequency coupling transformer having input, intermediate, and output tuned circuits and additional variable or adjustable coupling between the intermediate and input circuits, and resistance damping for the output circuit co-operating to vary the selectivity characteristic of the network in a pre-determined manner. This characteristic with resistance in the tertiary, or output circuit, is as shown in Fig. 3 by the curves 35, 36 and 37 for three degrees of selectivity as provided by the switch 31, the curve 35 being the response characteristic for the network with the switch 31 in the position shown in the drawing. It will be seen that, except for the curve 35, the response for the two lesser degrees of selectivity is flat topped, and such that an accurate tuning response to a signal tuned in is not possible. It is necessary, ordinarily, to increase the selectivity by reducing the coupling through the switch 31, to provide the response characteristic shown by the curve 35 in order that the tuning indicator valve may indicate accurately an exact resonance with a received signal. By damping the circuit by resistance means, as shown, the desirable response characteristic for signal reception with high fidelity is provided.

### Damping Resistance

As shown in Fig. 3, it has been found that the curves 36 and 37 may be made to assume a sharp peak corresponding to the peak of the curve 35, by controlling the same damping resistance 27 provided in the tertiary circuit for the broad tuning response. For example, when the switch 28 is closed to short circuit the resistor 27 in the tertiary circuit, the response characteristic assumes the peaked form shown in Fig. 2 for the three degrees of selectivity shown by the curves 35, 36 and 37. It will be seen that all of the curves have a peak characteristic 38 providing sharp tuning indication at resonance without necessitating changing the selectivity characteristic of the interstage network by operation of the switch 31.

The switch 28 may be a simple single-point switch which may be moved to the closed position for tuning, by a suitable connection with the tuning control element 6 as indicated by the dotted line 39 in Fig. 1. The intermediate circuit is earthed, and the resistor 27 is short-circuited by earthing the resistor at the opposite end through a single circuit connection 30. With this arrangement, the resistor 27 is momentarily shorted out during the tuning operation to provide the sharp tuning response, and the overall selectivity adjustment remains unchanged in whatever position it is adjusted for. The response is then restored to normal as shown in Fig. 3 upon releasing the tuning control element by causing the switch 28 to open.

The coupling network shown may be applied between other amplifier stages in a similar manner, the single coupling network being shown in the present example in order to simplify the drawing and the description.

Referring to Fig. 4, along with the preceding figures, the circuit of Fig. 1 may be modified as indicated, to provide a switch 34 corresponding to the switch 31 in the number of contacts or operating positions, and conjointly controllable therewith to connect the lead 33 to earth for the position of the switch 31 corresponding to the highest degree of selectivity.

This arrangement, in effect, is the same as permanently closing the switch 28, and making it unnecessary to operate the switch 28 when tuning, when the highest degree of selectivity is desired. This is possible for the reason that the curve 35 in Fig. 3 is only slightly broader than the same curve in Fig. 2, thereby providing substantially the same fidelity.

While three degrees of selectivity are provided in the system shown, additional contacts may be provided with suitable connections to coupling windings in the coil 30 to increase the number of steps in the selectivity adjustment. Where a greater number than that shown are provided in the circuit, it is desirable to utilise the circuit of Fig. 4 for the most selective position of the control switch, in order to eliminate the necessity for actuating the switch 28 when manually tuning for distant stations.

# Leaves from a Short-wave Log

### Good Signals from Costa Rica

ON a recent evening a broadcast from TIEM, San José (Costa Rica), was logged on 29.87 m. (10.042 mc/s). The call was: *La Voz de Alma America*, and the interval signal heard consisted of four chimes struck every 15 minutes. TIPG, *La Voz de la Victor*, in the same city, which could not be traced on its habitual channel, was finally found to be working on 31. 21m. (9.612 mc/s).

### Another Mystery Station

ON many evenings a station of which the exact location is kept secret may be heard broadcasting in several European languages on 29.88 m. (10.04 mc/s). The purport of its broadcasts is anti-Soviet propaganda.

### Athlone Logged in U.S.A.

EXCELLENT reception is reported from various parts of the U.S.A. of transmissions from Radio Eireann (Moydrum), on 16.82 m. (17.84 mc/s). The station broadcasts a news bulletin in the English language nightly at B.S.T. 22.30.

### First German Radio Relay from Steamer

THE Munich transmitter recently carried out an interesting experiment with a small motor-launch on Lake Constance. The motor-boat *Allgau* when crossing the lake broadcast a two hours' concert by means of a small 40-watt installation. The signals were picked up on a receiver at Lindau, conveyed by landline to the 100-kilowatt Munich transmitter and thence re-diffused.

### International Concert No. 7

THE *Union International de Radio-diffusion* has made all arrangements with the Brazilian broadcasting authorities for the transmission of a special radio programme of international interest to take place in the spring of 1940. The broadcast will be relayed to stations in North, South and Central America and to most of the important European transmitters.

### Another Shanghai Broadcaster

A CORRESPONDENT writes that he has picked up a broadcast news bulletin in English emanating from a new Shanghai (China) station on 11.81 mc/s (25.4 m.). The call-sign, he believes, was XVOK. This would appear to be the 18-kilowatt transmitter registered in official lists as XGBC on 11.801 mc/s (25.42 m.).

### Short-wave Stations of Honduras

OF the three short-wavers in the Republic of Honduras (Central America), HRN, in the capital city, Tegucigalpa, is the best heard. The station works on 51.06 m. (5.875 mc/s) with a power of 500 watts, the call being *La Voz de Honduras*. HRD2, *La Voz de Atlandida*, at the port of La Ceiba on the Atlantic coast, operates on 48.12 m. (6.235 mc/s), 250 watts. The broadcasts open with a marimba foxtrot, *Solo Tuyo*, and close down with that popular melody, Ted Lewis' *Good Night*. At San Pedro Sula there is also a small 100-watt transmitter HRP1, *El Eco de Honduras*, on 47.24 m. (6.351 mc/s), but it does not appear to have been heard in the British Isles. The distance between Honduras and London is roughly 5,000 miles.

## C.E.A. EXHIBITION

EACH year the Cinematograph Exhibitors' Association holds an exhibition and conference at a well-known holiday resort, and all the latest developments in cinema equipment are featured. This year is no exception to the rule, and with Blackpool chosen as the venue for activities a preview was arranged on the Sunday so that any projectionists who are normally employed during week days could have an opportunity of examining the exhibits. The only big-screen television receiver to be shown was the Baird set on the Gaumont British stand. This is the latest form of the twin cathode-ray tube projector as installed at the New Victoria Cinema, London, and scheduled for a number of other cinemas within the London service area. It incorporates certain improvements in design when compared with the earlier big-screen models, but still employs the cathode-ray tube whose screen is obliquely scanned and whose front surface brilliance is projected directly on to the 15ft. by 12ft. silver screen. The latest form of lens is 12½ins. in diameter, having an f/2 aperture. This is made by Taylor, Taylor Hobson, who at the C.E.A. exhibition made a special feature of the construction on their stand. Bearing in mind the attitude of the C.E.A. and K.R.S. to television in general it will be interesting to learn later what were the nature of the discussions that took place on this vital topic.

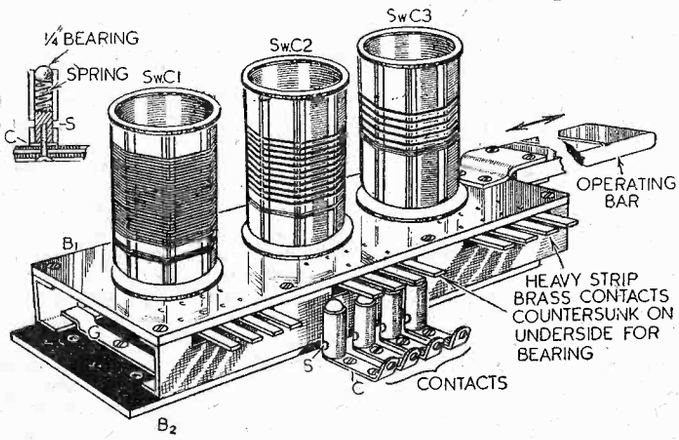
# A PAGE OF PRACTICAL HINTS

SUBMIT YOUR IDEA — READERS WRINKLES — THE HALF-GUINEA PAGE

## A Novel Coil Switching Unit

WISHING to incorporate a new short-wave receiver in a cabinet on its completion, and in view of the fact that I am using plug-in coils, I decided to try my hand at constructing a switching unit in which the three plug-in coils could be permanently fitted. The accompanying illustration shows the scheme adopted, and from this it will be observed that a minimum of wiring results, whilst to reduce the tendency of contact noises, the bearing movement has a continually self-cleaning action on the brass contact segments.

The three coil-holders are mounted first of all on an ebonite base (B1), which is drilled and tapped for the contact pieces at equidistant points relative to each coil. This base is fitted to the aluminium (16 gauge) runners by 6B.A. bolts and nuts, whilst for the push-pull control I have cleated a strip of ebonite, previously buffed down, the cleats being easily made from some odd brass pieces handy at the time.




*A coil switching unit to avoid coil changing.*

To ensure a smooth action in the push-pull control, I then mounted another ebonite base (B2), this time directly on the wooden baseboard of the receiver, thus by bending three aluminium strips to act as guides (G)—one of which is clearly depicted—the completed coil chassis or unit would freely slide from one position to the other when wave-changing, whilst white lines made in the control bar indicate the exact position of the switching.

The inset diagram shows the construction of the four bearing contacts which are wired to the receiver, and there are one or two points here which need enlarging. A reasonably light spring is used under each ball bearing so that when the last contact in each instance is passed, the bearing will not spring out of the brass tube, and for the same reason, and to allow the tension of the spring to be such that a good contact (electrically) is obtained, the bearing in each assembly is well recessed.

A hole drilled through each tube is provided so that the brass plug, which is tapped for the baseboard mounting screw, may be finally soldered in; this is depicted by (S).—E. R. ADAMSON (Smethwick).

### *THAT DODGE OF YOURS!*

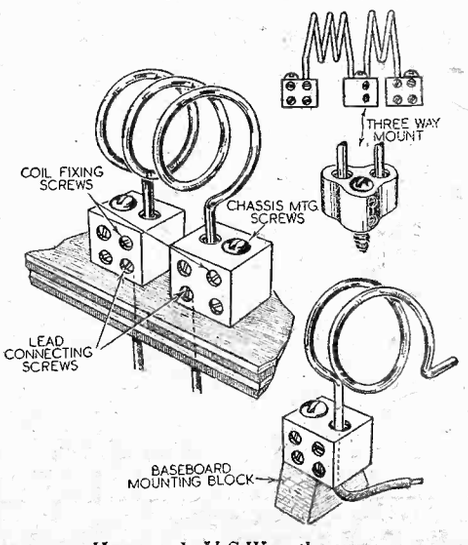
**Every Reader of "PRACTICAL AND AMATEUR WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay £1-10-0 for the best wrinkle submitted, and for every other item published on this page we will pay half-a-guinea. Turn that idea of yours to account by sending it in to us addressed to the Editor, "PRACTICAL AND AMATEUR WIRELESS," George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Put your name and address on every item. Please note that every notion sent in must be original. Mark envelopes "Radio Wrinkles." DO NOT enclose Queries with your wrinkles.**

**SPECIAL NOTICE**

**All wrinkles in future must be accompanied by the coupon cut from page iii of cover.**

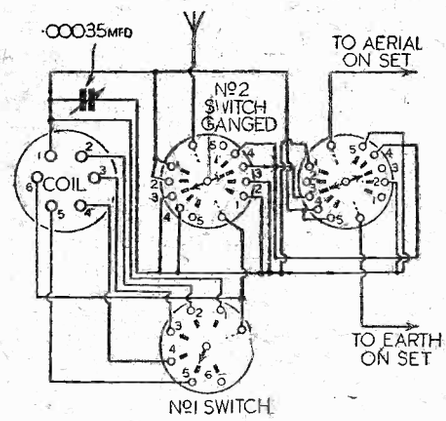
## U.S.W. Coil Mounts

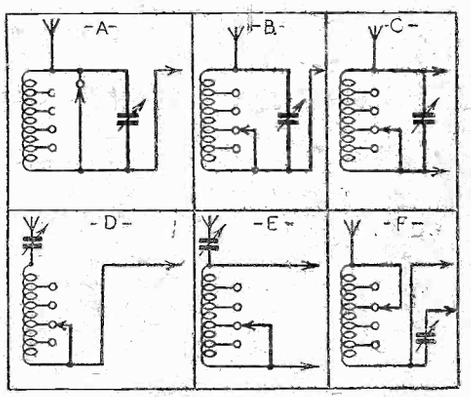
THE accompanying diagrams show an improved and cheap form of mounting for ultra-short-wave coils. It will be seen that porcelain cable connectors are used. This form of mounting besides being cheaper is, I have found, very versatile in its application. It can be used in many varying situations, both for chassis and for baseboard work. Also, the changing of inductances, and leads to the inductances, is an easy matter, as is the coupling of one coil to another.




*Home-made U.S.W. coil mounts*

The diagrams show several ways in which this form of mounting can be used.—J. SEARS (Potters Bar).




*Connections and circuit combinations which are possible with Mr. Marchant's 6-in-1 wave-trap suggestion.*

## A 6-in-1 Wave-trap

THIS "six-in-one" wave-trap is very compact, and is useful for eliminating code and other interference, and increases range, selectivity and volume. The two six-prong coils, which cover from approximately 20 megacycles to 465 kilocycles, are wound as follows:

Coil 1.—150 turns of 28 gauge enamelled wire close wound and tapped at every thirtieth turn.

Coil 2.—30 turns of 20 D.C.C. tapped at every sixth turn and space wound to cover approximately 2ins.

Switch No. 2 is a two-gang unit having four separate circuits, each circuit consisting of five contacts. Switch No. 1 is a single unit.—E. C. V. Marchant (S.E.26).

# TELEVISION SERVICE AREA MAP

## A Valuable Guide for the Listener, Service Man, or Dealer who is Interested in the Present Television Transmissions

AS announced last week, the Radio Manufacturers' Association have prepared a map showing clearly the area of reliable reception which is served by the present television transmitter at the Alexandra Palace in North London. The map, which is printed on good stout paper, measures approximately 31in. by 28in., and below we give a reproduction showing some of the more important places which are included in the area. The original map gives many more place-names, but these have been deleted so that the reproduction would be legible. It will be seen that there are two shaded areas, the outer light area denoting the limit of reliable reception, and the inner small dark areas outlining places where difficulties have been experienced due to particular local conditions.

The circular rings are indications of 10-mile steps from the transmitter, and it will be seen that the original estimate of 25 miles as a reliable distance for reception has been considerably exceeded. On the other hand, at only 10 miles in a south-westerly direction—at Brentford—an area of indifferent reception is met.

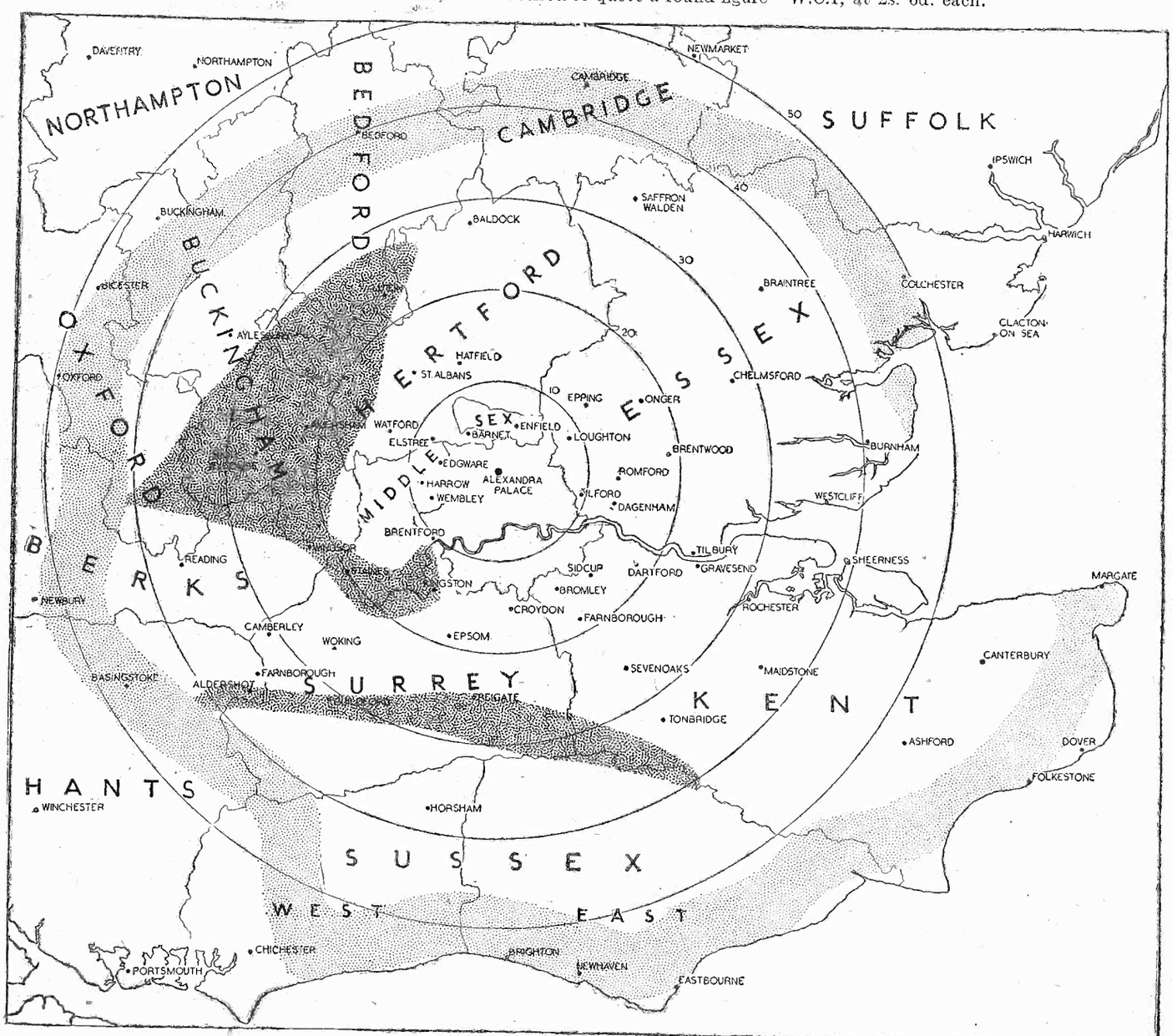
### What It Shows

The R.M.A. make the following observations regarding this map, which, as already mentioned, will enable dealers to prove to their customers that they are definitely in a reliable area or to otherwise provide convincing sales talk. It also enables those who are at present doubtful regarding the value of television to see whether or not they should take advantage of the existing programmes. "It proves that, if it is desired to quote a round figure for the effective radius of the television station, a figure of 40 miles can safely be used.

"Areas where reception may be unsatisfactory due to local characteristics are indicated in a distinctive colour in order to assist dealers in explaining the circumstances to potential customers, who, although within the outer boundary of the map, live in a house, road or district where the signal is not satisfactory.

"It is, of course, impossible to lay down a hard-and-fast line between the area where reception is satisfactory, and that where it is unsatisfactory, so the outer boundary has been indicated by a broad shading covering an area roughly five miles wide."

Copies of this map are available from the R.M.A. at 59, Russell Square, London, W.C.1, at 2s. 6d. each.




*A reproduction of the R.M.A. Television Service Map. The original map shows many more place-names, these having been deleted on the above map for clarity.*

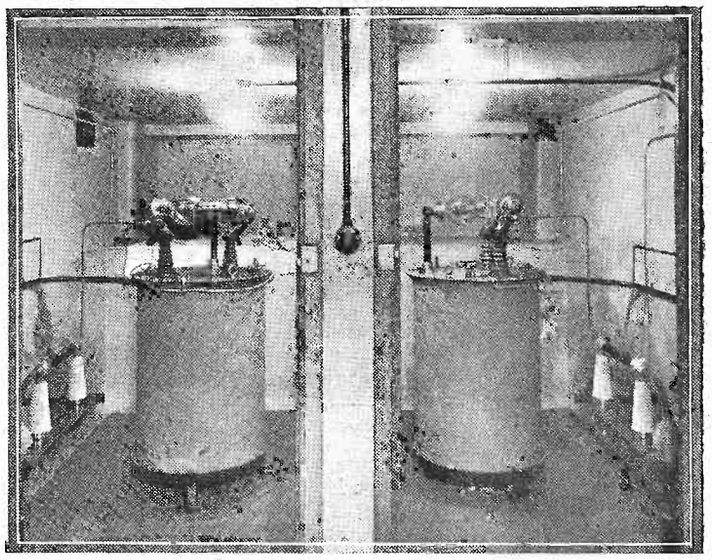

July 15th, 1939. Vol. 4. No. 160.

## More Teething Troubles

SOME of the television teething troubles which America is experiencing after two months of experimental transmissions furnished by one company are due directly to antagonism from cinema interests. The supply of standard talking films does not appear to be forthcoming at the moment, with the result that the technicians have turned their attention to the design of film transmitting equipment capable of using 16 m.m. films. Judging from American reports it would seem that if the film distributor companies could visualise a really lucrative rental market for their films they would not be averse to a measure of co-operation with television interests, but their greatest fear is associated with the reaction of the exhibitor to the adoption of such a policy. It is for this reason that the Hays Television Committee is content at the moment to hold a watching brief in the hope that any commercial developments which do materialise will be satisfactory to both sides. It is not yet known whether the use of 16 m.m. film has occurred to the B.B.C. as a way out of the impasse which exists in this country. If not, then the possibilities should be explored, for there is no doubt that carefully-selected films form an admirable alternative in television programmes, and English-speaking films are to be preferred to continental ones with English sub-titles. There is no doubt that certain film interests show willingness for co-operation, and quite recently the Paramount Company, who have acquired a major interest in the Du Mont Television Laboratories, stated that in their opinion television contains no threat to motion pictures. They incline to the belief that it will afford a new outlet for the brains and genius of the picture industry, be an adjunct to the film business and not a competitor, and in the big towns and cities provide a new source of theatre revenue through the medium of big screen installations.

## Spontaneous Appreciation

IF any further evidence was required of the value of outside broadcasts in connection with big screen television presentation in cinemas, this was readily forthcoming on the occasion of the return of Their Majesties after visiting North America recently. At each of the five London cinemas where equipment was installed, large audiences had assembled for the actual broadcast from 5.15 p.m. to 6.15 p.m. In spite of an overcast sky the two B.B.C. outside broadcast units at Waterloo Station and Buckingham Palace provided some really excellent pictures, although from time to time defects were apparent. With one camera horizontal bands moved up and down the picture, and this was apparently due to synchronising pulses actually becoming superimposed on the vision modulation. With another camera a large dark area was prominent, but as this usually coincided with the sky it introduced no prime difficulty. The spontaneous applause rendered by the audience when the King and Queen arrived and were seen by television on the big screens, however, was a gratifying indication of the way in which the audience appreciated that this was an actuality transmission and they were participating in a scene the intimacy of which was only made possible by this latest of inventions. When the scene was faded over to Buckingham Palace, not only did the powerful 20in. telephoto lens fitted to one of the super Emitrons give a memorable close-up of the Royal Family on the balcony, but also sections of the crowd which unwittingly provided humour for the occasion. The whole production was carried out in a first class manner and calls for praise to those responsible for the organisation. With reference to the actual equipment employed in the cinemas the accompanying illustration is interesting, for it shows the dual high tension units as installed for the Baird apparatus at the Marble Arch Pavilion. Safety catches on the doors prevent the E.H.T. cubicles from being entered, while the electrical supply is alive, and each unit is capable of furnishing a current of 10 milliamperes at 60,000 volts for full output. Technical data concerning this part of the equipment was furnished in a recent issue of PRACTICAL AND AMATEUR WIRELESS, and all L.C.C. regulations have been complied with to ensure that the installation is foolproof.



*The Baird E.H.T. unit in duplicate as installed in the Marble Arch Pavilion.*

## A Deaf Aid

ON more than one occasion these columns have recorded news items where the value of television reception has been brought to the fore as a deaf aid. In those cases where any affliction of the hearing is present the person concerned is, as a rule, an expert reader of the lip language. The televised pictures as shown on a good quality home receiver, especially with close ups, enable a deaf viewer to enjoy programmes denied him by ordinary broadcast radio. It appears however, that this is regarded as a *new discovery* by America and accounts have already appeared in the press showing how this opens up a new vista. One particular aspect which was stressed was the value of an internal television system in those business houses where members of the staff are deaf. Visual telephonic conversations could then be undertaken and so avoid the necessity for writing messages or using an intermediary as interpreter.

## Where Is That Report?

THE Postmaster-General is still receiving deputations from bodies whose interests are allied to television in one form or another. The last one presented the case for the retailer, and since all branches of the country were represented, there is little doubt that once more the P.M.G. was urged to give immediate attention to provincial television. A three-year plan was suggested whereby an 85 per cent. national coverage would materialise by the end of 1942. While promising to give full weight to representations made to him, Major Tryon brought out the stock reply that he was waiting for the Television Advisory Committee's report. Why this irritating and annoying delay should be necessary on so vital an issue is beyond the comprehension of all those who have the development interests of television at heart. The television home receiver market will depend on the Post Office recommendations and with Olympia fast approaching, manufacturers are naturally very concerned, because of their inability to settle the question of production numbers. Then, again, the cinema industry is vitally concerned, for as was said the other day after the rediffusion of the arrival home of Their Majesties, the trade is keeping abreast and featuring news of public importance, but it, as yet, has no idea of the extent of its relationship to television for the future. News reels were televised and rediffused during the time which elapsed between the departure from Waterloo and the arrival at Buckingham Palace, but what sort of copyright situation was involved by this procedure? The Director of Television speaks of difficulties with the film companies, theatrical managers, artists and so on; in fact, everyone is anticipating a settlement of at least the major problems as a result of the very lengthy and tedious deliberations of the Advisory Committee. Apart from any question of entertainment, employment will be affected, export problems settled; in fact, the whole gamut of indecisions hinge on this one report and still the industry has to wait. The only saving grace is to hope that when eventually made public, the recommendations will be found worth waiting for.


**Peculiar Results are Often Obtained when Tuning the P.A. Stage, and Unless the Operator Knows what Indications to Expect, Serious Losses will be Introduced. The Question of Neutralisation is also Dealt with in this Article. By L. O. Sparks.**

BEFORE discussing neutralising the P.A. stage it becomes necessary to devote a few lines to the question of tuning a power amplifier, as many A.A. licence holders appear to be rather uncertain concerning the correct procedure and what visual indications should be expected.

The first thing to remember—and this can be applied to all stages in a transmitter—is that it is far easier to take simple precautions, when experimenting or carrying out adjustments, to protect the valve against excessive anode current than to have to replace it with a new one. For example, in a P.A. stage, the anode current of a valve under normal operating conditions usually associated with such circuits can be greatly in excess of its rated current when the full anode voltage is applied, and the circuits are not tuned to resonance or the grid circuit suitably biased or loaded. This, therefore, necessitates watchfulness on the part of the operator, and it is always advisable to reduce the value of the anode voltage supply when the time comes for it to be applied.

## Procedure

We will assume that the stage has been properly neutralised, if this happens to be necessary with the valve in use, and that the apparatus is ready for tuning.

The preceding stage, usually referred to as the "driver," must be tuned for maximum output *before any H.T. voltage* is applied to the *anode circuit of the P.A. valve*. The maximum output of the *driver* can be determined by the simple loop-lamp method, but bearing in mind the adjustments which have to follow, it is more satisfactory if the arrangements given below are employed. It was mentioned in the article in the issue of last week how grid current flows in the grid return circuit of a P.A. valve, and it should be noted that if the value of the grid current is measured it will give a very satisfactory indication of the power of the drive applied to the grid circuit. To do this it is necessary to connect in series with the grid return circuit, i.e. the source of bias, a suitable milliammeter to register the current, and it will be found that the more *powerful the drive* the *higher* will be the *grid current reading*.

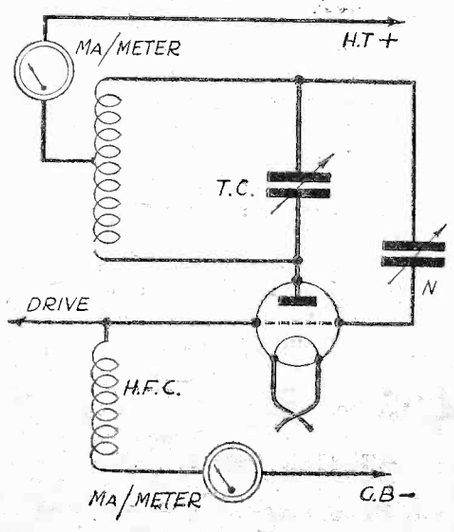



*Fig. 1.—A normal neutralised P.A. stage showing where meters should be fitted for preliminary tuning.*

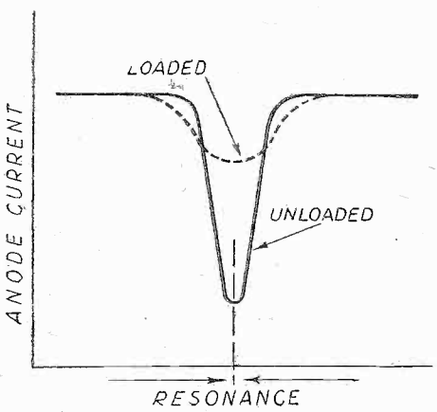



*Fig. 2.—A typical anode current curve of a P.A. Note variation when load is applied.*

With the meter in position and the driver tuned for maximum output, the coupling between the two stages should be completed and the current reading noted. A simple adjustment of the driver tuning will show that, due to the application of the coupling, the tuning has been thrown slightly off the maximum setting, so—and bear this point in mind—for any and every experiment made with the coupling always remember to re-tune the driver to resonance.

## Re-tuning

At this stage adjustments must be carried out to determine the most satisfactory degree or form of coupling to be used for maximum excitation of the P.A. grid circuit. The grid-current meter will prove most valuable in such instances as direct observations can be made. The re-tuning business does not apply only to the driver valve *if* the grid circuit of the P.A. is of the tuned type, as it will be equally essential to tune that section as well after each adjustment.

Don't carry out these preliminary, though very important, operations as quickly as possible, but take ample time to note all the effects produced and try to reason out for yourself the whys and wherefores of the various results obtained. When all is to your satisfaction, a *reduced* anode voltage can be applied, not forgetting to include, in series with it, a suitable milliammeter to register the total anode current of the P.A. valve. The essential requirements are shown in Fig. 1.

The anode tank circuit can now be tuned to resonance and, owing to the possibility of high current readings as mentioned above, this should be carried out as quickly as possible. When the circuit is brought into resonance with the drive, the anode current will fall *very* suddenly and then rise again, equally as quickly, when the tuning point is passed. The drop or dip in the anode current can be taken as a very rough guide to the efficiency of the stage, but as this can be dependent on other factors than the drive only, too much faith should not be placed on that method. As a general approximation, it can be assumed that the drop in the anode current should be in the neighbourhood of 15% to 20% of the *rated* current consumption of the valve in use. Checks can be applied to the P.A. anode circuit by using the loop-lamp test to indicate the amount of R.F. present in that section.

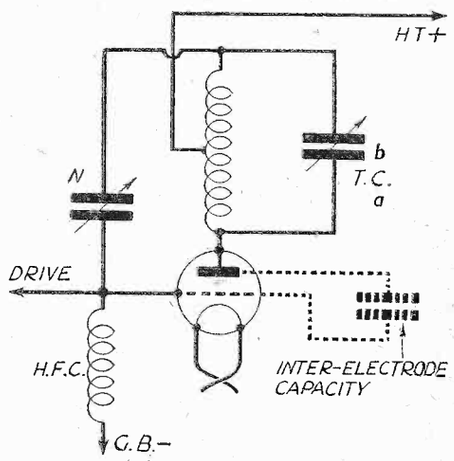



*Fig. 3.—Showing how a neutralising condenser is fitted to nullify the inter-electrode capacity.*

## Applying the Load

The next thing to do is to apply the load to the tank of the P.A. anode, and whether the load is in the form of an artificial or radiating aerial, the procedure is practically identical.

As soon as the load is connected, the anode current meter will indicate an *increase* in current above the maximum *dip* value, and if the tank tuning is varied slightly either side of the resonance point, it will be noticed that variations in current are not so sharply defined as when the stage is unloaded. A typical curve is shown in Fig. 2.

As in the case of the coupling between the driver and the power amplifier, it will

(Continued on page 427)

# Impressions on the Wax

## A REVIEW OF THE LATEST GRAMOPHONE RECORDS

BENIAMINO GIGLI, now the highest paid singer in the world, sings two favourite Italian songs from his concert repertoire—"Aprile" (April) and "Notte d'amour" (Night of Love) on *H.M.V. DB* 3815. Gigli made this record at the H.M.V. studios at St. John's Wood during his recent visit to sing at Covent Garden.

"Because" and "For You Alone" had a great attraction for Caruso, who made records of both of them, and now, many years after, Webster Booth, the English operatic tenor, has recorded both of these songs on *H.M.V. B* 8920.

Two other famous singers, Paul Robeson and Peter Dawson, have also made new recordings this month. Paul Robeson, who during his recent visit to Russia was greatly attracted by the Russian folk songs, sings one of them—"Night," in Russian and English, on *H.M.V. B* 8918. On the reverse he sings William Blake's "The Little Black Boy."

Peter Dawson chooses an old favourite, "Somewhere a Voice is Calling," for his latest, and couples it with "Just for To-day." The organ accompaniment for the former song is most effective.—*H.M.V. B* 8919.

Records by the Kentucky Minstrels are generally in demand, and there have been numerous requests for some of the Plantation Songs introduced into their earlier programmes. Most of these are short and just the thing for the tuneful medley they have now made on *H.M.V. BD* 707.

### Orchestral

SCHUMANN'S "Symphony No. 4 in D Minor," which still figures in symphony concert programmes, has been recorded by the London Symphony Orchestra, conducted by Bruno Walter, on *H.M.V. DB* 3793-5.

"The Dance of the Seven Veils" is a powerful piece of work, and when the opera "Salome" was first produced in 1905, it greatly shocked opera-goers of that day. It demands a big orchestra and therefore has been recorded by the Dresden State Opera Orchestra on *H.M.V. DB* 4639. The orchestra is conducted by Karl Bohm, one of Richard Strauss's most intimate friends. Strauss, by the way, recently attained his 75th birthday.

Short and most delightful is Constant Lambert's conducting of the Sadler's Wells Orchestra in the Ballet "Les Patineurs" (The Skaters), which will find great favour. The music is mostly taken from Meyerbeer's Opera "L'Etoile du Nord."—*H.M.V. C* 3105.

### Aldershot Tattoo

RECORDS that will be in demand are those just released of the Aldershot Tattoo. It has been recorded on three double-sided 10in. records, *H.M.V. B* 8921-3.

Dick Todd, the Canadian singer, who made his debut on H.M.V. last month, has recorded a new song by Hoagy Carmichael called "I Get Along Without You Very Well Except Sometimes." Coupled with this is "You're the Only Star in My Blue Heaven."—*H.M.V. BD* 719.

America's Radio Sweetheart, Kate Smith, sings "Don't Worry 'Bout Me," from the World's Fair edition of the famous Cotton Club Parade, and "And the Angels Sing," on *H.M.V. BD* 718, while two other records of note are "Deanna Durbin Memories" on *H.M.V. BD* 711, and a medley of hits from the Astaire-Rogers picturisation of "The Story of Vernon and Irene Castle," on *H.M.V. BD* 721.

### Swing Music

ARTIE SHAW has recorded "Prosschai" and his own "Non-stop Flight" on *H.M.V. B* 8925, whilst Benny Goodman has recorded "Rose of Washington" and "And the Angels Sing" on *H.M.V. B* 8926.

This month H.M.V. have revived "Dardanella" and "Sugar," by Paul Whiteman and his orchestra. These ten-year-old masterpieces feature some of the most brilliant solos ever recorded by Bix Beiderbecke, the genius of the trumpet, whose career was so tragically cut short by death a short while after these records were made.—*H.M.V. B* 8931.

There is a story behind the Frankie Newton record of "Romping" and "Who" on *H.M.V. B* 8927. Some months ago, Hughes Panassie, the French jazz critic, went to America to arrange a series of special recordings for H.M.V. This was Panassie's first visit, and his knowledge of jazz had been obtained entirely from records. Before he went, he had mentally assembled a series of ideal compositions. These he put into practice with quite remarkable results. No restrictions were placed on the musicians, who were given *carte blanche* to play just as they felt. This, the first record to be released, is as fine an example of pure jazz as one could wish for. The uninitiated may find them a little difficult at first but after a while it will be seen how perfectly the different improvised parts (there was not a note written down in advance) dovetail together.

### Decca

ALEXANDER BOROWSKY presents another Bach Piano Concerto arranged by Busoni. It is the delightful concerto in F Minor—a very short work but very complete—*Decca LY* 6154. Bach is represented again by an entirely new orchestral arrangement by Alois Melichar of the ever popular D Minor Toccata and Fugue—*Decca LY* 6162.

Then there is the first appearance on records in England of the Stross String Quartet, who give an excellent performance of the Beethoven String Quartet in A Major, Opus 18, No. 5—*Decca LY* 6165-7.

# NOTES FROM THE TRADE

## New Drydex Battery

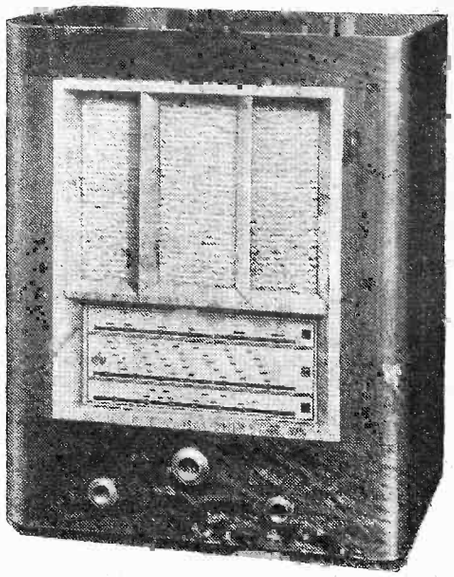
THE Chloride Electrical Storage Company announce a further L.T. battery for use in the new all-dry battery portable radio receivers. This is a 1.5 volt battery, fitted with a socket for 2-pin plug, and it measures 3⅞in. by 2⅝in. by 5¼in. The type No. is H.1161 and the price is 3s. 9d.

## New G.E.C. Receivers

THE General Electric Company announce a further range of 5-valve receivers, consisting of an A.C., an A.C./D.C., and a battery model—to be known as the 4040 series. In each case the circuit is a two-band superhet with A.V.C. and large power output. The wave-ranges are 192 to 550 and 1,000 to 2,000 metres. Tuning is by push-button as well as manual. There are six buttons which may be adjusted for selecting any six stations on the long or medium bands. Immediately the button is depressed the required station is brought into tune, whilst the "thermometer" indicator on the tuning dial rises or falls to the name of the selected station. Tone control and volume controls are provided in addition to the wavechange and tuning controls. The A.C. and A.C./D.C. models are rated to deliver 4 watts output. All three receivers are housed in a similar moulded cabinet measuring 19¾in. by 11¼in. by 9½in., this being adequate, in the case of the battery model, to accommodate the standard 120 volt H.T. battery and a 60 aH accumulator. The A.C. model costs 8½ guineas, the A.C./D.C. model, 9 guineas, and the battery model, £7 19s. 6d.—less batteries.

## Pilot New Model

PILOT RADIO announce the first of the new season's models—a 4-valve battery all-wave superhet. This has been designed to give to owners of homes without electricity a selection of stations equal to those provided for the mains user. It incorporates a new economic range of Mazda battery valves which, due to their low consumption, increase the life of the H.T. and L.T. batteries by approximately 50 per cent. Special precautions have been taken to ensure that the receiver will give an adequate performance even when the battery has run as low as 40 volts. Three wavebands are covered—16.5 to 51, 190 to 580, and 850 to 2,100 metres. The circuit incorporates a frequency-changer, I.F. stage, second detector and A.V.C. by means of a double-diode-triode and an output power pentode. Provision has been made for an extension speaker and an internal speaker silencing switch is fitted. The speaker is an 8in. permanent-magnet moving-coil model, and the tuning scale is calibrated with station names and wavelengths. The overall size is 17in. by 14in. by 9in. and there is ample battery space. No grid bias battery is required as the circuit incorporates an auto-bias arrangement. The H.T. consumption is rated at less than 10 mA and the accumulator consumption at .5 amps. The price, exclusive of batteries, is 9 guineas and hire purchase terms are, of course, available.



*The new Pilot Model B-34.*

## A.V.C. ELABORATIONS

*(Continued from page 414.)*

through resistance R11 and produces in it a voltage drop, which in turn increases the negative bias on the second valve. The resistance R10 serves as a grid-leak resistance, whilst R12 supplies the normal grid bias of the second valve.

When the signal on the diode detector is weak, the negative bias of the double-diode-triode is low, and consequently the anode current of this valve is high. As a result, there is a large voltage drop in R11 and the anode current of the EF6 becomes blocked—the loudspeaker being therefore silent. When the signal has risen to a certain value, the anode current of the double-diode-triode is zero, and there is no longer a voltage-drop in R11. The EF6 then gives normal amplification and the receiver reproduces the signal. In this circuit the automatic volume control is effected by means of the diode D1. As the cathode of the double-diode-triode receives a positive voltage from the potential divided R6-R7, the A.V.C. does not come into action until the peak value of the signal on the diode exceeds the voltage at the tapping point.

The values to be selected for resistances R6 and R7 will naturally depend upon the delay voltage required. As a rule the delay voltage and the resistance R11 are given such values that quiescence is put out of action the moment the A.V.C. begins to operate, otherwise the signal on D2 would not rise with the rapidity necessary for sudden elimination of quiescence.

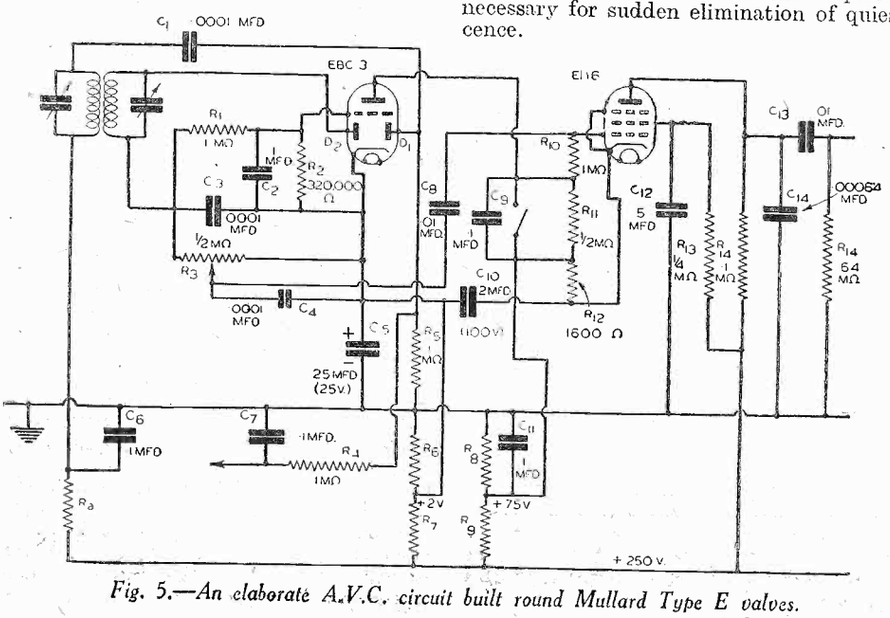



*Fig. 5.—An elaborate A.V.C. circuit built round Mullard Type E valves.*

## 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.*

**A. C. B. (Glasgow).** The idea is not novel and we have published articles on the subject in previous issues. We regret, therefore, that we should not be interested in further details of this type of receiver.

**E. S. (Birmingham).** The amplifier is one which amplifies at low-frequency, that is, after rectification. Signals are, of course, sent out at radio or high frequency. Full details concerning the licence may be obtained from the Engineer in Chief, Radio Section, G.P.O., Armour House, E.C.1.

**C. A. B. (S.E.18).** Our "Wireless Constructor's Encyclopædia" is exactly the book you need. The price is 5s. or 5s. 6d. by post from these offices.

**B. D. (Anglesey).** We regret that we are unable to recommend any firm for the type of apparatus mentioned. It does not appear to be marketed in this country.

**A. R. (Blackheath).** Write to the Westinghouse Brake and Signal Co., Ltd., at 82, York Way, King's Cross, London, N.1.

**F. C. (W.4).** The unit may be defective, or you may be over running it. Write to the makers or suppliers giving full details of your installation.

**N. L. (Co. Tyrone).** We regret that we are unable to supply a wiring diagram or any other details of the receiver in question.

**E. J. F. (Co. Wexford).** The new valve may have totally different characteristics. You give no type numbers and therefore we cannot give definite advice.

**R. B. (Belfast).** The issue in question would not help you. The tuning indicator should be fed from the A.V.C. circuit, that is, from one of the diodes of the double-diode valve fitted to your set. The valve is joined to H.T. in the usual way and the grid fed from the A.V.C. line. The makers' instructional sheet will give appropriate coupling and decoupling values.

**F. B. (Beckenham).** We can only suggest that owing to an oversight your letter has been overlooked. Write to the firm again and give full particulars. The holiday period may have resulted in short staff which has caused the omission.

**C. H. S. (Brentwood).** It should be quite possible to add the record player, but we have no details of your set and therefore suggest you write to the makers for confirmation.

# 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.**

### SLOUGH AND DISTRICT SHORT-WAVE CLUB

**Headquarters:** 35, High Street, Slough, Bucks.
**Secretary:** K. A. Sly, 16, Buckland Avenue, Slough, Bucks.
**Meetings:** Alternate Thursdays at 7.30 p.m.

AT the last meeting, held on June 22nd, the chief item was an extended period of morse practice, during which the more experienced members, among them G6PR and G3XH, went slowly for the benefit of the members who are beginning their study of the code. Progress has been marked among these newcomers to morse and many are developing into expert senders. Following this a discussion on conditions took place, during which G6PR gave an account of the DX which he had been working during the past fortnight. It was decided that a regular feature at our meetings should be a period devoted to members' difficulties. It was also decided to purchase a call-book for the use of members.

The agenda for the next meeting includes a talk by Mr. J. Paine (G6PR) on "Arranging and operating a portable station for National Field-day." A discussion will also take place on plans for a club field-day. The usual items, such as morse practice (slow and fast), and discussion on conditions, will also take place.

New members are always welcome to any of our meetings, and they will have a good opportunity of learning morse, or, if they already know it, to improve their speed.

### EASTBOURNE AND DISTRICT RADIO SOCIETY

**Hon. Secretary:** T. G. R. Dowsett, 48, Grove Road, Eastbourne, Sussex.

AT the society's meeting, held last Tuesday, Mr. S. M. Thorne, A.M.I.R.E., gave a demonstration on valve characteristics. Valve curves were plotted, and some of the very early types of valves gave some unusual curves. The kink in the screened grid valve was also demonstrated.

Full information for joining the society can be had from the hon. secretary.

### INTERNATIONAL SHORT-WAVE CLUB (LONDON)

**European and Colonial Representative:** Arthur E. Bear, 100, Adams Gardens Estate, London, S.E.16.

MEMBERS of the International Short-wave Club (London Chapter) who attended at the R.A.C.S. Hall, Cavendish Grove, Wandsworth Road, S.W.8, on the evening of Friday, June 30th, listened with great interest to the lecture on "H.F. Insulators," which was delivered by Mr. N. Westcombe. Mr. Westcombe illustrated his lecture with lantern slides and cathode-ray oscillograph experiments. He explained in great detail the remarkable developments that had been made in insulating materials in recent years and also described the special ceramic materials Tempa S, Calit, Conda F, Conda C, and Conda N, which are used as dielectrics. The most comprehensive display of insulators, condensers and kindred components were on view. The members agreed that this was one of the best "shows" ever staged at a meeting of the I.S.W.C.

### BRITISH SOUND RECORDING ASSOCIATION

**Hon. General Sec.:** F. J. Chinn, 14, Tirlemont Road, South Croydon.

ON Tuesday evening, June 20th, a party of members visited the new H.M.V. personal recording studio at 363, Oxford Street, W.1. They were received by the recordist, Mr. E. G. Huntley, whose friendly and charming manner soon put the party in a receptive mood to appreciate the high standard of quality which this service achieves.

After inspecting the studio, which has a claimed reverberation period of one second and which contains two microphones of the RCA inductor (dynamic) type, a grand piano and an H.M.V. reproducer, the members adjourned to the recording room, with the exception of Mr. W. Corderoy, an accomplished singer, who remained to supply the necessary material for recording. "Where'er You Walk" was well rendered and recorded with fidelity by the compact equipment. Surprise was expressed by several members that the swarf thread from the E.M.I. cellulose-acetate blanks could be successfully removed by means of a suction pipe. The ingenious lay-out of the recording room enables the recordist to see both the actual performance and the volume level indicator (dB. calibrated), whilst he is attending to the cutting.

### SALE AND DISTRICT RADIO SOCIETY

**Headquarters:** St. Mary's Schools, Barkers Lane, Sale, near Manchester.
**Secretary:** S. C. O. Allen (2FCQ), 31, Ennerdale Drive, Sale.
**Meetings:** Held weekly at 7.30 p.m.

THE question of providing extended morse practice facilities was discussed at some length by members of the society, on Thursday, June 29th. Eventually it was decided to split the present practice period into two parts. One class, for beginners in morse, will be from 7.30 p.m. to 8 p.m. each Thursday; from 8 p.m. until the business meeting commences at 8.30 p.m. the code will be sent out at a higher speed for more advanced members. Tentative arrangements were made to give morse practice by radio from station G5UP on Wednesday evenings at 9 p.m. The frequency is 1,915 kilocycles. A telephony announcement will precede the morse practice.

### ASHTON AND DISTRICT AMATEUR RADIO SOCIETY

**New Clubroom:** 17a, Oldham Road (nr. Free Library).
**Secretary:** K. Gooding (G3PM), 7, Broadbent Avenue, Ashton-under-Lyne, Lancs.

MEMBERS are very busy getting the new clubroom at the above address ready for the coming session and gear is being installed. G6DV has been scouting around and obtained chairs, benches, and a stove at less than bargain prices! The next job is to erect an antenna for the club receiver which is now being built. The annual general meeting was held on the 28th ult., when the following officials were elected to hold office for the next 12 months: President, J. Partington (G5PX); Chairman, W. P. Green; Secretary, K. Gooding (G3PM); Assistant Secretary, S. Wild (2BBV); Treasurer, J. Cropper (G3BY); Librarian, H. Hattersley; Morse Instructor, F. Bottom (G3FF).

In future meetings will be held *every* Wednesday, with business meetings once a month.

### BRADFORD SHORT-WAVE CLUB

**Headquarters:** 1, Fernlehurst Buildings, Baildon Road, Baildon.
**Secretary:** G. Walker, 33, Napier Road, Thornbury, Bradford, Yorks.
**Meetings:** Every Friday 8 p.m. Sundays 11 a.m.

THE above club has now established itself at the new headquarters, and transmissions have been carried out with success. The place is ideally situated for the erection of antennæ, and experiments have been carried out with one or two types, of different dimensions.

One or two nights during the week, the club is open although these are not regular. Wednesday being the most used as there is a morse class that attends for practice on this particular night.

The club is open to anyone interested in short-wave and amateur radio, and the secretary will be only too pleased to furnish any particulars of the club and its activities.

### RADIO, PHYSICAL AND TELEVISION SOCIETY

**Hon. Sec.:** C. W. Edmans, 15, Cambridge Road, North Harrow, Middlesex.

DURING the past two months the society has not been particularly active. Several more members have now obtained artificial-aerial transmitting licences, whilst others have been promoted from the artificial-aerial to the full-licence category. One member has been fortunate enough to have been granted a full licence without having to serve a probationary period with an artificial-aerial.

Field days have in the past proved extremely popular. This year the society's field day will be held towards the end of August, in the Dorking district, as in the past. Two meetings will be held before the appointed date to make arrangements and for the testing and adjusting of apparatus. It may be possible for a few non-members to partake in this field day. Readers interested but who are not members of the society should make application to the hon. secretary as early as possible. Members will, of course, receive notification by post.

### PINNER AND DISTRICT RADIO AND TELEVISION SOCIETY

THE above society has just been formed with headquarters at 419, Station Parade, Rayners Lane, Pinner. Members number 13, and although 12 are licensed transmitters, membership is open to anyone interested in short-wave radio or television. Subscriptions 2s. 6d. per year. The committee, consisting of G2MC, G3QK, G3NO, G3SM and G2KA, met on June 30th and have in hand plans for a successful first meeting to be held shortly. Particulars from sec., J. F. A. Lavender, G2KA, 53, Ivy Close, South Harrow.

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## TRANSMITTING TOPICS

(*Continued from page 424*)

be found necessary to re-tune the P.A. tank circuit when the load is applied and every time any adjustment is made as regards its degree of coupling, and in this direction an artificial aerial which embodies a small lamp will be most useful to determine conditions to produce maximum power output.

### Neutralising

We have seen that instability is likely to be produced in a P.A. stage when a triode or poorly-screened multi-electrode valve is used, owing to the feed-back introduced by the inter-electrode capacity of the valve and the fact that the anode and grid circuits are tuned to the same frequency. Fortunately, there is a very easy way of nullifying the source of feed-back though, unfortunately, the actual operation is not always so easy as the method.

The simplest way of understanding the cure for the trouble is to have some idea of its cause; therefore, the following brief description will, it is hoped, not appear superfluous. Radio-frequency potentials exist on the grid and anode electrodes of the valve under consideration. If some of the R.F. voltages are fed back from the anode to the grid, excitation will take place and the valve will simply act as a self-excited oscillator.

Once these oscillations start, they will continue until some means are adopted to reduce or *counteract* the feed-back causing the trouble. If the circuit shown in Fig. 3 is examined, it will be seen that the anode tank coil receives its H.T. supply through a centre-tapping point. This circuit, incidentally, is only one method of obtaining neutralisation, and it is the small variable condenser marked N which interests us at the moment.

When the valve is in operation, fluctuating voltages appear across the tank tuning condenser and, by virtue of the fact that they are of a high-frequency alternating nature, the two sections of the condenser are alternately positive and negative. When "a" is positive "b" will be negative and so on *ad lib.* We have agreed that the feed-back is due to the capacity between anode and grid which, in turn, is provided by the capacity caused by the electrodes in the valve itself. Taking this a step farther and examining Fig. 3, it will be obvious that through employing the small variable condenser N, *each end* of the *tank coil* is virtually connected to the grid. At first glance it might be thought that the provision of a second path for the transference of energy from anode to grid would make matters very much worse. It would do, if it were not for the fact mentioned above about the plates of the condenser T.C. being at opposite potentials at any given instant. Through this, the grid receives an impulse via the inter-electrode capacity having, shall we say, a positive potential *but* at the same instant it also receives one from N having an opposite potential, namely, negative, therefore, if the two supplies are equal in strength but opposite in nature, then they will cancel out and the grid will no longer be affected. The balance is obtained by using a variable condenser for N, the actual capacity of which is, of course, very small, and not usually larger than the inter-electrode capacity of the valve.

*Criticism, Chat and Comment*

# The Promenade Concerts, 1939

## Our Music Critic Reviews the General Scenes and Performances of London's Great Musical Show

WHILST you and I are wending our ways seaward and contemplating our annual absence from the toils of the office and the crowded platform waiting for the 8.45, the powers at Broadcasting House which feed us with our musical nourishment go on a sort of half-time. Beethoven and Bach give way to the beach and the brine, and the sporting commentaries—when the rain is not falling—are considered more seasonable fare than symphonies or quartets.

All very rational, sensible and summerish. But one man at least will see to it that those to whom the Eroica and the Jupiter Symphonies are essential items on the Bill of fare, wherever they may be, shall not go hungry. For the 45th season of Promenade Concerts will be commencing shortly under the direction of Sir Henry Wood, who must be surely music's "chef en chef." For many years one of the most famous and familiar figures in London life, Sir Henry, whether now at home or away, is thinking of those packed and sultry nights in Queen's Hall which he will shortly be called upon to face again, and we can be certain that he, at any rate, is not wholly idle or unmindful of our appetites.

### Looking Back

In order to appreciate best what a really amazing service of concerts these "Proms" have been one would do best to cast one's mind back to the first year of their existence. We should have seen hansom cabs and "growlers" driving up to Queen's Hall, from which would emerge quaintly dressed ladies wearing puffed sleeves and showing dresses which could only be swelled out by voluminous petticoats, accompanied by gentlemen with "mutton chop" whiskers and "bowlers" like split peas on top of their heads.

A motor-car had recently been driven down the Brighton Road at twelve miles an hour, but it was one of the eccentricities of the age and no such freak was to be seen in Regent Street.

When the people arrived inside the Hall and opened their programmes, they found that Mr. Grieg's "Peer Gynt" suite or Tschaikowsky's "Casse Noisette" was being given its first performance, together with works by Sullivan, German, Saint-Saëns, Balfe or Wallace, etc., etc.

My! How the scene has changed! No less than the character of the concerts. To-day we get double, triple and quadruple concertos of Bach as the centre-piece of two hours of his music. All the Beethoven and Brahms symphonies and concertos, whole acts from Wagner's music dramas, as well as the most abstruse works of Elgar and Delius, Hindemith and Honneger, Bax and Bartok.

The Bach, Beethoven, Brahms and Wagner nights are invariably "sold out" and the queues for the Promenade begin to form up in Riding House Street shortly after tea. Whilst on the night they perform the "Ninth Symphony" the crowds in the street cause a dislocation of traffic which the unthinking fail to associate with such an "exclusive," "la-di-da" thing as music.

The "boon and blessing" that these concerts are to the vast music-loving public, to whom the "symphony concert" is inaccessible alike through its hour and its prices, is indeed beyond the power of most pens to adequately record. They are literally nectar and ambrosia to practically all who attend them.

*Mr. Maurice Reeve, our Music Critic.*

### Broadcasting's Aid

At first it was thought that Broadcasting would "kill" them and it was a long time before the managers of the day would agree to the relay of any part of a Promenade Concert. The "last season of Promenade Concerts" was, indeed, actually announced. But, happily, the reverse of this has been the case and broadcasting has acted as a stimulant rather than an antidote.

Not only are they attended by as big and as enthusiastic crowds as ever but multitudes all over the country hear what would otherwise have been a closed book to them.

The personal element in the music is as much wanted as ever, and no doubt the trim beard and red carnation of Paul Klenowsky is chiefly responsible for this. Attending the Promenade Concerts is a task which should not be undertaken lightly. It is quite herculean in reality and not for the weak or the faint-hearted. On a hot August night, for a Beethoven or Wagner programme, the promenaders form a packed mass from stage to back wall. A friend six paces away is as unapproachable as the skies. A thirsty mortal "called to the bar" finds his return to the body of the Hall impossible and the remainder of the programme lost behind closed doors.

On such a night more than once can a subdued shuffling sound be heard at the back underneath the Grand Circle. The novice at these concerts begins to "shush" and look round indignantly for the boorish heathen who does not worship yet at the shrine. But the experienced promenader knows the reason well enough: it is a fainting case being skilfully passed over the heads of the crowd by the St. John Ambulance attendants, several of whom are present every evening. But the atmosphere of the "Proms" is more than half their charm; as with everything else that has become established in our affection as well as in our lives. They have a very exciting and exhilarating one, and nobody but the most hard-boiled can fail to be swept into their whirl. Gentlemen, do not hesitate to take off your coats if you feel you have mistakenly strayed into a Turkish bath instead of a concert hall.

Ladies, if you care to arrive early enough there is one row of chairs (which cost twelve shillings each and are designated stalls in the afternoons) round the back of the hall and under the platform towards which you can make a rush as soon as you are admitted to the promenade.

### High Quality Standards

Playing such huge programmes every night for six or eight weeks, in addition to rehearsals and much other work, would be thought sufficient for the stoutest heart to flinch at just occasionally.

But neither Sir Henry nor any of his colleagues have yet been known to "slack" or to fall short of their best for one moment. They are "at it" all the time and their achievement is amazing. 45 years is a long time, and the more so when we remember that Sir Henry is still on the right side of seventy. Few people do not know that he has been in continuous charge of the Concerts from the very beginning, and that their evolution from a more or less light musical entertainment to symphony concerts of the very highest standard is due to him more than to any one man. No wonder that he and the "Proms" are an institution and are now looked upon as part of the Londoner's World with the Tower and the Abbey. Anything affecting their welfare and their continued health and prosperity would be deemed as important as the safe keeping of those other landmarks.

Having entered their fifth decade they may correctly be termed an inheritance.

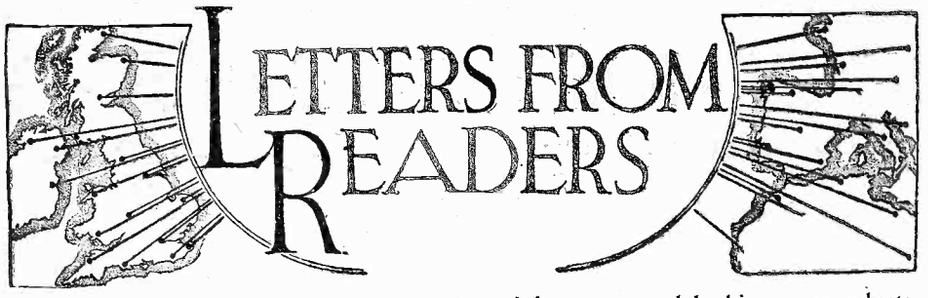
To those of my readers who have not met Sir Henry on the rostrum at the Proms I would beg them to do so at the earliest possible moment. A personal visit should be arranged wherever possible. But as they are accessible to all of us without having to stir from our chairs it would seem rather inexcusable to delay the introduction much longer.

The programmes are arranged with the utmost skill so that one man's meat is entirely separated from another's poison.

If Bach and Brahms on Wednesdays are too much for Jack and Jill, Saturdays are bound to offer them the delights of Tschaikowsky, Dvorak, Rossini or the latest novelties in modern music.

Furthermore, all the finest instrumental concertos are done, as well as the choicest operatic arias and scenes, by the leading instrumentalists and singers.

Let us conclude by raising a glass to the Proms, Sir Henry, and all that they stand for in the musical life of the country and of London in particular.




**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).**

## A Helping Hand

SIR,—Since snobbery appears to be the prevalent fashion among some present-day radio amateurs, beginners in wireless often find themselves severely handicapped in their efforts through not having anyone to help them with their problems.

I should therefore be very pleased to give help and advice to anybody who cares to write or call on me; local SWL's will be especially welcome.

Incidentally, it may interest you to know that I have made many radio-minded friends through the medium of letters appearing in PRACTICAL AND AMATEUR WIRELESS.—PATRICK WHITTLE, G-2AOW, 32, Burleigh Gardens, Southgate, London, N.14.

## Short-wave Difficulties

SIR,—With regard to the "10 and 20 metre receiver" described in your last issue, I should like to make one or two remarks, which, while not intended to underrate the excellence of the design, might be of help to constructors who experience difficulty with the receiver.

Firstly, a common trouble with short-wave receivers is inability to obtain oscillation. On this particular receiver it would be quite probable that, if the brackets connecting the coil to the condenser were removed, oscillation might be obtained as the size of these pieces of metal might affect the ease with which the valve oscillates.

Secondly, the use of transformer coupling with an H.F. pentode type valve very often leads to loss of volume. Unless a special transformer is used a high-impedance choke or high-resistance capacity method should be used. I have found a doubling of volume by using a high-inductance choke to match up to the high impedance of the S.G. valve.

Thirdly and lastly, I have found that a battery valve is exceedingly difficult to get going in an electron-coupled detector circuit due to the necessity of efficient filament choking. You stated in your article that a battery receiver could be built up on exactly similar lines.

I trust that this letter will be regarded as a piece of constructive criticism and not as an attempt to heap scorn on the heads of your no doubt highly efficient engineers.—GERALD R. W. LEWIS (Cheltenham).

## Reception from "Mauretania"

SIR,—On reading my PRACTICAL AND AMATEUR WIRELESS this week, dated July 1st, 1939, I failed to see any report from short-wave listeners regarding reception from the *Mauretania*. I therefore enclose my log for June 18th, 1939.

At 9.45 p.m. B.S.T. I logged Rugby, my reading being 34.3 metres. This station was in communication with the *Mauretania*, testing transmission, the announcement being, "Hello, *Mauretania*, Hello, GCTF." At 10.00 p.m. Rugby instructed *Mauretania* to "go ahead." I then tuned lower down to 33.6 (my reading) and the "Maurie" came on. This was a broadcast to America. The following people spoke. Sir Percy Bates, Capt. Brown, Dr. Bryan and the commentator was an American. Reception was very good, coming in at about R8. Only slight fading was experienced and reception was very clear. There was nothing of any real radio interest in this broadcase, i.e., any comments heard regarding reception between the Rugby operator and the wireless operator on board the "Maurie." Reception was on loudspeaker and broadcast finished at approx. 10.25 p.m. B.S.T. My receiver is a late 1937 Ferranti 3-valve All-Wave Superhet, with an output of from 3-4 watts. My aerial is an inverted L type, 45ft. long and 30ft. high.—C. C. Ibbotson (Liverpool 9).

## "English Hours"

SIR,—I would be extremely grateful if you would bring this programme radiated by the National Broadcasting Company to the notice of your readers.

It is called the "English Hours" and is radiated daily at 5 p.m. to 7 p.m., B.S.T., on the following wavelengths and frequencies.

CUT THIS OUT EACH WEEK

### Do you know

**—THAT the 14 to 20 metre band is the most suitable for listening at all times at this part of the year.**

**—THAT the resistances used for supplying the S.G. voltage of some valves should be selected to pass a much greater current than the valve itself.**

**—THAT some modern multi-electrode valves may be used in unorthodox circuits with quite good results.**

**—THAT a typical instance of the above is a standard Class B valve used in a reflex circuit.**

**—THAT thermal-delay switches are not normally required when an indirectly-heated rectifying valve is employed.**

**—THAT in many cases an earth connection is undesirable for short-wave reception, although a lot depends upon the circuit design.**

*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.*



W3XL, New York N.Y.—17,780 kc/s, 16.87 metres.

W8XK, Pittsburgh, Pa.—15,210 kc/s, 19.72 metres.

Comments on these programmes will be gratefully acknowledged and reception reports verified by: Richard A. Thomas, The English Hours, National Broadcasting Co., R.C.A. Building, Radio City, New York, N.Y.—JAMES T. BLACKWOOD, Radio G3TG (S.E.24).

## Correspondents and Card Exchanges

SIR,—As a regular reader of PRACTICAL AND AMATEUR WIRELESS I would be very pleased to hear from readers in all parts of the world who would like to correspond with me. I promise to answer every letter. Wishing PRACTICAL AND AMATEUR WIRELESS every success.—PETER F. ILIFFE, 22, Firfield Avenue, Birstall, Leicester.

SIR,—I have noticed recently several letters offering exchange of QSL cards, published in your paper.

I should be greatly obliged if you would publish this letter saying that I will willingly exchange QSL cards with any S.W. enthusiast at home or abroad.—R. M. OWEN, G5RB, 14, Watermead Road, Bromley Road, Catford, S.E.6.

SIR,—I have been a reader of your excellent journal for some years, and have found it of great assistance.

I wonder if you could put me in touch with any "AA" or "full ticket" fans in Leicester, as I shall be moving to that town on Sunday, July 1st.

My address will be 6, Normanton Road, Leicester, and any communications should be addressed to me there.

I am 17 years of age, and have held an AA ticket since May, '38.—L. SMEE (2DVT).

SIR,—If any of your overseas readers, or any other readers, would care to exchange QSL cards I would be very much obliged.

I am very pleased to see more "Transmitting Topics" in your pages as the series in 1938 was very very interesting, and most helpful.—JOHN R. TYZACK, 197, South Eldon Street, South Shields, Co. Durham.

## A 20-metre Log

SIR,—I have been a reader of PRACTICAL AND AMATEUR WIRELESS for three months now, and I find that it gives much help to a novice like myself. I have been "tinkering about" with crystal sets for the past two years, but only took radio up seriously two months ago.

I take much interest in other readers' logs and here are some 20m. stations logged in the last week.

F3WT, 3BO, 3PB; FAQD; PK4GW; LX1AJ; EI7M; CK1AF; I1SG; SM6F, 7MU, 5NM, 6J5, 5KB; FM4JG, MG; LY1S; SJM4; KA1CS; GK2AGJ; W2XAY; ZE1JZ, B2B, S1T; VS72A; OZ5Q; LA5A; FA2P; HA9CZ; F8VZ; W1AKY; FURAF; HA8Q; BS7OA; SV1CE; FV1CA; W4DXY; CT1OR; W1BLO; I1SM, RI; FQ5BO; ZCRB; and FU2 (Cairo), also 24 G stations.

The set is a 5-valve superhet, with an antenna 75ft. long, 25ft. high, running S.E.-N.W. All listening done round about 6 p.m.

I would like to correspond with a reader of about my own age (thirteen years) interested in short-wave experimenting etc.—LEWIS J. MAY 38, Eastwood Road, Cannon Hill, Birmingham, 12.

# "On With the Show"

## The Popular Seasonal Production which is Presented at the North Pier, Blackpool, and from which Extracts will be given During the Summer in the Radio Programme

LAST year, when a fire wrecked the 14th and most lavish edition of "On With the Show," at the North Pier Pavilion, Blackpool, the master showman-songsmith happened to pass a fortune-teller's.

"You've suffered a big reverse," she told Lawrence Wright, "but you're big enough to rise above it. The trial will make you stronger, more determined. Next year will be the most successful year of your life."

And 1939 does indeed find L. W. on top of the world. His famous song-publishing business thrives on a host of big hits—many of which are incorporated in this year's Blackpool show—and the 15th edition of "On With The Show," rising Phœnix-like from the ashes, is the biggest production ever.

This year, with the B.B.C. relaying fifty-six seaside shows, there has been hot competition for all-star bills, and Lawrence Wright romps past the post with a terrific radio bill starring Tessa Deane, Sutherland Felce, Bram Martin, Lance Fairfax, Wheeler and Wilson, Frank Randle, Anita Martell, the Marquis Trio, Barbara Wood, 17 Terry's Juveniles, and The Chorus of Health and Beauty Girls—as big a line-up as you'll find at any No. 1 Music-hall!

Lawrence Wright—alias Horatio Nichols—works on the principle that nothing is too good for Blackpool. Blackpool is the North, and the North is the synonym of entertainment. He personally hand-picks the artistes, and this year the shrewd showman (who launched his first show while in the R.N.A.S. during the War, in partnership with his barracks bed-neighbour Sydney Howard!) surpasses all his expansive gifts to showland.

How this showman goes talent-spotting is displayed in the signing of Wheeler and Wilson.

Wright went to meet a friend in Birmingham last Christmas. While there, with time to kill, he visited the panto starring George Robey. In it he saw Wheeler and Wilson. He nearly "rolled in the aisles" at their antics. Forgetting all about his friend, he spent the rest of the night signing Wheeler and Wilson for three Blackpool seasons!

Incidentally, Wheeler and Wilson made such a hit in their first B.B.C. music-hall, John Sharman signed them to broadcast on the following Saturday, a unique honour. They are father and son. Jimmy Wheeler was studying to be a scientist, but quitted the laboratory to join his father, Ernie Wilson, veteran variety trouper, in a double-act.

Lawrence Wright has invested this year's show with the essence of Youth.

### "Youth Takes a Bow"

One of the sensations of the 1939 "On With The Show" is a 15-year-old girl, only just left school, who forms the feminine part of the entirely original adagio-act, The Marquis Trio, fresh from triumphs at the Grosvenor, Dorchester, Mayfair, and other London night-spots.

Barbara Wood, the show's all-round girl, is a "prodigy." As a child her doctor ordered her to take up dancing for her health. At 11, she won the 50-guinea Blackpool Trophy and 19 medals for singing and dancing. At 13, she broadcast from St. George's Hall. At 15, she was Britain's youngest principal-girl in Leeds panto. Ere quitting the 'teens, she was a Midland Regional radio star, and performed before Queen Mary, Queen Maud of Norway, and other Royal personages.

Topical in these days of Keep Fit and lithe girlhood are the Health and Beauty Girls, personally picked by Lawrence Wright from the pupils of London's leading terpsichorean expert Euphan Maclaren.

Then, if you—Sir or Madam—on your (of course!) annual jaunt to Blackpool—care to see the Jessie Matthews or Evelyn Laye of to-morrow, you'll see such stars in the embryo stage among the 17 specially-chosen Terry's Juveniles. Try the Carroll Levis game, pick your own Discoveries from the kids—ten years ahead!

Now a British tradition, this show of Lawrie Wright's will magnetise a great many radio-fans this season to Blackpool. In previous seasons, L. W. has brought to Blackpool such people as Norman Long, Revnell and West, Bertini, Hal Swain, Peggy Desmond, Horace Kenny, Tessie O'Shea, Robert Naylor, Jan Ralfini, Syd Seymour, Sylvia Cecil—but never has L. W. gathered so much star talent in one bill.

Tessa Deane, radio's queen of song, will be seen playing the piano as well as singing. Tessa studied the piano at the Royal College of Music, won a scholarship and gold medal at 16. Turning to the stage, she played leading London roles, including "Rose" in A. P. Herbert's "Derby Day," which role she took in the radio version. She starred in the B.B.C.'s "Songs from the Shows" and "Music Halls" from their inception. She is a great traveller, speaks and sings in four languages, and comes to Blackpool direct from "Rose Marie."

Incomparable compère "Sutty" Felce is one of the brightest stars of television, was the first artist to perform magic before the television cameras. When he was a youth his father died, leaving "Sutty" a legacy which was only enough to carry him on till he got a job.

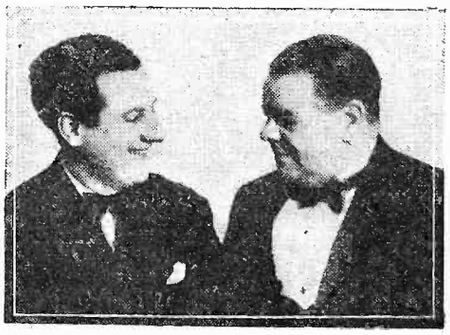
Fair, wavy-haired, six-footer Lance Fairfax, opera and musical-comedy star, was born in Wellington, New Zealand, and at Wellington College excelled in all athletics. He starred in musical films at Elstree as England's "Nelson Eddy," has appeared in big West End musical plays, and comes to Blackpool from the London Palladium.

Brilliant character-comedian Frank Randle, of "Old Hiker" and "Any More for a Sail" fame, needs no introduction to Blackpool fans.

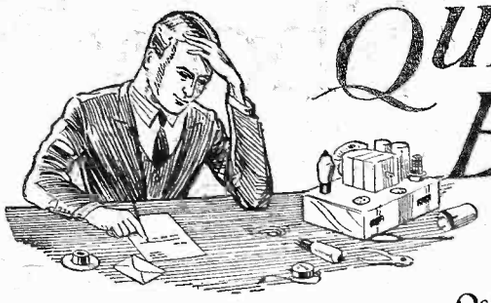
One of the most consistent bandsmen on the air, smiling, immaculate Bram Martin, began his career as a 'cellist, playing for Bruno Walter and accompanying Anna Pavlova.

Bram has been busily preparing to get every ounce out of the swell line-up of song-hits Lawrence Wright picked for this year's show, and destined to get the nation laughing, humming and dancing is the successor to "The Lambeth Walk"—"Boomps-a-Daisy!"—a great new composition by Annette Mills.

Another great number, which will delight the hearts of Lancashire particularly, is "My Shawl," the subject of a lovely scene presenting all the shawls of the world—the Spanish shawl, the shawls of Japan, Mexico, Egypt—and, of course, the world-famed Lancashire shawl!



*On the left is Bram Martin, who is appearing with his orchestra in "On with the Show." Above are the comedians, Wheeler and Wilson, who are also in the show, and on the right is Barbara Wood, the delightful soubrette who is also featured.*



# QUERIES and ENQUIRIES

many cases adjustment of one circuit will give reading modifications in two or more circuits.

## Black Crackle Paint

**"Could you please give me the address of a firm which sells that black crackle paint mentioned in 'Notes from the Test Bench' a short while ago? I have tried to get it here, but have not succeeded. Can you give details for making a small L.F. oscillator?"—A. G. S. (Edinburgh).**

THE firm in question is Hamrad, Ltd., of 32, St. Lawrence Terrace, London, W.10, and the paint is sold in tins at 2s., 3s. 6d. and 4s. 6d. An oscillator which might be suitable for your purpose was described in our issue dated May 20th last. If, however, you need a test device for L.F. response, etc., you should build a unit on the lines of that described in our Service Manual.

## Meter Design

**"Could you please tell me the difference between a volt and ampmeter, and whether one can be converted into the other? Also, can you recommend a book on learning morse code?"—W. S. (Cambridge).**

A VOLTMETER is used for measuring voltage, and accordingly must be joined *across* a circuit or supply. In other words, it measures the difference of potential across the two points. An ammeter, on the other hand, measures the current which is flowing in a circuit and accordingly is joined in series. Some voltmeters may be used to measure current simply by connecting them in series with the circuit, but the scale will have to be drawn up to suit the particular instrument, if it is not already calibrated for use as an ammeter or milliammeter. We refer you to the article on learning morse in our issue dated May 20th last.

## All-purpose Meter

**"I am considering the building of a transmitter, but a point which I am worrying about is the installation of meters. I appreciate that meters are important in every part of the complete circuit, but owing to the widely-differing currents, several meters would appear to be called for. Is there no way of making one meter serve for every circuit without complicated switching or other devices?"—J. L. (W.1).**

A SINGLE meter with a maximum scale reading of 1 mA may be used for the purpose. A closed-circuit jack should be included in each anode and/or screen-grid lead, and across the jack contacts a suitable shunt resistance should be connected. This should be selected so that it will multiply the meter scale by a definite factor (5, 10, etc.) and thereby bring the needle to about the centre of the scale. If the meter is then mounted on a small bracket provided with a plug it may be inserted in any required jack and the appropriate reading obtained. Each jack should be clearly marked with the multiplication factor provided by the shunt resistance. It is obviously preferable to have several meters permanently in circuit, however, as in

## Oscillator Fault

**"I have built a signal tester on the lines indicated in a recent article for practising morse. I am using an old valve which I am assured is in order, a 16-volt G.B. battery and all parts as recommended. In order to get all in a small space I have used a flash-lamp battery with series resistance for the filaments. I cannot get any oscillation with the unit, merely a click when the key is depressed. Do you think this is due to the filament supply, or is there any other thing likely to be wrong with the unit?"—L. D. E. (Cambridge).**

### 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.**

THE valve will only oscillate when a good current is flowing and suitable coupling exists between anode and grid. Accordingly if the transformer is unsuitable and does not provide sufficient coupling, or if the filament supply is insufficient you will be unable to obtain results. In the latter connection you should remember that the dry battery will deliver sufficient voltage but probably not sufficient current to maintain oscillation and an accumulator is definitely to be preferred for ordinary types of 2-volt valve.



## Coupling Winding

**"I have made some coils of the 6-pin type, but one or two do not appear to be working properly. I have adjusted the size of the primary and reaction winding, but signals are very poor on the bands covered by these particular coils. Can you offer any suggestion as to the cause of the trouble, as I am sure the size and windings of the coils are in order? I have wound the coils from data in your Coil Booklet."—L. S. W. (Bermondsey).**

APART from the size and disposition of the windings an important point is the relation between them—that is, the direction of the windings. For maximum results it is important that the primary should be wound so that it provides coupling with the secondary, and if wound in opposition you would obtain poor results. We would refer you in this connection to the article in our issue dated April 1st last.

## Screening

**"In building a modern multi-valve set, is it essential to include elaborate screening between stages such as you used in one of your receivers last year? I have wondered about this point, as some modern commercial receivers which I have looked at do not employ this method of construction, and I am not anxious to waste money unnecessarily."—T. R. (Whetstone).**

NORMALLY, the introduction of screening between stages is to prevent interaction between wiring and components and this ensures stability. It is possible to obtain this desirable result by careful disposition of wiring, but the types of receiver you have examined will, we think, have incorporated screens over each valve, which amounts almost to the same thing. At your address, however, you would probably find that the local station would be picked up on inter-circuit wiring, and therefore elaborate screening would be desirable in a powerful multi-valver if you wish to make long-distance reception during broadcast hours. It may even be necessary to enclose the receiver in a metal cabinet, effectively earthed.

## Aerial Design

**"I understand that the aerial design, height and other factors are of the greatest importance in controlling the efficiency of a receiver, as well as of a transmitter. As I am setting out to improve my present results I wonder if you can recommend any book on aerials which will explain the various features and give alternative designs."—V. E. (Mill Hill).**

A VERY good book on the subject is the Radio Antenna Handbook. This is obtainable from the R.S.G.B. Sales Department, 53, Victoria Street, London, S.W.1, price 3s. 9d., post free. In order to obtain maximum results on all wavebands, and from all parts of the world, it is often desirable to erect several aerials, and use particular units for special purposes, but it is possible to erect a rotatable aerial of the di-pole type which will give good results under most normal conditions and which, with a reflector, will cover any desired part of the globe.

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

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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.

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Amateur Wireless .. .. 4d. " "
Practical Mechanics .. .. 7½d. " "
Wireless Magazine .. .. 1/3 " "

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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.

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| The "Junior" Crystal Set | 27.8.38 | PW94 |
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| 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, 2 LF (Trans)) | *June* '35 | PM1 |
| Cameo Midget Three (D, 2 LF (Trans)) | — | 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)) | 18.2.39 | 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) | — | 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 (HF Pen, HF Pen, D, Pen (RC)) | 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) | 7.1.39 | PW35C |
| D.C. Premier (HF Pen, D, Pen) | — | 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) | — | PW56 |
| 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 "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 |
| **Four-valve : Double-sided Blueprint, 1s. 6d.** | | |
| Push-Button 4, Battery Model / Push-Button 4, A.C. Mains Model | 22.10.38 | PW95 |
| **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) | 3.6.39 | 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

| | Date of Issue. | No. of Blueprint. |
|---|---|---|
| **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 : Blueprint, 1s.** | | |
| B.B.C. Special One-valver | — | AW387 |
| **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 |
| 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 |
| 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 |
| 2HF Four (2 SG, D, Pen) | — | AW421 |
| 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, 2 LF) | *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 (2 HF, 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 |
| 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* '38 | WM329 |
| Harris' Jubilee Radiogram (HF Pen, D, LF, P) | *May* '35 | WM336 |
| **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. | — | WM365 |
| **PORTABLES.** | | |
| **Four-valve : Blueprints, 1s. 6d. each.** | | |
| Holiday Portable (SG, D, LF, Class B) | — | AW393 |
| Family Portable (HF, D, RC, Trans) | — | AW417 |
| 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-valver for America | 15.10.38 | 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) | — | AW449 |
| **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 |
| 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-wave Super | *Nov.* '35 | WM397 |
| **Mains Operated.** | | |
| **Two-valve : Blueprints, 1s. each.** | | |
| Two-valve Mains Short-waver (D, Pen) A.C. | — | AW453 |
| "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.** | | |
| S.W. One-valve Converter (Price 6d.) | — | AW329 |
| Enthusiast's Power Amplifier (1/6) | — | WM387 |
| Listener's 5-watt A.C. Amplifier (1/6) | — | WM392 |
| Radio Unit (2v.) for WM392 (1/-) | *Nov.* '35 | WM393 |
| Harris Electrogram battery amplifier (1/-) | — | WM399 |
| De Luxe Concert A.C. Electrogram (1/-) | *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 |
| B.L.D.L.C. Short-wave Converter (1/-) | *May* '36 | WM405 |
| Wilson Tone Master (1/-) | *June* '36 | WM406 |
| The W.M. A.C. Short-wave Converter (1/-) | — | WM410 |