

# A MIXER-FADER CONTROL BOX

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PAGE 481

# Practical and Amateur Wireless

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Edited by F.J. CAMM

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Vol. 8. No. 201.  
July 25th, 1936.

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**TAKE THIS OPPORTUNITY OF RENEWING OLD VALVES**

**CHANGING OVER TO PUSH-PULL**—See page 479



# Practical and Amateur Wireless

Edited by **F. J. CAMM**

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

VOL. VIII. No. 201. July 25th, 1936.

## ROUND *the* WORLD of WIRELESS

### British Radio Beacons

ON and around one thousand metres you may hear a variety of morse calls emanating from radio beacons on the British and European coasts. Two new signals should be noted, namely, GGH, on 988 m. (303.5 kc/s) from Barra Head Lighthouse, and GAM, Nab Lighthouse on 1,008 m. During foggy weather these are given out at six-minute intervals.

### Revival of the Death Ray

A SPECIAL electric gun is to be exhibited at the forthcoming California Pacific International Exhibition to be held at San Diego (Cal.). It is claimed for this invention that the ray discharged will destroy gas balloons, shatter metal, and cause casualties to troops at a considerable distance. The gun, of a shape similar to that of a telescope, is mounted on a motor lorry, and is actuated by an electric current stated to have a pressure of four million volts!

### Bordeaux PTT Station to Move

THE new high-power station which the French PTT authorities intend to install for the Bordeaux region will be situated well outside the city limits. A site has been found at Canterac, some eighteen miles to the north-west of Bordeaux. The transmitter is to be completed by 1937.

### Special Relay Station at Bayreuth (Bavaria)

THE Reichsfunk has officially inaugurated a small relay transmitter at Bayreuth complete with studios in order to feed the other German broadcasting stations with programmes from that district.

### Loudspeaker Warnings by Plane

THE United States Coastguard Service has adopted a system of broadcast from aeroplanes to warn villages and towns in the path of approaching hurricanes. The wireless apparatus with which the aircraft are fitted, including a special loudspeaker, weighs roughly one hundred-weight, and the sounds projected can be heard over a wide area.

### Continental Customs and Car Radio

MOTORISTS crossing the Belgian or the Duchy of Luxembourg frontiers are now requested to make a deposit of ten Belgian francs per kilogramme on all

wireless sets introduced into these countries. This amount is refunded on the return fitter. Where a radio set is permanently fitted in the car it should be declared at the time the triptych and other customs papers are taken out, and full details of weight, value, and number of valves should be specified in these documents.

### Italy Raises her Radio Counter-sanctions

WHEN during the period of the Abyssinian trouble the Italian nation was placed by certain nations "in Coven-

of 17,000 registered licence holders in a population of roughly 110,000 souls.

### Budapest (1) Temporarily Closed Down

TO cool its valves the Budapest (1) high-power station takes its water supply from the Danube. As a spring cleaning is necessary, the station will close down for eight days barring Sunday (morning and afternoon) and the programmes will be broadcast through the old Budapest (2) 20-kilowatt transmitter.

### Radio and the Foreign Legion

AT Bel Abbès, in Algeria, the home of the French Foreign Legion, wireless receivers have been installed in barracks to while away the leisure hours of the troops. In view of their diverse nationalities programmes containing selections of broadcasts from various European stations are taken nightly.

### Growth of Wireless in Europe

IN 1926, excluding the U.S.S.R., Europe possessed 119 broadcasting stations with an aggregate power of 116 kilowatts. In 1936, the number has increased to 283 transmitters, of which the total output reaches 6,300 kilowatts. From a maximum power of 16 kW ten years ago, the largest station to-day, that of Moscow, now heads the list with 500 kilowatts. Although it may be difficult to add transmitters to the existing radio network in Europe, by 1937 we may expect the total power to be over 8,000 kilowatts.

### Radio Rueil-Malmaison

THE new 400-watt private station recently opened by a Paris "daily" in the neighbourhood of the French capital is now testing every day on 360.6 m. (832 kc/s). The times of transmission are B.S.T. 12.30-13.30 and 19.30-21.00.

### 200 New Stations

THROUGHOUT the world there are, at present, two hundred new stations planned for erection in the near future, or already under construction. Europe tops the list with sixty-two transmitters, with South America a runner up (thirty-eight). The U.S.A. is expected to contribute thirty-two stations to the world's radio network in 1938; Asia, eighteen; Central America, Mexico and Canada, twelve; Africa five; and Australia seven.

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try," the E.I.A.R. as a retaliatory measure banned all musical compositions in its programmes which emanated from sanctionist states. Italian listeners are now tuning in again to the British stations, and the Rome and Milan wireless entertainments include some of the previously vetoed music.

### New Aircraft D.F. Stations

TWO new transmitters are now working in Belgium in connection with the Civil Aviation services. Brussels (ONB) and Ostend (ONL) both communicate with aeroplanes on 882 m. (340 kc/s).

### 100-Kilowatt Station for Reykjavik

THE Icelandic *Altinget* or Parliament has authorised the outlay for the construction of a 100-kilowatt transmitter to replace the present low-powered station. Up to the present the Island can only boast

# THE PICK of the PROGRAMMES

## Concert from Torquay

THE Torquay Municipal Orchestra, conducted by Ernest W. Goss, will broadcast from the Pavilion, Torquay, on July 28th, with Leonard Gowings (tenor).

## "Summer Serenade"

HARRY PELL will conduct the Birmingham Hippodrome Orchestra on July 30th in one of the programmes of light music in the "Summer Serenade" series. Mr. Pell, who came to Birmingham six or

### MAKE THESE DATES WITH YOUR RADIO

the Grand Theatre, Derby, which in November of this year celebrates its Jubilee. Built by Andrew Melville, it was burned down in March, 1885, in a disastrous fire in which two lives were lost, and rebuilt six months later. Oswald Cray has been managing director for the past fourteen years.

## IN HOLIDAY MOOD



Holiday time is radio time, too, as this happy crew with their new McMichael lightweight-portable evidently know.

seven years ago from the Portsmouth Hippodrome, was formerly music director of the Durham Light Infantry, and for some time on the B.B.C. staff at Newcastle. Birmingham Hippodrome Orchestra has broadcast frequently during the last three years.

## St. Hilda's Band

THIS famous North Country band is visiting the Midlands during the week beginning July 26th, and will give a popular programme from the studio on July 31st, with its musical director, Major S. Fairfield, conducting. Solo parts will be taken by Harold Hall (cornet) and Tom Littlewood (xylophone). Between the groups of band items, Jack Venables, a well-known Midland syncopated pianist, will play.

## Violin Recital from Midland Regional

ON July 28th Alfred Cave gives a violin recital, including a Handel larghetto, a Tartini fugue, and a Brahms scherzo. At the R.A.M. he won the gold-mounted bow. He has given a number of recitals, played at Queen's Hall Proms, and has been leader of the B.B.C. Midland Orchestra since it was formed. He is also leader of the City of Birmingham Orchestra.

## War-Time Revue from Derby

LEW LAKE is to present the original war-time revue "Splinters" on July 28th. Hal Jones has the principal part. This is one of the variety broadcasts from

## Instrumental Concert

AN Instrumental Concert will be broadcast from the Western studio on July 26th, when the artists will be Tarrant Bailey, Junr. (banjo and guitar), Leslie Rogers (saxophone), Gweneth Maine (harp), and Geoff Sisley (guitar).

## "Portrush Night"

DURING the summer months broadcast programmes aim at reflecting the mood and activities of the season, and consequently the microphone is turned toward the seaside and summer resorts generally. The programme on July 31st from Northern Ireland comes from Portrush, Ulster's most famous seaside resort, which is now linked with Belfast by means of the Atlantic Express and can be reached non-stop in two and a half hours. The programme will be made up of music by the Band of the Welch Regiment, broadcasting from the grounds of the Northern Counties Hotel. Mr. Jack Gillam's Show "Gala Revels" from the Townhall, The Society Entertainers at the Orange Hall, and dance music from the Northern Counties Hotel, provided by Sibbald Treacy and his Rhythm Kings.

## B.B.C. Midland Orchestra

VICTOR HELY-HUTCHINSON, Professor of Music in the University of Birmingham, is to be the guest conductor of the B.B.C. Midland Orchestra on July 29th. He conducted it for some months

when it was formed; he was then the B.B.C.'s Midland Music Director. The programme will include some Elgar, Gretry's ballet suite, "Cephale et Procris," and a Berceuse of the conductor's own.

## Two Brass Men

A NEW play by Francis Dillon will be heard by Northern listeners on July 29th. Its title, "The Two Brass Men," is also that of a famous "conversation piece" between trombone and cornet, the trombone typifying a meek, peaceable little man, the cornet a big, blustering fellow. The play, which is an extension of this theme, has for its background a big Lancashire engineering works, which has been transferred, complete with Lancashire employees, to the South. An attempt is made to reform the old works brass band under a new conductor, and this leads to petty tyrannies, strife, and, eventually, murder.

## "Mr. Mike Presents"

ON July 27th Martyn Webster continues his monthly series of topical revues in the Midland programme. Cora Goffin, the musical comedy star and principal boy in many pantomimes, will be the lead. The cast will include Dorothy Summers and Marjorie Westbury, Hugh Morton, Denis Folywell, and Warwick Vaughan, the impersonator. Reginald Burston is to conduct the B.B.C. Midland Revue Chorus and a Revue Orchestra led by Norris Stanley. Several of the orchestrations are by Jack Hill, who wrote a good deal of music for Emile Littler's last Birmingham pantomime.

## "Jazz in the Park"

WALDINI and his Gypsy Band are now in their fifty-third season at the Pavilion, Roath Park, Cardiff. Waldini's show, "Jazz in the Park," will be broadcast on July 27th. This well-known band has broadcast several times previously from the studio, but this is the first time that one of these popular open-air shows has been heard by listeners.

## SOLVE THIS!

### PROBLEM No. 201.

Walters built a four-valve set having two 41 M.P. valves in the output stage with a common bias resistance having a value of 320 ohms, and a speaker field winding having a resistance of 2,500 ohms acting as a choke in the H.T.+ lead. Although the required value of field winding resistance had been carefully calculated, the voltage supplied to the anodes of the output valves was found to be excessive. Why was this? Three books will be awarded for the first three correct solutions opened. Address your letters to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 201 in the left-hand corner, and must be posted to reach this office not later than the first post Monday, July 27th, 1936.

### Solution to Problem No. 200.

The first three valves were of the indirectly-heated type and therefore the current consumption was very low during the heating-up period. Consequently the current passing through the dropping resistance was low, and the voltage applied to the valve anodes was excessive. He should have fitted an indirectly-heated rectifying valve.

The following three readers successfully solved Problem No. 199, and books are accordingly given forward to them: J. Robertson, Auckengill, Wick, Caithness; Y. F. Yip, Carlton, Ducie St., Oxford Rd., Manchester; P. W. Evans, 19, Pounds Park Rd., Peverell, Plymouth.

# CHANGING OVER TO PUSH-PULL

A Push-pull Stage can be Substituted for a Single Valve Output Stage in Most Cases. This Article Deals with Points which Have to be Considered when the Substitution is Made.

By IDRIS EVANS

**T**HERE is no doubt that a well-designed push-pull output stage can provide better quality of reproduction than the average single valve stage. Excellent quality can, of course, be obtained from an all-mains receiver by using a super-power low-impedance triode in the output stage, but this type of valve requires an anode voltage of 400 volts. It is, therefore, as cheap, and cheaper in some cases,

may be taken from a dry battery of the super-capacity type. Alternatively, an accumulator H.T. battery may be used to advantage for supplying a receiver of this type.

### Using a Super-power Valve

If a valve of the super-power type is in use in the single valve output stage the addition of an extra valve of this type will

An extra valve may be added to an economy type pentode without increasing the consumption beyond the limits of a dry battery—the current taken by the two valves in push-pull will be approximately 10 mA. A power pentode, on the other hand, consumes about 15 mA when the H.T. voltage is 120, and, therefore, as in the case of the super-power valve, a wet battery should be used.

### Mains Unit

If a D.C. mains unit is in use for supplying H.T., this may still be used for supplying the push-pull set. As the current consumption will now be nearly doubled, however, the voltage drop across the resistance in the unit will be much higher than before, and, therefore, the actual voltage applied to the valve anodes will be low. To compensate for the increase in current consumption the dropping resistance inside the unit must, therefore, be reduced in value—for example, if the current is doubled the resistance value must be halved. In many D.C. mains units there are two tapplings, however, one to be used when the total consumption is below 15 mA, and the other for consumptions of 15 mA to 25 mA. If a push-pull stage is fitted, the higher of the two tapplings should be used unless very low-consumption valves are employed.

In an A.C. mains unit a rectifier is used to convert the A.C. to D.C., and if this rectifier is fully loaded by the valves when a single output valve is used, two low-consumption valves must be used in the push-pull stage in order to keep the current consumption at the same level as before. Many of the modern types of A.C. unit have a good regulation, however, and provide a steady output voltage when the current consumed by the receiver lies between approximately 10 and 30 mA. One of these units should, therefore, be chosen if it is intended to change over to push-pull at a later date, as the increased

(Continued overleaf)

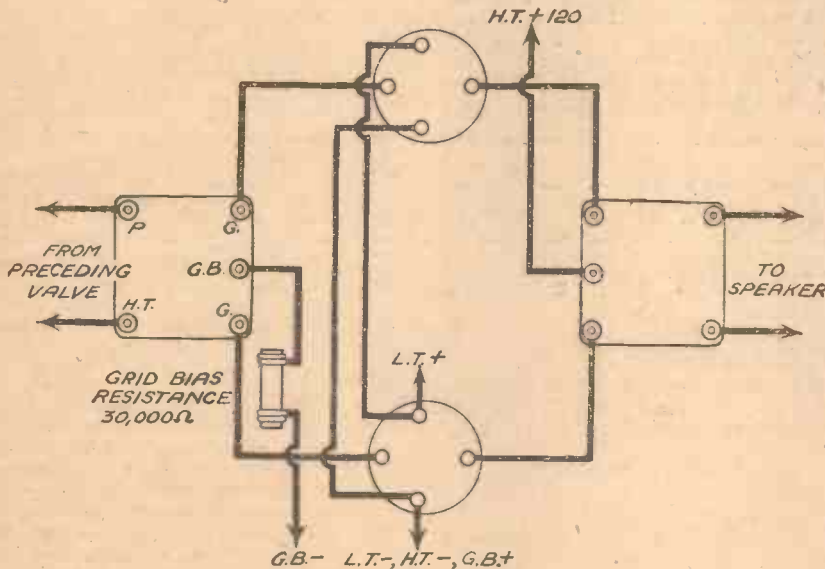


Fig. 1.—A battery operated push-pull stage, using triode valves.

to fit a push-pull stage to provide the same undistorted output wattage.

When a change-over from single valve to push-pull is made, it is necessary to change the transformer coupling the output valve to the preceding stage, and unless the speaker is fitted with a centre-tapped transformer an output transformer must also be fitted. Very little difficulty should be experienced with these two components, however—it is the valve substitution that provides the difficulties. Fig. 1 shows a battery-operated push-pull output stage.

### In the Battery Set

When two valves are connected in push-pull the current consumption is twice that of one of the valves. This is, of course, an important factor when dry batteries are used for supplying H.T., and, therefore, great care must be taken when choosing the valves. If the receiver has a valve of the small power type in use, e.g., a 215P or similar type, the addition of a second valve of the same type will increase the current consumption of the output stage to approximately 12 mA, and the total consumption of the receiver will then be approximately 16 mA if the preceding valves are a detector and an H.F. pentode. This current

increase the current consumption to approximately 30 mA. This is a decidedly higher current than the normal dry battery is designed to supply, and, therefore, a wet battery should be used, or the super-power valve should be replaced by a small power type and an additional valve of similar type added.

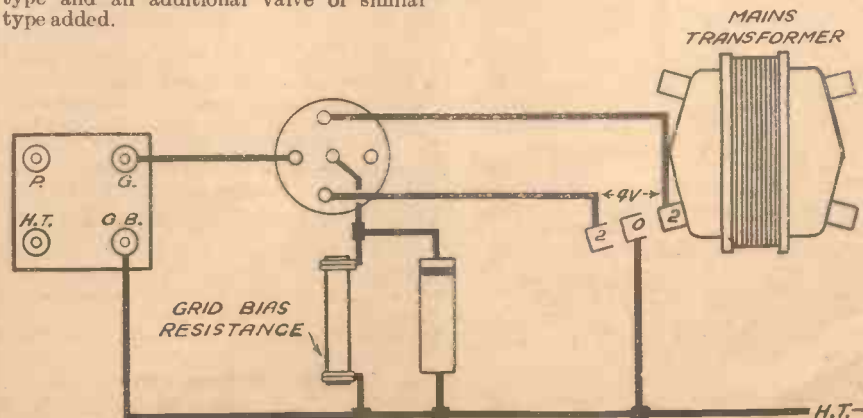


Fig. 2.—Showing the difference in the position of the bias resistance in a stage using an indirectly-heated triode valve.

## CHANGING OVER TO PUSH-PULL

(Continued from previous page)

current consumption entailed by the change-over will not necessitate alterations to the unit. If, on the other hand, a unit having a low current rating is used (e.g., 15 mA) the best procedure is to fit two low consumption valves in the push-pull stage in order to keep the consumption within the limits of the unit.

### All-mains Sets

Great care must be taken when modifying all-mains receivers as the mains supply units are generally nearly fully loaded by the valves originally fitted. This does not rule out the substitution of push-pull valves for an existing single valve stage, however. For example, the consumption can be kept at approximately the same level by using two power triodes in place of a pentode—two 41M.P.'s in place of a P.T.41. When a modification of this nature is made, however, care must be taken to alter the biasing resistance value accordingly, and if indirectly-heated valves are used in place of a directly-heated type (as in the above example) the position of the bias resistance must be altered; the resistance position is shown in Fig. 2. It must be borne in mind that when two valves are connected in push-pull a bias resistance value equal to half that specified for one of the valves must

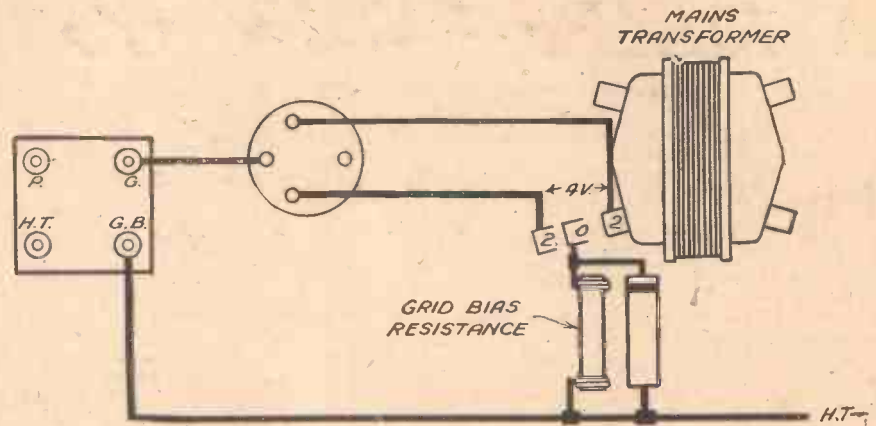


Fig. 3.—Showing the position of the bias resistance in a stage using a directly-heated triode.

be used, as the current passing through the resistance will now be doubled. It is also pointed out that the heater current consumption will be increased when an extra valve is added. Most mains transformers can supply this extra current without causing a material drop of heater voltage, but it will be advisable to consult the manufacturers before the addition is made.

In A.C./D.C. sets a lower tapping should be used on the heater dropping resistance in order to compensate for the additional resistance of the extra valve, and it should also be ascertained that the rectifier is not being overloaded. If two valves using approximately the same H.T. current as the original single valve are used, however, this trouble cannot occur.

# RADIO POSITION-FINDING

An Interesting Experiment with a Portable Radio Set

AT the present time, radio position-finding plays a very important part in the safety of shipping and commercial aviation, and for such purposes complicated apparatus is used. Yet the principle of position-finding is quite simple, and with the aid of a portable radio set, a map and a pocket compass, you can work out your position anywhere in the British Isles. All you have to do is to obtain compass bearings on two or more B.B.C. transmitters.

Briefly the principle is this: "Given the compass bearings of an unknown point from two or more widely separated known points, the position of the unknown point can be obtained." And by juggling with a portable radio, these conditions can be fulfilled. First, it is well known that the frame aerial of a portable set is directional, which means that maximum signal strength occurs when the edges of the frame are in a direct line with the station received. Conversely—and of much greater use in this experiment—there is a rather sharply defined point of minimum strength when the frame is exactly at right angles to the transmitter. So by adjusting the set to this minimum point, we can take compass bearings on any station received, i.e., along an imaginary line cutting the frame-aerial at right angles.

### Method of Working

For example, suppose we are down by the coast and decide to check up our position by radio. First we must select two B.B.C. transmitters to act as the known points, say London Regional and West Regional. Switching on and tuning in London, we slowly rotate the set backwards and forwards until we find the critical point at which the signal is weakest or fades out altogether. Adjusting the com-

pass, we take a bearing along a line cutting our frame aerial at right angles, and we find, for example, that it runs due north and south; in other words, our position is somewhere along a line stretching across England from north to south and which passes through London. Now we take a second bearing in exactly the same way on the West Regional station, and find that the bearings are W.N.W. in one direction and E.S.E. in the other.

### Plotting Position

We are now able to plot our position. Opening the map, we draw a straight line right across it from N. to S., cutting through London; and a second line from W.N.W. to E.S.E., passing through Watchet, Somerset, the location of West Regional. The point at which the lines intersect is the position of the portable set, which in our example would be somewhere near Beachy Head. All very simple it seems, but there are difficulties which will always cause an error

of a few miles. In the first place, it is not easy to judge the exact point of minimum signal strength, and a small error here will be magnified in the final result. Using headphones rather than the loudspeaker, and keeping volume to a low level, will help in this respect. A second difficulty is to draw accurate bearing-lines on the map, for here again a small error will be magnified. One method is as follows: you will find on nearly all good maps a small N. and S. line printed in one corner. Place your compass over this line so that N. and S. on the dial are parallel to it, and then revolve the whole map so that the needle also reads N. and S. In this position of the map you can place your compass on any town, adjust it to read N. and S., and then mark off your bearing-line. Though not strictly accurate, this method has the merit of being simple and will give quite good results.

### Watch Your Compass

Beware of your compass when taking bearings, for if placed on the lid containing the frame aerial and loudspeaker, it may be deflected by the speaker magnet. If this is suspected, twist a small piece of wire round the handle or other protrusion on the front of the set, and bend it so that it is exactly at right angles to the frame aerial. The wire will act as a pointer if the compass is slipped underneath. Finally, it is often a great help to get a bearing from a third station, as it may show up errors in the other two. In theory, all three bearing-lines should intersect at the same point, but do not expect them to do so exactly, for this is asking too much from such simple apparatus. The best result you can hope to obtain is somewhere within a five or six-mile radius of your true position.

## THE WIRELESS CONSTRUCTOR'S ENCYCLOPAEDIA

By F. J. CAMM  
(Editor of "Practical  
and Amateur Wireless")

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# A MIXER-FADER CONTROL BOX

A Universally Adaptable Unit, which can be Used with Any Amplifier or Receiver Equipped with Pick-up Input Sockets.  
By R. C. SMITH

**M**OST amateurs who possess an amplifier, or radio set equipped for gramophone reproduction, have experimented with a microphone connected, with necessary battery and transformer, to the pick-up sockets; and many, no doubt, have arranged a suitable change-over switch to connect either a pick-up or a microphone to these sockets, as desired.

Much amusement and entertainment can be had in this way, but much more interesting effects can be obtained by quickly and noiselessly changing from gramophone reproduction to microphone announcing, or vice versa, or to "mix" the two sources of sound in some simple manner.

It is quite within the capabilities of the average home constructor to construct a unit which will control individually,

and radio fader control. These latter faders are of 500,000 ohms resistance, and should preferably be of the logarithmically tapered type, to give even attenuation of volume, preventing the crowding of the useful adjustment to one end of the scale. The microphone current control is a variable resistor of 400 ohms (a potentiometer can be used, connecting the arm and one end of the resistance element only), and the meter is a standard 25 mA moving-iron instrument. This meter shows the current passing through the microphone, and is necessary to ensure that the maximum permissible current advised by the makers is not exceeded. If too great a current is allowed to pass, quality of speech will suffer, and the microphone will be more inclined to "pack." Always work with

as low a value of current as is possible, consistent with the required output. Once the current has been adjusted, the meter can be switched out of circuit. This is done by means of a double-pole double-throw Q.M.B. switch. Behind the panel are mounted the microphone transformer and battery, the latter being a ordinary telephone plugs, but for a permanent job terminals are advised, as with plugs and jacks there is always a possibility of noises being introduced due to bad contacts at the jack-points. Mounting the unit in an all-metal case serves to provide absolute hum-free operation even when used in close proximity to a powerful all-mains amplifier or radio-set. The circuit of the unit is shown in Fig. 1, all values of components being marked thereon. The wiring diagram is shown in Fig. 2, and the connection and operation of the unit are quite simple.

### Input Connections

The various input sources are connected to their respective terminals and the output of the unit is connected to the input of the amplifier, or pick-up sockets of the radio set. Keep the lead from the unit to amplifier as short as possible, and preferably use screened wire, with the screening earthed. The microphone battery is switched on, and current adjusted to the maker's recommended value; the meter is then switched out of circuit. With the amplifier switched on, and all three fader controls at a minimum, no sound will be heard from the loud-speaker. Put a record on the gramophone turntable and start the pick-up off in the first groove. Immediately "fade-in" the input from the pick-up to the desired volume, then by "fading-out" the pick-up and "fading-in"

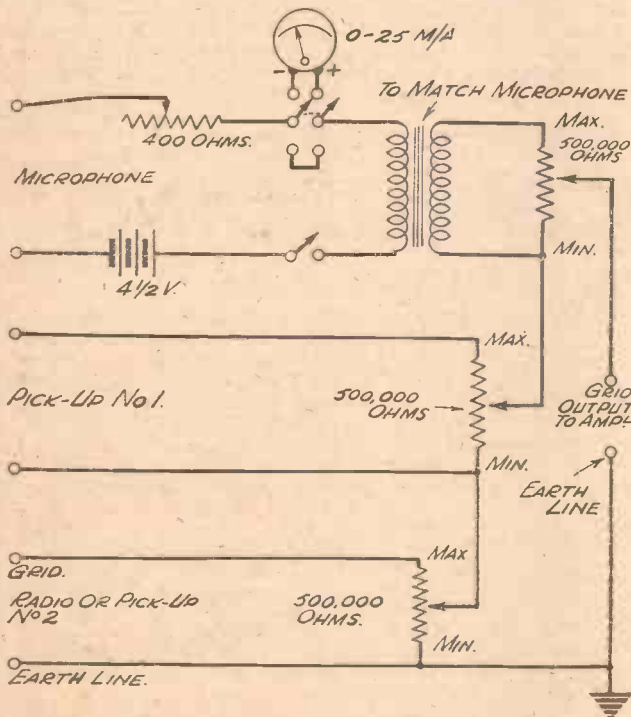


Fig. 1.—The complete circuit of a 3-circuit fader-mixer control.

and mix at any desired volume level, the sound input from several sources.

Such a unit, herewith described, can be easily constructed, using only standard components, and can be used, when completed, with any battery or mains amplifier, or radio-set equipped for pick-up amplification. This device will "fade-in," "fade-out," or "mix" any one of, or combination of, three different input channels, viz. pick-up, microphone, and radio, or two pick-ups and one microphone. Where the unit is used with an ordinary radio set, utilising the pick-up sockets, it is obvious that it will not be possible to use radio as one channel unless a separate H.F.-Det. unit is available.

### General Layout

The controls on the front panel consist of microphone current control, microphone current on-off switch, meter switch, microphone fader control, pick-up fader control,

4 1/2-volt grid-bias battery. The choice of the transformer needs special attention, as many of the so-called "microphone transformers" on the market are useless for serious work, where good quality speech is desired.

All input and output receptacles are mounted on a small panel fixed at the right-hand side of, and at right angles to, the front control panel. In the case of the original unit made by the author, these connections were all duplicated, with jacks and terminals for each input channel, and also for the output. The jacks are used for a quick set-up, in conjunction with

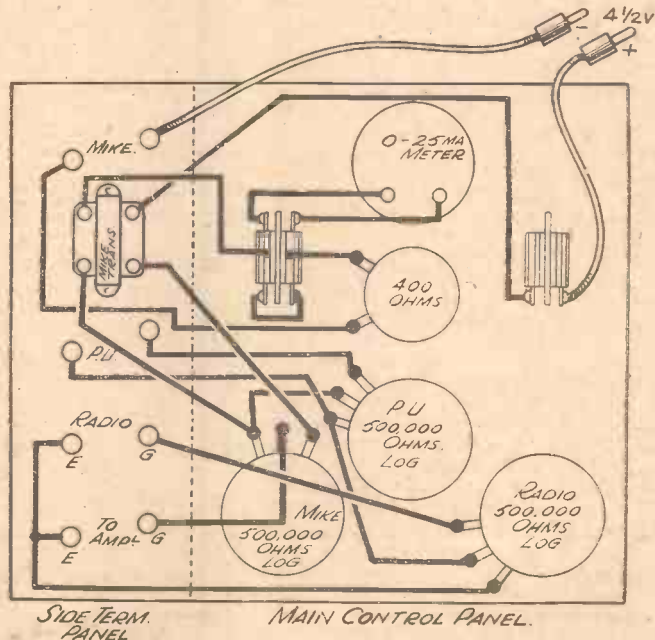


Fig. 2.—Complete practical wiring diagram of the unit shown theoretically in Fig. 1.

the microphone, an announcement can be made with a soft background of music of any desired volume. When the announcement is over the microphone is "faded-out" and the pick-up "faded-in" to the previous volume level. After some practice, the user can make a smooth change-over from one source to another without any clicks, bangs, or splutters from the loud-speaker, which are inevitable where

ordinary switches are used for changing over.

**Operating Pointers**

A few words about the points which must be observed when using the mixer will not be out of place at this stage. For quiet operation, the microphone fader should always be at minimum whenever the microphone is moved (except where a hand microphone is used), or when the current is switched on or off. Similarly the pick-up fader should be at minimum when a new needle is being fitted, and when starting off the needle in the first groove of a record, "fading-in" before the melody commences. The needle usually traverses several grooves

as a resistance capacity coupled stage, and connected through a .01 mfd. condenser to the control box input, as in Fig. 3.

**Using the Unit**

Many uses for this mixer immediately suggest themselves. During an evening of gramophone music, the title of each following record can be announced. Record music can be utilised to fill in intervals during a series of vocal announcements, or soft music can be used as a continuous background for the same. Where a radio H.F. detector unit is used, records can be played to fill in an uninteresting gap in the radio programme, leaving the radio unit tuned in and switched on, ready to be immediately "faded-in" at such time as the programme regains its interest.

Amateur vocal efforts over the microphone can be greatly assisted by accompanying the singer with an instrumental record of the song. "Radio-play" arrangers can find many uses for the mixer to introduce various sound effects into the play.

Although of such simple construction, the unit is capable of serious work, and can be used with

**ITEMS OF INTEREST**

**Appointment of Television Announcer**

MR. LESLIE MITCHELL has been appointed a Television Announcer as from Tuesday, August 4 next. His connection with broadcasting dates back to 1929, when he took part in the Armistice Day broadcast of "Journey's End." He joined the B.B.C. as announcer in 1934, and is at present a producer in the Variety Department.

**New Deputy Director of Music at B.B.C.**

THE B.B.C. recently announced that the appointment of Deputy Director of Music has been accepted by Dr. R. S. Thatcher, at present Director of Music at Harrow School. This follows the B.B.C. decision to reorganise its Music Department in order that Dr. Boulton may be given relief in his double duties of Director of Music and Chief Conductor. Under the new arrangement, Mr. K. A. Wright will be free to concentrate on his work as chief music programme builder and to develop his foreign contacts.

After studying at the Royal College of Music and Worcester College, Oxford, Dr. Thatcher became Assistant Music Master at Clifton College in 1911. Returning from war service in 1919, he was engaged as Director of Music at Charterhouse School and in 1927 was appointed Director of Music at Harrow School. It is hoped that Dr. Thatcher will take up his duties with the B.B.C. in the Autumn.

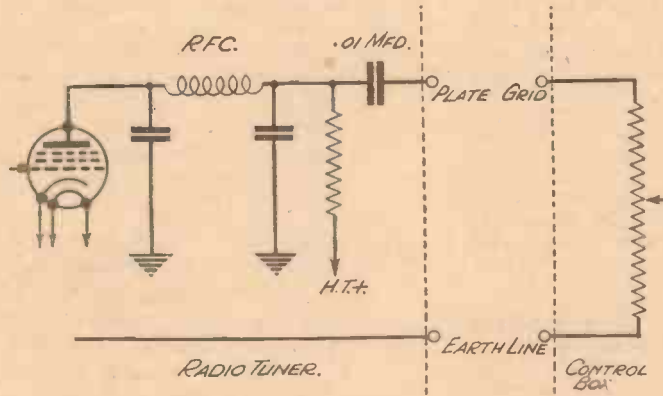


Fig. 3.—How to arrange the output from a radio receiver for use with the fader-mixer.

before the actual reproduction starts, giving time to "fade-in" gradually. In a like manner, fade-out the pick-up as soon as the melody finishes, before the auto-stop throw-off groove is reached.

If the foregoing points are not observed, the various actions mentioned would cause disconcerting plops and scratching noises in the loudspeaker if the unit was passing any output through to the amplifier at the time.

The radio input terminals may also be used for a second pick-up, and where twin turntables are used, the unit can take the place of the more conventional centre-tapped fader potentiometer, with the added advantage of being able to introduce microphone announcements on top of the reproduction from either pick-up.

Where a separate radio tuner is used as one channel, the plate of the detector valve, if a triode, can be connected to the input of the control box by means of a conventional L.F. transformer, provided the distance between the three units, the radio tuner, control box, and amplifier, is not too great. If a screen-grid or pentode valve is used as a detector, it should be treated

every satisfaction in conjunction with high-power public address installations. With a high-quality Reistype current microphone, the 4½-volt grid-bias battery will not be of sufficient capacity, but the polarising voltage supply can be altered to suit the individual microphone used.

Although only one microphone channel is included in this unit, two or more can readily be introduced into the mixer by duplicating, or tripling, the microphone input circuit. The wiring diagram for two microphones and one pick-up is shown in Fig. 4. It will be noticed that only one meter is necessary, but of course, each microphone should have the meter switched into its circuit in turn, the current adjusted, then cut out.

As a final word of warning, if, as is advised, a metal panel and cabinet are used, do not forget to insulate from the panels all terminals and variable resistors, unless these have insulated shafts. Failure to observe this point will result not only in failure to obtain signals, but also perhaps in damage to the microphone or pick-ups.

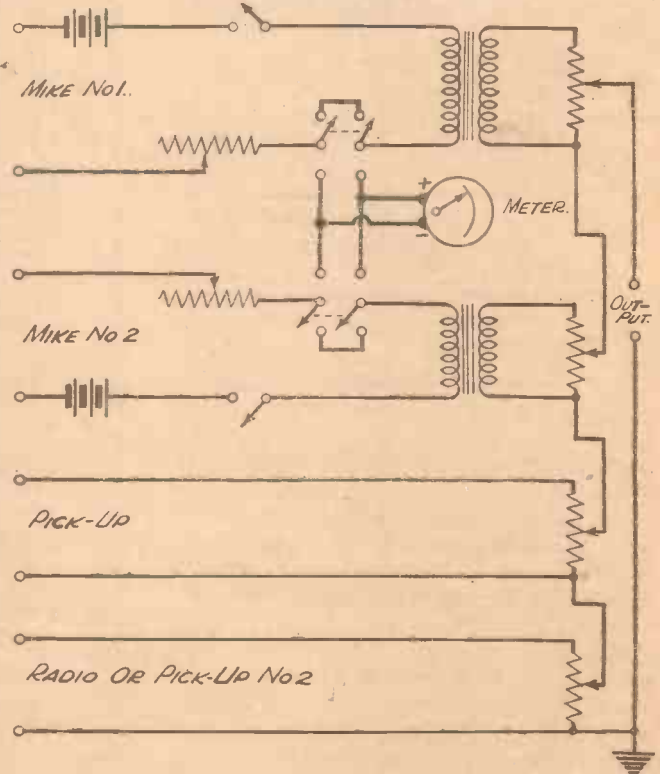


Fig. 4.—This modified diagram shows the method of employing two microphones.

**LIST OF COMPONENTS REQUIRED.**

- One panel and side panel (preferably of metal and of a size to carry particular parts used).
- One cabinet to suit (preferably of metal for complete screening).
- One 0.25 mA moving-iron meter.
- One D.P.D.T. Q.M.B. switch.
- One on/off Q.M.B. switch.
- One 400-ohm variable resistance.
- Three 500,000 ohm potentiometers (log type).
- Eight terminals or sockets.
- One 4½-volt grid-bias battery.
- One small grid-bias battery clip.
- One microphone transformer (to match mike to be used).
- Two wander plugs (red and black).
- Two angle brackets.
- Sundry wire and screws.

**Pye Four-channel Radio**

PYE RADIO report a continued success of their all-wave marketing drive. This is being backed by a series of large-space insertions in the four National papers, that is the Daily Mail, Express, Herald and News Chronicle.



# On Your Wavelength

## Now I Know

I HAD the temerity to ask two weeks ago why portable wireless sets were not in more general use. I really have to be most careful how I write and what I write, for the eagle optics of my readers eagerly scan every word I pen and they do not hesitate to write to me, sometimes cheerfully and helpfully, and sometimes otherwise! *A propos* this paragraph, Mr. W. Wyatt writes: "Because they usually only get locals, and B.B.C. programmes, they are waste of juice. In the course of my work, I visit many houses; I find few who like Henry Hall at 5.15; many like the Children's Hour, whilst sports talks are not in favour. There are too many silly noises in so-called comic songs, and few vocalists ever sing a word which can be understood. Squealing sopranos are too common, and if it were not for foreign programmes a good



Radio out in India.

many sets would not be used at all, for the common complaint is that local broadcasts are a waste of listening time. So who wants to lug a portable receiver around for walks? With regard to home construction, there is more interest taken. Now your paper is usually more readable for the practical layman of wireless than any of the others." I am inclined to agree with this reader, or, rather, this reader is inclined to agree with me, for I have expressed myself many times on the poor articulation, enunciation and declamation of the average singer. I can excuse the intrusive aitch, but I cannot pardon the slurring of words. It is true that some of the scores are amateurish and are not planned to enable the vocalist to pronounce his words. I have given an example of this before, but I will reiterate it:—

Take the song "The Sunshine of

## By Jhermion

Your Smile." When you hear this it sounds as follows:—

Giver mea yourer semile,  
The luvver liter in yourer ise.

In an endeavour to please the listener the vocalist is compelled to sound the terminal consonants with the effect as above. Modern musicians do not design their music so that the words can be properly pronounced. The terminal "T" preceding "and" is bound to lead to trouble, so if the song is designed with a rest or pause, the song could be better produced. What, however, has this to do with portable radio?

## American Radio

HEREWITH a letter from R. J. R., of Clapham:—

"I have long intended to write to you, and now I've done it. However, you've asked for it, so here goes.

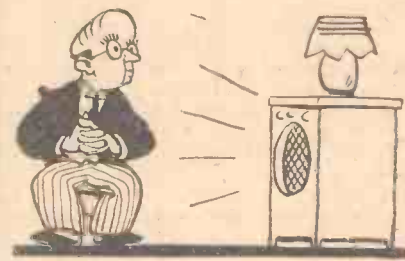
"Let me say, first of all, that I have no axe to grind. I am not connected in any way with the trade. I just push a pen for a living, and make a hobby of radio as far as my purse and my wife will permit. You appear to be woefully ignorant about this subject. So I hope, at least, to put you on the right path.

"I have some practical experience, as I have used American valves exclusively, and other parts when I can obtain them, for the last two years, during which time I have designed and built three or four sets. My experience shows that Yank tubes are not only infinitely cheaper, but often more reliable and better made than English, and this applies to all other parts as well. As to price, if I expressed myself fully on this I should be open to action for libel against the English manufacturer, who must make a disgusting profit, as manufacturing costs are higher, if anything, in U.S.A. Over there mains valves average 30-50 cents each (1s. 3d. - 2s.) as compared with 12s. 6d. - 25s. for equivalent English types over here. The best Yank makes may be bought in England for 6s. each, which, incidentally, shows a handsome profit for someone!

"Have you seen the latest metal tubes which have been in use in U.S.A. for the past eight or nine months? They are beauties, but although they are now obtainable over here at 7s. 6d. each, I have not yet been able to afford a set of them. The 6E5 'Magic Eye' tuning indicator tube is also a great advance on anything we have in this country.

"As to quality, I cannot understand your experience quoted in PRACTICAL AND AMATEUR WIRELESS of July 11th, 1936. The Yanks are far ahead of us in this respect, and sets with a frequency curve of 20-20,000 cycles, or 1 decibel, are not uncommon. I would point out, however, that a lot of Yank stuff on the English market is out of date or rejected, and consequently, one has to know what one is buying to give it a fair test.

"And a word about junk shops/



No alternatives!

I buy most of my stuff at these, partly for cash considerations and partly because they sell mainly manufacturers' type components, and I cannot stick terminals! Soldering tags which project through the chassis for me every time. I do agree with you, however, that you have to know what you are about or you will be stung. I hope all this hasn't bored you."

## And Another

THIS time from A. C., of Cowbridge:—

"As a reader from 1932 of *Amateur Wireless* and PRACTICAL WIRELESS off and on till the amalgamation, may I say that *On Your Wavelength* is the first I tune to when I get my copy every Wednesday.

"I like the variety you give us, but why worry about the d— dance bands or their racket? Give us

your old snappy bits as of old. I'm with you every time.

"I have a pile of *Amateur Wirelesses* dating back to 1933 which I would like to dispose of, as you are often asked for numbers out of print. I wonder if you would care to have them for the benefit of other readers; if they are of use would you give me the O.K. in the PRACTICAL AND AMATEUR WIRELESS, then I would send them on. I would pay the cost willingly."

I shall be glad to put this reader into touch with the first claimant who writes to me.

### Elephant Radio

I LEARN that the Maharajah of some spot with an unpronounceable name has equipped his elephants



Prof. Rudy Vallee, M.A.

with radio, apparently so that he could pick up the programmes from the Indian Broadcasting Company. I gather that he will soon be tired of listening to fat stock prices and the monsoon forecast, and he has now installed a transmitter in his palace and one on another elephant, so that he can keep in touch with his domestic affairs while tiger shootin' hout hin Hindia. Incidentally, why must we say shootin', fishin', goffin', and huntin'? Our language is getting very go-as-you-please, in spite of our nice young men at the B.B.C., who, I understand, spend hours reading the script before they broadcast, with the inevitable result that you can tell they are reading by the painful punctilio and pedantry of their utterances.

### Important Talks

A SUGGESTION has been mooted that during important talks of a political nature all stations should broadcast that talk and that on no account should variety be allowed to distract the attention of the listener, the idea being to compel the listener to listen to the talk. They overlook the fact that the radio has a switch! Personally, I am all against political broadcasts whilst the B.B.C. is owned by the State. There is always the danger that the opposition will not get the same opportunities of putting



### Gang Condensers

MANY of our readers who constructed the £4 Superhet were supplied with two-gang straight condensers instead of the superhet type by their local dealers. The effect of using a straight condenser in this set is the reception of low-wave-length stations at two points on the dial; for example, London National is received at its correct setting and also at approximately 450 metres. The trouble is not so easy to locate as one might at first imagine as a somewhat similar effect can be produced if the I.F. transformer trimmers are not correctly adjusted. An examination of the vanes of the condenser sections will reveal whether the correct type is being used, however. In a 465 k/c condenser the vanes of the oscillator section are much smaller or are fewer in number.

The difference between the two sections is not so marked in condensers designed for an intermediate frequency of 110 k/c, but even in this type the difference in the size or in the number of vanes is easily noticeable. Constructors should therefore examine gang condensers before fixing them to the chassis, as there is always the possibility that a straight condenser may be supplied in place of a superhet type or a superhet type in place of a straight—the two types are generally exactly alike externally.

### Condenser Shorts

IN connection with gang condensers it is also pointed out that the leads connecting the fixed vanes to the coils should be disconnected when tests for short circuits are being made. Several readers have written to us recently stating that their meter registers continuity across the fixed and moving vanes, and in most cases we have found that the test has been made with the coil in circuit—the coil winding has a very low resistance and will give the indication of a short-circuit across the condenser.

### S.G. Detector

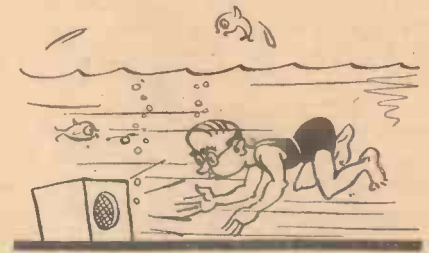
Designers seem to be at variance concerning the best component values for use in conjunction with the H.F. pentode detector. Some favour a form of power-grid arrangement, with the valve unbiased, whereas others employ a high value bias resistance. Again, in some receivers one finds a very high value anode resistance—anything between 250,000 ohms and 500,000 ohms—and in others a value of 50,000 ohms is employed. With most H.F. pentode valves it is our experience that best results are obtained with a high anode resistance and zero negative bias.

### H.F. Chokes

Constructors will probably have found that the H.F. choke in the anode circuit of the detector valve can be short-circuited without materially affecting reception on the medium and long-wave bands. On wavelengths below 100 metres, however, some type of choke will be found essential if good reaction control is to be obtained.

their case so forcibly as the Government speakers.

The Winston Churchill incident was a case in point. I ask the B.B.C. to believe that I am quite capable of forming my own political opinions, a capability which I share with most other citizens who are capable of thinking. The rest are made up of those who vote for their party whether it is right or wrong, those who will vote for any party which promises to take the tax off beer, and a small proportion of imbecile creatures who fall in love with Mr. Eden's profile, or Austen Chamberlain's smile. The public is never given the full facts, and with Moscow and other countries pumping out political broadcasts in all languages the situation is getting complex.



An under-water loudspeaker.

### Rudy Vallee, M.A.

THAT arch crooner Rudy Vallee has had a Master of Arts Degree conferred on him by the Suffolk Law School, Boston, Mass., on his appointment to the professorship of "Radio Showmanship." When you think about it he really does deserve a lot of credit. It is the opinion of some people that he has a poor voice, and can only croon. I am told that he does not understand much about music and yet he has climbed the ladder of success to such effect that both you and I know his name. He is worth more money than I shall ever earn, notwithstanding my scholastic attainments. Rudy must be very clever and/or very lucky. Good luck to him!

### From the Land of Bunk

AMERICA was discovered chiefly to provide journalists with a job. That job consists of hounding down every individual who can provide a story or noos. At a certain American Super Hotel (it must be super because the proprietors say so) they have a super swimming pool, and as it caters for a jazz-intoxicated population which has elevated Harlem and nigger music to a position of pre-eminence, it has become necessary, in addition to having loudspeakers blaring from the roof and walls, to have an under-water loudspeaker. How does it work?

A PAGE OF PRACTICAL HINTS

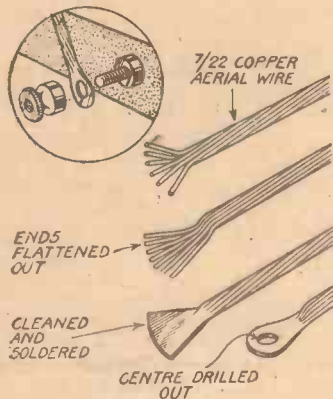
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

A Lead-in Hint

MANY good aerials of 7/22 copper wire end in a poor connection to the lead-in, due to the difficulty of securing the bulk of the wire under a small nut. This

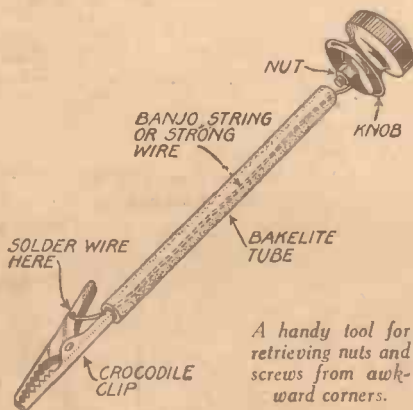


Method of treating the ends of stranded wire for making good connections.

may be overcome by cleaning each strand for an inch or two at the end and hammering the whole bunch to a flat surface. Thoroughly coat these ends with solder, and the result is a flat piece of solid metal. Drill this through to take the screwed terminal stem, and the result will be very good contact, and increased efficiency.—A. JOHNSON (Willesden).

A Device For Awkward Corners

THIS handy tool can be constructed from odd parts usually found in the "junk box." It consists of a crocodile clip, a short length of wire, and a knob. The diagram is self-explanatory. In order to



A handy tool for retrieving nuts and screws from awkward corners.

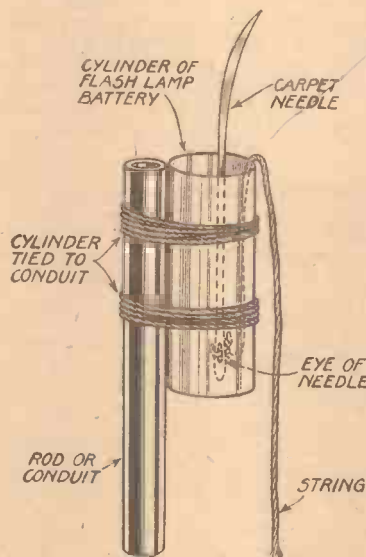
open the jaws of the clip it is only necessary to pull upward on the knob, and to release it when the jaws are to be closed. The tool can be used for retrieving nuts, screws, etc., in places where the hand or fingers cannot reach.—R. H. NEWLAND (Kingsbury).

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., 8-11, 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 Wrinkle.

An Aerial-replacing Device

THE accompanying sketch shows a device which I used to replace a broken halyard. It consists of a long rod, which may be a fishing rod or a length of conduit piping used by electricians. To



A novel device for replacing a fallen aerial.

the end of the rod is attached a small cylinder which can be obtained from an old flash-lamp battery; inside the cylinder is placed a carpet needle (about 6 ins. in length), eye downwards, and to the eye

of the needle is attached the end of a ball of string. To use the device, stand on a ladder long enough to enable you to reach the pulley block with the long rod. Work the point of the needle through the eye of the pulley, and when you are sure the point is through the pulley, pull the string gently, which should force the needle sufficiently through the pulley to allow the needle to drop through on the other side by its own weight. By jerking the string upwards so as to relieve the weight of the string the needle will come down low enough to be reached by the hand. Now attach the new halyard, taking care to join the rope to the string by whipping it with a piece of thin wire so that the join goes over the pulley wheel smoothly. Finally, do not attempt to use the device on a windy day, and use a curved needle in preference to a straight one.—E. A. HORNE (West Norwood).

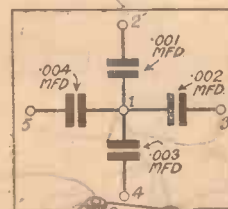
A Capacity Board

THE accompanying sketch shows a device consisting of four fixed condensers and five terminals mounted on a small ebonite panel, the arrangement giving a range of capacity varying from .01 to .0007.

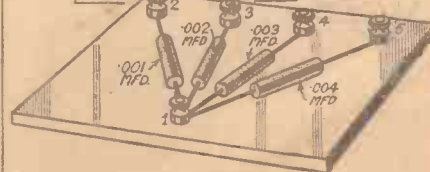
By taking a connection from terminal No. 1, and connecting terminals 2, 3, 4, and 5 together, the capacity will be .01, while by taking a connection from terminal No. 2 and terminal No. 3 the capacity will be .0007. A wide range of capacities can be obtained from these four condensers by using the connections tabulated below:

Capacity	Connection	Capacity	Connection
.01	1-2, 3, 4, 5.	.0019	4-2, 5
.009	1-3, 4, 5	.0017	4-5
.008	1-2, 4, 5	.0016	3-4/5
.007	1-4, 5	.0014	3-5
.006	1-2, 3, 4	.0013	3-2, 4
.005	1-3, 4	.0012	3-4
.004	1-5	.001	1-2
.003	1-4	.0009	2-3, 4, 5
.0025	3, 4-2, 5	.00085	2-3, 5
.0024	5-2, 3, 4	.0008	5-2
.0023	4-3, 5	.00075	2-4
.0021	2, 3-4, 5	.0007	2-3
.002	1-3		

Constructors will find this a cheap and useful way of having a number of capacities for test bench use.—A. HAMPTON (Lytham).



A method of arranging a bank of small condensers for forming a simple capacity board.



NEWNES' TELEVISION AND SHORT-WAVE HANDBOOK

2nd Edition

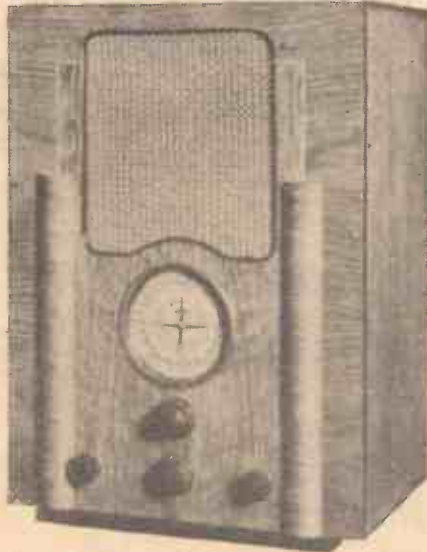
By F. J. GAMM.

Price 3/6 or 3/10 by post from the Publishing Dept., George Newnes, Ltd., 8-11, Southampton St., Strand, London, W.C.2.

# The Peto-Scott All-wave S.G. Three

An Efficient Battery-operated Four-band Receiver  
Covering the Short as Well as the Ordinary Broadcast  
Wavelengths

THE present demand for receivers which combine the short waves with the standard broadcast bands has led to the production of some interesting mains apparatus, but the Peto Scott receiver under review has incorporated many of the desirable features with simple battery operation. A very simple circuit has been incorporated, but the choice of coils and other components has resulted in an arrangement which produces maximum results on each band, and there is no compromise introduced in order to enable the short waves to be covered. The standard S.G., detector and pentode output circuit forms the basis of the receiver, and special coils are employed, in conjunction with a special type of ganged condenser. This has been arranged, with the wave-change switching device, so that it simplifies tuning on the short waves and removes the difficulties which are present when a



This illustration shows the new cabinet and tuning dial fitted to the Peto-Scott 4-Band Receiver.

standard .0005 mfd. condenser is employed, even through a slow-motion gear.

The wave ranges covered are from 14 to 31, 28 to 62, 200 to 550 and 900 to 2,100 metres, and thus the main short-wave broadcasting stations may be heard in addition to the regular amateur bands.

## The Layout

The receiver is built upon a metal chassis and the main items are totally screened, thus avoiding risk of instability. An H.F. pentode is employed in the first stage, and this, together with the output valve, is a Hivac product. The detector is an Osram triode, and these three valves are supplied with the receiver, as the particular combination has been found to produce the best performance.

The tuning dial fitted is divided into four coloured sections, and the illustration gives

some idea of the size of the dial and the arrangements which are made for accurately locating the various stations. A four-arm pointer is fitted, two of the arms being long and two short, the latter passing across the inner circuit which has the right-hand portion coloured green (covering the 14 to 31-metre band) and the left-hand portion red, covering the remaining short-wave band. The top of the outer circle is orange for the medium waves and the blue lower portion is calibrated for the long waves, and to enable the user to ascertain readily which section is in use the wave-change control knob is provided with four coloured dots. The tuning control, situated immediately above the wave-change switch, is of the double type, having a concentric slow-motion knob providing a reduction gear of 100 to 1. The normal control is also geared to provide a reduction of 8 to 1, and thus simplify tuning on all bands.

## The Controls

In addition to these two controls there is a combined on/off switch and volume control and a reaction control, whilst to assist in obtaining the required selectivity for individual aerial systems a separate aerial socket is fitted at the rear and brings into circuit an alternative aerial tapping. As would be expected with any receiver of this type the reaction control and the volume control must be adjusted together to provide adequate selectivity on the ordinary broadcast bands, but the sensitivity is of a very high order. When connected to a suitable aerial, and the appropriate aerial socket selected, practically all of the main European stations may be heard. The reproduction, too, is of a very high order due to the efficient moving-coil loudspeaker which is fitted and the arrangement of the L.F. circuits.

It was on the short waves, however, that the most impressive performance was obtained, and the smoothness of the reaction control over the entire short-wave range was a most favourable point. It was, in fact, found possible to adjust the reaction control almost to the oscillation point and then to tune through each short-wave band without the need for a readjustment of reaction, a feature which is not often found in straight short-wave receivers, let alone in all-wave sets.

## Accessories

This particular receiver is supplied in a very complete form, and in addition to the valves and batteries the makers supply a 10-page instructional booklet and a length of aerial wire fitted with insulators. The H.T. battery is a standard Oldham 120-volt



A neat metal chassis is employed in the new Peto-Scott Receiver, and totally-screened coils are used.

unit, whilst the accumulator is one of the new Oldham indicating batteries which shows at a glance the exact condition of the electrolyte by means of an indicating pointer. The instructional booklet deals very fully indeed with the method of setting up the receiver as well as the correct method of tuning and the most effective aerial-earth system to employ. Provision has been made for the use of an extension loudspeaker, and sockets for this purpose are fitted to the existing speaker, whilst a fuse is fitted on the chassis to protect the valve filaments and a spare fuse forms part of the equipment supplied with the receiver. The price of this complete kit is £7 15s., or 7s. 6d. deposit and 18 monthly payments of 9s. 6d.

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# Practical Television

July 25th, 1936. Vol. 3. No. 12.

## Facing More Opposition

IT is remarkable how the development of high-definition television to the status of a public service is fraught with so much opposition from different quarters. These notes have from time to time drawn the attention of readers to some of the difficulties which the authorities have had to face in this connection. Now the promise of television viewing rooms in departmental stores, railway stations, etc., has raised the question of whether visitors to these rooms are to be admitted free of charge or whether definite prices of admission will be charged which are subject to entertainment tax. If the former, or alternatively if the charge made is not taxed, then the theatres, music halls, etc., say that this is a new form of entertainment for the public which is providing unfair competition. Steps are already being taken in the matter to make representation to the proper quarter and it is hoped that for the benefit of all a satisfactory solution will be found.

## Germany Making its Plans

Preparations for televising certain of the sporting events at this year's Olympic Games to be held in Berlin are now well advanced, and it seems certain that both the intermediate film and electron camera methods will be employed. The latter is still the subject of official secret development, and the only direct-pick-up scanner now in use for the public experimental programme service is the spotlight apparatus. This has, however, been improved when compared to its earlier prototype. Secondary emission photo-electric cells are now employed, and owing to their greater sensitivity as against the normal ones the extent of the scene which can be encompassed in the studio is much larger. Semi-extended scenes embracing four people easily are now televised, the standard of definition being 180 line picture dissection repeated at 25 frames per second, and it is not expected that this standard will be departed from even for the Olympic Games. This standard has been employed for just over two and a half years, but it is anticipated that at the Berlin Radio Exhibition which opens in August, pictures of about twice this definition will be shown in the form of line demonstrations. Bearing in mind that the first thirty-line television demonstrations were shown at the Berlin Radio Exhibition seven years ago by Karolus, Mihaly, Baird and Fernseh, it must be admitted that the progress has been very thorough and painstaking.

## Farnsworth and the Amateurs

One of the pioneers of television in the United States of America, Mr. P. T. Farnsworth, has taken up the cause of the amateur constructor very strongly. He was speaking recently before the Federal Communications Commission which has been appointed in that country to draft regulations for controlling the development of television as a form of public entertainment by radio. Although admitting that the price of the first sets is sure to be high he emphasised that it should not be

necessary to wait until television is perfected before it is presented to the public as a service. Just as the amateurs had in the early days of wireless fostered and expedited its development, so they should be given the same opportunity to show their prowess and ingenuity with television equipment. This would stimulate trade and help to lower the prices of television parts, and with the home constructors' active co-operation it would ensure that the apparatus would be of good quality. While a certain measure of caution was commendable, progress could not be held up indefinitely, and the greater the number rendering assistance within the reception areas of the radiated

television artists in one room, and transmitting the results to another room in which the diners will be present.

## In New York

Determined to be ahead of London for the inauguration of its test television transmissions, New York chose June 29th as the day for starting, this date having been chosen some time ahead when it was announced that the B.B.C. would send out their first signals on July 1st. That the Americans need not have made such haste is plainly evident for the British high-definition signals are still "in the air" and not "on the air." However, these American tests sponsored by R. C. A. are an effort to learn how the signals will behave when received in the steel skyscrapers. An 8-kilowatt ultra-short-wave radio transmitter is located on the top of the Empire State building, the carrier frequency being 50 megacycles (6 metres). As the building is nearly 1,300 ft. high and the tallest in New York, the choice of a transmitting site is an admirable one, and a number of special receiving sets have been installed in the homes of engineer observers so that an



A television receiving set of the Fernseh A.G., which belongs to the well-known Goertz Company, and which is used by the German Reichspost authorities for experiments preliminary to the introduction of a public television service.

signals, the quicker would sets without flaws become available generally.

## Showing Television in London

From several different sources it is learned that the television transmissions when they become available from the Alexandra Palace will be featured at many different receiving sites throughout London. Quite apart from radio dealers who naturally will look upon the pictures as an attraction to bring customers into the shop, the large stores, certain railway stations, cinemas and even restaurants are seeking information as to the best way in which they can feature sets. Assistance is being rendered by the B.B.C. in the form of a memorandum making certain recommendations, and the novel appeal to patrons will do much to stimulate interest. One restaurant proprietor in the centre of London has signified his intention of not only showing the radio pictures but of holding auditions of possible

accurate log of the results obtained can be made. Apart from the "stationary" receivers a certain number of mobile sets will be employed, but it is stated that the minimum of publicity will be associated with the work. Naturally problems of interference in relation to site, screening from buildings, optimum power transmitting conditions, feeders and aerial formations will all form part of the tests which are to be conducted over a long period. The data compiled will then enable questions of future service to be planned with a greater degree of finality than would be the case if no work of this nature had been undertaken.

## NEWNES' TELEVISION AND SHORT-WAVE HANDBOOK

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THERE is only one small point to be added to the constructional details given in last week's issue. This concerns the method of attaching the lid of the cabinet. As most amateurs are probably aware, the frame aerial has to be erected so that it may be turned in the direction of the station it is desired to hear, and when at right angles to the station the amount of energy picked up by the frame is a minimum, and unless the station is

position as shown in the illustration at the top of this page. Special hinges may be obtained from some stores which will permit of this, but they do not seem to be very easily obtainable, and a simpler scheme may be incorporated to avoid the difficulty of searching for such hinges. Ordinary one-inch brass hinges may be attached to the rear as for an ordinary box, and a strip of narrow but strong tape may then be glued inside the lid and the lower

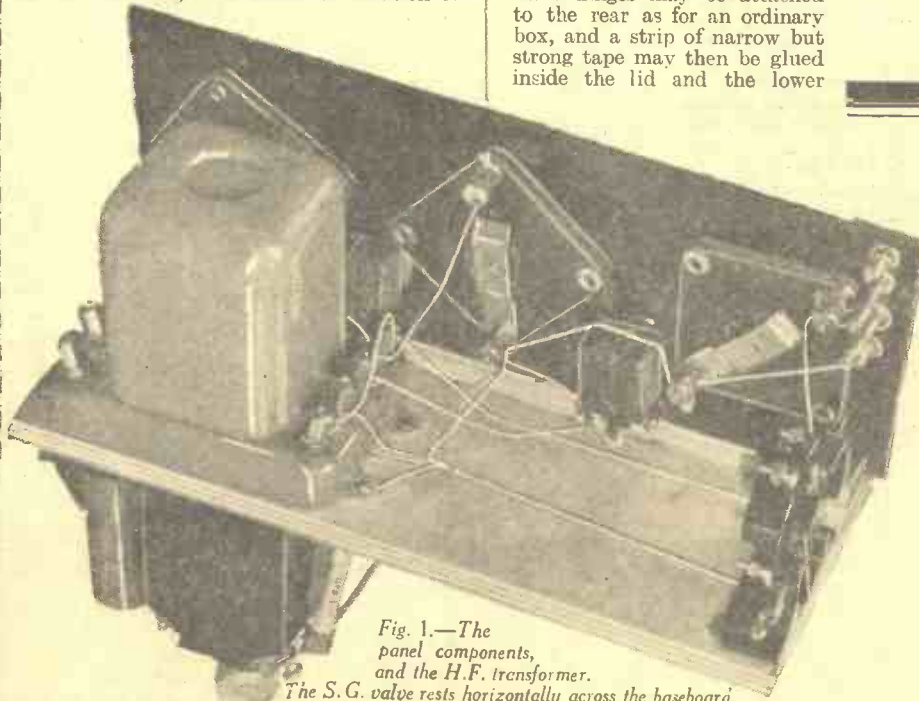


Fig. 1.—The panel components, and the H.F. transformer. The S.G. valve rests horizontally across the baseboard.

situated extremely close to the receiver no signals will be heard. It is necessary first of all, therefore, to arrange for the lid of the cabinet to remain in a vertical

section of the cabinet in such a position that when the lid is raised it will be unable to pass beyond a vertical position.

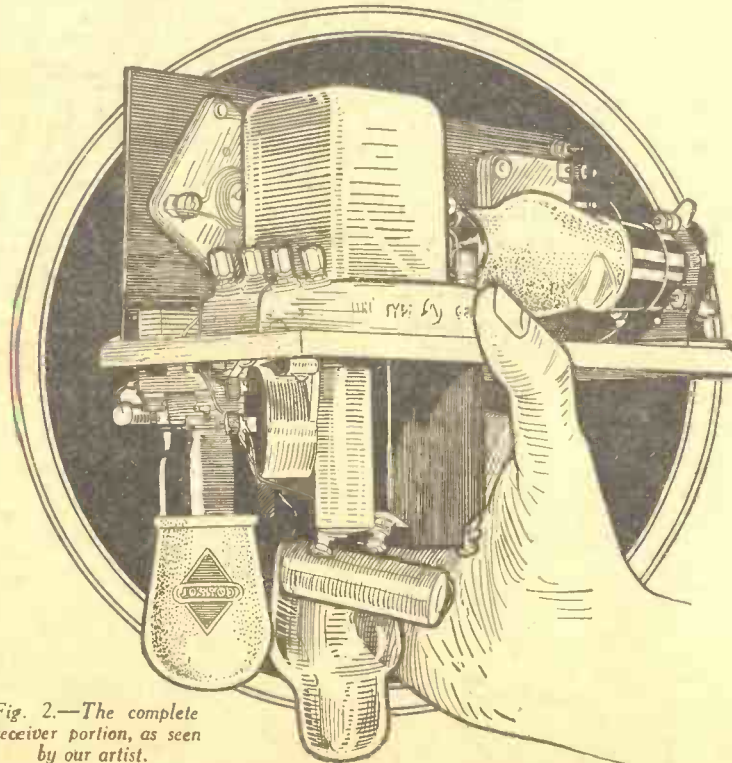


Fig. 2.—The complete receiver portion, as seen by our artist.

**Adjusting the Frame**

Some little care will be required in finding the correct anchoring point, as if the lid is not permitted to raise sufficiently the weight of the speaker will cause the lid to drop, whilst if the tape is attached too low down the lid will drop right back. Temporarily attach the tape by means of drawing-pins in order to find the most suitable position, and it will be found that a single support on the left of the cabinet will be adequate.

If all of

**Adjusting and Operating**

**Midgort**  
**Portable**

Final Hints on Constructing and Operating this Novel Portable, and Suggestions for Using External Aerial and Earth Systems.

By W. J. DELANEY



the connections are made as described last week the receiver may be switched on, and the wave-change switch turned so that the medium-wave band is selected. If the indicating plate supplied with the switch is fitted, the switch will have to be placed to the "On" position for this band, and to the "Off" position for long waves. Both tuning controls must be rotated together, although it will no doubt be found that they do not keep

**Absolutely Se**





**A Turntable**

As the receiver will have to be turned for each station required, it will obviously be desirable to fit some simple device to the base of the cabinet so that it may be swung round without the need for lifting it each time, and suitable ball-bearing turntables may be obtained from any good radio dealer. The keen experimenter will no doubt be able to devise a simpler arrangement from two plywood discs which will prove of equal advantage in

simply twisted round one end of the condenser, and the other wire end doubled and pressed into the aerial socket. Such an arrangement is of a rather temporary nature, and for a permanency a proper plug should be obtained to fit the aerial socket and the condenser should be soldered to the aerial lead.

It should be emphasised that when an outside or external aerial is used with a portable the internal frame aerial loses practically all of its directional property and there will be no need to turn it to provide maximum volume.

**Battery Voltages**

There will be no difficulty with this receiver in selecting the appropriate battery voltages, as the H.T. is supplied from the single maximum voltage socket, and the grid-bias is automatically obtained at a suitable value irrespective of the voltage of the H.T. battery.

exactly in step throughout the entire wave-range. If the direction of the nearest station is known, turn the receiver so that the long side of the lid points in that direction, and it should be found possible to hear the station without the use of the reaction control. As soon as the station is heard, turn the cabinet round in order to find the maximum position, and signal strength may be augmented in the ordinary way by means of the reaction control if desired.

this method of adjusting the receiver.

**External Aerial**

If the receiver is required as a permanent installation in the home, or if used in some remote part of the country where insufficient volume is obtained from the frame aerial pick-up, an external aerial may easily be added, as sockets are provided on the panel for both aerial and earth. For the former a standard outside aerial may be employed, or a simple throw-out aerial arrangement as specified for the Elf, and other portables, which have no frame aerial. A length of ordinary cotton-covered wire or lighting flex may be used and kept inside the cabinet when it is known that a bad locality is being visited, and it may be inserted into the aerial socket and thrown over any convenient tree or even laid upon the ground. A short wire inserted into the earth socket, and the other end pressed into the ground (after removal of the insulation) will be found of advantage even when no external aerial is employed. In the home, if a full-size outdoor aerial is to be used, a small-capacity fixed condenser should be connected between the lead-in and the aerial socket in order to increase the selectivity, as otherwise it may be found that there will be difficulty in separating the more powerful stations. A pre-set may be included as a permanent fixture in such a case and will enable the optimum capacity to be selected, or a small tubular .0001 mfd. condenser with wire ends may be used to avoid the difficulty of making connections. The end of the lead-in is



Fig. 3.—This illustration shows the detector and output stages, and the compact arrangement of the remaining components.

Both H.T. and L.T. batteries should give a reasonable period of active service, and as soon as any falling off in volume is noticed the accumulator should be recharged. No exact length of time can be given for either battery as this will depend upon the use to which the receiver is put. A good meter is, of course, an essential to the keen listener who wishes to obtain maximum performance from his equipment, and will avoid damage to the accumulator due to its being discharged too low at frequent intervals, and will also enable the life of the H.T. battery to be watched.

**Self-contained**





### WHAT IS QUALITY?

IT is surprising to find how many people there still are, owners of old-type receivers, who refuse to believe that the quality of reproduction being obtained is far from good enough. This is probably due to the fact that the human ear is generally very "accommodating," and rapidly becomes accustomed to a certain "tone," with the result that it accepts that as a standard. Although to-day the set-user has ample opportunities to hear good reproduction—at either a high-grade wireless store or at the local cinema—he does not, or will not, allow himself to appreciate that the reproduction which he has begun to enjoy is far from being natural and by no means like the sounds reaching the microphone at the transmitting station. One often hears a listener say: "Yes, I've heard several of these new receivers, but they don't touch mine for nice reproduction."

Probably the word "nice" explains a good deal, because there are so many people who have made themselves believe that the reproduction afforded by their loudspeaker suits their requirements. Nevertheless, if these same people would appreciate how unnatural the reproduction is, they would have no difficulty in liking considerably more reproduction which really is good.

I have stressed the human aspect to such an extent in order to try to convince those hundreds of listeners who have old-type sets that they are too easily satisfied, and that there is tremendous scope for improvement. There will be no attempt here to write in terms of "perfect" quality because, even if this could be obtained, the cost would be greater than the average reader could afford, whilst the ends might not appear to be justified by the involved means which must be adopted in order even to approach idealism.

### Volume Range

Those who make quality something very like a religion will explain that in order to obtain it you must have an amplifier capable of providing a maximum undistorted output of not less than five watts. There is probably a fair amount of truth in this, but it is still more important that the output stage be designed to handle, without distorting, very much greater signal strength than that which is normally obtained. The reason is that the loudest notes produced by, say, a brass band are of volume level thousands of times greater than a "pianissimo" note played on the violin. In order to obtain perfect "naturalness" the output must be such that the softest note played can be heard comfortably in the room; this means that the loudest note should be sufficient to "blow the roof off." It is important to mention in this respect, however, that the B.B.C. limit the variation to a certain extent in the control

room. This is partly because there is tremendous difficulty in transmitting the extremely wide range, and partly in the interests of listeners as a whole.

It is obvious that the control-room engineers should allow less amplification between the microphone and transmitter when a full band is playing than when, for example, a play is being broadcast. For this reason the "sound range" of the receiver need not be anywhere near as great as is theoretically necessary. At the same time it will be understood from what has been written above that the output valve must have a lot in reserve if it is to reproduce, through the speaker, the loudest of notes without overloading, and without the softest being inaudible.

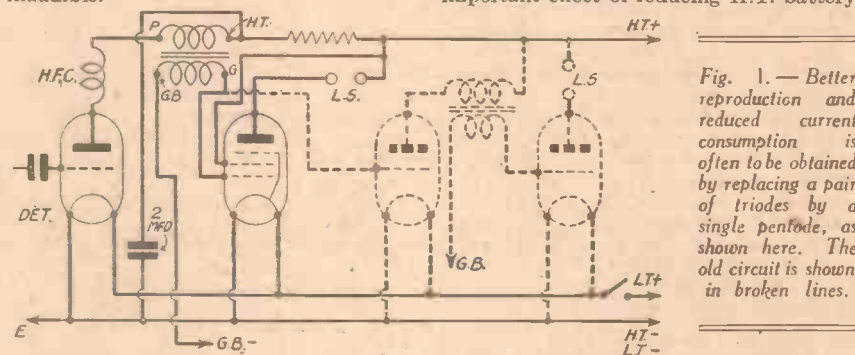


Fig. 1.—Better reproduction and reduced current consumption is often to be obtained by replacing a pair of triodes by a single pentode, as shown here. The old circuit is shown in broken lines.

### Make This Test

The best and simplest method of judging the effectiveness of the output stage is to connect a modern moving-coil speaker to the set (if your own is an "unknown factor" you can generally borrow a speaker from your dealer for comparison) and then to turn the volume control full on. If there is any harshness or "grating" on loud passages you can be sure that the output stage is not working as well as it should. It might not be necessary to make any drastic alteration, since it will be found that a marked improvement is apparent when the H.T. voltage is increased, the G.B. voltage being increased proportionately. If this does not produce the desired effect it will probably be worth while to replace the output valve by one with a larger rated undistorted output and lower amplification factor. But do not expect this to produce greater volume—the reverse will probably be the case, but the quality should be decidedly better.

### A Simple Alteration

Where two low-frequency stages are employed—we are dealing principally with battery sets—it will frequently be found better to dispense with one of these and to replace the first one by a pentode, as shown in Fig. 1. Provided that the transformer feeding this is of good quality it will nearly always be noticed that

reproduction is better—despite the fact that pentodes are still considered by many to be inferior to triodes when quality is concerned. This is actually a fallacy given a pentode of modern type, and the fact that one intervalve coupling is saved results in the improvement. It is true that a pentode generally emphasises the higher frequencies, making reproduction somewhat high-pitched, but in many cases this is not an advantage because other parts of the set have the opposite effect. Should the speaker sound rather too shrill after the modification it is a perfectly easy matter to fit a simple tone control consisting of either a fixed condenser having a capacity of between .001 mfd. and .01 mfd. between the speaker terminals, or by connecting a variable resistance in series with a fixed condenser between the anode of the output valve and earth, as shown in Fig. 2.

### Old Portable Sets

In view of the season it is worth pointing out that the above modification can very well be applied to many of the old-type portable receivers still in use which have five valves—nearly always arranged as two H.F.—Detector—two L.F. Besides improving quality, the alteration has the important effect of reducing H.T. battery

current, especially if a high-efficiency pentode such as the Cossor 220 H.P.T. is used. On other than portable sets it is better to use a valve such as the Cossor 220 P.T. when the H.T. current of about 14 mA (at 120 volts H.T.) can be afforded. This valve provides greater handling capacity and cannot normally be overloaded when used in either a "straight" or superhet circuit.

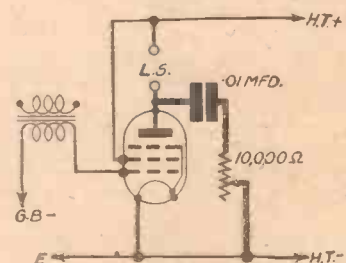
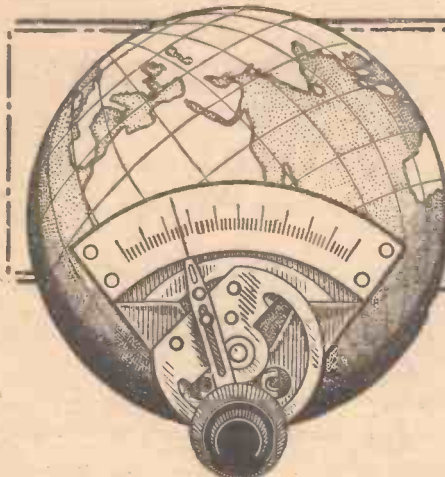


Fig. 2.—A simple tone control (shown in heavy lines) for preventing shrill reproduction when using a pentode.

Be more critical, and if your set is really old consider the possibility of making a new one. There is an ample choice in the list of receivers which have been described in PRACTICAL WIRELESS during the past year. You will find a list of these on page 498 in this issue.





# SHORT WAVE SECTION

## NOTES FOR SHORT-WAVE EXPERIMENTERS

The Subjects Discussed in this Article Include Stage Gain and Reaction, L.F. Amplification, and Pick-up Noises. By A. W. MANN

**A**LTHOUGH sensitivity and volume, amongst other things, are most desirable features in a short-wave receiver, the more sensitive a receiver happens to be, the more likely it is to pick up noise.

A receiver in which noise over-rides signals is definitely bad, and cannot be tolerated, but every signal received is unfortunately accompanied by a certain amount of hissing or other background noise, and in order to obtain satisfactory reception precautions must be taken to reduce noise to the minimum. It is safe to assume that nobody has ever built an experimental receiver which, on test, proved to be of such outstanding merit that further improvement was impossible.

Comparisons between T.R.F. and superheterodyne short-wave receivers are common, but nevertheless somewhat unfair relative to noise. I do not mean to infer that superhets are not noisy, but that critics, when making comparisons, conveniently, or so it seems, overlook important factors.

For example, multi-stage T.R.F. receivers are also noisy, but to a lesser degree, simply because the amplification per stage compared with a superhet employing an equal number of valves is much lower.

The superheterodyne having a higher stage gain and greater sensitivity delivers a greater signal output. Thus it will be appreciated that noise is also amplified to a greater degree. If, however, the experimenter designs and builds a multi-stage T.R.F. receiver capable of providing an output equal to the superhet, it will be found that an equal amount of noise will be in evidence.

Experimenters, in some instances, base their opinions as to the merits and demerits of high-frequency receivers on the amount of volume obtainable, and spend quite a lot of time trying out different methods of applying reaction together with various amplification systems in order to further increase volume.

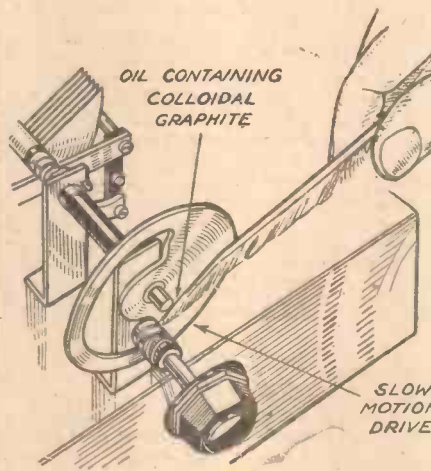
### Stage Gain and Reaction

Taking into account the end in view, such enthusiasm is misdirected. By all means try different methods of applying reaction, but not with the idea that there is one method which will increase signal volume to a greater extent than the rest.

Whilst there are various methods of applying reaction, it should be understood that there is a definite stage gain limit obtainable by the application of reaction. No matter the method adopted, type of circuit or valve used, the gain obtainable due to the application of reaction remains the same.

To attempt further increase would result in instability.

A multi-valve receiver of poor performance generally incorporates an inefficient detector circuit of low sensitivity, and experimenters sometimes attempt to off-set this disadvantage by extra stages of amplification at low frequency, in order to boost the signal. Reaction is brought into effect, and the reaction control is pushed to the absolute limit, thus maximum overall gain is obtained.



A feather is useful for applying a little lubricant to the condenser spindle for ensuring silent action.

Now maximum reaction or regeneration effects, and maximum sensitivity, are two entirely different things and this point is worth a few minutes' study. Under the circumstances outlined reaction is not used to the best advantage, because it is used to make up for a deficiency, and not, as it should be, to further increase efficiency.

### L.F. Amplification

When the detector is of poor sensitivity, signals, as may be expected, are comparatively weak, and the whole outfit lacks punch. Applying reaction to the limit increases signal volume and brings up noise to a marked degree.

As the signal is further amplified at low frequency, so also is background noise. The final result is a much-too-high ratio in favour of noise at the expense of the signal.

The reason for this is that there exists a definite limit to useful amplification which is determined by permissible noise level. To carry matters to extremes, therefore, means that the net output over and above the permissible limit would be noise only, as the signal would be completely over-ridden.

Detector efficiency, sensitivity, and maximum gain per stage in detector L.F. and H.F. stages will result in a favourable signal ratio. It is, therefore, a wise plan to reduce L.F. amplification to one stage if transformer coupling is used, and obtain additional amplification on the H.F. side when multi-stage receivers are contemplated.

### A Question of Pick-up

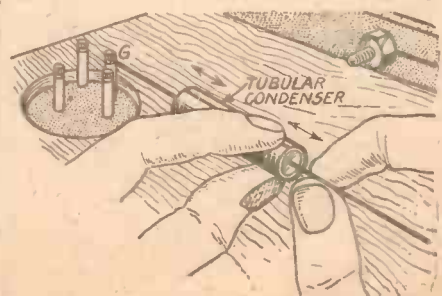
One fact not generally realised is that it is possible with a short-wave receiver to pick up noise whilst the actual wavelength to which the set is tuned is free from noise. This state of affairs revolves around short-wave aerials, and raises an interesting point of discussion.

One experimenter favours a short aerial because he can obtain sufficient volume with good selectivity and comparative freedom from noise. It is, of course, quite possible to design an aerial system which has a low noise component. On the other hand, a long aerial is favoured because it provides plenty of pick-up. Pick-up in itself is a very desirable feature when applied to signals, but the fact that it will show the same impartiality to noise is sometimes overlooked.

However, once this is realised, experimenters turn their thoughts to methods of overcoming the trouble. I do not propose to comment upon the various methods which may be employed, but to draw attention to an effective and efficient method used for years by various commercial communication organisations to whom consistent point-to-point communication is of vital importance.

### Reducing Noise

The method consists in tuning the aerial in resonance to the received frequency, or in harmonic relation to that frequency. By doing so it is possible to reduce noise to a percentage not generally appreciated. The fact that noise may be produced inside the receiver should not be overlooked.



Make sure that the wire-end connectors of fixed condensers are not loose and making bad contact, by testing to see if there is any possible end movement.

Valve noises, especially in A.C. operated receivers, are not unknown, but are less troublesome nowadays than a few years ago.

One form of noise producer is, however, well known to the experienced amateur. For example, a coil shield, the sides of which fit inside the base, the latter being riveted to the chassis with eyelets. A certain amount of rocking is apparent on examination, thus, contact between base and chassis is intermittent and so produces crackling.

Badly-soldered and high-resistance joints, also slack connections, produce the same effects. A general overhaul of soldered joints when a chassis is on the bench will often result in better performance. If spring-type shielding is used on the H.F. side, it is advisable to make quite sure that this

makes proper contact with coil cans where it passes through the walls of the latter.

### Metal Cabinets

Metal screening cabinets are becoming very popular as the advantages of efficient screening are appreciated. Experimenters who make their own, however, are apt to use material of too light gauge, in order to cut down expense, but it is a mistake to do so. If stout gauge material, firmly bolted together, is used, freedom from crackling will be assured.

Everyone with experience of metal panels will agree that thin gauge aluminium, even though supported by brackets, is a constant source of trouble, and should not be used.

So far as static noises are concerned

every location presents an individual problem and solution, and whilst it is permissible to lay down general rules for guidance, these should not be regarded as hard-and-fast rules.

A little painstaking experiment sometimes begets a simple solution. One important factor, however, must be realised: it is that there is not at present any known method which may be adopted which will totally eliminate noise, although it is of course possible to reduce it and strike a happy medium.

Under existing circumstances, the most suitable receiving apparatus and associated equipment is that which enables the listener or experimenter to obtain clear signals with a low background ratio. In the main, clarity and quality should be the objectives.

**D**URING the past few days of the Colombian transmitters the two most frequently heard have been HJ1ABP, Cartagena, on 31.25 m. (9,600 kc/s), which has now raised its power to 800 watts, and usually opens its broadcasts with an electrical recording of Sousa's famous march, *El Capitan*; and HJ1ABJ, Santa Marta, on 49.79 m. (6,025 kc/s) which, as an interval signal, features a four-note gong.

An acquaintance informs me that he has picked up a programme from a new station in the Dominican Republic; it would appear to be H11J, San Pedro de Macoris, previously on 41.15 m., and now working on 51.15 m. (7,290 kc/s). The power has been raised from 100 watts, and according to an announcement will be increased to 500 watts in July or August. It is operated by a local newspaper, *El Este*, of which the name is frequently coupled with the call-letters during announcements. The schedule is: Daily (exc. Sundays), B.S.T. 12.25-13.40; 17.40-19.40 and 00.10-05.40; on Sundays from 17.40-20.40 only. The address to which reception reports should be sent is: Radio emisora H11J, Apartado Postal, 207, San Pedro de Macoris (Dominican Republic).

### Colombian Transmissions

So far the wavelengths used by the Colombian short-wave broadcasters have been peculiarly changeable, but it is pleasant to learn that, in future, we shall find them fairly regularly on the channels given to them. Most of these stations, according to Government regulations, have been compelled to increase their power to a minimum of 1 kilowatt, failing which they were threatened that their licence would only permit them to work on the medium-wave broadcasting band. In view of the discrepancies to be seen in most published lists, you would do well to make a note of the official frequencies on which the stations have been requested to work: HJ1ABP, Cartagena, 9,600 kc/s (31.25 m.); HJ1ABG, Barranquilla, 9,583 kc/s (31.31 m.); HJ5ABD, Cali, 9,540 kc/s (31.45 m.); HJ1ABJ, Santa Marta, 9,520 kc/s (31.51 m.); HJU, Buenaventura, 9,510 kc/s (31.55 m.); HJ1ABE, Cartagena, 9,500 kc/s (31.58 m.); HJ4ABP, Medellin, 6,135 kc/s (48.90 m.); HJ1ABB, Barranquilla, 6,128 kc/s (48.96 m.); HJ3ABX, Bogota, 6,122 kc/s (49 m.); HJ4ABD, Manizales, 6,110 kc/s (49.10 m.); HJ4ABE, Medellin, 6,097 kc/s (49.20 m.); HJ3ABF, Bogota, 6,073 kc/s (49.40 m.); HJN, Bogota, 6,060 kc/s (49.50 m.) and 5,965 kc/s (50.29 m.); HJ3ABD, Bogota, 6,050 kc/s (49.59 m.); HJ3ABH, Bogota, 6,012 kc/s (49.90 m.).

## Leaves from a Short-wave Log

### Ecuador

Another newcomer to the ether of which I have only been given scanty details is HCDT (possibly HCBT?), Ambata (Ecuador), from which tests are being carried out on 45.59 m. (6,581 kc/s). The announcements and call are only given out in the Spanish language. Another correspondent writes me that he has logged the call as HCVD on that wavelength. There is some doubt about the call-letters in view of the fact that a small station at Ambata (HCVT) worked last winter on 41.1 m. (7,300 kc/s). It is probably the same transmitter operating on a higher wavelength. As some of the Ecuadorian broadcasters have been heard in Europe, it would appear that a search is called for. Try between B.S.T. 04.00-05.00, and take as a jumping-off point the condenser readings of either H14D, Trujillo City (45.73 m.—6,560 kc/s), or TI-RCC, San José (45.8 m.—6,550 kc/s), which happen to be the nearest channels above the desired station.

### Addis Ababa

Listeners who some months ago were lucky enough to log one or two of the special broadcasts from ETB, Addis Ababa (Abyssinia), on 25.09 m. may be interested to learn that although the station was closed down on the occupation of the capital by the Italians, it has since been brought into operation, not for ordinary radio broadcasts, unfortunately, but for telegraphic traffic with Rome. Radio telephony tests, however, have been picked up on this wavelength between B.S.T. 21.00-22.00, which leads one to believe that the plant is being overhauled and brought up-to-date. Daily more and more stations are being converted for the use of radio telephony, and you may have noticed the number of Russian transmissions met with when searching on short- and ultra-short-wave channels. One of the latest is RVU, Vladivostok (U.S.S.R.), on 21.75 m. (13,790 kc/s), which tests with Moscow daily between B.S.T. 12.30-13.30, and in the course of the transmission tries out a few gramophone records.

### New Russian Transmitters

Moscow has added two more short-wave broadcasters to its network for the trans-

mission of talks in English, Spanish and German. You will find RW96, a 20-kilowatt, on both 19.76 m. (15,180 kc/s) and 31.51 m. (9,520 kc/s). On the lower wavelength, at present, broadcasts are limited to Sundays at B.S.T. 19.20, when, in succession, talks are given in Spanish and English; on 31.51 m. there is a daily transmission from midnight to 02.00 B.S.T. As the 19.76 m. channel is also used by Daventry Empire GSO, the transmissions clash for roughly one hour, and some adjustment should be made.

Although listeners in the British Isles frequently log reception of a number of South American broadcasts, it is some time since I heard that anyone had picked up a Peruvian transmission. Possibly, in the near future this may not be such a rare occurrence, as OAX4G, Lima, which acts as the short-wave outlet of OAX4B, in the Peruvian capital, will increase its power to 2 kilowatts in August. The channel used has been 48.15 m. (6,230 kc/s), but I am advised that it may be raised to the neighbourhood of 50 metres. The station is on the air from B.S.T. 01.00-04.00. Address: Estaciones radiodifusora OAX4B y OAX4G, Avenida Abancay, 915, Lima, Peru.

### Brussels

In view of the success achieved by the Brussels broadcasts through ORK, Ruysselede (29.04 m.), the Belgian PTT authorities have decided to extend this service. In addition, as the Ruysselede transmitters, when not broadcasting programmes, are used for radiotelegraphy and radiotelephony with New York, Buenos Aires, Rio de Janeiro and the Far East, the construction of an 80-100 kilowatt station is to be put in hand without delay. It will be used for the Brussels short-wave programmes as occasion arises.

Some time ago in these notes I mentioned that the Czech Government was building a powerful s.w. transmitter at Podebrady, near Prague, to be solely used for the relay of radio entertainments for overseas listeners. The following frequencies have now been officially allotted to this station, of which the call-sign is registered as OLR: 21,450 kc/s (13,899 m.); 15,320 kc/s (19.5 m.); 15,230 kc/s (19.70 m.); 11,875 kc/s (25.26 m.); 11,760 kc/s (25.51 m.); 11,745 kc/s (25.54 m.); 9,504 kc/s (31.57 m.); 6,115 kc/s (49.06 m.); and 6,010 kc/s (49.92 m.). We may therefore expect to hear tests on a number of these channels before a final selection has been made.

# BALLAST RESISTORS

## FOR UNIVERSAL MAINS SETS

Some Interesting Points Concerning the Determination of Resistance and Wattage Figures for Different Types of Set

By FRANK PRESTON

IN making a receiver for operation from D.C. mains—and this includes universal receivers—it is customary to include some form of resistor in series with the valve heaters to regulate the voltage applied to them. In fact, the only case to which this does not apply is when using foreign valves with heaters designed for operation at the full mains voltage. The skeleton heater circuit shown in Fig. 1 shows the method of including the resistor in circuit; for simplicity the heaters of the four valves are shown as being connected "in line," although in practice it is usual to start by connecting one side of the detector heater to the negative mains lead, joining the other side to the H.F. valve or valves, finally passing to the power valve, rectifier, ballast resistor, and positive side of the mains (D.C.).

### Series Connections

Arbitrary voltage figures have been assigned to the valve heaters in Fig. 1, and it has been assumed that they each require a current of .2 amp. The question which generally arises is how can the correct value be found for the resistor marked R. It can be seen that the total voltage dropped across the heaters of the four valves shown is 106, because this is equal to the sum of the voltage ratings of the separate valves. And if it is assumed that the voltage of the mains supply is 200 it becomes evident that the voltage which must be dropped by the ballast resistor is 94. Using Ohm's Law, which states that the resistance required is equivalent to the voltage to be dropped divided by the current, we see that the value of R should be 94 divided by .2, or 94 multiplied by 5 (since .2 is the same as 1/5). The value is thus found to be 470 ohms. In practice it would probably be found satisfactory to use a 500-ohm resistor, as being the nearest standard value, but if voltages in excess of 200 might be applied to the set a tapped resistor would be desirable, with tapings for, say, 200, 215, 230, and 250 volts.

### Lamp-type Resistor

So far the matter is quite straightforward, and the simple calculations involved depend upon the direct use of Ohm's Law. But there are often several other aspects to be considered, as, for instance, when it is proposed to use an electric-light bulb as ballast resistor. In this case the resistance values of the available lamps are not known; instead, the lamps are graded according to their wattage rating. At first glance this might not appear to complicate matters in the least, because we know that the wattage is equal to the voltage drop multiplied by the current passed. Thus, one might (wrongly) say that a suitable lamp for use in the position marked R would be one of 94 times .2 watts—rather less than 20 watts. This at first appears reasonable, because the method is perfectly correct for finding the minimum wattage rating for a wire-wound resistor. It would, in fact, be correct for a lamp, if that lamp were rated at 20 watts at 94 volts. The wattage figure would still be sufficiently accurate if the lamp were for 100-volts operation, but it would certainly not apply to a 200-volt lamp.

### Peculiarities

This is obvious when it is considered that a 200-volt, 20-watt lamp passes a current of .1 amp. (20 divided by 200), and that the current required by the heaters is double this figure. We must in a case such as this take the resistance value and current into consideration, ignoring the voltage drop, which merely leads to complications. But how can we find that wattage of a 200-volt lamp which will pass just .2 amp. when wired in series with the valves, one might ask. Well, we know that wattage is equal to current squared times resistance, or  $I^2R$ , and we know that the resistance required is 470

other words, there will be an appreciable voltage surge when the set is first switched on, and this must necessarily place a heavy strain on the heaters.

A carbon-filament lamp, on the other hand, is extremely good, because its properties are just the reverse; the resistance of the filament becomes less as it approaches incandescence. This is the effect which is wanted, and by using a lamp of this kind we ensure that the voltage applied to the valves increases from zero to the correct figure after the set has been switched on. Carbon lamps are not used to any great extent nowadays, but they are still available.

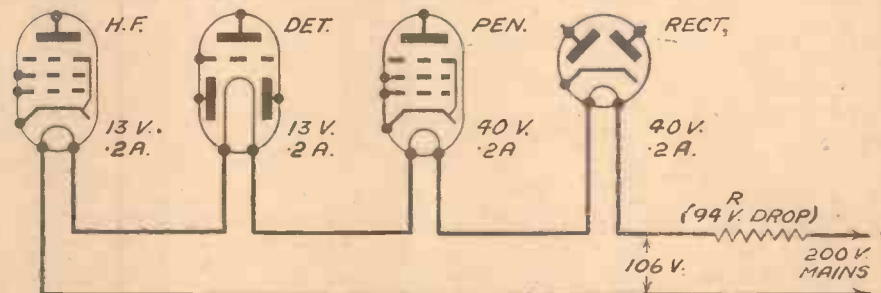


Fig. 1.—Heater circuit showing the valves in series with the ballast resistor, marked R.

ohms, the voltage rating of the lamp being 200. We also know that the current passed in amps. is equal to the voltage divided by the resistance, so we can substitute figures in the formula:  $W=I^2R$ , when we get:

$$\text{wattage} = \frac{200}{470} \times \frac{200}{470} \times \frac{470}{1}, \text{ or } \frac{40,000}{470}$$

which is approximately 85 watts. There is no standard lamp of this rating, so we must either give up the idea of a lamp resistor or use one of 100 watts (400 ohms) in series with a 70-ohm resistor.

A possible alternative is to use a 100-volt, 20-watt lamp, as mentioned above or, by trial calculation, find another standard type of lamp with the necessary resistance value.

It should be stressed that the use of a metal-filament lamp in a circuit such as that under consideration is by no means good practice, due to the fact that the resistance of a filament of this type is considerably lower when cold than it is when hot. And as the wattage rating is based on the resistance of the filament when hot, it will be appreciated that the value will be

### Voltage Regulation

It should be emphasised, however, that lamp-type resistors are only really worth while when the set is to be operated from one standard voltage. If it is required for use on both A.C. and D.C. mains of voltages between, say, 200 and 250, the ballast resistor which has been considered above should be replaced by a barretter. This is similar in construction to an electric lamp, but is so designed that its resistance varies in proportion to the applied voltage. Thus, if the voltage is increased, its resistance automatically increases, the result being that the current is maintained at a constant level. Barretters are not graded according to wattage rating, nor according to resistance, but according to the current which they are designed to pass and the range of voltage-drop which they cover. Thus, a standard barretter is rated at .2 amp., 90-230 volts. This could be used in place of R in the circuit shown in Fig. 1, when the set could be fed from supplies between 200 and 336 volts.

## PROGRAMME NOTES

### Lelia Gousseau

THE Northern Ireland Orchestra, conducted by Peter Montgomery, will play works by French composers in a concert on August 1st. The soloist is Lelia Gousseau, a French artist, who ranks with the leading pianists of the day. She had a brilliant record at the Paris Conservatoire, and since her student days has appeared in the principal cities of Europe. The programme includes Ravel's Concerto for pianoforte and orchestra, "Reveries and

Passions," the first movement of Berlioz' Fantastic Symphony, "Le Roi's amuse" by Delibes, and Petite Suite by Debussy. Lelia Gousseau will also play Debussy's Pagodes" and "L'ile Joyeuse."

### Night Time in Lincolnshire

FOLLOWING the success of last month's "Lincolnshire Night's Entertainment," a similar programme is projected for July 24th from the Northern Regional. While it is not yet possible to give specific details the programme will no doubt be a composite one, including broadcasts of concert parties and variety from seaside resorts such as Cleethorpes and Skegness and from the ancient city of Lincoln.

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# 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.

## THE WALTHAMSTOW AND DISTRICT RADIO SOCIETY.

ON July 4th, at the Society's headquarters, a demonstration and lecture was given by G5VY on Ultra High Frequency apparatus. Several transmitting and receiving sets were demonstrated, two of the transmitters being of a type never before seen by the public; these were of G5VY's own design, and were absolutely stable without the aid of crystal control.

Particulars of the Society may be obtained from the Secretary, W. T. Cooper, 2, Station Road, Walthamstow, E.17.

## RADIO, PHYSICAL AND TELEVISION SOCIETY.

HAVING held several 5-metre field days, the above Society proposes to hold one on 2½ metres in the near future. In view of this, a lecture was given on Friday, July 10th, entitled "2½-Metre Apparatus for Reception and Transmission," by our president, Dr. C. G. Lemon, A.M.I.R.E. A super regenerative receiver, as in the case of 5-metre reception, is used, and it is found more convenient to use a separate "quenching" valve. Receiver operation presents no difficulty, as was demonstrated by Dr. Lemon when he showed his receiver in operation, transmissions from his nearby 2½-metre transmitter being received with perfect quality.

The transmitter is of an extremely simple nature, in fact it consists of little more than a small power valve and two H.F. chokes. Nevertheless the lecturer said that he had been able to maintain consistent contact with a station 1½ miles away, using a minute power, in addition to the fact that there are many obstructing steel frame buildings.

So far as it is possible to tell, the lecturer said the propagation of signals of 2½m. length seems to be better than that of those of 5m. Much information on this subject will, it is hoped, be collected at the coming field day. Those requiring further particulars are asked to write to the Hon. Sec., Mr. M. E. Arnold, 12, Nassau Road, Barnes, S.W.13.

# CATALOGUES RECEIVED

## WORLD LISTENING ON FERRANTI.

FERRANTI LTD., of Moston, Manchester, have just issued a well-illustrated brochure giving particulars of a useful range of Ferranti all-wave receivers and radiograms. Included in the range are the Parva A.C. and Universal table models, the Nova, Magna and Arcadia superhets. There are also the Parva All-wave Radiogram, the Arcadia Superhet A.C. Radiogram, and the Gloria, a high-class superhet all-wave high-fidelity autogram. Variable selectivity is incorporated in the Arcadia and Gloria receivers, and full particulars of this important feature, together with specifications of all the models in the range, are given in the brochure.

A new device, which is incorporated in all the new Ferranti superhets, is a magnascopic dial which makes short-wave tuning simple by means of enlarged readings which are seen through a window just above the main dial. Some interesting information on "How to Log Distant Stations on Your Ferranti Set" is also included in the brochure.

# BOOKS RECEIVED

## PROMENADE CONCERTS—1936.

THE B.B.C. have just issued the full prospectus of the forty-second season of Promenade Concerts which opens on Saturday, August 8th, at the Queen's Hall.

It is just ten years since the "Proms" were taken over by the B.B.C. and reorganised. Thanks to this timely intervention, the continuation of one of the most popular and characteristic features of musical life in London was assured, and the "Proms" entered upon a fresh period of prosperity, which shows no signs of waning.

Sir Henry J. Wood will conduct, and Marie Wilson will lead the B.P.C. Symphony Orchestra of ninety players throughout the season of eight weeks.

The general scheme remains unaltered. Monday nights will again be devoted mainly to Wagner (this year the selection of excerpts has been made with a view to securing greater coherence, and reducing "scrappiness" to a minimum); new and modern works will be mostly heard on Tuesdays and Thursdays; the classical nights will be Wednesdays (Bach and Brahms alternately) and Fridays (Beethoven); while Saturdays will be "popular," with a sprinkling of first performances. The latter will include five works by British composers, and five of foreign composers. There will be a "one-man concert" on Tuesday, August 11th, when William Walton will conduct a programme of his own works, including the Viola Concerto, played by William Primrose, and the first Symphony.

# 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.

S. D. K. (Edinburgh). We have no details here and suggest you communicate direct with the Radio Society of Great Britain.

W. C. (Glasgow). It would appear that you are applying the mains supply through the earth lead, and therefore should fit a fixed condenser between the earth lead and the earth terminal. It may also be wise, if this has not already been done, to fit a small fixed condenser in the aerial lead in a similar manner.

J. R. (S.W.7). See PRACTICAL AND AMATEUR WIRELESS dated May 9th last, page 205.

J. A. B. (Huntingdon). We have no blueprint of the unit mentioned, and no details have been given by us at any time in this particular direction.

H. W. (Birmingham). Get into touch with G. Game, Esq., 40, West Drive, Heathfield Park, Handsworth, Birmingham 20. He is the Hon. Sec. of the Slade Radio Society. DX is simply an abbreviation for "distance," and is the term now generally adopted for long-distance working.

P. M. (Shepherd's Bush). There is no standard, and therefore we cannot tell you the connections. A good radio dealer should be able to trace them out for you.

C. F. L. (Workshop). The speaker could not be used in this particular receiver, but if your supply is D.C. a 2,500-ohm speaker could be obtained and connected direct across the D.C. mains. If an A.C. supply is available you would have to obtain a mains transformer and rectifier to supply the necessary D.C.

N. M. C. (Walsall). You must have a working knowledge of the Morse Code, and full details concerning the licence may be obtained on application to the Postmaster-General's office.

G. R. W. (Lancaster). No winding details have been given for the type of coil mentioned by you.

S. D. (Catcliffe, Nr. Rotherham). The Utility dial referred to is designed for use with condensers following the straight line wavelength law and coils having inductances of 157 and 2,200 μH. It should therefore suit your receiver. An article on the subject of Push-pull appears in this issue and answers your second query.

T. H. (Leeds, II). The connections to the middle pin are simply ignored and the power valve is plugged into the valve-holder in the ordinary way. Of course, the grid bias will have to be modified to suit the different type of valve.

P. H. R. (S.W.18). It is only bad if the bias is lower than that recommended for the particular valve you are using at the H.T. which is applied. Some valves certainly only require 1.5 volts at 120 volts H.T., whereas others may require as much as 15 volts with the same H.T. You must therefore consult the valve-makers' data sheet for the particular valve you are using.

J. P. (Hindley). The extra wire is for earthing purposes and is intended for use with a three-pin socket, in which the extra pin is joined directly to earth. At the other end the wire is connected to the metal casing of the apparatus which is used and this prevents the user from receiving a shock in the event of an internal short-circuit. A frequency changer must be used in a superhet, but there are several different types.

A. J. F. (Smethwick). So far as we are aware there is no book dealing with the subject mentioned by you.

J. P. (Sparkbrook). The addition of a push-pull output stage should certainly be worth while. We cannot suggest any simple way of making the receiver "all-wave."

A. B. (Kilburn, N.W.6). If the 5-valver is fitted with the standard 2 amp. valves the heater circuit at 240 volts will consume 48 watts. The three-valve A.C. set will have standard 4-volt 1 amp. valves and consume 12 watts, and even allowing for heavy transformer losses the total mains load will be far less than 48 watts.

G. H. (Newry, Co. Down). The insulators are manufactured by Messrs. Ward and Goldstone, of Pendleton, Manchester, and the price you mention still holds good. The reference number for the long type is R27/198 (21ins. overall in length). The smaller twin-group insulators are 2s. per dozen with 3in. grooves or 3s. per dozen with 3in. grooves.

G. H. (Braunton, N. Devon). We have no blueprints or other details of commercial receivers, and therefore suggest that you get in touch direct with the makers of the receiver.

A. C. (Shoreditch). We cannot state whether the set is defective or not. It should certainly give a better performance than that stated, but your aerial-earth system may be defective or a component may be faulty.

R. S. (North Marrow). The accumulators were made by the Hercules Company, but as mentioned last week, we are now unable to trace the company and they appear to have gone out of business.

F. J. C. (Dagenham). We cannot supply blueprints of the Telsen receivers.

B. A. B. (Ipswich). The European representative of the International Short Wave Club is A. E. Bear, of 10, St. Mary's Place, Rotherhithe, London, S.E.16.



By JACE

**"Hot-Stuff" Radio on Board H.M.S. Lupin**

A GOOD story is told of the adventures of a Marconiphone Model "273" Battery Receiver aboard the good ship H.M.S. *Lupin*.

The set was supplied to the crew of the *Lupin* and was paid for out of the Mess Fund. On a run to Iceland the performance of the "273" fell off owing to the unsuitability of the aerial-earth arrangement coupled with the distance from broadcasting.

To remedy this it was decided to couple the "273" to the main aerial used for wireless telegraphy work through a switch which, of course, would be opened when the main transmitter was working. This arrangement worked like a charm until one day someone left the switch closed. Now the Marconiphone "273" has always been held to be a particularly robust instrument, but 25 amps. at 7,000 volts is quite a bit more than it can stand.

The set was reduced to a charred mass, which is not to be wondered at, but what did surprise the Commander no end was the appearance of a perfectly good dinner suit which was hanging in his cabin. On reaching it down from where it was hanging against the iron bulkhead, he found that the coat had no back and the trousers no seat; all due to the fact that the blazing "273" (which was on the other side of the bulkhead) had transmitted its heat, with dire results.

All of which goes to prove that Marconi sets are indeed "hot stuff!"

**A Lighthouse Broadcast**

ON August 5th a novel broadcast will be given in the National programme, when engineers under the direction of Mr. S. J. de Lotkiniere, the B.B.C. Outside Broadcast Director, will bring to listeners some of the experiences and surroundings of the lighthouse-keeper tending the lights and signals in the tower of Beachy Head Lighthouse. Microphones at various points will pick up the sweep of the sea and the night calls of birds still hunting for food on the rocks below. Lighthouse watching is a lonely profession but a not unmusical one. There is the symphony of the wind sweeping continuously round the tower, the lashing of the sea, the siren voices of ships and always the mew of the sea-gull. The B.B.C. commentator will look out from the window and watch for the ships as they pass safely up the Channel.

The only unknown quantity is the weather. When the storm blows round Beachy Head, there is no question of coming and going in the lighthouse boat. The engineers and commentators have been warned to come with food and clothing as provision against forced detention by a storm. This should make a vivid broadcast, bringing to listeners a night life far removed from that of the entertainment world, but one of greater importance.

Should the broadcasting party be imprisoned in Beachy Head lighthouse, they will tell listeners of the life during a storm lived by the guardians of the shipping ways.

**Memories of Long Ago**

LISTENERS who dislike sentiment in any form will probably hurl figurative brickbats at the programme of "Old Memories," which will be broadcast from Northern Ireland on July 25th. Not that the performers propose to wallow in an orgy of sentimentality, but they are certainly going back to that vague period generally known as the Good Old Days, in search of songs and melodies for a programme which must of its nature appeal to the middle-aged and the elderly rather than the very young. Each item will be



*Reginald Foort, solo organist at the Paramount Theatre, London, who has just recorded for "H.M.V." a Medley of Daly's Favourites, is seen listening to his record at "H.M.V." studios, Abbey Road, which he recently visited.*

identified with the period of its origin by some appropriate reference to the current events of the same time. The artists are Rosemary Dinsmore (soprano) and Herbert Thorpe (tenor), who will sing both solos and duets of the kind that might have been heard in the drawing-rooms and the theatres of our grandmothers' and great-grandmothers' days, and the B.B.C. Northern Ireland Orchestra, conducted by Philip Whiteway, will play such items as the Overture to "Martha," Haydn Wood's arrangement of the well-known intermezzo, "I hear you calling me," and finally, Hermann Finck's selection, "More Melodious Memories."

**Olympic Games Broadcast**

IN connection with the broadcast of the Olympic Games which take place in Berlin from August 1st to 16th, it has now been arranged that Commander Woodrooffe and Mr. Wells, of the Outside Broadcast Department, shall proceed to Berlin for the duration of the games.

During the few days at their disposal before the Games begin, they are to select commentators from among the British parties attending the games, one to cover each form of sport. They will then, where necessary, train these commentators in the difficult art of sports commentary.

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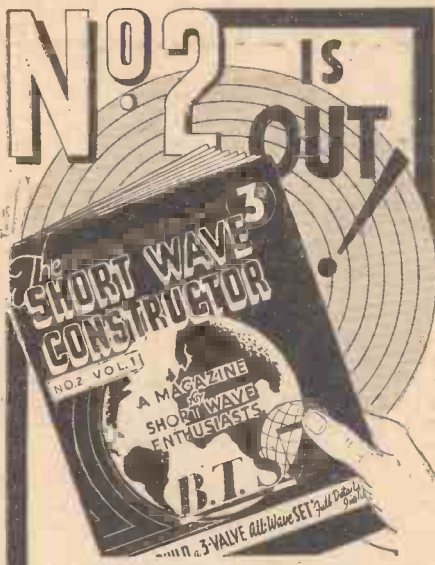
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**COMPONENTS TESTED IN OUR NEW LABORATORY**

**New Mazda Rectifier**

A NEW rectifier is announced by the Edison Swan Electric Company in the 350 volt 120 mA type. This is provided with a 4-volt 2.2-amp heater and has a standard 4-pin base. The type reference is LU4, and the maximum output under typical operating conditions is 120 mA at 400 volts. The price is 15s.

**Milnes H.T. Batteries**

OWING to an increase in the price of raw material, Milnes Radio, Ltd., have found it necessary to increase the prices of their battery fillers. The Pump Filler now costs 7s., and the Syphon Filler 3s. 6d. The smaller syringe filler may be obtained for 1s. 3d.

**McMichael 367 Portable**

THE latest McMichael 4-valve portable is now released in either blue or maroon rexine, and the measurements of this novel receiver are 13½in. by 13½in. by 7½in. deep. The circuit consists of an S.G. stage, followed by a normal triode detector, with two parallel-fed transformer coupled L.F. stages, an economy pentode feeding the permanent-magnet M.C. loud-speaker. The H.T. consumption is 7.5 mA. and the L.T. consumption .55 amps., and provision has been made for headphone use. Sockets for the addition of external aerial and earth connections are provided, and three entirely separate scales, showing medium and long-wave stations and wavelengths, are fitted. Automatic grid-bias is employed, and the price of the complete receiver is £8 18s. 6d. The total weight of the receiver is 22½ lbs.

**Bulgin Pre-set Condenser**

A NEW pre-set air-dielectric condenser has now been added to the range of similar Bulgin components, and the new model has a total maximum capacity of 29 mmfd., with the usual dual arrangements for adjustments. The component is intended for either baseboard or panel mounting, and it may be included either above or below the baseboard, in the latter case a small hole serving for the insertion of a screwdriver for adjustment purposes. The rotor shaft is slotted at both ends for the accommodation of the adjusting instrument, and any device having a blade similar to a screwdriver may be employed. The spacing between the vanes is wide enough to permit of the condenser being used in high-voltage apparatus, and the insulation provided by the Ceramic base is adequate for all normal wireless apparatus. The price is 3s. 6d., and the overall dimensions are 1½ × 1½ × 2 ins.

**"Battery" Radio Without Batteries**

AN interesting news story of interest to all users of battery sets "broke" over the week-end. A leading set manufacturer, E. K. Cole, Ltd., has developed a receiver that does not depend on either mains power or H.T. batteries for operation. It is called the "No. H.T." set.

The importance of this new development cannot be over-estimated. It has been hailed as the "Diesel" of the radio industry, as sensational in its way as would be a car that ran without petrol or a steam engine without coal or oil.

Ekco claim for the new "No H.T." system that it:

- Eliminates battery replacements;
- Gives more constant power;
- Is cheaper in operation;
- Is lighter in weight; and
- Is easier to connect.

Full details of the system are not yet available, nor has the price of the set been announced. It is understood that a built-in generating system is used in conjunction with ordinary L.T. accumulators of the type used in every battery set.

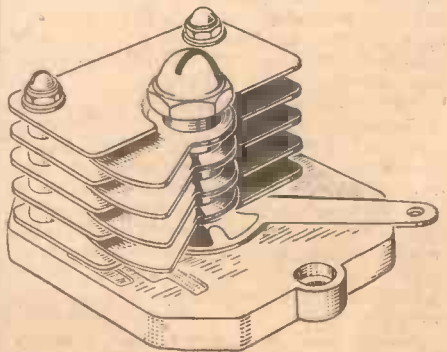
Experts forecast a vast future for "No H.T." radio, and it is likely to revolutionise the sales of battery receivers during the coming year.

**A New Service Aid**

SERVICE engineers will be interested in the new Philco Test Set, which is made up from the 088 all-wave Signal Generator and a circuit tester, and is to be released shortly by Philco. The tester is a meter of the multi-range Weston type, having a resistance of 1,000 ohms per volt and designed for measuring A.C. or D.C. volts up to 1,000, current up to .5 amps, and resistors up to 500,000 ohms. Capacities from .002 to 10 mfd. may also be read and the meter may be included in an output circuit for direct output readings. The price is 12 guineas with a special reduction to Philco dealers and members of the R.M.S. The complete test set with leatherette covered carrying case costs £18, or £16 10s. to Philco dealers and members of the R.M.S.

**A Conversion Unit**

FOR the use of listeners with D.C. mains receivers on an A.C. supply a special conversion unit is now being marketed by Messrs. Harmer and Simmons. This rectifier is intended for connection to the mains and enables the D.C. receiver to be operated when the mains supply is changed over to A.C. and a smoothed D.C. output is then fed to the receiver. The price of the unit is £5.



The pre-set condenser from the Bulgin range referred to above.

# LETTERS FROM READERS

The Editor does not necessarily agree with opinions expressed by his correspondents.



All letters must be accompanied by the name and address of the sender (not necessarily for publication).

## Recording Reminiscences

By DEREK OLDHAM

WERE it possible for me to take you back to that Year of Grace, 1924, you would find gramophone recording methods very different from those of to-day.

It is only twelve years ago that I was recording Gilbert and Sullivan with Edna Thornton, Robert Radford, Henry Lytton, Violet Essex and Peter Dawson. Peter was—and still is—a great fellow, but in the recording studio his keen sense of humour could be very disconcerting. Being a person with an affinity for “the giggles,” it takes little to make me laugh, and in those early days of gramophone recording I had to beg Dawson not to make a funny remark before the red light came on.

He always said he wouldn't, but just as the light cue was given we were all laughing heartily. Peter Dawson not only had a keen sense of humour, but he was an excellent fellow to work with.

## Dashing Obligatos

There was another recording horn in the studio, but that was monopolised by the orchestra, who occupied wooden tiers which extended from floor to ceiling. Some of the players were perched so high that their music stands had to be suspended from the ceiling. I shall never forget those amusing occasions when a member of the orchestra had to dash to the recording horn to do his obligato! One had to work fast.

With the introduction of electrical recording, the “His Master's Voice” studios at Hayes underwent considerable structural alteration. By a strange twist of fate I was actually the first English tenor to use the new electrical recording apparatus introduced by H.M.V. in 1925.

## Those Early Microphones

But I certainly admit that, at first, we found the microphones a little strange, although we soon realised the advantages of electrical recording over the acoustic method.

Microphones, then, were very different from the highly-efficient moving-coil type used to-day at the H.M.V. studios at Abbey Road, London. I remember that they had to be draped with blankets to prevent resonance.

Realising the need for more centrally situated recording studios, “His Master's Voice” leased, in 1926, the Queen's Hall and Kingsway Hall, London, and it was a very strange sight to find these great concert halls enshrouded with heavy drapings, from the circle down to the stalls. It covered in the whole place and gave the impression of a London theatre prepared for the cleaners.

## Nerves

In 1931 I made my first recording at the H.M.V. new studios in Abbey Road, London. That was another occasion I shall not forget.

The only thing with which I have been troubled, in my experience of recording, is “microphone nerves”—a state of mind that is shared by many of my contemporaries. It is not quite the same as “mike fright”—it is the inability to complete the final recording after having made several perfectly good waxes. Yes, I certainly remember those occasions—especially when we had to repeat a song six or seven times before it was pronounced satisfactory.

## A Short-wave Superhet

SIR,—I heartily endorse the suggestions of G5LP re short-wave superhet. There must be hundreds of S.W. enthusiasts whose ambitions run to something more than the usual 0-v-1 and 1-v-1 circuits, and who are only waiting for publication of the necessary particulars to get going. I would suggest that a stage of pre-selection, and a C.W. beat oscillator are essential to any circuit you may decide on.

Hoping to see a really “hot” S.W. super described in your excellent journal.—F. HALPIN (Midhurst).

## A Good Log with an 0-v-1 Receiver

SIR,—As I have not seen a log from this district published in your paper, I enclose mine, which might interest you. I first started on short waves in February, 1936, and my set is an 0-v-1, with inverted L-type aerial, 45ft. long, 12ft. high at the far end and 15ft. high at the house end. The log of the stations received since February last is as follows:

Amateurs (20 m.): 178 U.S.A.; also VE3JV, VE2BG, VE1CN, VE1CR, VE3QS, VE3EO, VE9AL, VE1AM, VE3FM, VE1EF, VE1AW, VE1BA, VE1L, VE2BA, VP2PA, PY2CK, CO1I, CO2KY, CO7CX, VP9R, VP6YD, VP6YB, VO1I, VO4Y, HH5PA, HI5X, NY2AE, HI7G, OA4R, F8NV, F8IL, CT1BY, I1KG, OZ1D, SU1RO, SU1CH, CT1GY, EA5BE, IT1KM, CT2AB, SM5SX, EA7AI, LY1J, EA7BB, CT1CV, LA1G, F8PTY, FA3JY, FR8CC, EA4BM, EA3GY, EA3AC, EA2AP, G5ML and G5NI.

Amateurs (40 m.): sixty-three G stations, numerous Continental stations, and over thirty broadcast stations, including W2XAD, 3XAL, JVP and COCH.

I have received “Veris” from VK2ME, VQ7LO, COCH, W3XAL, 2XAD, 2HJN, 9CSI, 9BBU, CO2KY, HH5PA, VE2BG, SU1RO, LY1J, RW59, LRU, HAS3, and EAQ.

Incidentally, I never listen-in after 12.30 a.m., and I wonder how many readers can equal this log with a 0-v-1 set.—E. BARRS (Andover).

## How Old is a Valve?

SIR,—Referring to the letter of F. G. E. (Shepherd's Bush), in your issue of July 11th, concerning the life of valves, he and other readers may be interested to know that in 1926 I built a H.T. eliminator using two Marconi U4 rectifying valves (half-wave).

Two years later I constructed another eliminator, using a Marconi U5 rectifying valve (full wave). The first eliminator was then handed over to my sister for her receiver.

A few weeks ago the U5 valve of my eliminator had to be replaced, as the emission was insufficient for the needs of my receiver, after eight years' use. The two U4's in my sister's eliminator are still going fine after ten years' use.

I have also three 2-volt valves which I have had in continual use for over six years, and which are still up to makers' specification on test.

Thanking you for several hints I have picked up through reading your valuable journal.—P. HOOPER (Portsmouth).

## Received on a Single-valver

SIR,—You recently published in your pages my log of stations received on a single-valver. Since that time I have also received VK3LR, VUB and W1XK. My greatest interest now lies in the 40-metre amateur band, and I logged the following British stations in the four days July 6th to 9th:

G's: 12TC, 15MZ, 2QL, 2KC, 2AH, 2AJ, 2NL, 2RP, 2ZT, 2MR, 2DI, 2XG, 2XO, 2UU, 2UQ, 2PX, 2IU, 2QO, 5AA, 5KF, 5CG, 5ZJ, 5XN, 5PH, 5JL, 5WO, 5RR, 5QO, 5LO, 5TP, 5YA, 5CC, 5CJ, 5XG, 6UX, 6KG, 6BM, 6OX, 6UI, 6ID, 6DW, 6CW, 8AB, 8BA, 8AX. I also received EI4L and EI8J.

My set is still a 0-v-0, using a 35ft. inclined antenna.—A. P. L. CASLING (Hale, Cheshire).

## Correspondents Wanted

SIR,—I am very interested in short-wave reception and transmission, and should be very pleased to get in touch with any reader who is interested in these subjects, and who is preferably about my own age—16 years.—ROBERT BROADBENT (440, Wakefield Road, Dalton, Huddersfield).

SIR,—I should like to get in touch with any short-wave listener living in the Salisbury district of Wiltshire.—J. W. DICKINSON (Colliery House, Alfreton Road, Nottingham).

CUT THIS OUT EACH WEEK

# Do you know

—THAT switches for the interruption of a high-voltage circuit should always be of the quick make-and-break (Q.M.B.) type.

—THAT a temporary fixed condenser may be made up by inserting a piece of paper between two ordinary coils.

—THAT high notes are directed in a straight line from the loudspeaker, whereas low notes radiate and are thus heard at various angles.

—THAT unscreened coils, chokes and similar inductive components should not be placed close to earthed metal surfaces.

—THAT automatic grid-bias arrangements in a battery receiver avoid the risk of running a valve with too much or too little bias, due to the discharge of the H.T. battery and the deterioration of the G.B. battery.

—THAT the performance of a portable receiver is often vastly improved by making an earth connection to it.

—THAT if no earth socket is provided in the above type of receiver, a short wire should be attached to the L.T. negative terminal and joined to earth.

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 Neenes, Ltd., 8-11, 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.

# Practical and Amateur Wireless BLUEPRINT SERVICE

**PRACTICAL WIRELESS**  
**STRAIGHT SETS.** Battery Operated.  
One-valve : Blueprints, 1s. each.

Date of Issue. No. of  
Blueprint

All-Wave Unipen (pentode) ..	—	PW31A
Two-valve : Blueprints, 1s. each.		
Four-range Super Mag Two (D, Pen) ..	11.8.34	PW36B
Three-valve : Blueprints, 1s. each.		
Selectone Battery Three (D, 2 LF (trans.)) ..	—	PW10
Sixty-Shilling Three (D, 2 LF (R.C. & trans.)) ..	2.12.33	PW34A
Leader Three (SG, D, Pow.) ..	—	PW35
Summit Three (HF Pen, D, Pen) ..	18.8.34	PW37
All-Pentode Three (HF Pen, D (pen.), Pen.) ..	22.9.34	PW30
Hall-Mark Three (SG, D, Pow.) ..	—	PW41
Hall-Mark Cadet (D, LF Pen (B.C.)) ..	16.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D (pen), Pen) (All-Wave Three) ..	13.4.35	PW40
Genet Midget (D, 2 LF (trans.)) ..	June '35	PM2
Cameo Midget Three (D, 2 LF (trans.)) ..	8.6.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen) ..	17.8.35	PW53
Battery All-Wave Three (D, 2 LF (R.C.)) ..	31.8.35	PW55
The Monitor (HF Pen, D, Pen) ..	8.2.36	PW61
The Tutor Three (HF Pen, D, Pen) ..	21.3.36	PW62
The Centaur Three (SG, D, P) ..	—	PW64

Four-valve : Blueprints, 1s. each.		
Fury Four (2 SG, D, Pen) ..	—	PW11
Beta Universal Four (SG, D, LF, Cl. B) ..	15.4.33	PW17
Nucleon Class B Four (SG, D (SG), LF, Cl. B) ..	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen) ..	—	PW34C
Battery Hall-Mark 4 (HF Pen, D, Push-Pull) ..	—	PW46
F. J. Camm's Superformer (SG, SG, D, Pen.) ..	12.10.35	PW57

**Mains Operated.**

Two-valve : Blueprints, 1s. each.		
A.C. Twin (D (pen), Pen) ..	—	PW18
A.C.-D.C. Two (SG, Power) ..	7.10.33	PW31
Selectone, A.C. Radiogram Two (D, Pow.) ..	—	PW19

Three-valve : Blueprints, 1s. each.		
Double-Diode-Triode Three (HF Pen, D.D.T., Pen) ..	10.6.33	PW23
D.C. Ace (SG, D, Pen) ..	15.7.33	PW25
A.C. Three (SG, D, Pen) ..	—	PW29
A.C. Leader (HF Pen, D, Power) ..	7.4.34	PW35C
D.C. Premier (HF Pen, D, Pen) ..	31.3.34	PW35B
Ubique (HF Pen, D (Pen), Pen.) ..	29.7.34	PW36A
Armada Mains Three (HF Pen, D, Pen) ..	18.8.34	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, 2LF (R.C.)) ..	17.8.35	PW54
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen) ..	31.8.35	PW36
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) ..	—	PW45
Universal Hall-Mark (HF Pen, D, Push-Pull) ..	9.2.35	PW47

**SUPERHETS.**

**Battery Sets : Blueprints, 1s. each.**

£5 Superhet (Three valve) ..	—	PW40
F. J. Camm's 2-valve Superhet (two-valve) ..	13.7.25	PW52
F. J. Camm's £4 Superhet ..	—	PW58

**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 ..	—	PW59
F. J. Camm's Universal £4 Superhet 4 ..	11.1.26	PW60

**SHORT-WAVE SETS.**

Two-valve : Blueprints, 1s. each.		
Midget Short-Wave Two (D, Pen) ..	15.9.34	PW38A
Three-valve : Blueprints, 1s. each.		
Experimenter's Short-wave Three (SG, D, Power) ..	—	PW30A
The Prefect. 3 (D, 2LF, RC and Trans.) ..	8.2.36	PW78

**PORTABLES.**

Three-valve : Blueprints, 1s. each.		
F. J. Camm's £1F Three-valve Portable. (HF Pen, D, Pen) ..	16.5.36	PW65
Four-valve : Blueprints, 1s. each.		
Featherweight Portable Four (SG, D, LF, Cl. B) ..	—	PW12

**MISCELLANEOUS.**

S. W. Converter-Adapter (1 valve) ..	—	PW48A
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**AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS.**

Blueprints, 6d. each.		
Four-station Crystal Set ..	—	AW427
1934 Crystal Set ..	—	AW444
150-mile Crystal Set ..	—	AW450

**STRAIGHT SETS. Battery Operated.**

One-valve : Blueprints, 1s. each.		
B.B.C. Special One-valver ..	—	AW387
Twenty-station Loud-speaker One-valver (Class B) ..	—	AW440
Two-valve : Blueprints, 1s. each.		
Melody Ranger Two (D, Trans) ..	—	AW388
Full-volume Two (SG, Det, Pen) ..	—	AW392
Iron-core Two (D, Trans) ..	—	AW395
Iron-core Two (D, QPP) ..	5.8.33	AW396
B.B.C. National Two with Lucerne Coil (D, Trans) ..	—	AW377A
Big-power Melody Two with Lucerne Coil (SG, Trans) ..	—	AW338A
Lucerne Minor (D, Pen) ..	—	AW426

Three-valve : Blueprints, 1s. each.		
Class-B Three (D, Trans, Class B) ..	2.4.33	AW386
New Britain's Favourite Three (D, Trans, Class B) ..	15.7.33	AW394
Home-Built Coil Three (SG, D, Trans) ..	—	AW404
Fan and Family Three (D, Trans, Class B) ..	25.11.33	AW410
£5 5s. S.G.3 (SG, D, Trans) ..	2.12.33	AW412
1934 Ether Searcher: Baseboard Model (SG, D, Pen) ..	20.1.34	AW417
1934 Ether Searcher: Chassis Model (SG, D, Pen) ..	—	AW419
Lucerne Ranger (SG, D, Trans) ..	—	AW422
Cosior Melody Maker with Lucerne Coils ..	—	AW423

P.W.H. Mascot with Lucerne Coils (D, RC, Trans) ..	—	AW377A
Mullard Master Three with Lucerne Coils ..	—	AW424
£5 5s. Three: De Luxe Version (SG, D, Trans) ..	19.5.34	AW435
Lucerne Straight Three (D, RC, Trans) ..	—	AW437
All Britain Three (HF Pen, D, Pen) "Wireless League" Three (HF Pen, D, Pen) ..	3.11.34	AW451
Transportable Three (SG, D, Pen) ..	—	WM271
£6 6s. Radiogram (D, RC, Trans) ..	—	WM318
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
Iron-core Band-pass Three (SG, D, Pen) ..	June '34	WM362
1935 £6 6s. Battery Three (SG, D, Pen) ..	—	WM371
Graduating to a Low-frequency Stage (D, 2LF) ..	—	WM378
P.T.P. Three (Pen, D, Pen) ..	June '35	WM389
Certainty Three (SG, D, Pen) ..	Sept. '35	WM393
Minutube Three (SG, D, Trans) ..	Oct. '35	WM396
All-wave Winning Three (SG, D, Pen) ..	Dec. '35	WM400

Four-valve : Blueprints, 1s. 6d. each.		
65/- Four (SG, D, RC, Trans) ..	—	AW370
"A.W." Ideal four (2SG, D, Pen) ..	18.9.33	AW402
2 H.F. Four (2SG, D, Pen) ..	—	AW421
Crusaders' A.V.C. 4 (2HF, D, QP21) ..	18.8.34	AW445
(Pentode and Class-B Outputs for above: blueprints 6d. each) ..	25.3.34	AW445A
Self-contained Four (SG, D, LF, Class B) ..	Aug. '33	WM331
Lucerne Straight Four (SG, D, LF, Trans) ..	—	WM350
£5 5s. Battery Four (HF, D, 2LF) ..	Feb. '35	WM381
The H.K. Four ..	Mar. '35	WM384

Five-valve : Blueprints, 1s. 6d. each.		
Super-quality Five (2HF, D, RC, Trans) ..	May '33	WM320
New Class-B Five (2SG, D, LF, Class B) ..	Nov. '33	WM340
Class-B Quadradyne (2SG, D, LF, Class B) ..	Dec. '33	WM344
1935 Super Five (Battery Superhet) ..	—	WM370

These blueprints are full size. Copies of appropriate issues containing descriptions of these sets can in most cases be obtained as follows:—  
"Practical Wireless" at 4d., "Amateur Wireless" at 4d., "Practical Mechanics" at 7½d., and "Wireless Magazine" at 1/3d., post paid. Index letters "P.W." refer to "Practical Wireless" sets, "P.M." to "Practical Mechanics" sets, "A.W." refer to "Amateur Wireless" sets, and "W.M." to "Wireless Magazine" sets. Send (preferably) a postal order (stamps over sixpence unacceptable) to "Practical and Amateur Wireless" Blueprint Dept., Geo. Newnes, Ltd., 8-11, Southampton Street Strand, W.C.2.

**Mains Operated.**

Two-valve : Blueprints, 1s. each.		
Consoelectric Two (D, Pen) A.C. ..	23.9.33	AW403
Economy A.C. Two (D, Trans) A.C. ..	—	WM286
Unicorn A.C./D.C. Two (D, Pen) ..	Sept. '35	WM394

Three-valve : Blueprints, 1s. each.		
Home-lover's New All-electric Three (SG, D, Trans) A.C. ..	—	AW383
S.G. Three (SG, D, Pen) A.C. ..	—	AW390
A.C. Triodyne (SG, D, Pen) A.C. ..	19.8.33	AW399
A.C. Pentaquester (HF, Pen, D, Pen) A.C. ..	23.6.34	AW439
Mantovan A.C. Three (HF, Pen, D, Pen) A.C. ..	—	WM374
£15 15s. 1936 A.C. Radiogram (HF, D, Pen) ..	Jan. '36	WM401

Four-valve : Blueprints, 1s. 6d. each.		
All Metal Four (2 SG, D, Pen.) ..	July '33	WM329
Harris Jubilee Radiogram ..	May '35	WM386

**SUPERHETS.**

**Battery Sets : Blueprints, 1s. 6d. each.**

Modern Super Senior ..	—	WM375
Varsity Four ..	Oct. '35	WM395

**Mains Sets : Blueprints, 1s. 6d. each.**

1934 A.C. Century Super A.C. ..	10.3.34	AW425
Heptode Super Three A.C. ..	May '34	WM359
"W.M." Radiogram Super A.C. ..	—	WM366
1935 A.C. Stenode ..	Apr. '35	WM385

**PORTABLES.**

Four-valve : Blueprints, 1s. 6d. each.		
Midget Class-B Portable (SG, D, LF, Class B) ..	20.5.33	AW389
Holiday Portable (SG, D, LF, Class B) ..	1.7.33	AW393
Family Portable (HF, D, RC, Trans) ..	22.9.34	AW447
Two H.F. Portable (2 SG, D, QP21) ..	June '34	WM363
Tyers Portable (SG, D, 2 Trans) ..	Aug. '34	WM367

**SHORT-WAVERS—Battery operated.**

One-valve : Blueprints, 1s. each.		
S.W. One-valve converter (price 6d.) ..	—	AW329
S.W. One-valve for America ..	—	AW429
Roma Short-waver ..	—	AW452

Two-valve : Blueprints, 1s. each.		
Ultra-short Battery Two (SO det, Pen) ..	Feb. '36	WM402
Home-made Coil Two (D, Pen) ..	—	AW440
Three-valve : Blueprints, 1s. each.		
World-ranger Short-wave 3 (D, RC, Trans) ..	—	AW355
Experimenter's 5-metre Set (D, Trans, Super-regen) ..	30.6.34	AW438
Experimenter's Short-waver ..	Jan. 19, '35	AW463
The Carrier Short-waver ..	July '35	WM300

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-valve Short-waver ..	Mar. '35	WM383

**Superhet : Blueprint, 1s. 6d.**

Simplified Short-wave Super ..	Nov. '35	WM397
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**Mains Operated.**

Two-valve : Blueprints, 1s. each.		
Two-valve Mains Short-waver (D, Pen) A.C. ..	—	AW453
"W.M." Band-spread Short-waver (D, Pen) A.C./D.C. ..	Aug. '34	WM368
"W.M." Long-wave Converter ..	—	WM380

Three-valve : Blueprint, 1s.		
Emigrator (SG, D, Pen) A.C. ..	—	WM362

Four-valve : Blueprint, 1s. 6d.		
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans) ..	Aug. '35	WM391

**MISCELLANEOUS.**

Enthusiast's Power Amplifier (1/6) ..	June '35	WM387
Listener's 5-watt A.C. Amplifier (1/6) ..	Sept. '35	WM392
Radio Unit (2v.) for WM392 (1s.) ..	Nov. '35	WM398
Harris Electrogram (battery amplifier) ..	Dec. '35	WM399
De-Luxe Concert A.C. Electro-gram ..	Mar. '36	WM403
New style Short-wave Adapter (1s.) ..	June '35	WM388
Trickle Charger (6d.) ..	Jan. 5, '35	AW492
Short-wave Adapter ..	Dec. 1, '34	AW456
Superhet Converter ..	Dec. 1, '34	AW457





# QUERIES and ENQUIRIES

## Making a Valve Tester

"I have recently opened a shop and deal in radio spares, etc. I have a fairly good range of instruments and am taking up set servicing, but I should like your assistance on one point about which I am not clear. I should like to build an instrument similar to those I have seen in American magazines which are designed for valve testing. It appears that a valve from a customer's set is simply inserted into a suitable socket and the dealer can tell whether the valve is good or not. The meters are marked 'Good' and 'Bad,' and the customer is thus able to see that you are not making him buy a new valve unnecessarily. Can you assist me to make up such an instrument?"—F. G. B. (Norwich).

THE building of a tester of the type described should not be difficult, but the provision of a meter showing good and bad is not such a simple matter from your point of view. Furthermore, it should not be necessary as a standard meter may be employed with the advantage of a wider field of use, and you can still assure your customers that you are giving genuine information. Make up a simple test unit and upon the panel mount valveholders suitable for all the types of valve now met with. Filaments, cathodes, grids, etc., should all be interconnected and a multi-contact selector-switch provided so that the necessary voltages may be applied. These should preferably be obtained from a mains transformer wound to deliver various voltages from 2 upwards. Arrange the switches so that the grid and anode are linked, and then the application of filament (or heater) voltage, together with a small anode voltage, will result in a flow of anode current. By plugging in a new or standard valve you can draw up a table of currents, and then upon plugging in your customer's valve the emission may be compared with the table which should, to assure your customer, be fitted to the cabinet containing the tester. We presume you are familiar with the best method of locating inter-electrode short-circuits, and this should be included in the tester.

## Connecting a Pick-up

"Some time back I purchased your book 'Fifty Tested Wireless Circuits,' for which I show my appreciation. I constructed Circuit No. 14 and have converted this into an ordinary broadcast band receiver, but now I want to use a pick-up on the set. Could you please tell me where the two leads should be taken?"—R. D. (Harrow).

THE pick-up must be joined between the grid of any valve and earth. In order to provide the necessary bias to a battery valve, however, the battery (or the appropriate tapping) must be joined between earth and the grid, and therefore, instead of making the connection direct to the earth line the pick-up lead is inserted into the appropriate socket on the grid-bias battery. To obtain maximum volume the pick-up should be joined to the detector valve in the circuit in question, and therefore the

lead or leads at present joined to the grid terminal of the detector valve-holder should be removed, and one lead from the pick-up joined at that terminal. A wander plug should then be attached to the remaining pick-up lead and this should be inserted into the 1.5 volt socket on the G.B. battery now in use for the L.F. stages. A changeover switch may, of course, be fitted to avoid the need for disconnecting the leads each time it is desired to change from radio to gram.

## Crystal Set Details

"Can you tell me where I can get a copy of the circuit of a four-station crystal set, and could you also tell me if there is a battery for a crystal set? If so, what kind, please?"—J. H. (Dublin).

## 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.

Please note also, that queries must be limited to two per reader, and all sketches and drawings which are sent to us should bear the name and address of the sender.

If a postal reply is desired, a stamped addressed envelope must be enclosed. Send your queries to the Editor, PRACTICAL AND AMATEUR WIRELESS, George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

BLUEPRINT AW.427 may be obtained from this office, price 6d., and gives details of a four-station crystal set. No battery is required with this particular receiver, but in some types of crystal set a special type of crystal detector is employed with which a low voltage may be used. This is the carborundum type of rectifier, and a voltage from 1.5 to 6 may be applied to improve the rectification properties. A potentiometer is generally used to select the best working voltage.

## A Home-made Condenser

"I have your issue of March 21st last, and I am about to build the Tutor Three. I have got the coils and most of the parts but I cannot trace the value of C5 as it is not shown in the blueprint."—G. E. H. (Bryn-mill, Swansea).

CONDENSER C5 is home-made, and the instructions for making up this condenser are given in the constructional article. It is the capacity obtained between two pieces of connecting wire twisted together, and on the blueprint is shown as a twist, similar to ordinary rope, from the two terminals on the coil unit. About three inches of ordinary connecting wire should be connected to each of the first two terminals and twisted for their entire length, taking care not to permit the bare ends to come into contact and avoiding a fracture of the insulated covering.

## An Energised Speaker

"I have a home-built five-valve set as per diagram enclosed. I am now anxious to obtain a new speaker and prefer an energised magnet type. Could you tell me the most suitable field resistance for this circuit and in what part it should be included for maximum current? I might mention that I am not keenly concerned with expense and therefore want the best."—J. S. (Glasgow, C.4).

THERE is no really convenient position in the circuit where the speaker could be included, without requiring some rather severe modification to the wiring. It could be used in the H.T. positive feed, but greater sensitivity could be obtained by connecting it direct across your D.C. mains. We therefore suggest that you select a field with a D.C. resistance of 2,000 or 2,500 ohms, which, connected across a 250-volt supply, would pass a current of just over 120 mA and provide a wattage of about 30.

## Two-Channel Receivers

"I am thinking of building a receiver to enable me to hear and see the forthcoming television transmissions. I wonder if it is yet possible to give me any help in designing a suitable receiver. I thought of using a single H.F. stage, with separate oscillators and intermediates, but you may be able to suggest something more simple or easier to operate."—B. W. (Holloway).

AT your address you should not require anything in the way of a powerful receiver for the sound section, although no doubt a fairly high stage-gain will be desirable in order to receive a brilliant picture. Thus you could use a simple set for the sound section, and this could be built up and pre-tuned to the sound wavelength and would require no further adjustment. On the other hand, you could use the arrangement you mention, or could build up an intermediate-frequency transformer of your own which would have two secondaries, and arrange for the frequency changer to produce a double-beat which could be separated out in the I.F. stages.

## A.C. Silver Souvenir

"I have been using the A.C. Silver Souvenir for some time, but a fault has developed which is proving rather elusive to trace. Volume has fallen off, and there is a peculiar form of distortion. I had a spare output valve and have tried this in substitution without tracing the trouble. Is there any simple way in which I can trace out a fault of this nature?"—P. E. R. (Dublin).

THE simplest scheme to adopt is to include a voltmeter and milliammeter in each stage of the circuit in order to ascertain which stage is receiving the wrong voltages, as some component has apparently broken down and the most likely place is in an automatic biasing circuit or in the H.T. feed. The Data Sheet which was published in our issue dated November 23rd, 1935, will prove of value to you, as it gives the principal current and voltage readings in various parts of the circuit and you can thus make a very simple check.

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

**Miscellaneous Advertisements**

Advertisements are accepted for these columns at the rate of 3d. per word. Words in black face and/or capitals are charged double this rate (minimum charge 3/- per paragraph). Display lines are charged at 6/- per line. All advertisements must be prepaid. All communications should be addressed to the Advertisement Manager, "Practical and Amateur Wireless," 8, Southampton Street, Strand, London.

**RECEIVERS, COMPONENTS AND ACCESSORIES**  
Surplus, Clearance, or Secondhand, etc.

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Everything a constructor requires. Lowest prices. No junk. Catalogue 14d. shows thousands of bargains. During summer, few only shown below.  
**RADIOMART.** Utility 2-gang uniknob and dial, 3/11, 1,500 vt. Tubular condensers, 6d.; Holsby electrolytics 8 mf. 500, 2/11, 4 x 4 mf., 1/6, 25 mf., 25 v., 1/-, etc.  
**RADIOMART.** Smoothing chokes, 20 by 120 m.a., 3/11; 100 ma., 2/11; 40 ma., 1/11. Telsen Ace transformers, 1/11. Radiograms, RG48, 2/9. BTH speaker, 2/11.  
**RADIOMART.** Varley iron-cored, 10/6. Bifocal dual-range coils. Very selective, 2/11; matched pair, 5/3.  
**RADIOMART.** Pushback wire 6 yds. 6d., heavy 9d.; 2 gross solder tags, 6d. Resincored solder, 9ft., 6d.  
**RADIOMART.** Centralab pots, all sizes, 1/6; switched, 2/-. Tubular glass fuses, 2d.  
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**RADIOMART.** Tolsen H.F. chokes, 1/11; screened 1/11. Utility 1936 SL wavelength dials, 3/11.  
**RADIOMART.** Lissen 3-gang superhet kit coils, two I.F.'s ganged condenser, ditto Bandpass, ditto 2-gang all wave, 10/- kit.  
**RADIOMART.** Traders' monster bargain parcels, value £4/10/0 for 10/-; also 5/- parcels.  
**RADIOMART.** Famous continental A.C. valves, 4/6. American Durtron, etc. All types, 3/6. Battery from 2/3.  
**RADIOMART.** Utility 8/6, microdisc dials, 3/11. Radiophone. 00016 short-wave condensers, 3/6. Series gap twin, 3/9.  
**RADIOMART.** Ceramic all brass microvariables, 15 mmfd., 1/4. 40 mmfd., 1/7. 100 mmfd., 1/10. Short-wave H.F.C., 9d.  
**RADIOMART.** Orders 5/- post free. Get our bargain catalogues. General 14d. Short-wave, 14d. 44, Holloway Road, Birmingham. Tel.: MID 3254.

All lines advertised last week still available.—**RADIO CLEARANCE**, 63, High Holborn, W.C.1. Tel.: Holborn 4631.

All goods previously advertised are standard lines, still available. Post card for list free.  
**VAUXHALL UTILITIES**, 163a, Strand, W.C.2. Over Denny's the Booksellers, Temple Bar 9388.

**CONVERSION UNITS** for operating D.C. Receivers from A.C. Mains, improved type, 120 watts output, at £2/10/0. Send for our comprehensive list of speakers, Resistances and other components.

**WARD**, 46, Farringdon Street, London, E.C.4. Telephone: Holborn 9703.

**MISCELLANEOUS**

**WIRELESS.**—"Marconi's" anticipate many vacancies shortly, so write for Free Prospectus to Britain's Leading Wireless Training Centre, Wireless College, Colwyn Bay, N. Wales.

**SHORT WAVE** on a crystal set. Full building instructions and crystal, 1/2 post paid.—**Radiomail**, Tanworth-in-Arden, Warwickshire.

**VISITORS TO LONDON** should get Newnes Handy Pocket Atlas and Street Guide to London. Edited by John Bartholomew & Son, Ltd., 18 coloured Maps, General Index to Streets and Railway Stations. 2s. from all booksellers.—George Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

"**WORKING MODELS** and How to Make Them." Edited by F. J. Camm, 3s. 6d.—This Book will appeal to all who are handy with tools. Contains complete instructions for the making of every kind of working model. Each model has been actually constructed in accordance with the details given and subjected to stringent tests. The instructions and diagrams are so clear that even the most elaborate model can be built without fear of failure. Obtainable at all Booksellers and Newsagents.—Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2.

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ALL POST ORDERS should be addressed to—**JUBILEE WORKS, 167, LOWER CLAPTON RD., LONDON, E.5.**  
 'Phone Amherst 2833 (Private Branch Exchange) Callers, as usual, to 20-22, HIGH ST., CLAPHAM, S.W.4. (Macaulay 2381.) and 165 and 165A, Fleet St., E.C.4 (next to Anderson's Hotel). (Central 2833.)  
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**SHORT-WAVE COILS** 4 to 6-pin types. 13-26, 22-47, 41-94, 78-170 metres, 1/9 each with circuit. Special set of 3 S.W. Coils, 14-150 metres, 4/-. with circuit. Premier 3-band S.W. Coil, 11-25, 19-43, 38-86 metres. Simplifies S.W. receiver construction, suitable any type circuit 2/-.  
**COIL FORMERS**, in finest plastic materials, 1 1/2 in. low-loss ribbed 4- or 6-pin, 1/- each.  
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**SUPERHET KIT**, 15/6 the lot. Telsen Band-Pass Superhet Coils, I.F.'s, 3-Gang Condenser, Disc Drive and chassis.  
**SPEAKERS**, K.B. 8" P.M.s 9/6, Goodman 7" P.M.s, 9/6, Rola 7" P.M.s, 10/-.  
**MAINS TRANSFORMERS.** Premier wire-end type with screened primaries.  
 H.T.S & 9 or H.T.10 with 4v. 4a C.T. and 4v. 1a C.T., 8/6.  
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 Any of these transformers with engraved panel and N.P. terminals 1/6 extra.  
**AUTO TRANSFORMERS**, step up or down, 60 watts, 7/6, 100 watts, 10/-.  
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**AMERICAN VALVES.** Genuine American  
**DUOTRON**, all types, 3/6 each. Hytron super quality, 3 months' guarantee, all types, 5/6.  
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**ELIMINATORS.**—Regentone (1936) Type W5a with trickle charger, 37/6; Type W1a (less trickle charger), 32/6.  
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**SOUTHERN RADIO BRANCHES.**—271/275, High Road, Willesden Green, N.W.10; 46, Lisle Street, W.C.2 All mail orders to 323, Euston Rd., N.W.1.  
**SOUTHERN RADIO**, 323, Euston Rd., London. S.N.W.1 (near Warren Street Tube). 'Phone: Museum 6324.

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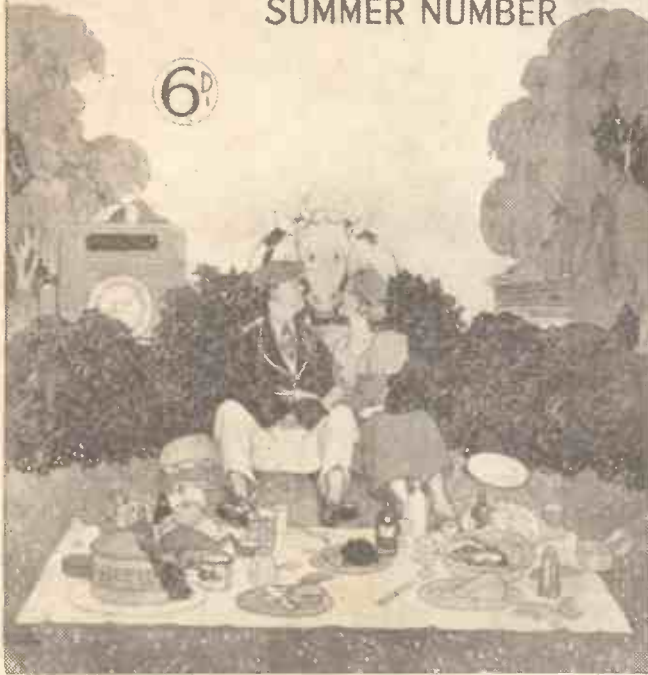
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Complete with valves, knobs, pilot lamps, leads, mains cable and plug. 12 months' guarantee. Deferred terms if desired. Cash £8 10s. with order, on 7 days' approval.

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Telephone: Bayswater 3201/2

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This coupon is available until August 1, 1936, and must be attached to all letters containing queries.  
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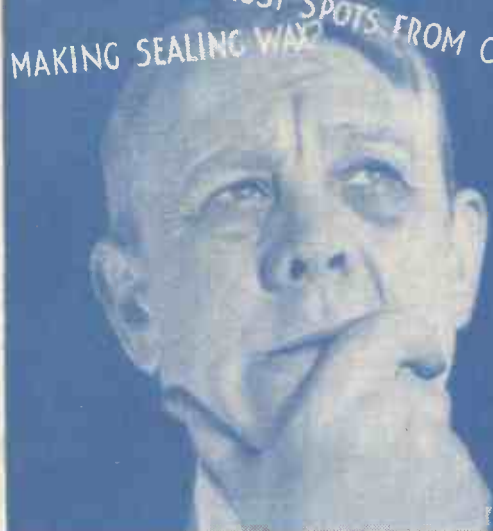
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