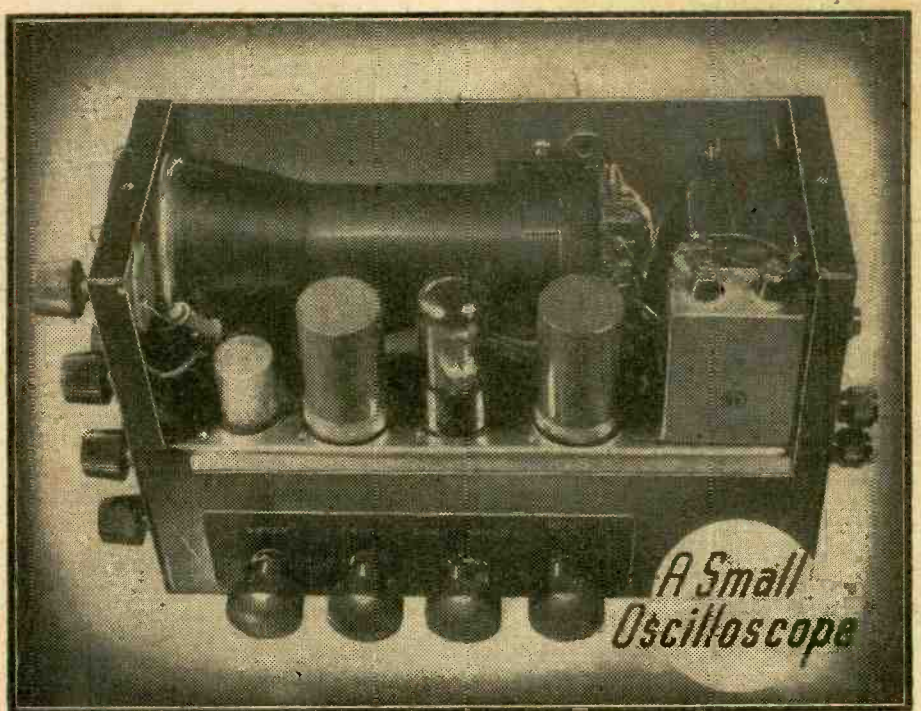
Practical Wireless

9d EVERY MONTH

AND PRACTICAL TELEVISION

Vol. 25. No. 518. || Editor: F. J. CAMM || SEPTEMBER, 1949



PRINCIPAL CONTENTS

Practical Wireless and PRACTICAL TELEVISION
17th YEAR OF ISSUE
EVERY MONTH
VOL. XXV. No. 518 SEPTEMBER, 1949
Editor F.J.CAMM

COMMENTS OF THE MONTH — BY THE EDITOR

Radiolympia

THE sixteenth National Radio Exhibition—Radiolympia—will be held between September 28th and October 8th and this year it promises to be an improvement even on its predecessors. There will be exhibits by the Royal Navy, the Army and the Royal Air Force, although strict secrecy is being maintained regarding the details. No doubt, however, there will be shown some of the more remarkable applications of the use of radar and radio.

Government exhibits will represent four establishments of the Ministry of Supply, and the Radar Research and Development Establishment will have a supersonic experimental tank to show how radar works. The Sonde radio-controlled balloon will be shown by the Telecommunications Research Establishment. As already described in this journal this balloon ascends to 39,000ft., carrying instruments for measuring wind velocity, temperature and humidity, radioing the results to its base.

Manufacturers, at the moment of going to press, have not released details of their exhibits, but it is known that some entirely new models of receivers—radio and television—will be on view. It is unlikely that there will be any great reduction in prices until purchase tax is removed.

The Signals Research and Development Establishment will stage an exhibit and the Royal Aircraft Establishment, Farnborough, will show radio transmitters and receivers for aircraft.

The Department of Scientific and Industrial Research is exhibiting for the first time. They will show apparatus for the location of storms by radio, and the plotting of storm areas will be carried out in public view based on readings received direct from Cornwall, Northern Ireland, Scotland and Dunstable. The measurement of the height and density of ionisation for forecasting the most favourable frequencies to be used in radio communications and broadcasting will also be demonstrated.

There will be a working model of the main runway at London Airport equipped with all the navigational aids, including the new bar and line artificial horizon lighting system. The display will include a model aircraft taking off from the runway in semi-darkness and making a circuit of the airport before coming in to land. The aircraft will be located by Ground Control Approach, at a scale distance of about four miles and its position shown to the public on a control console with position indicators arranged for direct viewing.

This journal will, of course, have a stand at the exhibition, where it will welcome readers.

Editorial and Advertisement Offices: "Practical Wireless," George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. 'Phone: Temple Bar 4363.
Telegrams: Newnes, Rand, London.
Registered at the G.P.O. for transmission by Canadian Magazine Post.

The Editor will be pleased to consider articles of a practical nature suitable for publication in "Practical 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 Wireless," George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

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

The Broadcasting Committee

THE Broadcasting Committee under the Chairmanship of the Rt. Hon. The Lord Beveridge, K.C., F.B.A., to consider the constitution, control, finance and other general aspects of the sound and television broadcasting services of the United Kingdom (excluding those aspects of the Overseas Services for which the B.B.C. are not responsible) and to advise on the conditions under which these services and wire broadcasting should be conducted after December 21st, 1951, held their first meeting in June.

The Committee will be glad to receive representations from organisations and individuals on any matters falling within their terms of reference. These representations should be sent in writing to the Secretary, Broadcasting Committee, General Post Office Headquarters, London, E.C.1, not later than October 1st.

Radio Wavelength Plan Adopted

A PLAN for the first complete assignment of radio frequencies for any region of the world has just been adopted in Washington by 25 countries and territories.

Conceived for the Western Hemisphere, the assignment plan diminishes confusion and interference in broadcasting by allocating radio wavelengths to the various types of broadcasters, including standard broadcast, aeronautical, maritime and amateur classes in the portion of the radio spectrum from 10 to 4,000 kilocycles.

The plan is based on allocations made at the Atlantic City Telecommunications Conference in 1947, where overall frequency assignments were made for three large world areas.—F.J.C.

ROUND THE WORLD OF WIRELESS

Broadcast Receiving Licences

THE following statement shows the approximate number of licences issued during the year ending May 31st, 1949.

Region	*Number*
London Postal	2,227,000
Home Counties	1,596,000
Midland	1,665,000
North Eastern	1,837,000
North Western	1,529,000
South Western	1,023,000
Welsh and Border	700,000
Total England and Wales	10,577,000
Scotland	1,104,000
Northern Ireland	193,000
Grand Total	11,874,000

Radio-telephone Installation at Fleetwood

BRITISH RAILWAYS have recently had installed at the Port of Fleetwood a very-high-frequency radio-telephony set for the purpose of providing ship to shore communication with the Isle of Man Steam Packet Company's vessels operating on the Fleetwood-Douglas summer service.

The installation renders possible, under all weather conditions, transmission of docking instructions and information as to weather, visibility and so forth, to vessels whilst still en route.

Hitherto, ships' captains often stood out at sea until they felt certain it would be possible to dock, but now that precise information on the situation can be given to the masters by the shore staff, delay in docking and departure of boat trains can be obviated. The apparatus is a Marconi "Seaphone."

Postal Service to Spain, Including the Balearic Islands

THE Postmaster General announces that insured letters may now be accepted for Spain and the Balearic Islands. The limit of insured value is £400.

Ekco's Part in Southend Press Week-end

A PARTY of some three dozen newspapermen, photographers and publicity officials were entertained at Southend during the week-end Friday June 10th to Monday June 13th by the Southend Branch of the Hotels and Caterers Association, the *Southend Standard*, the Southend Corporation and E. K. Cole, Ltd. Two celebrities from the entertainment world entered into the spirit of the occasion—Kim Peacock (Paul Temple) and Jimmy Hanley (star of "Holiday Camp" and other British Films). The visit ended with a tour of the Radio, Plastics and Lighting Divisions of the Ekco Works, and Mr. E. K. Cole was host at the final lunch attended by Southend's new Mayor, Councillor S. H. J. Bates, J.P.

Overseas Economic Surveys—Finland

A FURTHER volume in the series of Overseas Economic Surveys, a survey of economic and commercial conditions in Finland, was published for the Commercial Relations and Export Department of the Board of Trade, by H.M. Stationery Office, on Thursday, June 30th, 1949, price 2s. net.

A limited number of Press review copies are available at the Board of Trade Office, Millbank, London, S.W.1.

Murphy Dealers Visit to Ediswan Valve Factory at Sunderland

THE Ediswan Valve Factory at Cosmos Works, Pallion, Sunderland, was recently the venue of a visit made by 33 members of the West Riding Murphy Dealers' Association.

The party, welcomed to the factory by Mr. A. H. Lower, Works Superintendent, split up into small groups, each with an experienced guide.

The various processes in valve manufacture were fully explained, and, as was proved by the number and diversity of questions asked, the Radio Dealers

"Call in Paul Temple"—a party of Southend's guests during a tour in the Radio Division, E. K. Cole, Ltd. Left to right: M. W. T. Pattison of the News Chronicle, *A. N. Walker of the* Daily Graphic, *Wesley Clapton of the* Daily Herald, *an Ekco guide and Kim Peacock (Paul Temple of the B.B.C.).*

showed more than an ordinary interest. Special attention was given by the visitors to the methods employed to reduce the difficulties of certain tasks and to allow comfortable and efficient working conditions.

The Edison Swan Electric Co., Ltd., and particularly the company's personnel at Sunderland, are proud of the many congratulatory messages received since the visit from the dealers concerned.

Midland Television Mast

RECENTLY the television mast which is being erected by British Insulated Callender's Construction Co., Ltd., at Sutton Coldfield, for the B.B.C., reached a height of just over 600ft. It will be recalled that the contract calls for a 750ft. mast, the base pedestal of which is designed to withstand a maximum working thrust of 350 tons. The pedestal and first 27ft. section were in place in May last. By June 24th, the height reached was 400ft., the next 200ft. having been erected within a week.

At 600ft. the cross section of the mast changes from triangular to circular shape. This section of 110ft. will form a slot-type aerial. The eight dipoles will be carried on the final 40ft. which is of square cross section. The guy ropes used are novel inasmuch that they are of fully-locked coil construction.

Round the Colonies by Cable

A WORKING telegraph circuit in direct communication with Crown Colonies over thousands of miles was available without charge to visitors who wished to question the Colonies in the *Daily Express* building, Fleet Street, recently.

It formed part of the "Round the Colonies by Cable" exhibition arranged by the *Daily Express* in collaboration with Cable and Wireless, Ltd., in support of Colonial Month, which the Government organised to improve public knowledge of the Colonies.

The Colonial stations answered questions at short notice in the following local languages:

Aden	.. Arabic and Hindustani.
Malta	.. Maltese and Italian.
Cyprus	.. Greek and Turkish.
Nairobi	.. Hindustani, Swahili and Kikuyu.
Accra	.. Arabic, Fantee-Twi, Ga and Ewe.

B.R. and G.E.C.

BRITISH Railways, in collaboration with the General Electric Company, have installed a loudspeaker system at Finsbury Park station in which nearly 100 loudspeakers are employed. They are fed from two 60 watt amplifiers and have proved of great value in speeding up traffic and avoiding "bottlenecks."

Colour Television

IT is reported that the C.B.S of New York have resumed their colour television demonstrations. This utilises a mechanical scanning system and the transmissions are radiated on 490 Mc/s from a transmitter on top of the Chrysler Building. The power used is 20 kW.

Citizens Radio Service

AS from June 1st this service was removed from its experimental status. Under F.C.C rules any U.S. citizen who is 18 years of age or older, may obtain a licence for the 460-470 Mc/s band without technical knowledge. The only stipulation is that the transceivers which are used must be approved by the F.C.C.

King's Speech Record

HIS MAJESTY THE KING'S speech, which was broadcast and recorded by the B.B.C. at the inauguration of Colonial Month, was also simultaneously recorded by the Gramophone Company by means of a special link. This record, H.M.V. No. RG3893, will be on sale both at home and abroad very shortly.

Operatives at the valve-stem manufacturing section of the Ediswan Works, Pallion, Sunderland

Third Amateur Radio Exhibition

THE Third Annual Amateur Radio Exhibition, organised by the Inc. Radio Society of Great Britain will be opened at 2.30 p.m. on Wednesday, November 23rd, 1949, by the Baron Sandhurst, O.B.E. The Exhibition will remain open until November 26th (hours 11 a.m. to 9 p.m.).

The venue is the Royal Hotel, Woburn Place, London, W.C.1 (nearest Underground station, Russell Square, bus routes 68 and 77 pass the door).

Twenty-five concerns have reserved space, including the G.P.O. who are to stage a special exhibit.

Admission will be by catalogue purchased at the door, or 1s. 3d. on application to the Society (New Ruskin House), Little Russell Street, London, W.C.1.

Compact Mains 4-valver

A Two-band A.C./D.C Receiver for the Beginner

By F. G. RAYER

THIS circuit is built up around three pentodes, plus rectifier. The high efficiency of the mains valves gives very good sensitivity, and it was found that with a foot or two of wire criss-crossed across the back of the cabinet as aerial, the majority of the B.B.C. stations were well received, maximum volume on the locals being far too great for comfort. This, and the compact design, results in a receiver which can easily be carried about from room to room as desired. With a longer aerial, many more stations can be received.

From the circuit shown in Fig. 1, it will be seen that the input to the aerial coil is reduced as the bias applied to the R.F. valve is increased. This assures adequate control of volume and without this it was found difficult to reduce the locals to the strength sometimes desired. A coupling winding is used on the first coil to increase selectivity and prevent changes of aerial affecting ganging. A small fixed condenser is connected in series with the aerial to avoid the possibility of shocks when touching the latter.

No earth is necessary, but if used it should be taken to a .01μF. condenser returned to the chassis, not directly to the latter. (This is to avoid earthing one side of the mains.)

An anode bend detector is used. It was found this gave a reduction of hum compared with the leaky-grid detector. This is because the grid is earthed through the tuning coil, as regards 50-cycle fluctuations, which is not so when a small condenser is included between grid and tuning coil.

The output pentode, rated at 2.75 watts, with an anode voltage of 180, operates a 5in. moving-coil speaker. The latter is an energised type, with a 2,500 to 3,000 ohm field to obtain maximum efficiency with minimum size and weight. However, it was found that a permanent magnet speaker (with transformer suitable for mains pentode output) gave very good results. Therefore, if a P.M. speaker is to hand, it can be used. If so, there will be no

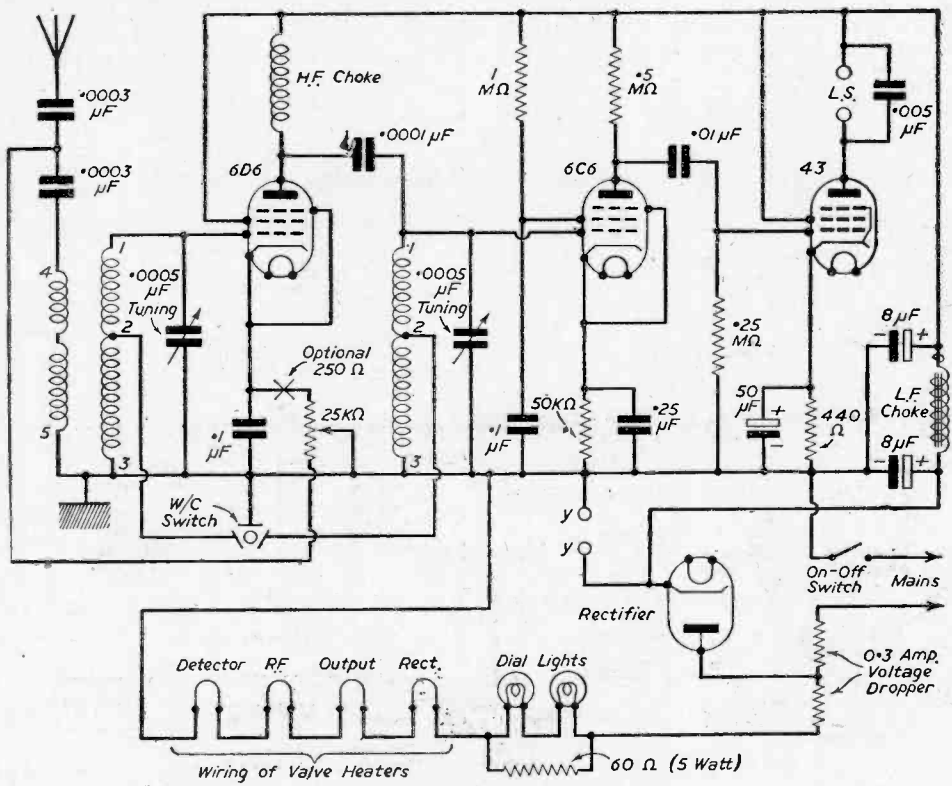


Fig. 1.—The Compact Mains 4-Valver in theoretical form.

connections to the points marked "Y.Y." in Fig. 1, which supply the field winding if an energised speaker is used.

A .3 A. mains dropper has been used instead of line cord because it is easer to adjust the high-tension voltage with the dropper. A resistor is connected across the dial lights to prevent them blowing before the valves have heated up. (The heaters, when cold, are of rather lower resistance, thus causing an initial surge.)

The Receiver Chassis

This is bent up from a strip of 20 S.W.G. metal 6¾in. wide. The deepest section was arranged to accommodate the majority of the fixed resistors and condensers and the lowest section is much shallower so as to leave sufficient room for the tuning coils. This means the chassis is bent in a series of steps, as shown in Fig. 6. These steps increase compactness and enable the controls to be situated conveniently. A piece of ½in. thick wood cut to shape is screwed in the rear of the chassis (see Fig. 3).

If an increase in size is not important, an ordinary chassis about 2in. deep can be used, but the cabinet will then have to be somewhat higher to accommodate the tuning coils.

Four valve-holder holes are drilled in the positions shown in Fig. 2. Two of the front controls are mounted on brackets. These can be cut from 20 S.W.G. metal, as can the screen erected between the tuning coils.

To save space the two 8 μF. smoothing condensers are clamped to a plate cut to fit on top of the tuning condenser. This plate has ½in. flanges turned down and bolted to the ends of the tuning condenser frame. Before fixing the plate on it may be necessary to solder lengths of wire to the fixed-plates tags of the tuning condenser, or this may be difficult to accomplish later.

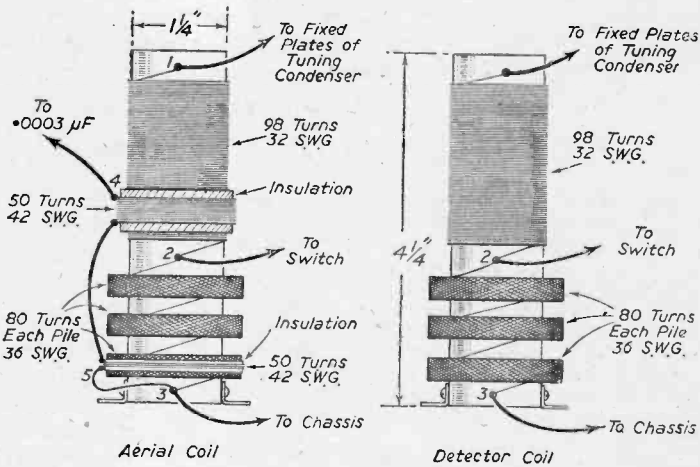


Fig. 4.—Full details of the coils.

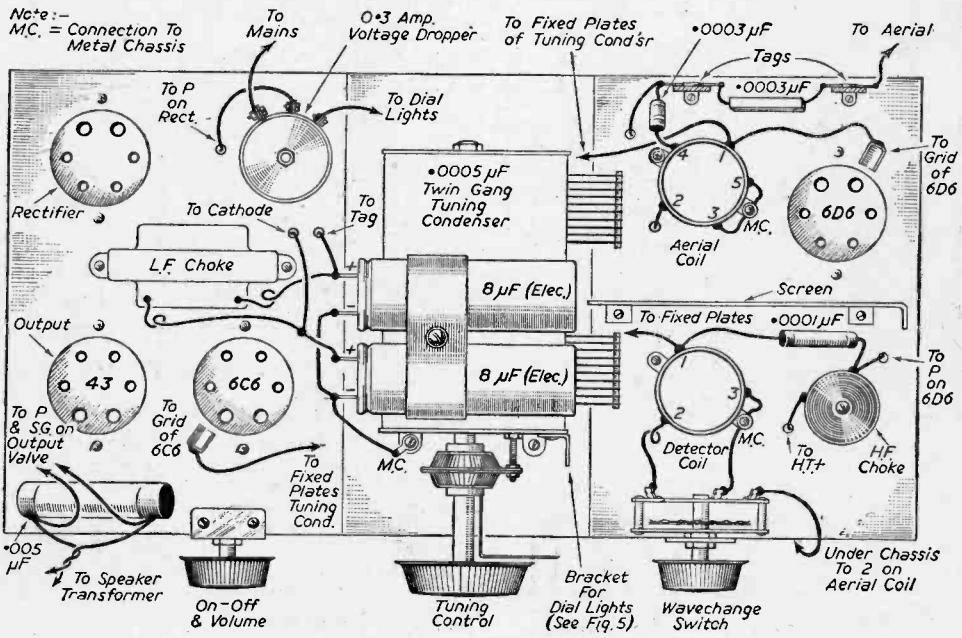


Fig. 2.—Above chassis view, showing layout and part of the wiring.

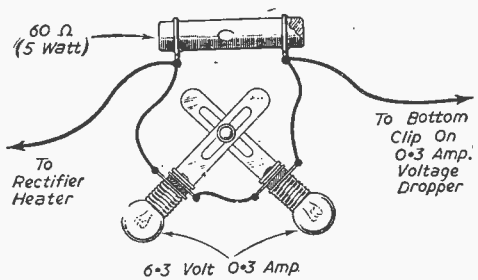


Fig. 5.—Dial light details.

leads) should be kept close against the chassis and well away from other leads, especially those connected to the valve grids and anodes. (Failure to attend to this point will result in some increase in hum.)

Two short lengths of twin flex are used for speaker field and speaker transformer connections. When the receiver is fixed in its cabinet do not allow these leads to pass near the grid connections of the valves, or slight humming will be caused.

R.F. and detector valves are enclosed in valve-screening cans. These may be either the type shaped to fit the valve, or the ordinary round type. Such cans are provided with clips and these must be used so that the cans are connected to the chassis.

Wiring the Receiver

Insulated wire should be used for all connections, and Figs. 2 and 3 should make the arrangement of parts and leads quite clear.

Underneath the chassis a stout bare wire is used to simplify the connection of a number of the resistors and condensers. This wire is in contact with the chassis. Other points marked "M.C." are also connected to the chassis.

An insulated tag is used to support the numerous H.T. plus connections. Two tags are also used on top of the chassis, near the back, to prevent the condenser in series with the aerial being pulled away.

For clarity the dial lights are not shown in Fig. 2, but Fig. 5 illustrates connections to them. Bulb-holders with long, slotted brackets are recommended, and these can be bent so that the bulbs come in the desired position after bolting to the gang condenser frame. Bulb-holders in which the brackets are insulated from the holders must be used. Twin flex is best for both the leads, parting this at the back of the chassis for rectifier and dropper connections.

All leads carrying A.C. (e.g., mains and heater

LIST OF COMPONENTS

.3 A. 800 ohm mains dropper.
Two 8 μF. smoothing condensers. 50 μF. bias condenser (50 volts working). .0001 μF. fixed condenser. Two .0003 μF. ditto. .005 μF. ditto. .01 μF. ditto. Two .1 μF. ditto. .25 μF. ditto.
Four UX 6-pin valve holders. 20 Henry smoothing choke.
Two insulated dial light holders, two 6.3 volt .3 A. dial lights, and 60 ohm, 5 watt resistor.
Moving coil speaker with transformer for mains pentode.
Two-gang .0005 μF. tuning condenser with reduction drive.
3-point rotary wavechange switch.
25,000 ohm potentiometer with switch. Fixed resistors: 440 ohm, 50,000 ohm, .25 megohm, .5 megohm, and 1 megohm.
H.F. choke for R.F. valve coupling.
Pair long and medium-wave tuning coils.
Twin flex with mains plug, etc.
R.F., detector, output pentode, and rectifier valves, .3 A. A.C./D.C. types.

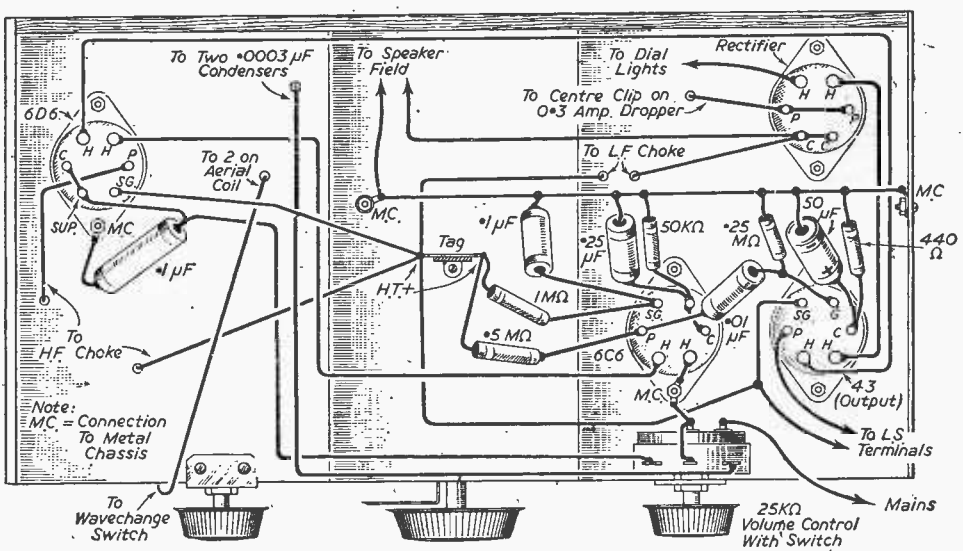


Fig. 3.—Under chassis layout and wiring.

It was found there was no need to use a screened H.F. choke if this choke is a little way from the tuning coil. The metal screen prevents interaction between this choke and the aerial coil, otherwise instability would be likely.

The Tuning Coils

Numerous ready-made tuning coils are obtainable, either unscreened or complete with cans.

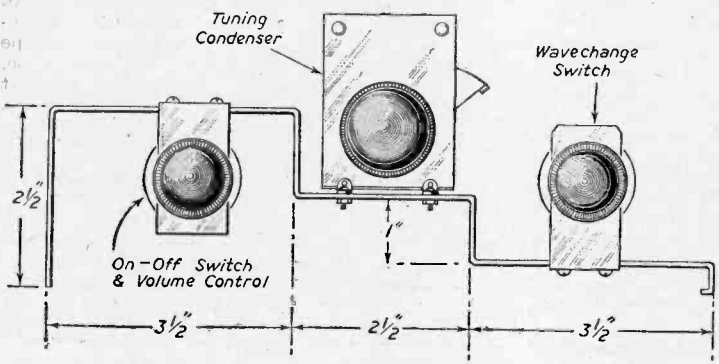


Fig. 6.—Front view of chassis, showing bending details.

There is no reason why a pair of these should not be used.

Full details of the home-wound coils are illustrated in Fig. 4. They will gang satisfactorily together provided both formers are of the same diameter (1¼in.) and the tuning windings are wound the same for each coil.

One coil has an aerial coupling winding. This is wound upon two layers of insulating tape, as shown in Fig. 4. This also shows all the connections, which are numbered in Figs. 1, 2 and 4 to avoid mistakes.

The Mains Dropper

The bottom clip of this is connected to the dial lights, the centre clip to the rectifier anodes, and the top clip to the mains. By adjusting the position of the centre clip the H.T. voltage will be modified, the latter increasing as the clip is raised. Normally this clip will need to be about ½in. from the top one, but a few trials with it in different positions can be made.

If a P.M. speaker is used, this clip should be somewhat lower because the additional H.T. consumption caused by the field of the energised speaker will be avoided.

The top clip should be lowered until the receiver begins to operate properly within 45 to 60 seconds after switching on. Alternatively, a meter may be used to measure the heater voltage and the clip adjusted until the voltage is correct. It will be found the position of neither clip is critical.

Withdraw the mains plug before altering the clips. The dial lights will not be at full brilliance because of the shunt resistor.

Trimming

For convenience, two or three yards of thin insulated flex can be soldered to the rear tag (see Fig. 2) to act as aerial. Unscrew both trimmers on the gang condenser, tune to a weak station with the tuning condenser plates almost wholly out of mesh, then adjust one of the trimmers for maximum volume, slightly retuning with the control knob meanwhile. If the gang condenser has no trimmers, or if these cannot be reached, then small 50 pF. trimmers can be wired between points 1 on each coil and the chassis. As the H.F. choke and R.F. anode connection throws extra capacity across the detector coil it will probably be found the aerial coil trimmer requires to be screwed down the most.

When enclosing the receiver in a cabinet, leave ventilation to prevent overheating.

Valve Types

A 6D6 is used for R.F., with a 6C6 for detector and a 43 for output. The rectifier is a 25Y5.

Actually it will be found different valves can be used satisfactorily. The 25Z5 is a similar rectifier, also obtainable with an octal base. For the output valve, a 25A6 may be used, this being the same as the 43 except for the octal base. If it were decided to use octal valves throughout, then the 6K7 type can be used in the remaining positions, and it was found good results were possible with these. Therefore if such valves are to hand and it is desired to bring them into service they can be used. But otherwise use the types shown so that the circuit can be followed exactly.

A 250 ohm resistor can be connected at the point shown in Fig. 1 to prevent the R.F. bias being reduced to zero for maximum volume. This will slightly increase the life of this valve.

CLUB REPORTS

WEST MIDDLESEX AMATEUR RADIO CLUB

Hon. Sec.: H. C. Bostock (G3BWC), 1 Grange Road, Hayes, Middx.

THE club continues to be very active and progressive in all spheres and membership is steadily increasing. Recent meetings have been devoted to a junk sale and lectures on the Cathode Ray Oscilloscope, and The Circuit Around the Valve—Practical Aspects.

A very interesting programme has been laid down for the next three months, including "Transmitter Nights," when the club will go on the air with the call-sign G3EDH.

Meetings continue to be held at the Labour Hall, Uxbridge Road, Southall, Middlesex, on the second and fourth Wednesdays of every month at 7.30 p.m.

Visitors and new members are cordially invited.

BIRMINGHAM AND DISTRICT SHORT-WAVE SOCIETY

Hon. Sec.: N. Shirley, 14, Manor Road, Stechford, Birmingham, 9

AT a recent meeting it was agreed that the annual subscription rate should be reduced to 7s. 6d. per annum instead of 15s. as at present. After some negotiation the Society has obtained a permanent clubroom at the Churchill Citizens Club, Acocks Green, Birmingham. This will replace the room at Moseley Road which has not come up to expectations. Application is being made for a club-transmitting licence, and work is being commenced on a 'phone/cw transmitter for top-band. The transmitter for 20-40 metres is practically completed. As the garden at the Churchill Club is over 200ft. long, there is ample scope for aerials. General meetings continue to be held at the Colmore Inn, Church Street, Birmingham, on the second Monday in each month.

Interference Suppression

Curing Trouble on V.H.F. and Television Receivers. By 'ALCHEMIST'

TO those like the author, who live near main roads or other centres of automobile activity, the interference to V.H.F. listening or viewing can be such as to ruin reception entirely, and some means of limiting this nuisance is essential. Although it may be hoped that the Wireless Telegraphy Bill now before Parliament will ultimately lead to complete suppression of man-made interference, it is evident that some long time will elapse before this becomes appreciably effective. Many constructors who have built sound only receivers and televisors are certainly troubled by ignition interference, and it is the purpose of this article to explain briefly the problems involved, and to

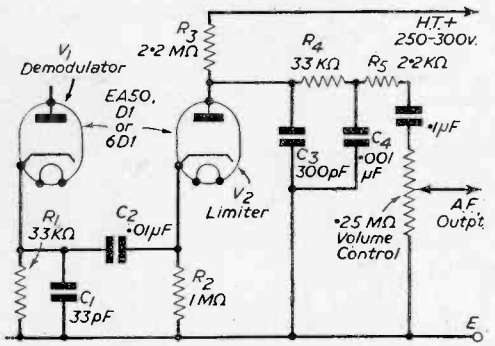


Fig. 1.—Sound Noise Limiter Circuit.

give some simple and cheap practical circuits which can easily be incorporated in existing or projected receivers, and which will reduce ignition and other short pulse interference to a low level.

Whatever methods are adopted in the receiver to reduce interference, it is obvious that the most important single factor is the strength of the signal entering the receiver, which in turn means the best possible aerial to preserve a high signal-to-noise ratio. In the event of the signal being too strong so as to cause overloading in the early stages of the receiver, it can easily be reduced by capacitor or resistance attenuation and the interference will be likewise reduced. Nothing can adequately replace a high well-placed aerial correctly matched to the receiver and fitted with a correctly placed reflector.

Dealing first with suppression on sound receivers, it is generally considered that interference is less tolerable than on vision receivers, which is fortunate, because it is an easier problem to limit pulse interference on sound than on the extremely wide frequency response required on V.F. work. Ignition interference consists of steep narrow pulses of duration up to about 20 microseconds, and no loudspeaker will respond directly to such short voltage changes, but the A.F. receiver circuits ntegrate them so as to shorten and widen them. Therefore, the general pulse wave form must be preserved up to the demodulator, and the limiting circuit arranged to preserve the rectified output from the demodulator whilst suppressing larger amplitude short duration pulses.

Peaky Waveforms

A simple and extremely effective sound limiting circuit is shown in Fig. 1. V_1 is the diode demodulator with unusually small values of load resistance R_1 and capacitance C_1 to preserve the peaky wave forms of very short duration interference pulses. The diode V_2 is normally maintained conducting due to the positive anode potential fed from C_3 via R_2. With rectification of an audio sine wave signal by V_1 its cathode becomes more positive and R_2 and the anode of V_2 will follow A.F. voltage changes which are sufficiently slow for the voltage across the anode capacitor C_3 to change as the diode current decreases. Thus, in fact, V_2 anode will follow V_1 demodulator A.F. output in sympathy, but a short duration interference pulse causes a very rapid rate of voltage change in a positive

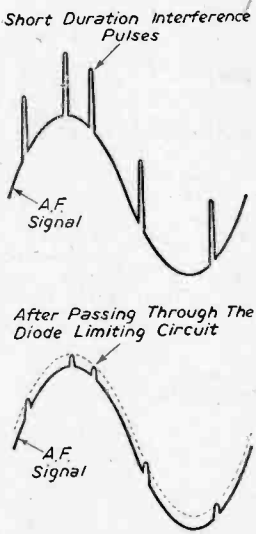


Fig. 2.—Diagram illustrating the general action of the limiting circuit of Fig. 1.

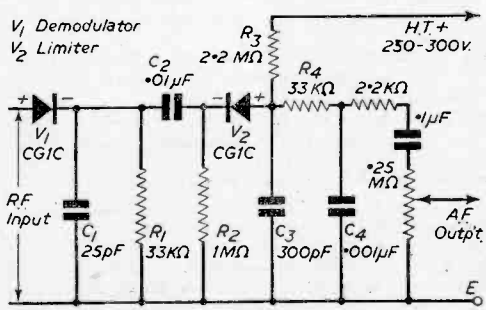


Fig. 3.—Sound noise Limiter Circuit using Germanium Crystal Rectifier. It should be noted that the polarity markings on the CG1C crystals are opposite to those normally employed with metal rectifiers. Some later rectifiers are marked in the other manner so they should be carefully checked when using them.

direction which the anode capacitor C_3 cannot follow sufficiently rapidly and therefore V_2 ceases to conduct, thus giving excellent discrimination between A.F. and interference pulse voltages.

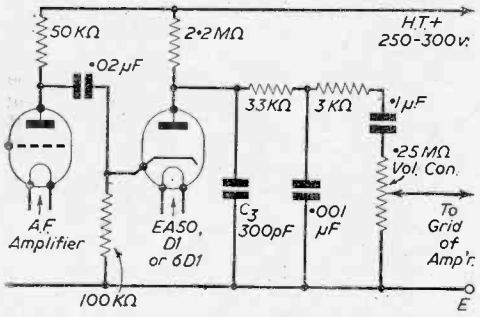


Fig. 4.(a).—Sound Noise Limiter following an A.F. stage.

The A.F. output is fed out via the R_4 C_4 filter. The general effect is illustrated in Fig. 2. The circuit of Fig. 1 shows two separate diodes, but of course a double-diode with separate cathodes (e.g., EB91,

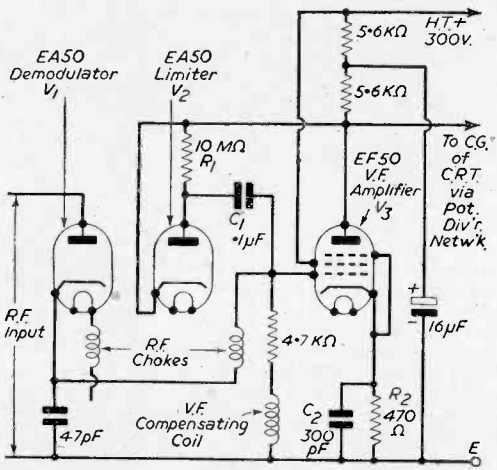


Fig. 5.—Negative voltage feedback circuit for vision interference limiter.

EB41) can be used equally well. Some latitude in the values shown is permissible and C_1, C_2, C_4 and R_2, R_3 at 50 pF, 0.02 μF, 300 pF and 100K, 2.5 MΩ respectively are satisfactory.

Crystal Rectifiers

An even simpler constructor's method employs the new B.T.H. germanium crystal rectifiers CG1-C (described on p. 251 of PRACTICAL WIRELESS, June, 1948). The absence of heater connections removes entirely any possibility of hum introduction and the general ease of construction makes this arrangement very simple to incorporate. Features of the germanium crystal rectifiers are their ability to withstand transient mA overloads up to one second duration, a maximum continuous input current of 50 mA, detector operation up to 100 Mc/s and a peak maximum voltage of —80 volts together with very small size (⅜in. long × ¼in. diameter). They are available only in the wire-ended form and care must be taken when soldering to minimise conduction of heat to the inner element by gripping the wire close to the metal end with a pair of pliers.

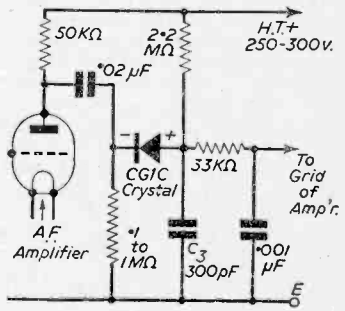


Fig. 4.(b).—A similar arrangement but using a germanium crystal.

The circuit is shown in Fig. 3 and is identical in operation to that in Fig. 1. The peakiness of the ignition interference is retained by R_1C_1 and the crystal V_2 remains normally conductive by the H.T. potential across C_3. A.F. voltages rectified by V_1 appear across R_2 and C_3 but short duration positive interference pulses do not pass V_2 because of the time delay caused by C_3 whose charge cannot change sufficiently rapidly. Thus V_2 ceases to conduct and the pulse amplitude is limited, as in Fig. 2.

These circuits are easily adapted to follow an amplifier instead of the demodulator stage as above, although here the gain of the stage is generally reduced by the need to preserve a good A.F. response. A suitable circuit is shown in Fig. 4, based on a triode impedance of about 15,000 ohms which can, of course, be the triode section of a double-diode triode (e.g., EBC33). Short duration pulses are again limited by the time delay introduced by the 300pF capacitor C_3. With these post-A.F. limiters there is some higher A.F. cutting, which, although not usually very serious and certainly

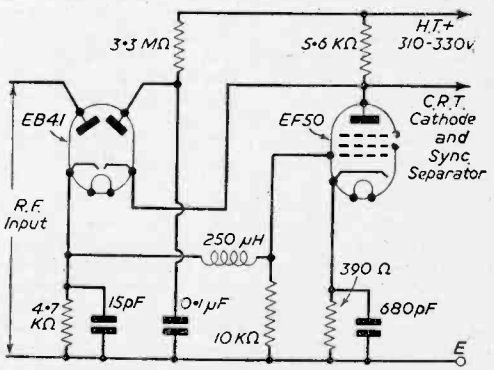


Fig. 6.—Fixed type diode vision noise limiter (negative-going picture signal).

preferable to the interference, does make the pre-detector circuits of Figs. 1 and 3 preferable for quality work.

Television Circuits

Turning now to television receivers, the sound section is dealt with by one of the previously mentioned circuits and preferably 1 or 3, as here maintenance of quality is generally more important. Experience shows that vision interference is in practice not so objectionable as that on sound. i.e., a larger number of big white "blobs"

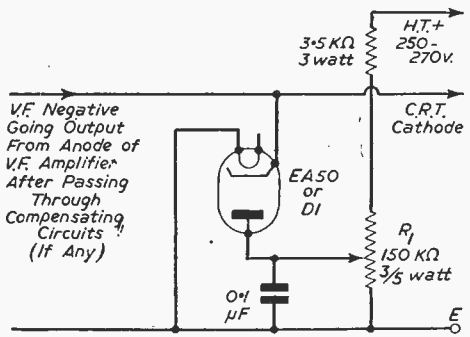


Fig. 7.—Variable diode vision limiter (negative-going picture signal).

on a screen can be tolerated than would even be borne as an audio signal. Thus conditions are less critical and a high nuisance level is tolerable which is fortunate because the problem of maintaining a V.H.F. response adequate for the television vision band width of approximately 2.7 Mc/s is difficult. In areas of very severe interference it is probably better to sacrifice some little picture detail for the sake of a "noise-free" picture and by limiting the constant response to about 2.5 Mc/s, which still gives an excellent picture, really first-class interference limiting is obtained by the circuit of Fig. 5 which is that employed in the first post-war Pye B16T receiver with one EB91 double diode in lieu of the 2 EA50s shown. The circuit is based on negative feedback in conjunction with the diode V_2. R_1C_1 in series between the anode and grid of the V.F. amplifier are shunted by the diode V_2. The picture signal is negative going (C.R.T. cathode is fed directly) and the sync. pulses positive going on the anode of the V.F. amplifier V_3. The value of R_1C_1 is such that the conduction of V_2 discharges C_1 to a value approximately equal to the picture "highlight" (peak white) voltages which are, of course, the most negative ones appearing at the anode of V_3. On receipt of an interference pulse on V_3 grid, its anode will temporarily become very negative, and the V_2 anode will remain above the cathode potential owing to the short duration and low repetitive rate of the pulse which does not allow sufficient time for C_1 to discharge to the peak pulse value. Thus the mean charge of C_1 is such as to make V_2 non-conductive over most of the picture signal, but it conducts above this value on an interference pulse to feed a negative voltage to V_3 grid which reduces the V.F. amplifier gain and hence the effect of the pulses on the picture. H.F. compensation is achieved by the V.F. compensation coil and the small value capacitor C_2 across V_3 bias resistor R_2.

Simpler circuits not so very effective in limiting interference but easier to install and having little effect on H.F. response are those in which voltages up to peak white level are accepted and those above this level are "short circuited." In practice such circuits are very effective as the mass of large white blobs which tends to obliterate a large part of the screen is reduced to the level of smallish white

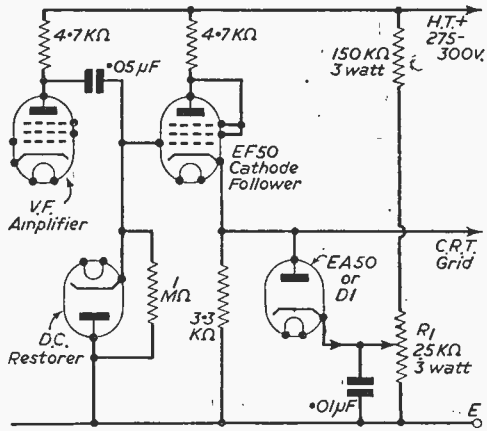


Fig. 8.—Variable diode vision limiter (positive-going picture signal).

spots. Three such circuits are shown in Figs. 6, 7 and 8, the first two being limiting circuits for use with cathode modulated C.R. tubes (i.e., negative going picture signals) and the last (Fig. 8) for use with positive going picture signals fed from the cathode of a cathode follower stage to the grid of the C.R.T. Fig. 6 is non-adjustable, whereas in the other cases the cathode biasing potentiometer R_1 is adjusted to render the diode conducting above peak white level. When this latter occurs, all interference pulses will be short-circuited so that instead of large blobs, only relatively small specks will be apparent. Very careful adjustment of R_1 is necessary to make the limiting action efficient without loss of detail in the highlights which will occur if the diode conducts prematurely at a voltage below that corresponding to peak white. It is easily adjusted by viewing a bright white portion of a stationary object such as the tuning signal or test card and turning R_1 until the white highlight is lost into a light grey shade; R_1 is then turned back until the white is just restored.

All these sound- and vision-limiting circuits have been thoroughly tested and can be recommended most strongly. They are designed specifically for short-duration pulse interference such as car ignition and will do little or nothing to limit other forms of interference.

Finally, all readers possessing cars are asked to fit a 5 to 10 kΩ resistor in the lead from coil to distributor. It really does make all the difference to this type of radiation and has no deleterious effect whatsoever on the car's performance. Special resistors for this purpose are available at about 2s.6d.

ON YOUR WAVELENGTH

By THERMION

The Car Licence

ONE of my readers suggests that the separate licence for car radio should be abolished because it is so easy for people to evade paying, especially those who use the secreted running board aerial as distinct from the rod aerial which proclaims to all and sundry that the car is carrying a radio set!

Radio Control of Models

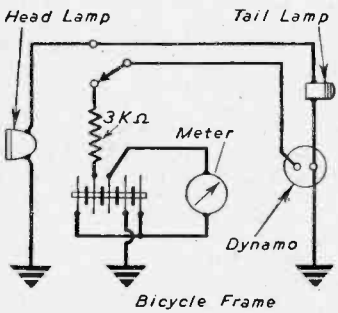
APROPOS my paragraph on this subject, I note that at the British National Model Aeroplane Competitions at Fairlop Aerodrome, the radio control contest attracted 42 competitors. Many appeared to feel that the strength of the wind did not justify them risking their expensive equipment, whilst others could not rectify minor faults in time to compete. The winner, C. Doughty, of Birmingham, really did control his model through quite a wide range of manœuvres and showed that radio control is a branch of our hobby capable of great extension. There is no doubt that soon there will be made more radio-controlled model contests.

In this respect one of my readers, Mr. A. E. Bugg, tells me that he has built a model of the pleasure steamer *Royal Daffodil*. It is 5ft. long and has start, stop, forward, astern, port rudder, starboard rudder and siren control. The range is about half a mile, and the Tx is a two-valve Tritet using two 6V6's with less than 5 watts on the anodes. The Rx is a three-valve super-regenerative using 1T4's with positive feed back. He has promised to send me full particulars.

Speedometer from Voltmeter!

MR. G. B. ROPER, of 30, Kenwood Gardens, Ilford, writes:

"Experimenters who have bicycles fitted with hub-dynamos may be interested in my idea for a speedometer. A 10-volt full-wave metal rectifier



Mr. Roper's idea for an electric speedometer

and a 0-40 volt moving coil voltmeter were all the parts I used, and may be obtained cheaply as ex-Government 'junk.'

"After the flange had been cut off the meter it was given a coat of black lacquer and fastened to the handlebar by a piece of strip metal, bolted to the 6 B.A. socket between the meter terminals. The old scale was painted out and recalibrated in M.P.H. with the aid of a friend on a motor-bike.

"Before mounting anything, the meter was modified to read about 0-12 volts by shorting out the resistance coils and wiring a 3,000-ohm, ¼-watt resistance in the rectifier primary circuit. This enabled a maximum speed of about 30 m.p.h. to be read.

"The rectifier was then mounted in the headlamp and wired up as shown. It should be noted that the meter is switched out when the lights are on, as they would shunt it across and prevent it giving a correct reading.

"Finally, I should like to say that the whole thing is quite robust, and although I have ridden over fields and cobbles it shows no sign of damage."

Television is a Mass Market

TELEVISION is now a mass-market product, according to a survey of television owners released to-day by Sylvania Electric Products, Inc.

Fifty-eight per cent. of television sets now in use are owned by families earning less than $5,000, the Sylvania survey discovers, while the rate of purchase of this group is growing much faster than that of families earning more than $5,000.

Frank Mansfield, Sylvania Director of Sales Research, told a news conference in New York City that this increasing market dominance of the middle- and lower-income families is the most important influence to-day in television sales.

He explained that the survey found well-to-do and prosperous families had entered the television market early and have continued to purchase sets at a steadily growing rate. Families earning less than $5,000 entered the market at a low purchase rate, but their market impact is growing faster. He pointed out that among families making less than $2,000 ownership of sets had increased 50 per cent. from December, 1948, to February, 1949; among families making up to $5,000, 33 per cent., and 30 per cent. in families with higher incomes.

Where is Absorption Point?

ACCORDING to the latest returns there were 11,873,950 broadcast receiving licences current in Great Britain and Northern Ireland at the end of May, 1949. This was an increase of 50,950 over the April figures and the total includes 140,850 television licences—an increase of 7,600. Licences continue to increase and I am wondering when absorption point will be reached. It seems a long way off yet, but the time must come when everyone has a radio set and therefore a licence, and presumably when that time arrives licences will reflect slumps and booms as in other branches of industry.

C.R. Tube Supplies From D.C. Mains—1

Oscilloscope Supplies and a D.C. Oscilloscope

By E. N. BRADLEY

CONSTRUCTORS and experimenters who are forced to rely upon the D.C. mains for their power supplies are always faced with difficulties when building gear which requires more than about 200 volts for its operation, but no difficulty seems so insuperable as the designing of an oscilloscope or small televisor. In normal gear A.C./D.C. valves can be used, but in an oscilloscope not only is it necessary to supply a high voltage of between 600 and 1,000 volts to the tube anodes, the tube heater, generally requiring four volts at one amp., has also to be fed. So far as television is concerned the constructor with a deep pocket can employ one of the new A.C./D.C. picture tubes such as the Mullard MW31—14C, which has a 6.3-volt 0.3-amp. heater which can be series connected with a chain of valves such as EF50's, but this is of no assistance to the experimenter who wishes to build a small and cheap circuit using the VCR97 or a similar 6in. tube where once again a heater power of four volts at one amp. is necessary.

In the large and commercial types of televisor the E.H.T. problem is overcome by utilising the high flyback voltages occurring in the line scan circuit, but in small televisors these voltages are not present since electrostatic tubes are employed. Nevertheless it is possible to derive quite a high E.H.T. from a scanning circuit by employing a ringing choke stage, although this system is not permissible in the oscilloscope where the timebase must have a wide frequency range. All these difficulties of C.R. tube supplies from D.C. mains can, however, be overcomo very satisfactorily by employing R.F. power for the heater supplies and either R.F. power or a ringing choke system for E.H.T. supplies. For the televisor E.H.T. the second method of generation is to be preferred by the home constructor, and therefore oscilloscope and televisor supplies must be dealt with separately, although the method of feeding the heater is common to both types of apparatus.

The Oscilloscope Power Unit

For all normal purposes a 3in. oscilloscope has an amply large screen—indeed the author prefers the 3in. D.C. oscilloscope to be described to a 6in. model generally used in his laboratory—and for a tube such as the VCR139, still obtainable as surplus, or for the Mullard ECR30 or similar 3in. tubes the power supplies may be taken as four volts at one amp., and about 600 volts at 0.5 mA., or so. These tubes are rated to take up to 800 volts on the anode, but a 600-volt supply gives a trace clearly visible in the brightest light with very fine focus, whilst tests in a darkened room show the trace at this voltage to be almost too bright for the safety of the screen, even with the timebase scan extending far beyond the borders of the screen.

The D.C. powered unit (which may also be used

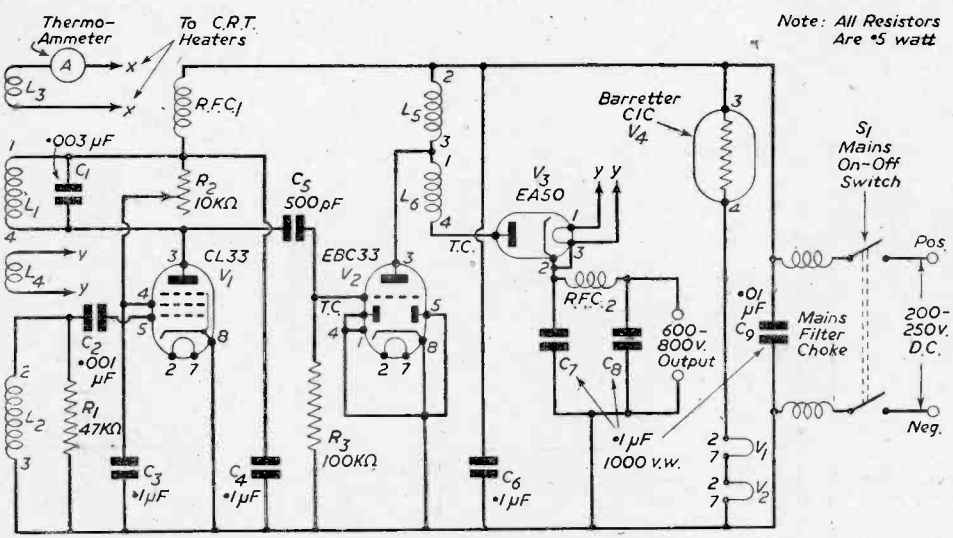


Fig. 1.—The R.F. power unit. Not th t C9 is rated at 1,000 v. working (.01μF).

for A.C./D.C. operation if a rectifier power pack is added) which supplies the C.R.T. heater and E.H.T. is shown in Fig. 1. V1, a CL33, with its associated components forms a self-excited oscillator capable of an output of several watts. This output power is drawn in two ways; two small windings, L3 and L4, coupled to the main windings L1 and L2, supply heater power to the C.R. tube and to the small rectifier V3, whilst from the anode of V1 R.F. power is applied to the grid of V2. V2, the triode section of an EBC33, is operated under conditions approaching to Class C working, so that across the anode coil of this second stage is set up a high R.F. potential of the order of 800 volts with no load applied. This high voltage is tapped off and rectified by V3 to give a supply of about 600 volts to the C.R.T. and its resistor chain.

The whole circuit has been designed to suit the small experimenter, and no special or expensive component is employed. The coils are commercially obtainable and are ordinary receiver-tuning coils, whilst the high voltage rectifier V3 is no more than an EA50 or VR92, a type of valve with which the purchaser of surplus equipment is usually overstocked. To make it possible for these normal and inexpensive components to be employed the operating frequency is rather higher than normal for such a unit—of the order of 230 kc/s, but in practice this is found to be an advantage for the coupling coils L3 and L4 are then small. An expected and serious disadvantage — interference with neighbouring receivers—did not arise when the unit was tested. The fundamental and harmonic frequencies were tuned in on a receiver close to the unit with the apparatus totally unscreened and were found to be very sharply defined with no spreading or splatter, and clear of all normal station frequencies, whilst the fitting of a normal screen to the unit cut out the harmonic reception and left only a trace of the fundamental signal. It is emphasised that this was a special test made with everything in favour of causing interference; under normal conditions, therefore, trouble from this source should not arise.

The coils employed in the R.F. power unit are an Atkins Laboratories White No. 2 for L1, L2, and an Atkins Laboratories White No. 1 for L5, L6, the E.H.T. output coil. These specifications must be observed; the unit may work with other coils, but equal results cannot be guaranteed. Atkins' coils may be obtained from any good radio stores.

L3 and L4 are wound on the White No. 2 coil as shown in Fig. 2. For L3, the 4 volts 1 amp. winding, cover a length of tinned 22 s.w.g. connecting wire with flexible insulating sleeving and wind on eight turns between the existing coils, taking care not to shift or break the windings which are, however, sturdy and well made. L4, which supplies 6.3 volts at 0.15 amp. to the EA50 is wound with 20 turns of 28 s.w.g. enamel and single silk-covered wire at the top of the coil former. Both windings must be made neatly and bank wound; the insulation between L4, L2 and the chassis must be perfect, since the full E.H.T. exists on this coil.

Note that these windings may be subject to slight adjustment of a turn or two either way. The exact frequency tuned, stray capacitances and the exact loading on the extra coils all have their effect, but adjustment is by no means difficult. A final adjustment for the correct supply to the C.R.T. heater is provided by the variable resistor in the screen lead to V1; slight under-running of V3 is permissible, but this valve should not be over-run in order that its life may be good.

Provided that the resistance of the bleeder chain is kept high, there is no trouble with sparking or flashover in V3.

It was anticipated that varying lead lengths between L3 and L4 and their respective heaters would give rise to variations in feed with power losses, fluctuating loads, etc., but again in practice no trouble was encountered, and long or short leads between these coils and the heaters may be employed. Special cable is not needed for ordinary

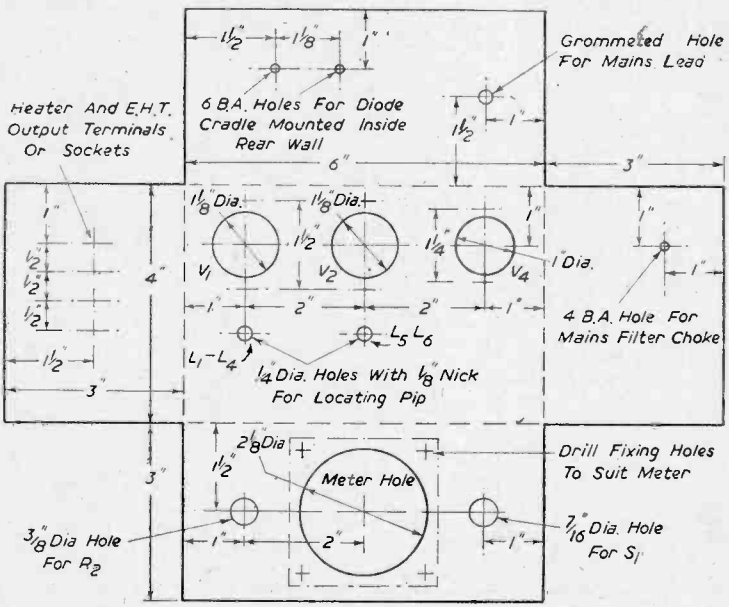


Fig. 3.—Cutting and drilling details of the power unit chassis.

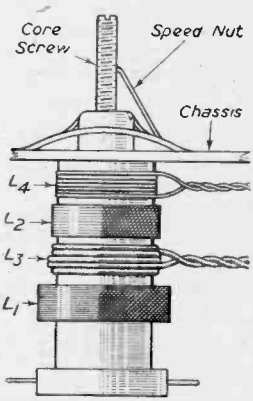


Fig. 2.—How the extra windings are put on the coil.

twisted flex will serve perfectly well; twisted wires should be used here to cut down radiation, and naturally the leads should be no longer than necessary.

Construction

The layout of the original unit is shown in Fig. 3, but there is no need to keep to the dimensions and chassis type shown, for the circuit appears to be absolutely non-critical. The circuit may be built up in a separate case as a supply system for experimental purposes, or it may be incorporated in the cabinet of an oscilloscope and built in a corner of the main chassis.

The components list below gives the parts required for the unit built up as a separate pack.

If the unit is to be built as a separate power source it should be constructed on a chassis similar in size to that shown in Fig. 3, and the chassis should be contained within a metal box or case. This case should have adequate ventilation ducts, since a good deal of heat has to be dissipated; perhaps the most satisfactory arrangement is to fit the chassis with a solid bottom plate of aluminium so that the coils and other below-chassis components are totally enclosed within a screening compartment, the top of the chassis being covered with a case of copper gauze which gives both adequate ventilation round the valves and barretter and excellent screening.

The mains are protected against the introduction of R.F. by a mains filter choke.

The thermo-ammeter should be considered as an essential, and cannot well be omitted from the circuit. Several excellent models are cheaply obtainable, however, and probably most constructors already have a suitable meter.

Adjustment

With the unit built, the wiring should be carefully checked, V1 and V2 inserted, and the circuit switched on. The unit should be running unscreened with all parts accessible, since the first check must be for oscillation and the correct values of L3 and L4.

A milliammeter in the H.T. positive line will show oscillation by running up to about 40 or 45 mA. as the cathodes heat up, then dropping sharply back to 30 mA., or so, to indicate oscillation and the self-biasing of V1 and V2. Both valves are run well within their maximum ratings. If there is no oscillation, which can further be checked by touching a small neon bulb to the anode of either V1 or V2, inspect L1, L2 for correct connection and/or damage to the coils.

The variable cores in both Atkins coils should be run right up the formers—that is, the maximum length of adjusting screw should be protruding from the former tops.

Assuming that the circuit is working correctly (remember that the polarity must be correct on D.C. mains) rotate R2 to put the full resistance in circuit and across L3 connect any old 4-volt 1-amp. valve as a check. The thermo-ammeter should register and the valve heater light up. Current will be high at first, and will then slowly fall as the heater resistance increases. Turn up R2 slowly until the correct current is being passed.

Leave R2 at this position, and leave the test valve heater connected in. Across L4 connect an EA50—omit the anode connection for the time being, to avoid shocks—and allow the heater to warm up. Check the current supplied from L3, which may fall a little with the extra load coupled in, and correct by using R2 if necessary. The current through the EA50 heater must now either be measured or checked by comparing the appearance of the heater with that of a heater of a similar diode running from a normal 6-volt source. To ensure proper running it is preferable to employ a second thermo-ammeter to measure the EA50 heater current. One of the popular 350-mA. models is ideal.

If the EA50 heater is incorrectly fed, vary the L4 winding by a turn or two, and test again. Endeavour to have 0.15 amp. passing through the EA50 heater when the test valve connected to L3 is being correctly supplied with 4 volts 1 amp.; the adjustment takes only a little time, and is well worth making, should it prove necessary.

Now connect up the diode with the high-voltage line to its anode and connect to the E.H.T. terminal the positive line of a high resistance voltmeter, the negative line going to the chassis of the unit. The voltmeter should have a full-scale reading of 1 to 2,000 volts, and a resistance of some megohms—an 0.5 mA. meter with 4 megohms in series will read 2,000 volts full scale and impose only a light load. The voltage measured may at first be disappointingly small—about 400 volts or so—but now slowly adjust the variable core of L1, L2, watching both the voltmeter and the thermo-ammeter as the adjustment proceeds. The E.H.T. should begin to rise as the oscillator and R.F. amplifier come into tune; keep the current to the test valve constant by adjusting R2 should this prove necessary. With the core of L1, L2 about half-way in, the maximum E.H.T. of between 350 and 700 volts should be obtained.

(To be continued)

LIST OF COMPONENTS

L1, L2—Atkins Laboratories White No. 2, with extra windings as detailed in text.
L5, L6—Atkins Laboratories White No. 1.
R.F.C.1, R.F.C.2—R.F. chokes, Eddystone 1066, or similar.
C1—0.003μF. 350 v.w. mica, T.C.C. M3N.
C2—0.001μF. 350 v.w. mica, T.C.C. M2N.
C3, C4, C6—0.1μF. 350 v.w. tubular, T.C.C. 346.
C5—500 pF. mica, 750 v.w., T.C.C. M3U.
C7, C8—0.1μF., 1,000 v.w. tubular, T.C.C. 2043.
C9—0.01μF., 1,000 v.w. tubular, T.C.C. 2043.
R1—47,000 ohms, ½ watt.
R2—10,000 ohms, variable, wire-wound.
R3—100,000 ohms, ½ watt.
V1—Mullard CL33.
V2—Mullard EBC33.
V3—Mullard EA50.
V4—Philips C1C Barretter.
2 Octal valveholders.
1 4-pin valveholder.
1 diode valveholder, cradle type; Belling-Lee L358/2.
Thermo-ammeter, 0-1.5 or 0-2 amps.
Mains filter choke—Weymouth, MSC3.
On-off switch, Q.M.B. double-pole.
Chassis, output terminals or sockets, control knob, grid clip, wire, sleeving, nuts, bolts, etc.

Short-wave T.R.F. Receiver

Suggestions for a 5-valve Headphone Receiver

By C. SUMMERFORD

SHALL it be superhet or straight? This is a question that every S.W. enthusiast asks himself at some time or other. It is a question, moreover, that is not made easier to answer by reading articles and correspondence columns in which advocates of either type of receiver set out their arguments so ably.

Regular readers of PRACTICAL WIRELESS will probably be aware that the writer belongs to the superhet school, although he has never condemned the T.R.F. receiver as being obsolete or ineffective. Furthermore, as is the way with members of the "mad fraternity," he is always trying to disprove his own theories. In pursuance of this, therefore, the circuit of Fig. 1 has been evolved without suggesting for a moment that it has the knife-edge selectivity one has come to associate with a well-designed superhet. Nevertheless, one *may* expect great sensitivity plus low background noise and, of course, complete freedom from the second-channel whistles so difficult to eliminate completely from even a good superhet.

The Circuit

A cursory glance at the circuit diagram of Fig. 1 shows that five valves are used in this headphone receiver, and this fact may seem to indicate that the cost will be on the high side. This is not so as the valves used are all obtainable as Government surplus stock. Actually, the whole five of them may be obtained from firms advertising in this journal for the very low sum of 24s. 6d. This, coupled with the fact that condensers (fixed and variable), resistors and potentiometers are also obtainable ex-Government at cheap prices from the same sources makes it possible to build the receiver for a "mere song."

Taking the circuit in greater detail, this comprises two radio-frequency amplifiers, a cathode-follower-buffer, diode detector and medium impedance triode output.

The two R.F. amplifier valves are both EF 50s, which have the Services Type Nos. VR91 or VR91A. Anode coupling is used between the first and second stage, and between the second R.F. stage and cathode-follower. As the EF 50s are special high-gain valves, inter-stage coupling must be very loose if stability is to be maintained. It is suggested that coils L3 and L5 should have a one-turn winding placed close to the grid winding on the 9-14 and 12-26 metre coils, two turns on the 22-47 metre coils, and five turns on the 41-94 metre coils similarly placed with relation to grid windings. This loose coupling will also greatly improve the overall selectivity of the receiver. The number of turns required for L1 depends on the type of aerial used and must be left to the discretion of builders of this unit.

It is hardly necessary to say, of course, that with two RF stages inter-stage screening must be fairly complete.

If it can be arranged for each stage to have its

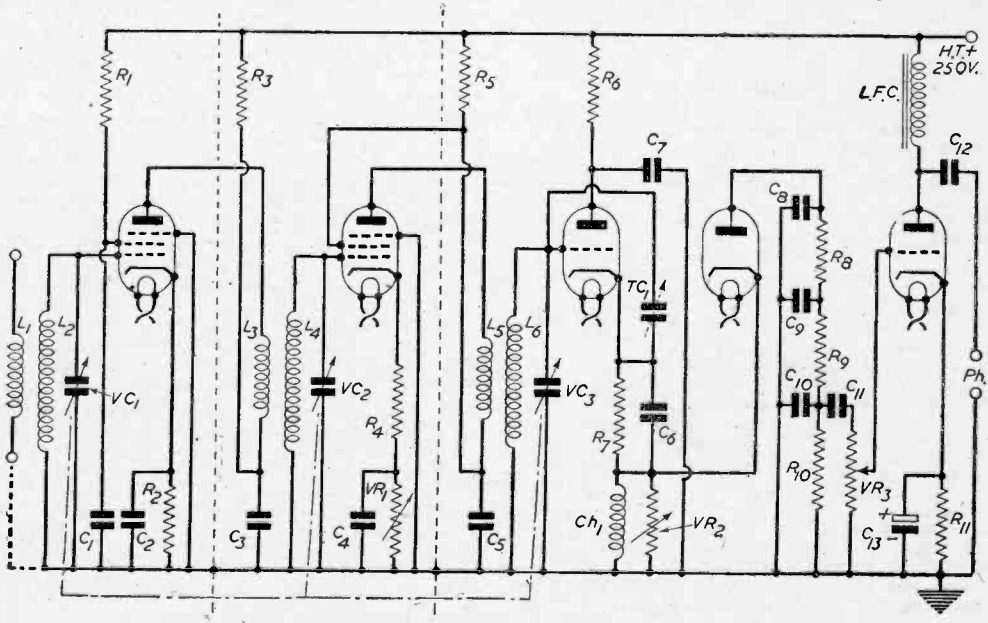


Fig. 1.—Theoretical circuit of the complete arrangement described here.

components in a separate metal compartment, that will be ideal. Also, it is an advantage to have one common earth point for each stage. The unbypassed resistor (R4) in the cathode circuit of the second R.F. valve is deliberate and is designed to create a certain amount of negative feedback. The reason for doing this is that it helps to keep the input impedance of the valve fairly constant over a reasonably wide variation of cathode voltage.

Passing to the cathode-follower-detector stage, this was fairly comprehensively described in the July, 1947, issue of this journal. Suffice here to say that it combines good power handling with exceptionally smooth regeneration control from 9 to 100 metres. The last valve in the chain is a medium-impedance triode which is used to operate the 'phones via the usual choke-condenser filter.

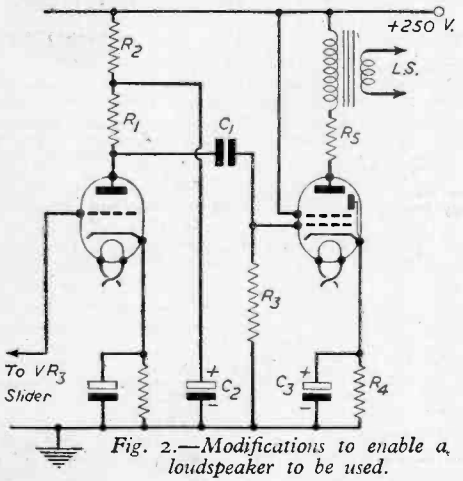


Fig. 2.—Modifications to enable a loudspeaker to be used.

Referring once more to the tuned circuits, it should be pointed out that trimmer condensers of about 20 pF should be connected across VC1, VC2 and VC3.

For Use with Loudspeaker

Those readers who prefer loudspeaker reception may make the simple modification shown in Fig. 2. The extra components required will be 5 resistors (2 half watt and 3 one watt), 2 electrolytic condensers, 1 fixed tubular condenser, 1 6V6 valve and an output transformer (if this is not already included as part of the loudspeaker unit). These extra components should not cost more than about 18s.

As against this the choke-capacity filter will not be needed. The 6V6 output tetrode requires 250 volts on anode and screen, with 12.5 volts grid bias and, when fully loaded, gives approximately 4.25 watts output with a total distortion figure of 10 per cent. Incidentally, this distortion (the amount of which is fairly typical for this type of valve), can easily be reduced by a simple negative feedback loop from the output transformer secondary to the cathode circuit of the preceding valve.

The final valve line up is EF50, EF50, 6J5, 6H6, 6J5, with the addition of a 6V6 for loudspeaker output.

Total current consumption will be about 90 milliamps with a supply voltage of 250. No details are given of the power pack, but a suitable one was described in the May, 1948, issue of PRACTICAL WIRELESS. In any case, smoothing and voltage must be of a reasonably high order, otherwise regeneration will be rough.

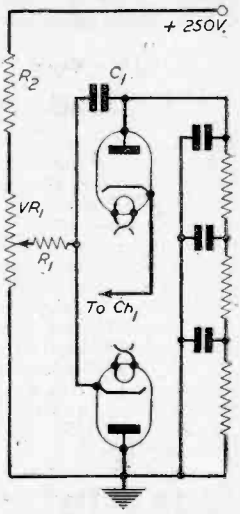


Fig. 3.—How a noise limiter may be added.

Noise Limiter

The noise limiter circuit of Fig. 3 has been added as an afterthought and requires no extra valves as the 6H6 is a double-diode with separate anodes and cathodes. In fact the only extras required are two fixed resistors, one potentiometer and a fixed condenser.

In operation VR1 in Fig. 3 is set sufficiently positive to prevent diode 2 (the bottom one) from conducting except on heavy pulses, such as those produced by car ignition systems. When this occurs diode 1 is virtually shunted to earth by C1. With regard to the 6H6, this may also be used for providing AVC if this is required. If it *is* used it is recommended that parallel feed be used to the grid of the EF50s.

LIST OF COMPONENTS FOR FIG. 1

L1, 2, Eddystone Four Pin Coils.
L3, 4, Eddystone Four Pin Coils Modified.
L5, 6, Eddystone Four Pin Coils Modified.
Ch. 1, Eddystone Short-Wave Choke.
VC1, VC2, VC3, 150 pF Three-gang.
TC1, 20 pF Trimmer Type.
C1, 2, 4, 6, 11, .01 μF Mica.
C3, 5, .1 μF Non Inductive.
C7, 8 μF 500-volt Electrolytic.
C8, 9, 10, .0001 μF Mica.
C12, 2 μF 500-volt Paper.
C13, 25 μF 12-volt Electrolytic.

R1, 100kΩ.	R4, 50kΩ.	R8, 9, 20kΩ.
R2, 250Ω	R5, 5kΩ.	R10, 50kΩ.
R3, 6, 10kΩ.	R7, 7kΩ.	R11, 9kΩ.

VR1, VR2, 10kΩ Potentiometer.
VR3, 250kΩ Potentiometer.
LFC, 30 Henry 10 mA. L.F. Choke.

ADDITIONAL COMPONENTS FOR FIG. 2.

R1, 40kΩ.	C1, .1μF.
R2, 10kΩ.	C2, 8μF Elec. Con.
R3, 150kΩ.	C3, 50 μF Elec. Con.
R4, 240Ω.	
R5, 100Ω.	

ADDITIONAL COMPONENTS FOR FIG. 3.

R1, 200kΩ.	C1, .1 μF Tubular.
R2, 250kΩ.	
VR1, 20kΩ.	

Power Pack Problems

Operation of Mains Units.

By W. J. DELANEY (G2MFY)

ALTHOUGH many amateurs consider the design of a power pack beyond them, others see nothing in it and make up a unit only to find that they have overlooked some vital point—often an expensive oversight as it calls for valve replacements. If the beginner examines the power unit side of a variety of commercial receivers he might be forgiven for considering the problem difficult—there appears to be such a wide range of circuits. Actually, however, they are all fundamentally the same, and the differences in most cases are merely schemes adopted by manufacturers either

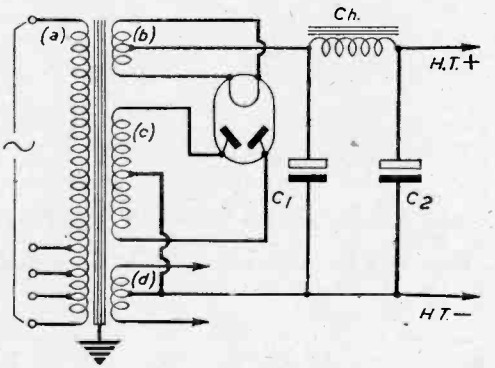


Fig. 1.—Essential details, or basic circuit, of a simple power unit.

for simplification of mass-production methods or to keep down costs. Fig. 1 shows the circuit—which might be called "basic"—of a standard A.C. mains power unit feeding any type of receiver—straight, superhet or even television. It consists merely of a mains transformer, a valve, two condensers and a choke. At this point it will supply, of course, only one H.T. voltage and a certain number of valve heaters (depending upon the rating of the winding (d)).

Transformer Design

Let us deal with the transformer first. This has four windings, winding (a) being tapped so as to enable it to be used with mains of any voltage. For this purpose it may be marked 0-200-240-250 (or the high voltage points may be marked 200/230, indicating that that point may be used on either 200 or 230 volt supplies or an intermediate value). A more modern idea is to mark the terminals or leads 10-0-200-220, etc. This enables a more accurate input setting to be arranged, as it is possible, by using either the 10 or 0 lead, to increase the input matching in steps of 10 volts. Usually, however, such accurate matching is not required, but many ex-Government surplus transformers will be found marked in this way.

Winding (b) is to supply the heater of the rectifying valve, but in modern design it will probably be found that this winding is not provided with a centre-tap. In this case one side of the winding is taken as the H.T.+ lead, and, if an indirectly heated valve rectifier is used, the side of the winding joined to the pin of the valve to which the cathode is connected is the positive lead (Fig. 2). Similarly, heater windings to-day are often not provided with the centre-tap, as little trouble is experienced from hum if one side of the heater winding is earthed. It is assumed, of course, that everyone is familiar with the reason for providing a tapping point, namely, the removal of hum. With older types of valve this was, in fact, found necessary, but modern 6.3 volt valves can be used very satisfactorily without this arrangement, and modern practice is preferably to take one valve socket on each valveholder in the receiver direct to earth. This has the advantage of enabling wiring to be simplified, in many cases producing better stability and it calls for only one lead from a power pack to a receiver where these are built as separate units (Fig. 3).

Voltage Losses

So much for the main points on transformer windings. Next comes the question of the two condensers and the choke. Condenser C1 (Fig. 1) will govern the output from the rectifier, and if the curves of a modern rectifier are examined it will be found that there are quite a number of volts difference when the condenser is changed from 4 μF to 32 μF. The output is greater with the larger value of condenser, but care must be taken not to use too large a value and the makers usually state the maximum value which may be used. Thus, if you have a power pack with a condenser of 4 μF in this position and could do with a few extra volts H.T. it may be possible to obtain them merely by using a larger condenser in place of the 4μF. Condenser C2 should be as large as possible consistent with removing hum. In modern television receivers this is sometimes as high as 100 μF or more, whilst in simple receivers it perhaps may be necessary only to use 8 or 16 μF. Its value is coupled with the choke, and this again must be

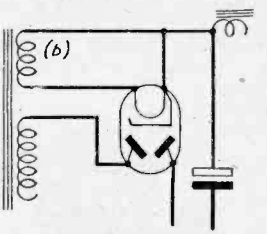


Fig. 2.—H.T. positive should be taken from the cathode-heater pin as shown here.

selected according to the circuit and the current which is passing.

It should be remembered that the total H.T. current of the receiver flows through this choke and therefore there will be a voltage drop through it. If, for instance, the output from the rectifier

is 250 volts and the valves in use pass a total current (including current which may flow through potentiometers across the H.T. circuit) of 100 mA. there will be a very large drop through the choke if this has a high D.C. resistance. As an example, suppose you have selected a 20 henry choke with a D.C. resistance of 1,000 ohms (such a choke would not, of course, be intended for use in such a

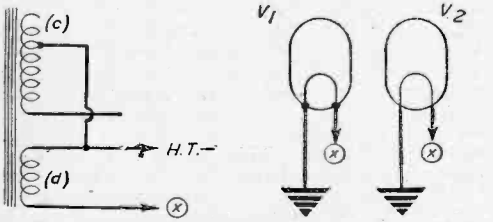


Fig. 3.—One side of each heater may be earthed direct.

position owing to its high resistance). This would mean that 100 volts would be lost through the choke and thus there would be only 150 volts left available at the receiver side. A point to bear in mind here is that when calculating voltage drop, etc., any changes which are made will also vary the voltage, and thus if, for instance, you are needing a few extra volts, remember that by cutting down the resistance of the choke you will get the extra volts but then the current will undoubtedly rise also, and this extra current may be sufficient to offset the increase you have calculated, so that you will be back where you started, in effect. Normally, smoothing chokes for use in the position indicated have very low D.C. resistance, less than 100 ohms, in fact.

Economies

It is possible to effect economies at this part of the circuit in the following manner. A choke to carry the maximum D.C. of the receiver has to have a fairly large inductance if it is to do its job of smoothing efficiently. This means that a heavy gauge of wire has to be used, and consequently it becomes a bulky and expensive item. However, the output stage is generally the heaviest from the current point of view, and as this is the last stage in the receiver any hum which may be present is not subject to further amplification. There is thus not the same need for hum removal as in earlier stages. Therefore it is sometimes possible to use a simple choke for the output stage (a matter of only a few henries) and a further choke of higher inductance, but capable of carrying only the moderately small current of the earlier stages, for the rest of the circuit (Fig. 4). Remember, however, that Choke 1 is still carrying the *total* current of the receiver when working out voltage drop. A typical rating for Ch. 1 is 2.5 H. at 50 or 60 ohms. Ch. 2 can be 20 or more henries and its D.C. resistance will not matter very much as it is unlikely that the earlier stages will need the maximum H.T., and if C3 is made large it will no doubt be found that the values of decoupling resistors in the early stages may be low enough to provide plenty of H.T. for the valves without the risk of instability arising.

When selecting the condensers for positions C1, C2 and C3 remember to take into account the surge voltage which will arise when the valve heats up—especially if this should attain maximum temperature before certain valves in the receiver. If, for instance, the secondary winding is rated at 350-0-350 volts it is certain that it will rise above that before all valves have settled down to normal temperature, and therefore condensers rated at 450

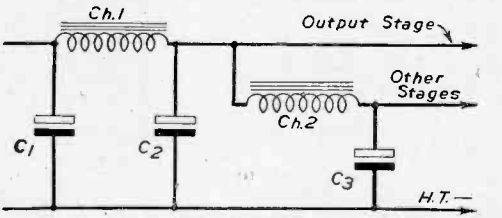


Fig. 4.—Better smoothing and economy may be effected by using two chokes.

or 500 volts working will be desirable. Most modern electrolytics carry on them the maximum surge voltage and current, and it is a simple precaution to include a meter in series or across the condenser to see just what the maximum current and voltage are when the receiver is switched on. If a directly heated rectifier is used with indirectly heated valves in all other stages it may rise to a very high value on switching on, as the rectifier is, in effect, unloaded and taking no current, with the result that there is no voltage drop anywhere, and a case was recently experienced where a very well-made transformer was employed, rated at 350-0-350, and on switching on it rose to just over 700 volts and fell back rapidly to just over 500, where it remained for quite a while until the valves began to draw current.

"British Radio for the World"

IN preparation for Radiolympia, September 28th to October 8, 1949, the Radio Industry Council, as in 1947, has sent overseas a booklet entitled "British Radio for the World," reviewing progress in the industry and conveying to overseas readers a cordial invitation to the exhibition.

The booklet is on a more ambitious scale than in 1947. It has a stiff paper cover in four colours, with the Radiolympia lion in white and a television aerial mast with radiating circles on a maroon ground. The context is in two colours and illustrated by photographs. The booklet was designed by the Council's advertising agents, Rumble, Crowther and Nicholas, and printed by the Shenval Press.

The contents, instead of being a statement by the Council, consists largely of articles on various aspects of the industry written by well-known radio journalists and scientists distinguished in radio and radar.

Ten thousand copies of the booklet have been printed, of which 5,000 have been distributed through the British embassies, legations and consulates, British chambers of commerce overseas, F.B.I. representatives, airline companies and broadcasting corporations. Copies have also been sent to all who attended the 1947 Radiolympia from overseas, and exhibitors are being offered free copies for their own customers and agents overseas. When the 10,000 copies are used, orders will be taken for reprints at a charge of 1s. 3d. per copy excluding packing and postage. The booklet is not obtainable except for distribution overseas.

Practical Hints

Gramophone Light

HERE is an idea which I recently fitted to a home-made radiogram cabinet (under lid). It is a novel and attractive dial floodlight and it can be easily made out of the scrap box.

An old aluminium condenser casing with the ends trimmed and an aperture of about ½in. cut along the body serves as the container for two bulbs. Two clip-on bulb holders are attached at each end and wired inside the container.

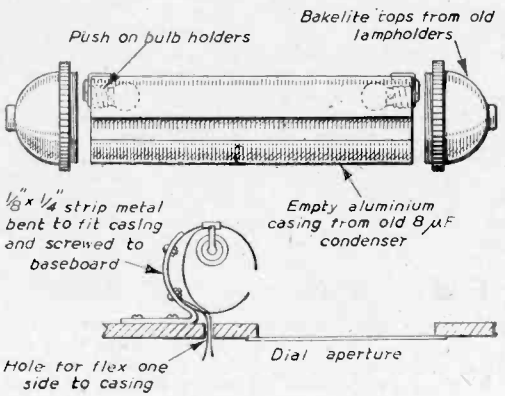
THAT DODGE OF YOURS!

Every Reader of "PRACTICAL WIRELESS" must have originated some little dodge which would interest other readers. Why not pass it on to us? We pay half-a-guinea for every hint published on this page. Turn that idea of yours to account by sending it in to us addressed to the Editor, "PRACTICAL WIRELESS," George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Put your name and address on every item. Please note that every notion sent in must be original. Mark envelopes "Practical Hints."

SPECIAL NOTICE

All hints must be accompanied by the coupon cut from page iii of cover.

The ends of the container are covered with two discarded lampholder tops. Wiring is brought up through the baseboard and is hidden from



A gramophone light.

view. The inside of the casing is given a coat of white enamel, whilst the outside can be finished in whatever colour the experimenter desires.—T. DAVIS (Skegness).

A Valve Repair

VALVES continue to be sent out from the factory with flimsy top caps, which are liable to become loosened. When this happens, only the wire passing through the pip holds them in position, and if this breaks the valve may be regarded as useless.

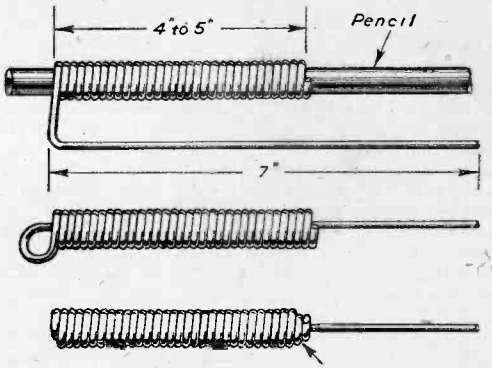
With a little skill and a little fine soldering, however, the valve may be made as good as new. First examine the pip to see if any of the wire is protruding. Should it be protruding sufficiently to make contact with the top of the cap, then all that it needs is resoldering (after securing the cap to the valve by means of an adhesive). If it is broken off short, i.e., level with the top of the pip, the position is much more serious, though the valve can still be salvaged if a little care is taken.

With a three-cornered file make a nick all round the pip about an eighth of an inch below the top. Then by squeezing on the nick with a pair of wirecutters the portion of the pip will break away, exposing a short length of the wire. To this another piece of wire is soldered, sufficient to bring it to the top of the top cap when the latter is in position. Do not use too thick wire for this job—a short piece of No. 28 copper wire is admirable.

Make a small hole in the centre of the top cap, and let the wire protrude through this when the cap is in position. A touch of solder, afterwards cutting off the surplus wire, completes the job. It is advisable, however, to secure the cap before doing this, and for this purpose I have found nothing better than plastic solder, which sets hard in an hour and has a grip which the valve makers might emulate.—W. NIMMONS (Belfast).

Soldering Hint

THE cored type of solder is most popular and useful, but if purchased in the small cartons is not too easy to use. I found it cheaper to purchase the large cartons and to use it in the following manner: About three or four feet are pulled out and wound round an ordinary lead pencil as shown in the accompanying illustration. The turns are put on side by side, but not too tightly. A length of about 7in. is left at the end



A useful idea for cored solder.

and the roll is then pulled carefully off the pencil. The long end is next turned over and pushed through the spiral winding and pulled until the end turn is neat and close as seen in the lower illustration. With a pair of pliers the start of the coil (that is the first two turns) are clamped round the projecting length of solder. It is thus possible to apply the solder to the iron right over the job, and as the projecting end becomes shortened it is simply pulled out to the required new length, the solder feeding itself from the turns at the end which unwind, but still leave the unit nice and rigid for use.—R. M. DAVIS (Hammersmith).

A Small

A Useful Accessory for th

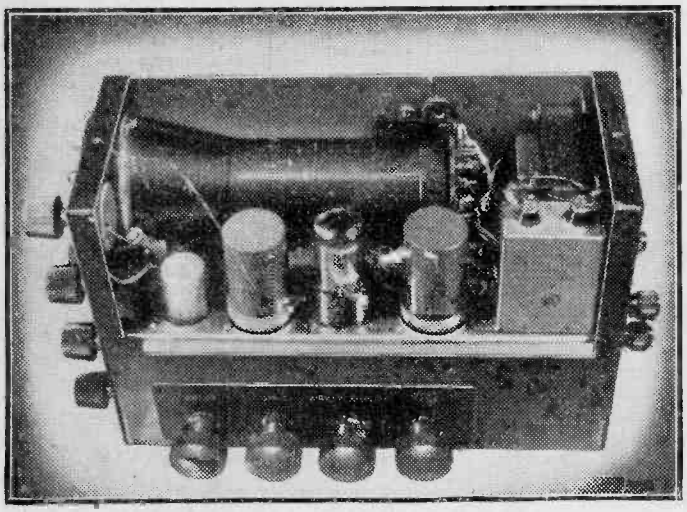
By P. D

THE advertisements for small oscilloscopes that have appeared in recent editions of the radio and electrical journals have greatly intrigued me and no doubt others like myself have felt the need for such a piece of apparatus, especially if any servicing of television has to be done.

I decided therefore to make one as small as possible from Government surplus stock and the results of my experiments are described herewith.

Compact Unit

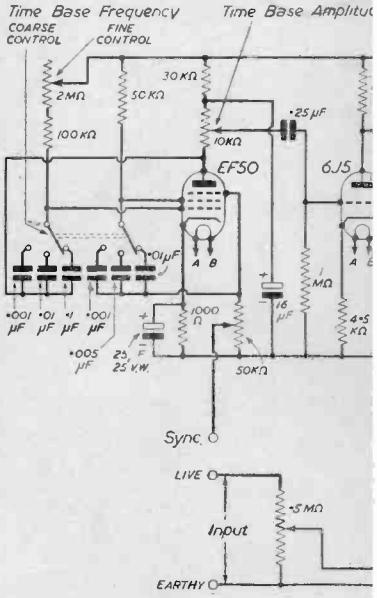
The oscilloscope is self-contained with time base, Y deflection amplifier, and power supply. The tube is a 3in. VCR139, the saw tooth oscillator an EF50 (VCR91) with a 6J5 to amplify its output, and the Y axis amplifier is another EF50. A small transformer with a square inch of core supplies the power: 4 v. 1 amp. for the tube, 6.3 v. .9 amp. for the time base and amplifier valves, 450 volts for the tube H.T. through a H90 Westinghouse rectifier (pencil type), and 250 volts for the time base H.T. through a selenium rectifier rated at 280 volts 40 mA. The controls consist of brightness, focus, X shift, Y shift, X sweep frequency; coarse and fine, X sweep amplitude, synchronise, two-way switch to select the Y plates from direct or amplified input, and input gain.



Interior of the 'Scope with valves and tube in position.

Power Supply

An analysis of the power supply circuit will show that the H.T. for the time base is smoothed by a small choke, and a 16 μF electrolytic condenser, with an 8 μF electrolytic as the reservoir condenser. The extra H.T. for the tube is smoothed by a resistance and a 2 μF Mansbridge-type condenser with a 2 μF reservoir condenser. The output on load of the H.T. is 200 volts, and of the EHT on load 500 volts. Thus it will be seen from the circuit diagram that the voltage on the final anode of the tube is some 600 volts and that the X and Y shift voltage can be varied plus or minus 100 volts from that value. This is sufficient to move the spot off the screen in any direction whilst the EHT is sufficient to operate the tube satisfactorily. The splitting up of the H.T. like this enables small



Theoretical circuit

LIST OF

Resistors :

1 2 megohm variable.
3 .25 megohm variable.
1 .5 megohm variable.
1 50,000Ω variable.
1 10,000Ω variable.
4 100,000Ω ½ watt.
1 50,000Ω ½ watt.
1 30,000Ω ½ watt.
1 10,000Ω 1 watt.
1 5,000Ω variable.
1 4,500Ω ½ watt.
1 1,000Ω ½ watt.
1 200Ω ½ watt.
1 2,000Ω 1 watt.
1 .25 megohm ½ watt.

Capacitors :

1 16 μF+16 μF '35
electrolytic.
1 8 μF 350 v. electr
1 25 μF 25 v. electr
2 2 μF 500 v. worki
3 .25 μF 500 v. wor
2 .001 μF.
1 .005 μF.
2 .01 μF.
1 .1 μF.

Valves :

2 EF50, VR91.
1 6J5.
1 VCR139.
1 Westinghouse H90
rectifier.

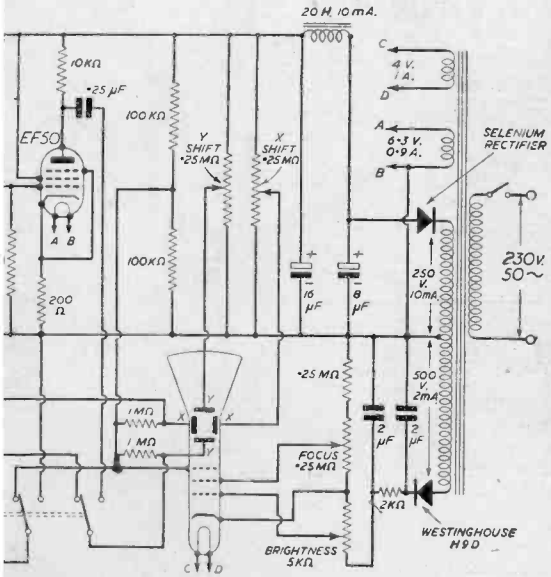
scilloscope

erimenter and Serviceman

ERIDGE

condensers to be used, and the negative H.T. of the time base and amplifier to be earthed. Details of the mains transformer will be found on the next page.

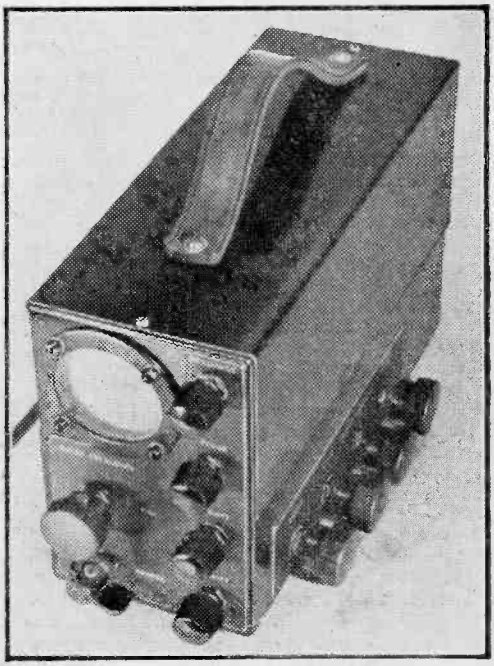
The time base consists of a Miller Transitron oscillator and an amplifier. An EF50 (VR91) is



small oscilloscope.

PONENTS

- 1 Standard Telephone selenium rectifier 280v. 40 mA.
- 1 Yaxley-type switch, two-pole, three-way.
- 1 Yaxley-type switch, three-pole, two-way.
- 1 On-off toggle switch.
- 2 B9G valveholders.
- 1 International octal valveholder.
- 1 Base for VCR139.
- 3 Insulated terminals.
- 10 suitable knobs.
- 2ft. x 2ft. 18G aluminium sheet for chassis.
- " Choke (see text).
- Mains transformer (see text).



General view of the completed instrument.

used for the oscillator since these are cheap and plentiful. The frequency is altered by means of a three-way two-pole switch, switching in pairs of condensers and the two megohm variable grid leak, which is returned to H.T. +. A fixed resistor of 100,000Ω is also included in this grid circuit to prevent damage to the valve. The output from this oscillator is taken from the slider of the 10,000 ohms potentiometer, which forms the anode resistor and is amplified by a triode 6J5, which is over-biased and has no by-pass condenser across the bias resistor. The combined negative feed back and over-biasing ensures a reasonably linear X sweep.

The amplifier is an EF50 slightly over-biased. This gives a sufficiently undistorted output to give full Y deflection with 1 volt 50 cycle R.M.S. input.

The input terminals are directly connected to the input gain control. Most circuits to be analysed are coupled to the oscilloscope with a condenser in series, and since the value of this condenser varies with the frequency, it was considered best to leave it out of the apparatus. In some cases a direct connection is required.

It will be noted that the suppressor grid of the oscillator EF50 is connected to earth through a 50,000 ohms potentiometer, the slider of which is connected to a terminal labelled "Sync." In order to synchronise any circuit to be analysed, an appropriate condenser is connected between this terminal and the live input terminal. The potentiometer is then turned until the trace just locks. For example, when checking the frame time base

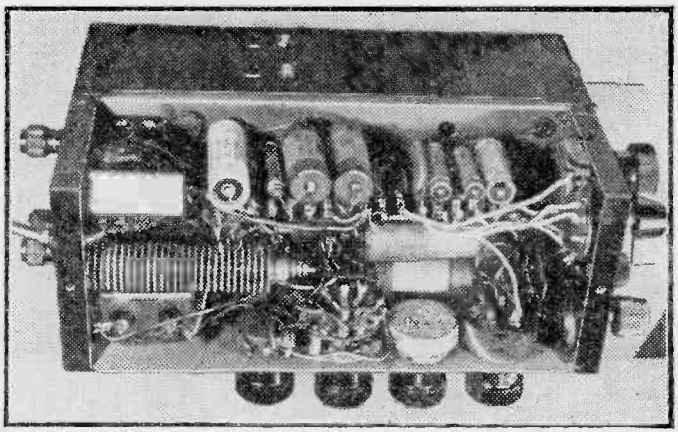
of a television set the oscilloscope should be coupled with a .1 μF condenser and the sync terminal coupled with .001 μF. For the live time base .001 μF is sufficient coupling with 10 pF for the sync coupling.

Layout

The photographs show the general layout of the components which is not critical except for the relationship between cathode-ray tube and mains transformer. In the position shown, i.e., transformer immediately behind the tube, there is no visible deflection of the spot due to the magnetic field of the transformer.

The transformer has a core of 1 square inch and a bobbin space of $\frac{1}{2}$in. The primary is wound with 1,840 turns of 38 enamelled wire, paper interleaved every 400 turns. The H.T. secondary is wound with 6,000 turns of 42 enamelled, paper interleaved every 400 turns and tapped at 4,000 turns. Two heater windings are required, one at 4 volts 1 amp. for the tube heater is wound with 35 turns 22 enamelled, and the other at 6.3 volts .9 amp. for the valves is wound with 54 turns 23 enamelled. Good insulation between the windings is essential. The wire should be put on as evenly as possible in order to get the number of turns into the space available.

Any midget smoothing choke is suitable—the one used having a resistance of 1,000 ohms with an estimated inductance of 20 henrys at 10 mA. The rest of the components are straightforward and can all be purchased from the surplus market.



This under-chassis view shows the disposition of the various components.

R.F. E.H.T. Unit

Constructional Data for a 7 Kv. Television Tube Supply

By E. C.

ONE of the greatest advantages of a radio frequency E.H.T. supply unit, as compared with the normal type of unit employing an E.H.T. transformer working on 50-cycle mains, is the greater degree of safety offered. The value of reservoir condenser required by the 50-cycle unit is generally not less than 0.1 μF. and a shock from such a condenser when fully charged may easily prove fatal, whereas in the R.F. unit, owing to the higher operating frequency, a reservoir condenser capacity of .001 μF is quite sufficient, and shock from one of these is only severe enough to be unpleasant. Other advantages, of course, include a saving in space and that a short circuit can be placed on the output without causing damage to the unit.

Principle of Operation

The unit basically consists of a single power valve operating as a class "C" oscillator and having a high "Q" secondary coil coupled to the anode coil, the secondary coil together with its self capacity and associated circuit capacity being arranged so that it resonates at approximately the same frequency as the anode circuit. The voltage induced in this secondary coil is magnified by the "Q" of the coil, and the resulting

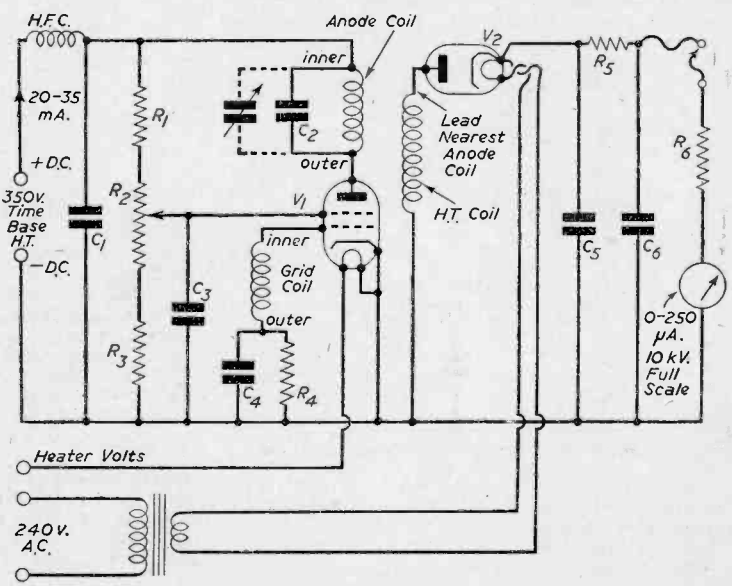


Fig. 1.—Theoretical circuit of the R.F. E.H.T. unit

high voltage which is developed is rectified and smoothed providing an output suitable for operating a magnetic cathode-ray tube in a television receiver, besides having many other useful applications. The output of the unit is controlled over wide limits by varying the screen potential on the oscillator valve.

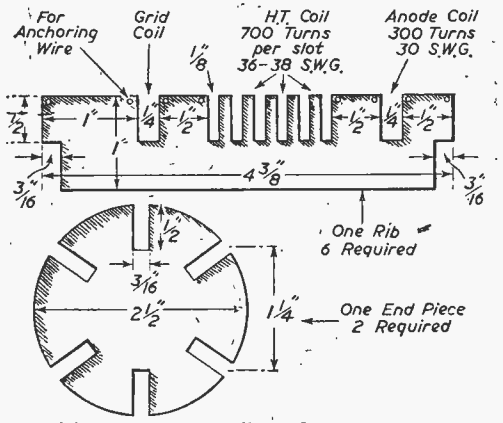


Fig. 2.—Main details of the coil former.

Construction

The most important part of the unit is the coil, and details of construction are as follows: The former is cut from 3/16in. Perspex or Paxolin, and consists of six slatted ribs fitted into circular end-pieces and held in place by any suitable cementing mixture; in the case of Perspex Polystyrene dope is very suitable. The drawing of one rib is shown together with an end-piece. When cutting the slots in the ribs it is advisable to cut the six strips and put them all in a vice at the same time side by side. This ensures good alignment of the slots on the completed coil. The same rule applies to the end-pieces which can be cut out with a fly cutter. The extra top piece with the rectifier valveholder is a convenient way of mounting the rectifier in view of the fact that

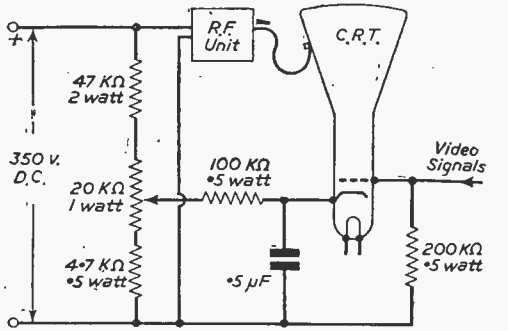


Fig. 3.—Bias arrangement for use with this E.H.T. unit.

the output voltage will appear between the rectifier cathode and chassis.

The coil should be wound before this top piece is fitted. The winding details are as follows: Commencing with the anode coil and using 28-30 S.W.G. silk and enamel, first of all, leaving enough lead over to connect the coil up, anchor the wire by pushing, say twice, through the eyelet hole. Wind as neatly and tightly as possible and don't let turns near the top of the coil slip down the

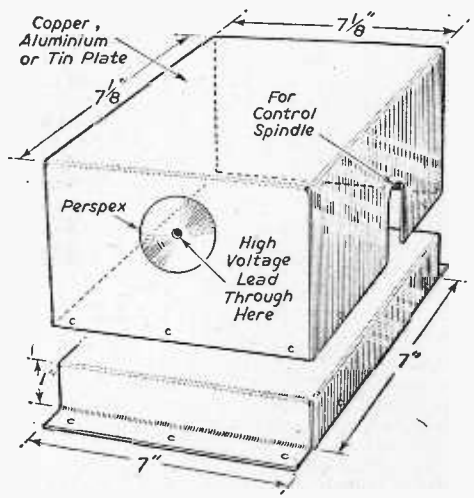


Fig. 4.—Details of the containing case for the unit.

slot as this encourages arcing; 300 turns are required and these should just about fill up the slot. Finish by anchoring the wire in the second eyelet and leave enough spare for connecting up. The anode coil is then finished, and the same details and wire apply to the grid coil, which can be done next. NOTE: *All windings are in the same*

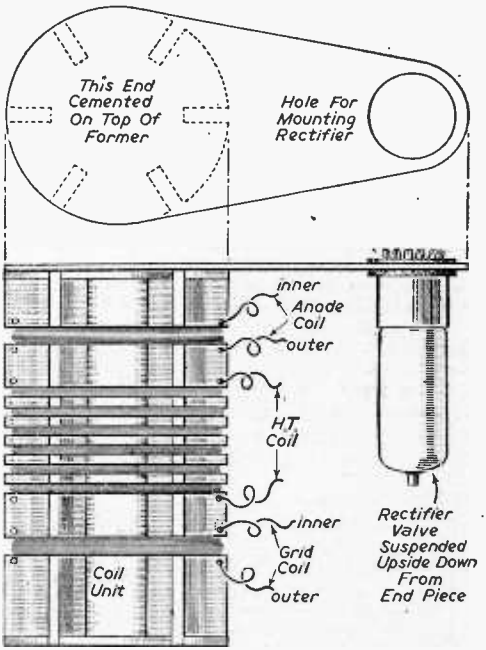


Fig. 5.—Coil construction and wiring details.

direction. For the H.T. coil, 36-38 S.W.G. silk and enamel wire is used. For the purpose of anchoring the H.T. leads the eyelet method is not advisable as the wire is much thinner than the anode coil wire and is liable to fracture more easily. A better method is to insert in the eyelet a stiff piece of wire, say 18-gauge tinned copper about 1in. long and bend over both sides to anchor it. The H.T. wire can then be soldered to one end of the 18-gauge piece and a thicker piece of lead-wire soldered on the other end for wiring into the circuit. NOTE : The eyelets must be kept as close as possible to the coil in the case of the anode coil and H.T. coil, as this is where the maximum potential is developed. Wind 700 turns per slot and on no account let turns near the top of the slot fall down into the slot. There will be about 1,000 volts developed between top and bottom of each slot. When the winding is complete paint the coils with coil dope; this will ensure that the wire stays put.

No mention has been made of fixing the coil to the chassis. Quite an easy method is to drill and tap two 4 B.A. holes in the lower end-piece. Bolts can then be driven up through the chassis into the former, but they should not be long enough to project more than $\frac{1}{8}$in. past the upper edge of the lower end-piece. Metal bolts must *not* be used to fix the rectifier bracket to the upper end-piece.

The Unit

Most present-day R.F. units use a special low heater consumption rectifier and feed the heater from a third coil coupled to the anode coil, but in such units the output generally has to remain fixed as varying the tank coil current to vary the output would result in variations of the rectifier heater voltage. Also, a valve voltmeter is generally necessary to set the heater voltage correctly, and any mistakes or slips may easily result in the valve being burnt out. In view of these difficulties, a transformer was decided upon. The transformer must be capable of withstanding the full output voltage across the heater winding and primary winding gap without arcing over. Transformers for this job can be obtained, although it is not a difficult job to wind one. The chassis size is governed by the size of the components used. An overall size of 7in. cube is generally quite big enough. Drawings of the chassis are given with a suggested layout. The wiring of the unit is simple and straightforward, and no difficulty should be experienced here. No leads should come closer than 1in. from the H.T. coil in case of flashover. No points of high potential, such as the .001μF reservoir and smoothing condenser connections should be closer than 1in. to the case. In the finished unit the H.T. lead from the smoothing condenser is fed through the hole in the Perspex disc which forms an insulator.

Testing

The unit should be tested with the cover off. For the purpose of testing, a two-gang air-dielectric condenser (.0005μF) is connected in parallel with a .0005μF fixed mica condenser, and connected across the anode coil. Both sections of the two-gang are connected in parallel to give a wide-capacity swing. The condenser should be mounted on some form of insulator, or on the bench, so as not to touch the chassis because it will be at H.T. potential. A knob should be screwed on the spindle in case of shock. This condenser is only required initially to get the right capacity to suit the particular valve and coil being used. When the tuning point is obtained, the variable condenser can be replaced by a fixed mica condenser. Only mica or similar condensers can be used here, the tubular type are unsuitable. Any normal power output pentode or tetrode will function satisfactorily in the place of V1, as long as it has a rated anode dissipation of 10 watts or more. Any normal rectifier valve will function in the place of V2 as long as it is capable of handling a peak inverse voltage of 20 kV., i.e., to give a rectified output of 8 kV. Smaller valves can be used if the output required is kept at the valve's rating. For the high-voltage .001μF condensers there is a good selection of condensers in Government surplus stores. R.F. condensers from high-voltage radar equipment are particularly suitable for this job.

With the vanes of the condenser wide open and the control set at approximately half-way, switch on and wait for warming up to take place. If everything is in order, some indication should be present on the meter, which has a full-scale deflection of 10 kV. Close the vanes slowly and watch the pointer, which should rise until it reaches a maximum. Increase the screen potential and retune the condenser again for a maximum. The output of the unit should now be well over 7 kV., and with a heavy duty valve may even reach 9 or 10 kV. Keep a watchful eye on the coil and rectifier valve for signs of corona discharge or flashover and note whether the rectifier heater transformer is standing the strain. The transformer will not be damaged by arcover unless left for long periods with a continual arc. If everything is in order the unit should be left on for about half an hour as a running-in test. The gang condenser should then be removed and a fixed mica condenser, of the right capacity to give maximum output put in its place. The cover can then be fitted and the unit is ready for work.

If the unit is used for feeding a C.R.T. in a television receiver, a method of obtaining grid-bias for the tube is necessary, as the normal method of a potentiometer in the bottom of a chain on the output of the unit cannot in this case be used. The circuit in Fig. 3 shows how this can be done.

The 4.7 kΩ resistor is merely to prevent full brilliance from being turned on in case of damage to the tube screen.

With the unit running and output indicated, switch the 350v. supply off and on say three times. The output should rise without signs of instability each time. If any trouble is experienced here, the grid coil connections should be reversed; the unit should then be quite stable.

LIST OF COMPONENTS FOR FIG. 1.

H.F.C. = Any medium or long-wave H.F.C.
C1 = .5 μF 350 v. D.C. working.
C2 = value determined by tuning (mica).
C3 = 1 μF 250 v. D.C. working.
C4 = .001 μF mica.
C5/6 = .001 μF 8kv. working
R1 = 20,000Ω 3 watt.
R2 = 25,000Ω 3 watt.
R3 = 2,000Ω $\frac{1}{2}$ watt.
R4 = 100,000Ω 1 watt.
R5 = 100,000Ω $\frac{1}{2}$ watt.
R6 = 40 megohms 4 watts.
M = 250 μA meter for testing.

Transformers and Chokes—1

Design and Construction of Mains Transformers, Current Transformers and Chokes

By ERIC LOWDON

THERE is a tendency among writers when dealing with this subject for amateurs to ignore the basic principles of design and to present the reader with a formula of the form

$$\text{Turns per volt} = \frac{\text{a constant}}{\text{area of core}} \quad \ldots\ldots (1)$$

Fixed values for frequency, flux density, voltage etc., are assumed and consequently no variation can be made in the dimensions or electrical characteristics of the transformer.

Usually a transformer so designed will give satisfactory service, but the limitations of such a formula become apparent when the constructor requires a transformer, which is, say, smaller than usual, or, having laminations on hand, wishes to make an inexpensive transformer, using the minimum amount of wire, or a transformer having an input other than the standard 50 cycle 230 volts. Few amateurs can say that they have not met such conditions for a transformer at some time or another.

By working from first principles the disadvantages outlined above are not present.

It is not difficult, the mathematics required are simple arithmetic, and if you are the type who, on being confronted with anything which resembles a mathematical formula, hastily averts his eyes and turns to the next page, I hope you will bear with me for a little and prove for yourself that any fears you may harbour in this respect are without foundation.

Formula (1) is derived from the basic formula

$$\frac{T}{V} = \frac{10^8}{4 \times F \times f \times A \times Bx} \quad \ldots\ldots (2)$$

Where :—

T = Total turns on winding.
V = Volts across winding.
F = Form factor.
f = Frequency of supply.
A = Area of core.
Bx = Flux density in core.

$\frac{T}{V}$ is the turns-per-volt ratio of the transformer, which means the number of turns required in the winding for each volt produced across it. This ratio is the same for each winding, primary or secondary, thus if $\frac{T}{V} = 8$ and the primary volts are 230, then the total turns required for the primary are $230 \times 8 = 1{,}840$ turns, and, if the secondary volts are 4, then the turns required for the secondary are $4 \times 8 = 32$ turns.

It is obvious, therefore, that if we can provide quantitative values for the symbols on the right-hand side of the equation, we can easily calculate the turns required for each winding on the transformer ; we will, therefore, examine each symbol in turn and discuss the points which govern the choice of value to be allotted to it.

Form Factor (F)

The value for F depends on the shape of the input waveform and is equal to 1.11 for a sine wave input which is normal for a mains transformer.

Frequency (f)

The standard mains frequency in this country is 50 c.p.s. We can, therefore, incorporate this figure with that for the "Form factor" in the formula as constants, but bearing in mind that should we at any time require a transformer working from a different supply, then more appropriate values must be used.

The vibrator transformer is a notable example of a component whose input is neither a sine wave nor 50 c./s.

The formula now becomes :

$$\frac{T}{V} = \frac{10^8}{222 \times A \times Bx} \quad \ldots\ldots (3)$$

Cross Section Area of Core (A)

This is the section area of the centre limb of the core, and the area to be used depends on the total watts *input* to the transformer.

The minimum area is given by

$$A = .15\sqrt{\text{Primary watts input}}$$

but for a conservative design a somewhat larger area is recommended, say

$$.19\sqrt{\text{Primary watts input.}}$$

Flux Density (Bx)

This is measured in lines per sq. inch of core area or sometimes in Gauss.

1 Gauss = 1 line per sq. cm. or 6.4 lines per sq. in. and the limiting factors to the amount of flux which can be carried by a core are :

(1) The saturation point of the material.
(2) Distortion of the current wave form due to the shape of the saturation curve.
(3) Losses in the material, i.e., hysteresis loss and eddy current loss.

Silicon iron, such as Stalloy or Silcor, is almost universally used for 50 c.p.s. mains transformers, and it is, therefore, the material which we will consider here.

At this point allow me to give a word of warning. Cores taken from surplus equipment may or may not be made from Silicon iron. Many of these equipments are designed to work from 500 and 1,000 c.p.s. supplies and such cores are probably made from materials to which the following figures do not apply.

A good figure for silicon iron is in the region of 65,000 lines per square inch, but it is permissible to go as far as 82,000 lines if it is wished to economise in copper or to make a small component.

We are now in a position to replace the symbols in formula (3) by suitable values and thus by simple arithmetic to determine the turns-per-volt ratio of any transformer we may require.

Design

Transformer design, even to the professional is largely a matter of trial and error, the procedure being as follows :

The designer enters the complete specification of the proposed transformer in a specially prepared design sheet. He then proceeds to calculate the various quantities required, which are also entered in the design sheet; when the calculations are complete he examines the design as a whole and compares it with the original specification, any alterations required are made to the design and again it is compared with the specification and so on until all the requirements have been met.

There are so many unknown factors to begin with that the designer is compelled to make certain assumptions, and quite a few guesses, before his design is completed. These points will be discussed in the example.

Of course, the professional is very often required to work to close limits with regard to permissible core loss, temperature rise, voltage, etc., whereas the amateur will not worry very much if his transformer has a temperature rise greater by a few degrees than that laid down by the British Standard Specification, especially if it means that he can accommodate his transformer in a space which would otherwise have been too small.

With reference to the design sheet mentioned above, the amateur can do no better than to emulate the example of the professional by preparing a simplified design sheet on which to enter the results of his calculations.

It is much better than using odd scraps of paper and old bus tickets; the design will proceed smoothly from beginning to end, and if a mistake is made it is easy to check back; further, a permanent record will enable the constructor to build a similar transformer at a later date without having to repeat the calculations.

Points to Observe

All measurements should be made accurately. If due attention is paid to this, then the heart-breaking experience of having to unwind two or three thousand turns of carefully wound wire, because there is no room for all the secondary winding, will not be yours.

1. Be sure that your wire is the correct gauge.
2. Measure the thickness of paper to be used with a micrometer (any engineer will do this for you).
3. Do not forget to account for the thickness of the bobbin.

In calculating the area of the core, the measured figure should be multiplied by a "stacking factor," which can be taken as .95. This is due to the fact that the laminations will not lie absolutely flat one against the other, and also because of the insulation on the laminations.

This also applies to the windings and for the same reasons. The turns per layer as calculated from wire tables should be multiplied by a "winding factor" of .95, and the space occupied by the depth of winding, i.e., the layers, by the same factor of .95.

Remember that for any given rating a small transformer will run hotter than a larger one, and if the temperature rise is excessive the insulation will be damaged. For this reason do not try to cut things too finely.

Where copper wire tables specify the maximum current ratings at 1,000 amps per sq. in., it is permissible to add up to 100 per cent. of the figures given.

When it is necessary to calculate the resistance of windings in order to compensate for volts drop, add approximately 20 per cent. to the figure obtained; this will allow for the increased resistance due to temperature rise.

Example of Transformer Design

Specification:

Input: 230 v. 50 ~.

Secondary: (1) 350-0-350 v. 100 mA.
(2) 5.0 v. 2 A.
(3) 6.3 v. 2 A.

If size is of no importance we can adopt a fairly conservative design, and for the purpose of this example we will choose a flux density of:

$B_x = 70{,}000$ lines per sq. in.

And core area $A = .18\sqrt{\text{watts input.}}$

The total watts output of the transformer is:

1. 350 v. × .1 Amp. = 35 watts
2. 5 v. × 2 Amp. = 10 watts
3. 6.3 v. × 2 Amp. = 12.6 watts

Total 57.6 watts.

A figure for the efficiency of the transformer must now be assumed, and for this size 85 per cent. is reasonable. For larger sizes this may be increased, more than 90 per cent. being obtainable at 300 watts output.

∴ Total watts input is:

$$W_0 = \frac{57.6}{85} \times 100 = 68 \text{ watts approximately.}$$

Effective core area $A = .18\sqrt{68} = 1.48$ sq. in.

$$\therefore \text{Actual area} = \frac{A}{\text{Stacking factor}} = \frac{1.48}{.95} = 1.56 \text{ sq. in.}$$

The turns-per-volt ratio of the transformer can now be calculated from formula (3) thus:

$$\frac{T}{V} = \frac{10^8}{222 \times 1.56 \times 7 \times 10^4} = 4.1 \text{ turns per volt.}$$

Primary volts are 230 v.

∴ Total primary turns = 230 × 4.1 = 943 turns, and the secondaries:

1. = 2 × 350 × 4.1 = 2,870 turns (centre tapped).
2. = 5 × 4.1 = 20.5 turns.
3. = 6.3 × 4.1 = 25.8 turns (say 26).

At this point we can choose the size of wire required for each winding, the current in the primary being deduced from the total watts input.

$$I_p = \frac{\text{input watts}}{\text{input volts}} = \frac{68}{230} = .295 \text{ Amps.}$$

Enamelled wire is usually used in transformers and the correct gauge is chosen from wire tables as follows:

Primary: .295 Amps.....28 s.w.g.

Secondary: 1. .1 Amp.....34 s.w.g.
2. 2.0 Amp.....20 s.w.g.
3. 2.0 Amp.....20 s.w.g.

The next step is the choice of lamination, and the only course is to make an intelligent guess at a suitable size. At a later stage it may be found that the size chosen is either too small or large, in which case the design would require to be modified to accommodate a different size.

(To be continued)

Impressions on the Wax

Review of the Latest Gramophone Records

OF the five Beethoven piano concertos No. 4 in G Major is perhaps the most lyrical. It has now been recorded by Robert Casadesus, accompanied by the Philadelphia Orchestra, conducted by Eugene Ormandy on *Columbia LX*1198-201. For those who like their Beethoven presented in a scholarly and artistic manner, devoid of meretricious stage business, this set will inevitably exert a strong appeal.

Anton Dvorak's final contribution to the orchestral repertoire was a group of five symphonic poems, among which was included "The Golden Spinning Wheel," which has this month been recorded by Sir Thomas Beecham, Bart., conducting the Royal Philharmonic Orchestra on *H.M.V. DB*6656-8. This piece is a difficult subject for musical representation, for it was inspired by a fantastic tale of a girl who loses hands, feet and eyes while working at her wheel. Dvorak avoids a too literal interpretation of this macabre story which, however, has a happy ending. Sir Thomas Beecham and the Royal Philharmonic Orchestra have made a notable addition to recorded music by their splendid performance of this rarely heard and interesting example of Dvorak's art.

This year commemorates the centenary of the death of Chopin. It is difficult to do anything striking in his case, either in the concert or record world, because his music is constantly in pianists' repertoires and every really important work has already been recorded. Notwithstanding, a record of Chopin's music at this juncture by a Pole, Witold Malcuzynski, is extremely fitting. He plays three of Chopin's most picturesque studies—Étude in G Flat, Étude in C Minor, and Étude in E. The Key of G Flat Major has a key signature of six flats, so that practically all the work is done with the black keys of the piano—*Columbia LX*1203.

"The Gypsy Baron," which has now been recorded by the Philadelphia Orchestra, conducted by Eugene Ormandy, on *Columbia LX*1202, is a typical specimen of the tuneful overtures Johann Strauss wrote for the many operas which, with the magnificent waltzes, carried his fame to every European capital. This overture contains the melody of the famous waltz of the same name, which reappears in the opera itself.

Many people will welcome that well-known piano soloist Patricia Rossborough back to the Parlophone list with recordings of two works that have lately come to prominence. "Jealous Lover," by C. Williams, is a follow on, as it were, from "Dream of Olwen," while public interest has been widely created by André Mathieu's composition, "Quebec Concerto," as a result of the film *Whispering City*. The number of the record is *Parlophone R*3208.

Light Music

Two tunes by the song-writing team Rodgers and Hart have been chosen by Andre Kostelanetz and his Orchestra for their latest recording on *Columbia DX*1575. The beautiful waltz, "Lover," made its appearance in 1933, and it has held deserved place in the forefront of popular melodies ever since that date. This new performance is undoubtedly one of the most satisfying yet made by America's leading exponent of light orchestral music. The coupling is another old favourite, "My Heart Stood Still," which dates back to 1927.

Peter Yorke and his Concert Orchestra also revives two familiar melodies for his latest recording on *Columbia DB*2548. The famous "Roses of Picardy" was, of course, one of the big song hits of the Great War of 1914-18. It was a fine ballad treatment by Haydn Wood of Frederick Weatherly's poem. "These Foolish Things" is another British song, this time from the mid-thirties.

"Campana A Sera" ("Bells at Eventide")—a very well-known Italian piece—is given typical Melachrino string treatment on *H.M.V. B*9781. An outstanding feature of the arrangement is the bell effect achieved by strings, harp and piano. "Fascination" on the reverse side is also played in typical Melachrino style.

Variety

Webster Booth and his talented wife have chosen two highly attractive songs for their latest contribution on *H.M.V. B*9786. "Throw Open Wide Your Window" and "Song of Paradise" make a thoroughly desirable record.

Popular American tenor Allan Jones, who is at present touring this country in his own road show, *Keeping Up With the Joneses*, returns to the H.M.V. lists with two numbers that are sung in the style that has won him hosts of admirers all over the world. "Do I Love You" is one of the four songs featured in the new Herbert Wilcox film *Maytime in Mayfair*, and "The Monkey and the Organ Grinder" is a fascinating ditty that makes a novel contrast to the first side—*H.M.V. B*9780.

A song which is extremely popular at the moment —"The Wedding of Lilli Marlene," sequel to the famous and original "Lilli Marlene" song—is featured this month by Steve Conway on *Columbia FB*3500. The coupling is "In All the World."

"Red Roses for a Blue Lady" and "Strawberry Moon" on *Parlophone F*2363 and "I Do, I Do, I Do," coupled with "The Echo Told Me a Lie," on *Parlophone F*2365, are the four titles chosen by Geraldo for his latest recordings. Geraldo's interpretation and Wally Stott's arrangements are sufficiently straightforward to meet with the approval of lovers of dance music, as the relaxed tempo makes each side an ideal dance tune.

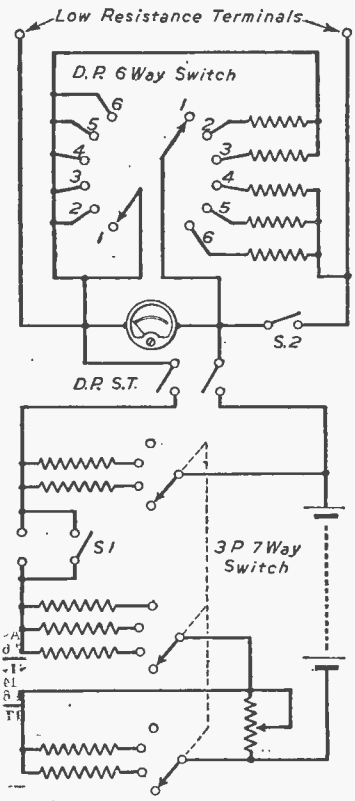
Other popular dance bands that have recorded this month are Harry Roy with "Wabash Blues" and "Bugle Call Rag," on *Parlophone F*2364; Ray Noble and his Orchestra, with "The Streets of Laredo" and "It Might as Well be Spring," on *Columbia FB*3498, and Lou Preager and his Orchestra, with "The Wedding of Lilli Marlene" and "Carnaval Time," on *Columbia FB*3506.

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

Wide Range Ohmmeter

SIR,—In response to Mr. Briscoe (Birmingham) concerning the "Alteration of the Wide Range Ohmmeter," I submit the diagram below.

The addition of the D.P.6-way switch, D.P.S.T. switch and the two S.P.S.T. toggle switches is for the purpose of making more practical the operation of the meter. By this arrangement I adapted the "wide range ohmmeter." I can read volts and milliamps, which makes it a kind of universal testing meter. The only addition I made to the ohmmeter circuit was the S.P.S.T. switch which I used across the "high resistance" terminals, instead of short-circuiting them by wire, to give a better appearance as a commercial job. When the meter is put in operation to work as an ohmmeter the D.P.S.T. switch is closed and the S.2 switch is closed, but the D.P. 6-way switch put to its zero position; the instrument is then as it was originally designed. But if it is required to measure mA. then the D.P.S.T. switch is opened but the switch S.2 left closed, and the D.P. 6-way switch brought to the mA. range. If one then requires voltage reading the S.2 switch is opened, which connects resistors in series with the meter, and the D.P. 6-way switch is brought to the voltage position. All measurements of volts and mA. are taken at the "low resistance" terminals. This arrangement which I use gave me good overall efficiency in all ranges, comparing with commercially-made instruments. No values are given in the two shunt and three series resistors, as this depends on the meter in use. Anyhow, the shunts are easily calculated by a battery and potentiometer method. I would like to thank you and your staff, and to say that we amateurs here in Egypt really appreciate their work, being in the main practical. My library dates back to January, 1933. I would appreciate if you could print this diagram for the benefit of readers who like to improve their instruments.—R. MUSCAT, A.M.I.E.T. (Alexandria).



Mr. Muscat's modification to the wide-range ohmmeter

U.S. Reader's Views

SIR,—I have been reading your magazine for several months now, and like it very much better than any other British radio publication.

I became a reader through pen-pal G4CL. I find your magazine to be frank and fair in relation to controversial subjects involving British versus American radio gear.

Construction is under way in our shop here—that of building the coil-winding machine.

I want to add, too, that the English sure can do a lot with a little. My hat is off to them!

During the war I met many of the English "hams" here and found them to be a great bunch of boys—real dyed-in-the-wool "hams."

The 5-metre converter works very well and is nice and smooth; we wound coils for six, of course.

Just thought you would like to know of our likes and dislikes over here. Lots of luck to you and your fine, clear-cut magazine.—C. T. F. (Roxbury, Massachusetts, U.S.A.).

A Peculiar Fault

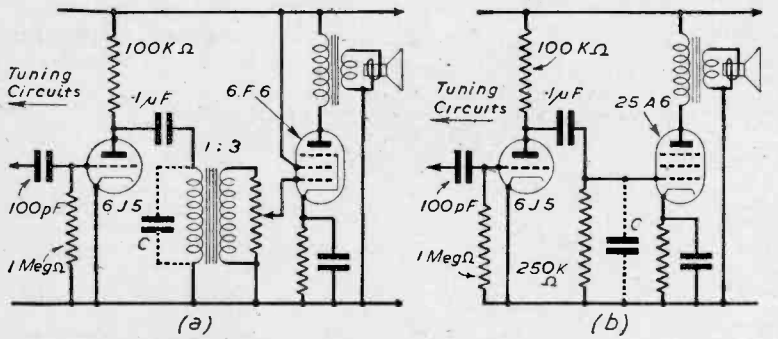
SIR,—I have recently experienced a peculiar phenomenon with regard to two radios which I have built. The circuitry concerned is shown on the next page.

In case (a), quality and volume were poor until condenser C was added, when volume soared and quality improved. This was thought to be a

resonance effect due to C (.002μ F.) and L of primary winding on transformer.

In case (b), symptoms were identical, and addition of C cured the trouble. This led to the thought that parasitic oscillation was occurring somewhere, but by-passing the 6J5's anode with .002μ F. produced little effect.

If some reader could offer an explanation I should be very interested.



Circuits illustrating a peculiar fault experienced by Mr. Jones.

On a different sphere now, with regard to new radio designs, etc.

I have read and heard in many places the criticism of "modern" sets that they use identical circuitry to that of 10 to 12 years ago. I would make this point: since a radio is intended to be listened to by *ordinary* people, it is useless to waste really good radio sets on them until they can appreciate them—both in the matter of quality and station-getting performance. The mass of the people need educating in radio, especially in the matter of quality, where listeners blithely suffer (no, enjoy!) appalling distortion, and, when listening, for instance, to a good amplifier and record, remark: "Isn't it squeaky?" or "Isn't it wooffy?"

How this education can be effected I do not profess to know, but until it is it does not pay to mass-produce radios capable of doing better than those at present produced.—G. P. JONES (E.17).

6K7 Pocket Receiver

SIR,—With regard to the above receiver described by me in the July, 1948, issue. Some months ago an advertiser offered a kit of parts stated to be suitable for this, but the coils provided were found to be unsuitable and to provide insufficient reaction, and, as a result, reception (using these coils) is extremely poor. I informed this advertiser of this point as soon as I noticed the announcement in PRACTICAL WIRELESS and am glad to say they have since ceased to advertise the unsuitable kit, and I hope readers will not experience further difficulty because of it.—F. G. RAYER (Glos).

Measuring Meter Resistance

SIR,—Mr. E. M. Bradley's ounce of practice was certainly impressive, but I should have made it more clear in my first letter that my quarrel with the equation used, $X = \frac{Rm.\ I}{i - I}$, was only for low values of battery voltage and ballast resistor.

If Mr. Bradley had used a 9 volt battery (as in the Wide Range Ohmmeter, December, 1948) in his experiment, he would have calculated the meter resistance to be 137.4 ohms, which is nearly a 2 per cent. error. In my opinion this is far too high an error on which to base the calculations needed for using the meter in a multi-meter circuit.

I strongly recommend his suggestion of the use of a 120 v. H.T. battery and large values of resistor and potentiometer; the accuracy is then less than ± 0.1 per cent. and the reading of the meter becomes the biggest source of error.—J. E. AMPHLETT (N.6).

Home-made Television Receiver

SIR,—I read with interest the letter from P Wade, Slough, concerning home-made television receivers, as I myself have had a "go," but, unlike your contributor, I did just manage to receive a "picture" after I had added a 1-valve pre-amp., but the sound still eludes me.

My set is constructed from a 62 Indicator and a 194 I.F. strip, both sound and vision being straight receivers, but I am not satisfied with the performance as I cannot guarantee reception and would like the opinion of the experts as to the most suitable W.D. units for conversion to TV receivers so as to be powerful enough to receive in districts like mine, which are well outside the A.P. area. —W. T. WRIGHT (Diss, Norfolk).

SIR,—I would like to tell all those readers who have followed the recent letters about the R. 1355 and television, that, at the invitation of Mr. C. Overland, G2ATV, I visited him and he demonstrated the R. 1355 in action. The Q.T.H was a main road and the aerial was an indoor 5ft. 6in. vertical "long" wire. Despite this the picture was of good definition and very little marred by ignition, etc. I was very satisfied by the performance.

Finally, to all those intending to build TV sets I heartily recommend the use of R. 1355 receivers and VCR97 tubes. It's worth it.—K. BERRY (Surbiton).

Programme Pointers

Recent programmes reviewed by our Music Critic MAURICE REEVE

IN pursuance of my remarks last month concerning the inordinate amount of time wasted, and racket caused, in the presentation and signing-off of most radio programmes, I am reminded that the same problem exists in filmland. At the movies there is a series of excruciating signature tunes and orchestral fanfaronades designed to introduce, firstly, the film company, and, secondly, to accompany the showing of the names, mostly in unpronounceable Central European languages, of every man Jack and woman Jill connected with the making and presentation of the picture. The whole wretched business creates a din and a showdown completely at variance with any picture, not to mention theatre, claiming any pretence to artistic, literary or histrionic integrity. It is heard all over the lounges, vestibules and corridors of the theatre, even to the restaurant, reducing what we have paid a lot of money to come to see to its own low level.

Radio would seem to have taken its cue on this point from the movies with even more nerve-shattering results. At least, at the flicks we only have to endure it, on a major scale, twice; whereas in radio-land it is inflicted on us at almost regular half-hourly intervals throughout the day and half the night.

Apart from the fact, of no consequence to anyone other than myself, that I dislike the whole business enormously, my chief complaint is that, like a cheap sauce, which, being without merit or distinction, reduces all food to its own level and deprives it of its individuality and characteristic flavour, so does the signature tune and paraphernalia of introduction reduce, or rather, kill, the singular merits and features of the various radio shows. Coupled with the signing-off, which frequently only serves to drag the show back down again after it has perhaps succeeded in living down and rising above the awful introduction to life its announcements saddled it with, it is all so conventional, so common, so uniform, so devoid of either taste or originality, and so calculated to avoid anyone connected with it ever having to think on the subject again. Can't we be different from the Americans in just one thing?

"The Schubert Discoveries"

THIS was one of those shows the B.B.C. knows how to put on so well. We were not left completely satisfied as to why the Rosamunde Ballet music was left done up in a brown paper parcel on Herr Spiner's shelves collecting the dust for so many years. But the atmosphere of neglect, and the sort of backwater up which the lovely music was left to drift, coupled with the sincerity and enthusiasm of the two young Englishmen, Sullivan and Grove, for it, made a fascinating document.

Why is it that stage German and Austrian gentlemen are invariably so complacent, charming, unruffled and placid? Their laughter always has a tear in it, and their sorrows a smile; their unctiousness is everlasting and their ire unprovokable. Surely, in real life, they have passions of some sort or other? On the stage it seems not. Their angelic smile and beatific nature go hand-in-hand with their amusing mispronunciation and their woolly fuddledness. Perhaps, like the signature tunes, we shall always have them with us; they are very old already.

"Love on the Dole"

THIS is one of those plays, like *Hindle Wakes*, the obstinacy of the success of which leaves us doubting whether it isn't ourselves, after all, who are in the wrong. That it has merits cannot be denied, any more than that it had an enormous success when it was originally produced. It presents an horrific picture of the vices and immoralities, miseries and hardships of all sorts, which were rife amongst whole communities who, in their entirety, were "on the dole" during the terrible late twenties and thirties up to the outbreak of the late war. The tragedy, squalor and demoralisation of it all was horrible; not a relieving note of any sort, unless we except the cheery character of Larry Meath, excellently played by Wilfred Pickles, who gladly wanted to enjoy Love on the Dole, but got killed in a riot after his girl turned the idea down, thinking rightly that it probably sounded much better than it was likely to taste. Had the play not ended with her going off to marry the rich and unsavoury Sam Grundy, who had previously wanted her without his being involved in any responsibilities likely to militate against his full relish of her, we might have been a little more convinced. I am not sufficient of a dialectologist to criticise the real Yorkshire and the assumed Lancashire brogues in this 100 per cent. Lancashire play.

Elgar Festival

THERE has been some glorious music, worthily performed, at the various concerts, comprising the Elgar Festival. Elgar, our greatest musical genius so far, is said to be totally without admirers on the continent, Germany alone excepted. Is it because of the robust Englishness of the idiom? Would Shakespeare suffer the same unfriendliness were he in an untranslatable medium? Perhaps, owing to the sacrosanct nature of notes, we shall be left in entire possession of him. Strange that England, which laps up the idioms of Tschaikowsky, Ravel, Stravinsky, de Falla, and goodness knows who else, in bucketfuls, without even troubling to masticate them properly, should be known as the "insular," "parochial," "provincial minded" nation! In the choral works, especially *The Dream of Gerontius*, and the orchestral *Falstaff*, *Enigma* and the violin and 'cello concertos, Elgar has bequeathed us incomparable masterpieces, enshrining our heritage as puissantly and nobly as the poets and painters. Make no mistake, he is one of the greatest Englishmen, even if, like all his race, a little aloof and "difficile" at times.

Wilde v Shaw

I DO not think Wilde makes quite such good "radio" as Shaw; one seems to miss the visual and the personal elements rather more. The

flashing epigrams lose some of their barb and sting when unaccompanied by the gestures and expressions which would be their property on the stage. Whilst *Lady Windermere's Fan*, presented on Whit Monday, revived memories of the visual orgy of delight Cecil Beaton's recent Haymarket production afforded us ; a joy the wireless is naturally unable to supply and for which it has no alternative. However, nevertheless and notwithstanding, it was a good show, starring Phyllis Neilson-Terry as Mrs. Ermine.

"Esmond"

The Sunday evening serial that has just concluded, Thackeray's *Esmond*, was one of the best the B.B.C. has yet put over. The atmosphere of the period and the urgency of the performances were excellently maintained, leaving the vivid between-episodes much less noticeable than in the Trollope stories. The thread was quickly picked up each week, and we felt only as we would have done had we been reading the book and being under the necessity of having to lay it down for periods, returning to it after our lawful occasions. Fay Compton, as Lady Castlewood, adorned it.

Clifford Curzon has earned for himself the position of our foremost pianist. In my opinion he so easily leads his rivals that he wins by a distance. He gave a lovely recital on June 7th, and played Liszt as only we ever hear the continental maestros play him dazzling technique which was always the master of, to others, its overwhelming difficulties, so that he is always able to infuse the hardest passages with the loveliest poetry and rhythm, colour, fire ; whatever they need to make them beautiful and not merely bravoura displays, instead of only being able to thank the Lord when he has safely swam the rapids and being able to think merely of the poetry etc., when the easy bits come along. His Ravel—*Jeux d'eau*—fairly splashed you with its spray, and Beethoven's *Rage Over the Lost Penny* set you looking amongst your rugs and sofas for the coins that were still safe in your pockets.

News from the Trade

Marconiphone Record Player

AN addition to the Marconiphone range was recently announced—and is the Marconiphone Record Player, model 8903.

This Player incorporates a lightweight pick-up and a special matching transformer which provides

Marconiphone Record Player, Model 8903—£8 10s., *plus P.T.*

an output of approximately 1.5 volts R.M.S. on average records. This is adequate to operate almost any radio receiver with good volume.

The synchronous motor employed, provided it is used on the specified mains frequency, automatically ensures that the turntable revolves at the standard speed of 78 r.p.m. The turntable is rim-driven by a friction drive direct from the motor spindle, An automatic brake is fitted and will operate on any record seven or more inches in diameter provided the record has an eccentric run-in groove. A hand brake is also fitted.

The price is £8 10s., plus purchase tax.

Hints on Television Aerial Erection

PHILIPS ELECTRICAL, LTD., have produced a booklet on the subject of aerials for television reception. It contains advice on the various types to suit all conditions and gives the best methods of installation.

It is not always realised, the booklet explains, that distance from the transmitter is not the only factor to be taken into consideration when selecting the type of aerial to be used. The strength of local interference will often influence such a choice, and due account must be taken of areas of poor signal strength and high interference.

The booklet also gives much good advice on feeder cables and their use and suitability, and emphasises that television is a much more exacting science than sound radio ever was. The days when "a piece of wire around the picture rail" would bring in a strong signal have never arrived with television, and never will, but care in the provision of a proper aerial will pay handsome dividends.

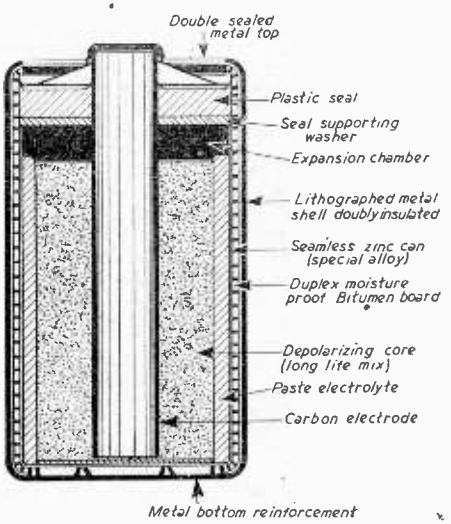
"Television Aerials" may be had by any Philips appointed dealer on application to Philips Electrical Ltd. (Radio Department), Century House, Shaftesbury Avenue, London, W.C.2.

The Alpha Leakproof Battery

A NEW battery is available which, it is claimed, will completely eliminate troubles experienced due to leakage, swelling, decomposition and short store life. The Alpha Leakproof Cell, fully protected by British Patent No. 531237, remains absolutely as new during its shelf life. It will not leak, withstands rough handling and w de temperature variations, and has a greatly increased store life.

These unique advantages—exclusive to the Alpha Battery—are obtained by the use of specially-selected materials and a doubly-insulated and doubly-sealed steel container which completely encases the cell, so that it cannot leak.

Alpha Accessories, Ltd., will replace not only the battery, but also any torch which may be damaged

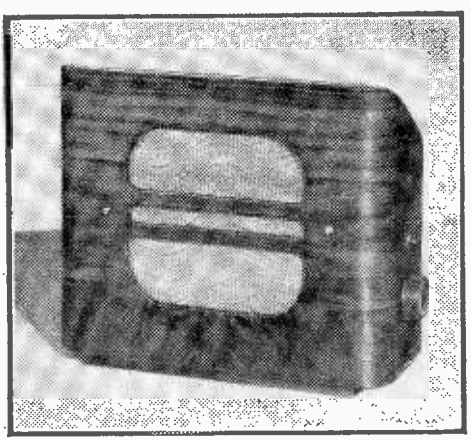


Sectional view (with details) of the new Alpha leakproof battery.

as a result of such a cell proving to suffer from defects common to ordinary batteries.

A small explanatory sketch is appended to show the constructional details of this unique cell, produced only by Alpha Accessories, Ltd.

These leak-proof cells, which are of standard size, cost only 6d. each.



One of the new Stentorian baffle loudspeakers. There are three models, and two of them are provided with push-buttons for use with the Long-Arm Remote-control unit.

Ekco Closing Bristol Depot

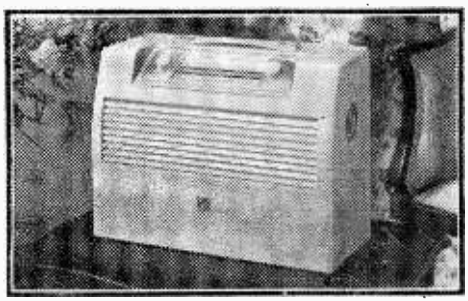
E. K. COLE announce that in view of the E. Company's developments in the Midlands their Service Depot at 14, Redcross Street, Bristol, was closed on June 30th. Dealers who have previously used the Bristol Depot should correspond with the Ekco Service Depot, 11, Brook Street, Birmingham, 3.

Valradio A.C./D.C. Converters

CONVERTER type 230/110 is a recent addition to the Valradio range of Vibrator Converters. It is primarily intended for operating radio-gramophones from 200-250 volts D.C. mains. The A.C. output from this converter has been specially filtered in order to eliminate the hum which is sometimes present with standard types of converter. Particular attention has been given to frequency stability; the maximum frequency variation being plus or minus half a cycle.

R.F. frequency interference effectively suppressed by means of a two-stage choke-capacity network.

L.F. frequency ripple is suppressed, partly by the output transformer and partly by an iron-cored choke and capacity filter system which eliminates the higher harmonics normally present in the output.



The new Ekco "Stroller." 4-valve plus rectifier superhet. It operates on A.C./D.C. mains or from batteries, and has a built-in frame aerial. Price £19 19s., inc. P.T.

Vibrator life is over 2,000 hours, but under average conditions a life of 3,000 or even 4,000 hours may be obtained.

The output of 110 watts is sufficient to operate 99 per cent. of the auto changer radio-gramophones on the market today. The output voltage on load is approximately the same as the D.C. input; where the input is likely to exceed 250 an alternate output tapping is provided on the transformer which reduces the output by 20 volts, thus ensuring that excessive voltage will not be applied to the equipment. An additional tapping is provided so that the converter may be used from a supply as low as 180 volts.

Similar converters are available for input voltages of 6, 12, 24, 32, 50 and 110 volts, and 230 volts 50 or 60 cycles A.C. output.

The converter is provided with input and output leads ready to be connected to the receiver, and where space permits may be housed inside the receiver cabinet. Price £10 15s.

Third Sale.

G. R.

By Order of the Minister of Supply.
WITHOUT RESERVE
MINISTRY OF SUPPLY STORAGE DEPOT, ROTHERWAS, HEREFORD
(about 2 miles from the centre of the city).
RUSSELL, BALDWIN & BRIGHT, LTD.,
are instructed to Sell by Auction at the above Depot, on
THURSDAY and FRIDAY, AUGUST 18th and 19th, 1949,
at 11 a.m. punctually each day:
100 TRACKED AND OTHER MDTOR VEHICLES,
200 ELECTRIC MOTORS, GENERATORS AND SWITCHGEAR,
500 COMMERCIAL AND CAR RADIO SETS
300 LOTS OF RADIO CHASSIS, COMPONENTS AND POWER UNITS
2,000 RUBBER TYRED WHEELS,
A LARGE NUMBER OF BOGIE WHEEL ASSEMBLIES, TRACKS AND ENGINES
and a large quantity of
MISCELLANEOUS STORES
including: Small Tools, Spanners, Vices, Storage Tanks, Chucks, Suds Pumps, Acid Jars, Metal Shelving, Picks, Shovels, Tow Bars, Chains, Wire Rope and Telephone Wire on drums, etc., etc.
Admission (on View Days and Sale Days) on production of Catalogue only. One Catalogue will admit Two Persons on View Days and One on Sale Days.
View Days: The Lots may be viewed on Monday, Tuesday and Wednesday, August 15th, 16th and 17th, between the hours of 9 a.m. and 4 p.m., and on Sale Days from 9 a.m. to 10.30 a.m.
Catalogues (Sixpence each—Postal Orders only) may be obtained from the Auctioneers' Offices, 20, King Street, Hereford. (Tel.: 2184), also Leominster and Tenbury Wells.

R.S.G.B. TECHNICAL PUBLICATIONS. "R.S.G.B. Bulletin" Monthly Journal; current issue **1/6**, five recent back issues **2/6**. "Valve Technique," 104 p.p., **3/9**; "V.H.F. Technique," 96 p.p., **3/9**; "Microwave Technique," 68 p.p., **2/3**; "Transmitter Interference," 32 p.p., **1/6**; "Service Valve Equivalents," 32 p.p., **1/3**; "The Transmitting Licence," 32 pp., **1/-**. All prices include postage. Radio Society of Great Britain, 28, Little Russell St., London, W.C.1.

REPAIRS to loudspeakers. Cones, coils fitted. Fields altered, rewound. Output transformers, clock coils. No mains trans. accepted. Prices quoted. Satisfaction guaranteed.—L. S. Repair Service, 49, Trinity Rd., Upper Tooting, S.W.17. Closed Saturdays. 'Phone: Balham 2359.

DUPLICATING of Radio Mailing Price Lists our speciality. Efficient service at low costs. BM/SYFA, London, W.C.1.

SERVICE SHEETS for hire; reasonable terms. Send s.a.e. for particulars to W. J. Herbert, 118, Gelli Rd., Gelli Pentre, Rhondda, Glam.

RECEIVERS & COMPONENTS

TR9 TRANSMITTER-RECEIVERS, these were formerly sold at **£6** each, the remaining few to be cleared at 25/- carriage paid. The Stamford Radio Co., 199, Stamford St., Ashton-under-Lyne, Lancs.

MIDDLESBROUGH radio enthusiasts . . . large stocks of Radio Components, Test Gear, Constructors' Manuals, etc. Denco, Eddystone, Raymart at Palmers, 114, Waterloo Road, Middlesbrough.

RATES: 3/- per line or part thereof, average five words to line, minimum 2 lines. Box No. 6d. extra. Advertisements must be prepaid and addressed to Advertisement Manager, "Practical Wireless," Tower House, Southampton St., Strand, London, W.C.2.

FAMOUS U.S. B348 Receivers: Eight valve six wavebands, A.V.C., B.F.O., C.W.O., crystal filter converted 230 volts A.C., **£17**, or 24 volt working, new, **£15**. Wire-wound Potentiometers, 2/-; H.F. Coils 6d.; 10,000 ohm vol. controls 1/6; High-note Buzzers Midget, 1/6; Dwarf Voltmeters, all ranges, 5/-; Ceramic Wafer Switches, 4-way, three pole, 3/-; Mains Trans., 6,000 volt. sec. 4/6; Tubular Condensers, 450 volt, .025, 2/- doz.; Glass Cartridge Fuses, 3 amp., 6d. doz. Crescent Construction Co., Ltd., 2, Gill Street, Liverpool, 3.

RADIO Receiver Kits. Nothing omitted to make a first-class two-wave domestic receiver in a smart brown bakelite cabinet. Universal only, **£4/19/6**; circuit and instructions included, or if required separately, **1/-**. 2½in. Phillips Speakers at 9/6. 12in. PM Speakers, 39/6. 16 + 16 MFD 450 v. D.C. at 3/6. 8 MFD 500 v. D.C. at 2/6. All-Wave Coil Packs, 46 5 K/cs I.F., only 5 leads to connect, 27/6. Television Lenses, 9in. and 10in., at 50/-; 6in. at 25/-. 6V6, 6K7, 6K8, 6Q7, 6/6; not ex-Govt. Duke and Co., 219, Ilford Lane, Ilford, Essex.

NEW COMPONENTS.—Resistors, ½w. 7 each, 10, 2,200, 10K, 470K, 2M, 4M, 5M, total 49, **4/9**; ¼w. 12 each, 150, 5,100, 20K, 250K, total 48, **4/9**. Ceramic EF50 V.H., 8d.; Sel. Rectifiers, 40mA. 240 v., 3/3; 80mA. 300 v., 3/6; M.E.S. Dial Lampholders, 3d., 2/6 doz.; Eddystone Spindle Couplers, 9d.; Xtal Diodes, 2/9; H.F. Chokes (S.W.), 9d.; 954 Valves, 3/-. Also Sig. Gens. and Comm. Recs. S.A.E. particulars. C.W.O. 6d. post on orders under 10/-. Eldridge, 254, Grove Green Rd., E.11.

WALTON'S WIRELESS STORES offer this month is of special interest to all 2 meter enthusiasts.—SCR 522 Transmitter and Receiver Units, all are new, receiver is complete and includes 11 valves, price **32/6**; Transmitter Unit partly dismantled by the Ministry, less valves, **8/6**; Modulation Transformer and A.F. choke, **5/-** the pair. Special terms in lots of 1 dozen to all Radio Societies, please write for details. We still have large stocks of CO-AX Cable complete with Pye Plug each end at 9d. per yard; 11ft Television Masts in two sections, **12/6**; 22ft. in four sections, **22/6**, and hundreds of other bargains. Write to-day for our latest list. Order C.W.O., but do not include extra for postage. All is free to any address in Great Britain. Walton's Wireless Stores, 203, Staveley Rd., Wolverhampton. ('Phone 22039.)

"TELEVISION," T-H Products presents model E.S.3 "Twin-Deck" Television for the home constructor; uses V.C.R. 97 (not radar conversion). Send large s.a.e. for illustrated brochure. T-H Products, 92, Leathwaite Road, S.W.11. (Battersea 4889.)

SUPERHET COILS, 3WB 465KC with diagram, 2/6 pair; Kit of parts for L.M.S. (iron cored) Coil Pack 465KC, 9/6; 8mfd 450 Electrolytics, 2/-; Droppers, 1/-; Assorted Eyelets, Eyeletags and Solder Tags, 6 gross 6/-; 50PF Trimmers, 4d. Send for cheapest list in England. Sussex Electronics, Ltd. (P), Riley Road, Brighton, 7. Tel. 4446.

FRITH RADIOCRAFT, LTD., offer:—R.C.A. Transmitters, type ET 4336, brand new in original cases; coverage 2 to 20m/cs, 807 crystal osc driving pr 813's in parallel, band-switched final, input 250/350 watts; front panel has all tuning, meters, switches for tune/operate, phone/cw, modulation indicator; chassis carries filament and bias supplies, keying relay, etc.; requires external HT power transformer and modulator; will run very comfortably at 150 watts with 1,000 v. and one 813, or up to maximum rating with 2,000 v. and pr. of 813's. Less valves, **£12/10/-** c.p. New lists giving 35 "Dollar Bargains" are now available, free on request. Frith Radiocraft, Ltd., Leicester.

EVERYTHING for Radio Constructors, Condensers, Coils, Valves, Resistors, etc. Send stamp for list.—Smith, 98, West End Road, Morecambe. Quick service.

EVERYTHING for the wireless constructor. Send stamp for price list.—H. Tabner, 118, Nightingale Road, Hitchin, Herts.

21 SET Trans Rec. complete. 11 valves, mike, phones. 6 volt acc.; good order. Also M.C.R.I. in cabinet, with matched 3in. speaker, phones, coil packs. Offers to Box No. 188.

RADIO RECEIVERS, type 76 3 valve, freq. cov., 150-505 K/cs., **15/-**; type 78v., 5 valve, crystal unit, freq. cov., 2.4-13mcs., **30/-**. Signal Generator, 196, **15/-**. Signal Receiver, 1066, **22/6**. Frequency Meter, 906, **£2**. Modulator Unit, 64.7 valve, **£1**. Ferranti, test set, 6 valve, **16/-**. Motor Generators, input 27v., output 60v.-150 watt, **10/-**. Cathode Ray Tubes, APS/3., **16/-**. All units are new, free delivery. Send for list of further items. Cash with order to Sanmark Productions, St. Marks St., Bolton, Lancs. Phone: Bolton 2632.

LOOK! New Components only. Everything for the home constructor. Send 2½d. stamp for list. Electro Radio Co., Llwyngwril, Merioneth.

CRYSTAL SET KITS, 200-550M., **3/9**; Matchbox size, **3/3**; guaranteed. Dry Portables with valves, **£2**. List 1d. Alextone, Hillworth, Longdon, Glos.

ONE-VALVE Loudspeaker Set. The "Economo" A.C. mains. Send 2/6 for diagram and constructional notes to Drew, 126, Sidwell St., Exeter, Devon.

CHASSIS, Panels, Racks and Metal Cabinets. Stock sizes or made to specification in steel or aluminium; wrinkle finishes available. Reosound Engineering and Electrical Company, Coleshill Road, Sutton Coldfield.

ASS. NUTS, BOLTS, etc., 1/6 lb.; S/W Tuning Conds., 100pf., 160pf., **1/6**; Buzzers, **1/6**; S/W H.F. Chokes, **6d.** List 2½d. Carter's, 67, Bell Lane, Marston Green, Birmingham.

TRANSFORMERS, I.F. 16/- pair; Filament, 6.3v. 1.5 amp. **7/6**; 3 amp. 9/-; Output, Pentode, 4/-; Multiratio **4/6**; Chokes, 10H. 100v. 100m.a. (ex-Govt.), **4/-**; 20H. 60m.a. 360v, **7/6**; 10H. 150-m.a. 200v., **14/-**; 5H. 250m.a. 200v., **18/-**. P.M. Speakers, 5in., **13/6**, 8in., **17/6**, 10in., **21/-**. Metal **Rectifiers**, 375v. 80m.a., **3/9**. Also Coils, Condensers, Volume Controls, etc. S.A.E. Lists. C.W.O. Please cover postage. Ark, 4, Queen Square, Brighton, Sussex.

NEW "QUALITY" RADIO TUNERS : suit any standard amplifier ; Constructional Manuals: No. 1 L. & M. wave T.R.F. with illuminated dial, glass and escutcheon R/G switch, **3/6.** No. 2 3-waveband 3-valve Superhet with large, elaborate horizontal dial assembly, exceptional range combined with quality, R/G switching, **3/6.** Absolutely Complete Kits with valves: No. 1 **90/-**; No. 2, **155/-.** Ready built and aligned Tuners: No. 1, **£5**; No. 2 **£8/10/-.** New "Quality" Audio Amplifiers : No. 1, 4-Watt output, pickup, and tuner inputs, volume; tone and feedback controls, valves, 6Q7, 6V6, 5Z4, A.C. 100-250v. No. 2, 15-watt, pickup, mike and tuner inputs, volume mixing, tone control, valves 6SN7, 6SN7, 2 x 6V6 in push-pull, 5Z4, A.C. 200-250. Constructional Manuals, No. 1 **2/6,** No. 2, **4/6.** Complete Kits with valves, No. 1 **110/-,** No. 2 **£9.** Ready built Amplifiers: No. 1 **119/6,** No. 2 **10 gns.** Bargains in Gramophone Equipment: Collaro AC47 motors with var. speed, 12in. turntable, **£5**; Collaro AC49 combined motor/pickup/autostop Unit, A.C., **£5/6/3**; AC47 ditto, with 12in. plate, var. speed. **£7/10/-.** Collaro new RC49 A.C. Mixed Autochanger with super Crystal pickup, special offer, **£14.** Exhaustive Constructional Manuals how to build first-class Radio Sets: "Vanguard 4," L. & M. wave, in moulded bakelite cabinet, **2/6**; "Overseas 5," L., M. & S. wave superhet of exceptional power, range and quality of tone, in figured walnut cabinet. **5/-.** New guaranteed Valves: **EF39, EF36, EL32, EF50, ECH35, 6K8, 6K7, 6Q7, 6V6, 6J7, 6SN7, 6F6, KT33C, 5Z4, 5U4, MU14, FW4/500, 25A6, 25Z6, 7/6** each: HVR2, 6L6, **10/6.** Osmor 3-wave Coil Packs. **33/-.** Terms: c.w.o. or any order c.o.d. P. M. bargain list 2½d. N.R.S., 102, Parkhill Road, London, N.W.3. Gulliver 1453.

97/6 CHARGING SWITCHBOARDS, 12/32v., 500 and 1,260 volts, amps., cut-outs, fuses, resistances, etc., 4 take-offs, superb unit, in case. **75/-**; Dynamos, 24v., 1,000 w., 9in. x 7in., ¾in. spindle. **75/-**; Electric Motors, 230v./1/50 1/5 h.p. Incorp. 1,260c. converter. **58/-**; Mains Transformer Switchboards, 230v. A.C. to 12v.; 5 separate take-offs, complete dist panel, switches, fuses, amps., new From **£15.** Rotary Converters, from 1-12 kw., 110 and 220v. D.C. to 230v./1/50 A.C., from **£15.** Motor Generators 1-6 k.w., 110 and 220v. D.C. to 24/35v. D.C. **£5-£59** ; Mains Transformers, ½-18kva., all types, Benmotors Power Supplies, Summerley St., Earlsfield, London, S.W.18. WIM. 3833. (100 yds. Sn. Elec. Line, 10 mins. Waterloo.)

TUNING UNITS. Full range of Denco, Lowther and Eddystone goods available. 5 to 10 wave-band gram. chassis covering 3 to 60 mc/s. 150 to 1,500 kc/s. Amplifiers for every use. Television kits, radio kits. TELEVISOR, **£51,** working at 150 miles range with good results. S.A.E. for leaflet of single items or illustrated 54-page catalogue, price **9d.**, to Mason's (P.W.), Wivenhoe, Nr. Colchester.

ASTOUNDING OFFER in Bargain Parcels. Each parcel guaranteed to contain the following items: Condensers and Resistances in various sizes, Switches (Toggle and Yaxley), Chokes, Transformer, Microphone, Valves, Morse Key, Potentiometers, Bulbs and Holders, Sistoflex, a 24 volt A.C. Motor and a miniature Moving Coil Speaker. The whole parcel sent post free for **£1.** Send cash with order to Bensamon Radio, Dept. W/O, 272, Romford Road, Forest Gate, London, E.7. Send 1d. stamp for list of other bargains.

MAINS TRANSFORMERS, fully interleaved and impregnated 200-250v. standard screened primaries; half shrouded drop through type 275-0-275v. 80m.a. 6.3v. 3a., 5v. 2a, **16/9,** 350-0-350v. 80m.a. 6.3v. 3a., 5v. 2a. **16/9;** Upright Mounting type, Midget 3-2½-3ins. 250-0-250v. 50m.a. 6.3v. 1.5a, 5 tapped 4v. 2a.. **16/9.** Fully shrouded 350-0-350v. 100m.a. 6.3 tapped 4v. 3a., 5 tapped 4v. 2a.., **21/6;** 425-0-425v. 200m.a. 6.3 tapped 4v. 4a., 6.3 tapped 4v. 6a.. 5 tapped 4v. 3a., **39/11** ea. P.M. Speakers, 2-3 ohms 3½in. Rola, **9/6;** 5in. Plessey, **10/6,** with trans. **11/9;** 6½in. Rola with trans., **15/6;** 8in. Truvox. **12/11;** 8in. Rola with trans., **16/9;** 10in. Rola, **23/9;** 10in. Plessey with PX4 trans., **23/9;** 10in. Plessey 15 ohm speech coil, **20/6.** Ex-Gov. Valves (unused): D1 **1/-,** 6H6 **1/6,** SP41, 8D2, 4D1, **2/3;** RK34, HL210, **2/6;** SP61, SG215, **2/9;** PM22A, **3/9;** 6C5G, EF36, **4/9;** KTW61, KTW62, 12SR7, 12SQ7, 5U4G, 5R4GY, **5/6;** 6J7G, 6K7G, VP4B, 12A6 (Met), 6K7 (Met), 6V6 (Met). **6/6;** 6K8 (Met), KT33C (26v.). 6SN7GT, **6/9;** 6J5 (Met), 5SP2, VP2, **5/6,** Chassis (Receiver), 16 s.w.g. undrilled aluminium, 10-5½-2in., **3/-,** 11-6-2½in. **3/9,** 12-8-2½in. **4/3,** 16-8-2½in. **5/6,** 20-8-2½in. **6/9.** Ex-Gov. Block Electrolytics, 32mfd. 450v., **1/9** ea., **16/9** doz. All goods guaranteed. Send 2½d. stamp for full list of component bargains. Special list for trade. C.W.O. or C.O.D. over £1. Postage extra. Radio Supply Co., 15, Queen Square, Leeds, 2.

ALUMINIUM Chassis and Panels. Any size quickly made, holes punched for valveholders, etc. All chassis for P.W. television receiver; cellulose and crackle finishing. Estimates free. 5 Valve All-Wave Superhet Receiver with 4 watt triode output, iron cored coils and large Perspex scale, **£12/17/6** with valves. Data sheet on request. Electro-Acoustic Developments, 18, Broad Rd., Willingdon, Sussex.

R.F. UNITS type 24, **9/9** ea. or less valves **6/9;** type 25, **12/6** ea. or less valves, **9/6;** type 27 with valves, **22/6** ea. Valves: EF50 **4/-,** EF36, EF39, **4/6,** EA50, DI, EB34, 6H6, **2/6,** 955, 956 **8/6,** 6AK5 **10/-,** 9001 **7/6,** PEN-46 **10/-,** EBC33, 6Q7 **5/-,** EF54 **5/-,** XH **8/6,** NR73 **10/-,** ATP4 **8/6,** 6AC7 **5/-.** Goodmans 3½in. Speakers with grill, **16/-.** Rola 6in., **16/-.** Jones and Cannon Plugs of most types available. Tannoy 20 w. pressure type units 5 ohm coil, **£2** ea. Power Units, type 302. 230v. 50cs. 700v. 120m.a. 12v. LT, **£3** ea. Pilots' Cockpit Lamps, red or green (state), 2/6 ea. All the usual ex-Gov. components in stock. S.A.E. for lists, please.—H. W. English, The Maltings, Rayleigh Road, Hutton, Essex.

ELECTROLYTIC CONDENSERS: Dubilier, 8 mfd., 500 vts., ¾in. x 2in., **3/-** each, **34/-** dozen. Goodman P.M. Speakers, 8in., with transformer in case, **21/-.** Slow Motion Dials with vernier 200-1 reduction front of panel mounting, 6in. diameter, **5/6** each. Muirhead Slow Motion Drives, **7/6** each. Telescopic Masts, extending to 12ft. in 7 sections, dural, very strong, **16/9** each.—L. Wilkinson, 204, Lower Addiscombe Road, Croydon.

G4GZ'S BARGAINS ! ! Airspaced Ceramic Trimmers, 50 pfd., **5/-** doz.; 25 pfd., **2/9** doz. Jackplugs, **4/6** doz. Valves—5Z4M's, 6K8M's, 6V6M's, 6J7M's, VR150/30's, VR1OS/30's, 6B4G's, 14F6's, 7/- ea.; 6X5GT's, 6SF5M's, **6/6** ea.; 6J5M's, 6SJ7M's, 6SA7M's, 6K6GT's, 6/- ea.; 6G6G's, 6B7G's, 6K7GT's, 5R4G's, 5/6 ea.; 6AC7M's, 6K7M's, 6SH7M's, 4/9 ea.; 6H6M's, 12J5GT's, 2/9 ea.; 866A's, **16/6** ea. Prices include postage. Stamp list. J. T. Anglin, G4GZ, 283, Welholme Rd., Grimsby.

HUNTS 0.1 mfd. 350v. Tropicalised Tubulars, 3½d. ea., 3/- doz., 30/- gr.; Valves, SP41, **2/6;** 6AC7, EBC33 **4/3.** Post extra. Modern Radio, 38, Seaside, Eastbourne.

BOMB SIGHT.—Sighting Heads in original steel cases ; weight 40lbs., **15/-**, carriage paid. Brown, 102, Cleveland St., Doncaster.

ACCUMULATORS.—Dagenite, 2v. 16 A.H. multi-plate, unspillable; price **8/6** post free. Freefwill Radio, 219, High St., Tooting, S.W.17.

AMATEUR disposing of Equipment, mainly batt. operated. Offers. List. 6, St. Thomas Terrace, Newcastle.

AMAZING VALUE ! 16 + 16 350 v., **1/9**; .0005 Twin Gangs, **4/9**; .2 amp. Dropper, **1/-**; etc. Send for lists other bargains. T. G. Howell & Co., 29, McWilliam Rd., Brighton, 7.

TUITION

TELEVISION.—The Gothic Television School specialises solely in training in television. Courses assume no previous television knowledge and provide guaranteed training for Brit.I.R.E., and R.T.E.B. examinations. All tutors possess university degrees and/or corporate membership of professional institutions and are appointed individually to postal course students to ensure complete and thorough training. Principals, M.B.E., B.Sc., M.Brit.I.R.E., education committee members, etc. Numerous well-known companies have adopted the School's Basic Television Course as standard television training for their staffs. Moderate fees. Details from Gothic Television School, 13, North Avenue, London, W.13.

"ENGINEERING OPPORTUNITIES." Get your copy of this free guide to A.M.I.Mech.E., and careers in engineering, building and plastics, etc., "No pass—no fee" terms. Free copy from B.I.E.T., (Dept. 242B), 17, Stratford Place, London, W.1.

WIRELESS (sea and air) TELEVISION. Broadcasting, Radar, etc., offer tremendous opportunities. Students, both sexes, age 14 upwards, trained for appointments in all branches of Radio. Low fees, boarders accepted. 2d. stamp for pros.—Wireless College, Colwyn Bay.

WIRELESS, Television. Postal Courses for Amateur Radio Transmitting Licence also Television for Radio Trades diploma. Apply British School of Telegraphy Ltd., 179, Clapham Road, London, S.W.9. (Forty years' experience in training students in Wireless and allied subjects.)

MERCHANT NAVY AND AIR RADIO. Here is an opportunity to train as Radio Officer for merchant ships and the air. The big liners are open to you, but you must first qualify for the P.M.G. Certificate. Established 30 years. We can put you through in the minimum time. Day, evening and postal instruction. Prospectus from Director. The Wireless School, 21 Manor Gardens, Holloway, London, N.7. ARC. 3694.

THE BRITISH NATIONAL RADIO SCHOOL offers you a career. Write to-day for free booklet describing our wide range of training courses in Radio, Radar, Telecommunications Principles, Mathematics, Physics, and Mechanics ; correspondence classes for the new series of C. & G. examinations ; we specialise in turning "operators" into "engineers," and for this purpose our "Four Year Plan" (leading to A.M.I.E.E. and A.M.Brit.I.R.E., with C. & G. Certificates as interim rewards) is unsurpassed ; our "guarantee has no strings attached."—Studies Director, B.Sc., A.M.I.E.E., M.Br.I.R.E., 66, Addiscombe Road, Croydon, Surrey.

Practical Television

Vol. 1. No. 7 NEW SERIES SEPTEMBER, 1949

The Television Tuning Signal

AS from July 24th a new form of tuning signal, both sound and vision, came into use. In place of the sustained single note on sound there is now a series of tunes specially recorded on woodwind and strings. In place of the original circle and square there is now a clock face, showing the time and having the vertical lines in a circle in the centre of the clock. These lines represent a definition of 2.5 Mc/s, and should be perfectly clear and separate, capable of being easily counted.

As some new readers may not be clear as to the function of the signal the following details are given:

The controls provided on a television receiver fall into two classes—the subsidiary controls that must be set when the receiver is installed, and which may need only very minor adjustments afterwards, and the principal controls, which may need slight adjustment before each programme to compensate for variations in the electricity supply voltage and also the internal temperature of the receiver.

The subsidiary controls determine the picture shape and keep it steady on the screen. They are sometimes placed behind a panel at the front of the receiver and sometimes at the back of it. The retailer who supplied a receiver will have set these when he installed it, and it is very rarely that they need further adjustment. If, however, such adjustment is found to be necessary, instructions for doing so are given in the booklet supplied with the receiver.

The subsidiary controls comprise the horizontal-hold and vertical-hold as well as the height and width controls. A picture that tends to break into vertical strips or to move up and down indicates that an adjustment of one of the hold controls is required, whilst the effect of incorrect height or width adjustment is observed as distortion of the circular clock face of the tuning signal.

The principal controls are usually four in number and they are labelled "brightness," "contrast," "focus" and "volume," whilst some receivers have also a tuning control.

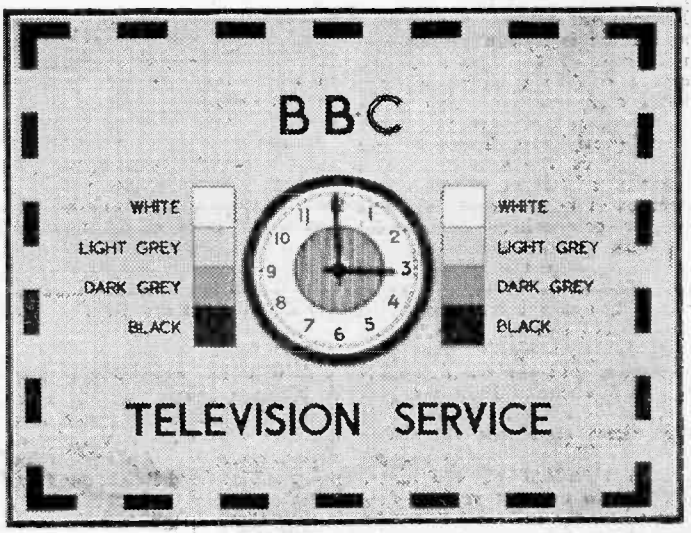
The following procedure for adjusting them has been devised to help viewers whose instruction books do not give any particular routine for this purpose. Here may we say that the standard of instruction literature issued by television and radio manufacturers is very low. It is incomplete, sometimes inaccurate, and presumes upon the part of the operator a technical knowledge which more often than not he does not possess. Here are the agreed instructions:

Switch on the receiver fifteen minutes before the start of the programme so that the receiver circuits have enough time to reach their normal working temperature. It is not, of course, necessary to allow so much time in the ordinary way, but only when the full adjustment is to be made.

Turn the contrast and brightness controls fully counter-clockwise.

When the tuning signal begins adjust the loudness of the sound with the volume control to a comfortable level for listening.

The effects of the brightness and contrast controls on the pictures are interdependent, and it is for this reason that the successive adjustments to them are recommended. *If the correct relative adjustment of these two controls is not found the brightness control will need readjusting whenever the overall brightness of the scene changes.* Fuller details of the adjustment of these two controls will be found on page 27.



The new Tuning Signal

Underneath the Dipole

Television Pick-ups and Reflections. By "THE SCANNER"

THE fine, hot, sunny days and evenings must have affected the size of television audiences in much the same way as they have the audiences of theatres and cinemas. The rate of increase of new viewers for June was not published at the time of writing these notes, but I do not expect that the figure will be high. Nevertheless, television has been a point of focus from many angles.

State Control

THERE is no denying the fact that the State control of radio and television in this country has had a deadening effect upon its development, quite apart from the deterring effects on would-be viewers of purchase and other taxes. The fact that the B.B.C. has still only one television transmitter, while dozens and dozens of stations are already operating in America, is a classical example of the paralysing effect of a State-controlled monopoly compared with the feverish activity engendered by the competitive efforts of private enterprise. And yet there is evidence that the uncontrolled commercialisation of American television is not the complete answer. The French are watching carefully, and there is now a proposal in that country to steer a middle course and to establish a large joint company in which both Government and private interests would participate. This company would have the sole concession for the allocation of television licences for its own stations or for competitive commercial stations. French equipment will be used, and the standard of transmission is to be 819 lines, which has also been adopted in Belgium. This compares with 625 lines adopted by Holland and Denmark, and the U.S.A. standard of 525 lines. British engineers still remain unconvinced that these standards show any practical advance on the present British standard of 405 lines, taking into account various factors adversely influenced by the greater number of lines, such as range, and cost of receiving sets.

Trade Politics

MEANWHILE, in England, conflicting statements are being made in many quarters. The Cinematograph Exhibitors' Association ("C.E.A."), realising that television has come to stay, aims at the ultimate establishment of its own transmitting stations for providing large screen television in cinemas. For the time being it opposes the showing by the B.B.C. of feature films. At the recent C.E.A. Gleneagles Conference one important exhibitor said: "Let us help them with our stars, with our technical advice and with our shorts—but not with feature pictures—which are our bread and butter. If we hand over feature films to the B.B.C., we hand over our business." Another exhibitor reminded the Conference that they ought to be thankful that television in this country was a B.B.C. monopoly—and that the situation was therefore vastly different from that in U.S.A.

At almost the same time, J. Arthur Rank, the film magnate, was opening a new Bush Radio factory at Plymouth, and in his opening speech criticised the slow pace at which television was developing in this country. Meantime in London, the B.B.C. Television Service was being assailed by the Association of Cine-Technicians, a trade union in which there are strong Communist influences, who seek rates and conditions for their members who are employed by the B.B.C. similar to those paid in the film studios. They will also probably seek to impose the "one man to one job" lines of demarcation, which have been partly responsible for increased film costs, the slump, and the unemployment in the British film industry.

The TV Chief

IT will be appreciated that Norman Collins, B.B.C. Television Chief, has his hands full, battling with such a variety of vested interests. An interesting point is that Lord Reith, one time Director-General of the B.B.C., is now Chairman of the Government Committee administering financial aid to the British film industry and may therefore be considered to be "on the other side."

This committee has granted loans to various film production companies and I understand that a loan has even been granted to a company making films in England expressly for American television. The dearth of material available for the many American transmitters has forced television managements to import films on a large scale. The Board of Trade is naturally inclined to be sympathetic to any enterprise which brings much-needed dollars to this country.

The American Mystery

WHAT *is* the exact position of television in America? There are actually approximately sixty transmitters in regular operation and about 1,650,000 receiving sets. Many of the receivers are in clubs, pubs and cafés, and the total viewing public each evening is estimated at about 5,000,000. The average receiver costs $254, though luxury models, including radio-gram record changer, may cost anything up to $2.700. The power of the transmitters is on the low side, usually between one and five kilowatts, which compares with the 17 kW. at the Alexandra Palace and 30 kW. at the new Sutton Coldfield (Birmingham) Station. Most of the transmitters are at present located in or near New York, Boston, Philadelphia, Chicago and Los Angeles. New York has seven stations and Chicago three. There are five "networks" which are either linked by co-axial cable, radio link or by the use of film recording of sound and picture made at the main studios. By the end of this year sixty-four stations will be regularly transmitting, but by the end of 1951 it is estimated that 400 stations will be on the air. This figure should be accepted with reserve, however, as the cost of radio and co-axial links has been found to be enormous. Nevertheless, it is anticipated that the Columbia system will have forty stations, with radio or co-axial link to twelve of them, and the other networks are aiming at the control of about 150 stations between

them. The difficulties of transmitting stations which are beyond the range of co-axial cable or micro-wave relay are exemplified by the station at New Orleans, which has to rely largely upon film. Thus, this latest survey of the American television scene gives the impression of bustling prosperity, rapid expansion and a sense of urgency in overcoming difficulties. Travellers recently returned from America confirm that the average programme material is less good than that sent out from the Alexandra Palace, but that it is improving rapidly. Already several small film companies have decided to concentrate on making films specially for television and to hire them out to the networks and also to the independent television stations. The quality of the picture varies a great deal, but at its best is equal to the best results from the Alexandra Palace.

What can be learned from the comparison of British and American television? Certainly one cannot blame the programme and engineering enthusiasts of the Alexandra Palace for slow progress. This blame must be placed at a higher level, upon the authorities who decide "policy," and upon that strangulation by red tape which seems to afflict the life of every one of us.

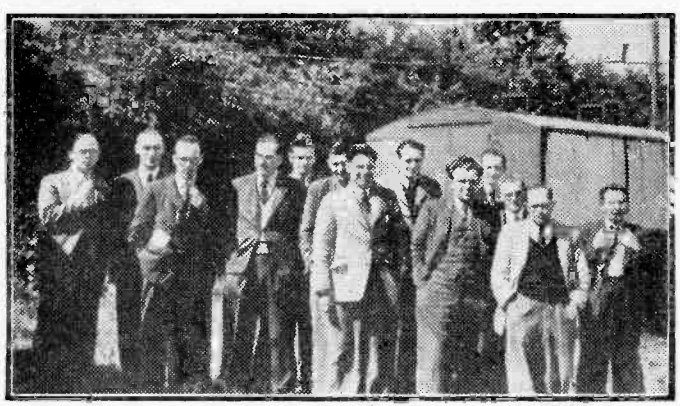
TELETOPICS

Contrast v. Brilliancy

MANY viewers find difficulty in ascertaining the correct relative settings of the brilliance and contrast controls—where the latter is mounted as a panel or exterior adjustment. Some makers inform the user that one governs detail in the shadow, or detail in the highlights, etc., but these statements are not necessarily correct or of assistance in making the best adjustment. It will be found that if the contrast control is slacked off too much the picture will slip, due to an insufficiently strong synchronising pulse. The contrast control is invariably an H.F. gain control and thus regulates the strength of the incoming signal which carries not only the picture intelligence but also the sync pulses, and thus the efficient working of the time bases is dependent upon the setting of the contrast control.

The brilliance control is a bias adjustment on the picture tube, and thus it is important that the two controls should be properly set so that the tube is not overrun, and that other parts of the complete equipment shall work efficiently, irrespective of picture quality (which may be poor due to incorrect alignment of tuned circuits).

Probably the best method of obtaining the correct adjustment of these two controls is to proceed as follows: first, slacken off the contrast control to its minimum position; next, remove the aerial plug from the receiver so that there is no signal input. Now turn up the brilliance control slowly until the raster just glows. This adjustment should be carried out very slowly, as in some circuits there is a time lag due to the particular circuit arrangements employed. Whilst this adjustment is carried out the room should be partially darkened so that it is possible to see the raster at a minimum point. As soon as the control has been set to the point where the raster is just visible, leave it for a moment or so to make sure there is no "backlash," then turn it back very slightly—so that the raster is almost, but not quite, blacked out again. This is the correct biasing point for the tube. Now the aerial should be plugged in, and the contrast control turned slowly until the picture appears. Advance it until details are fully visible in the light and dark parts of the picture, but if it is found that it is not possible to obtain maximum response at any setting of this control, then the tuned circuits need readjustment. If the circuit is in order and the details are correct, then the contrast control need not be touched again, the brilliance control (which is generally combined with the on-off switch) being turned off when the set is switched off.



The members of the first R.G.D. Television Course.

Instruction for Television Engineers

WITH the object of training dealers' engineers in the operation and maintenance of its television sets, the Radio Gramophone Development Co., Ltd., has organised a series of instruction courses. Each course lasts three days, from 10 a.m. on the Tuesday until 5 p.m. on the Thursday of every week; and the first, held at the company's Tasley Receiving Station, began on May 31st. It is intended to continue the courses until the end of July. The accompanying photograph was taken at the first course and portrays, from left to right:

Mr. G. D. Ratter, R.G.D.; Mr. S. Naylor, R.G.D.; Mr. J. T. Smith, Messrs. James Beattie, Ltd.; Mr. H. Tooth, R.G.D.; Mr. P. J. Brooks, Messrs. Crane and Sons, Ltd.; Mr. R. Satchwell, Messrs. W. H. Priestley and Sons, Ltd.; Mr. J. Castle, Corke's Radio; Mr. L. Cross, Messrs. H. F. Ward, Ltd.; Mr. S. D. Stacey, Cuttriss Radio and Elec., Ltd.; Mr. R. A. Cotterill, Messrs. Murdochs, Ltd.; Mr. T. Withers, R.G.D.; Mr. W. O. Brough, Dale, Forty and Co., Ltd.; Mr. S. T. Bolus. R.G.D.

News from the Trade

Television Kit Sets

MOST readers are familiar with the home-made television kits which are available from various sources and which have, as their basis, ex-R.A.F. receiver and radar units. These television units, almost without exception, use the VCR97 tube and the time base from a radar unit, whilst various aircraft receivers are employed (with circuit modifications) for the vision and sound receiver sections.

There have recently appeared on the constructor market two kits for television receivers in which no ex-service units are employed, although one of them utilises the VCR97 tube. This is included in a kit by Premier Radio, in which four units are employed, each being properly designed and arranged to pack together to form a single chassis combination not unlike a standard modern commercial television receiver. Ex-service surplus may be used for the valves as well as for certain other items, but the chassis are sold ready punched and each unit may be obtained separately if desired. There is a Vision receiver which costs £3 13s. 6d., a Sound receiver at £2 14s. 6d., a Time base at £2 7s. 6d., and a Power unit at £6 3s. 0d.—all the above prices including valves. The tube fittings and socket cost 7/- and the complete kit sells at £17 17s. 0d.

The second kit is a standard modern commercial model employing a Mullard 22/14C tube. The vision section employs the miniature B7G type valves and consists of 3 RF. stages, detector, noise limiter and V.F. stage, whilst the time base makes use of line fly-back E.H.T. The receiver is available in various versions as follows: A complete kit, with valves, tube, drilled chassis, etc., but without loudspeaker or output transformer, is £36. The same kit, but with a 12in. tube, costs £4 6s. 0d. extra. A kit consisting of all components, valves and the 9in. tube for vision and sound up to the detector stage, including drilled chassis, £14 15s. 0d. Similar outfit for the time base circuits, including ready assembled fly-back EHT, V.F. stage, sync separator, focusing and deflector coil assemblies and main chassis, £15 5s. 0d. A power unit, including all components and rectifier valve, delivering 310 volts at 225 mA. and 6.3 v. at 7 A. costs £6 7s. 6d. Purchase tax is extra on the above prices, and the kit is available from Denco Distributors, Ltd., 115, Fleet Street, E.C.4.

G.E.C. Programme

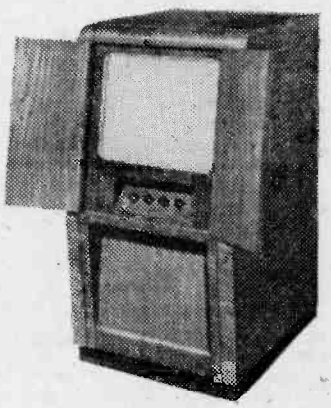
AN illustrated brochure from the G.E.C. gives details of the television programme for the coming season and introduces two new models—BT 1091, a table model, and BT 1093 a console. Details of the circuit features are given, and it is claimed that the 3 Mc/s bars on Test card C are visible. A superhet circuit is employed with an I.F. of 13.5 Mc/s for vision and 10 Mc/s for sound. The tube is the G.E.C. flat-ended (moulded) unit with electro-magnetic focusing. EHT is 7 kV. giving maximum brilliancy. The table model costs 42 gns. and the console 55 gns.—both plus P.T.

Television Aerials

MANY viewers were at one time under the impression that a television aerial had to be in the form of an "H" and in many districts quite close to the Alexandra Palace transmitter it is possible to see such aerials. In many cases an attentuator has had to be fitted to the receiver to reduce the signal strength, and it is now possible to obtain indoor aerials of the simple dipole type which are adequate within a certain range of the transmitter. Modern designs now being produced, however, show departures from what has hitherto been considered as standard. A typical example is the folded dipole—in either round or square section tubing, and with or without reflector and/or director. This type of aerial is small and consequently light in weight and offers, in many cases, lower wind resistance. By suitable design it can accept a very wide waveband and thus ensure adequate sideband reception. This type of aerial is available from such firms as E.M.D.O., of Moor Lane, Staines, J. S. Newman, Ltd., of 10, Museum Street, W.C.1, etc.

H.M.V. Model 1806

THE latest H.M.V. receiver is the 1806, fitted with a 15in. aluminised tube, and is illustrated below. A T.R.F. circuit is employed for both sound and vision, and noise suppressors are provided. Brightness and contrast controls are interlocked so that control may be varied over the normal operation amounts without appreciably affecting the background. Focusing is electro-magnetic and a good bright picture is obtained with the 7 kV. EHT and the aluminised tube—thus permitting comfortable viewing in a normal lighted room. Reproduction is of a high standard and is provided by a 10½in. elliptical loudspeaker. The price is 115 gns. plus P.T.



The new H.M.V. Model 1806 receiver described above.

Ekco Birmingham Appointment

TO further Ekcovision progress in the new Midlands Television area E. K. Cole Ltd. have recently appointed Mr. E. R. Barnett to advise appointed Ekco dealers in the new area on demonstrations, sales promotion and after sales service of receivers. Mr. Barnett, who has had a long and wide experience in every aspect of television, will be contactable at the Ekco Service Depot, 11, Brook Street, Birmingham 3, or at the head office, Southend-on-Sea. Mr, J. E. Edwards will continue to handle similar functions in the Alexandra Palace transmission area.

Practical Wireless
BLUEPRINT SERVICE

PRACTICAL WIRELESS

	No. of Blueprint
CRYSTAL SETS	
Blueprints, 1s. each.	
1937 Crystal Receiver ..	PW71*
The "Junior" Crystal Set	PW94*
STRAIGHT SETS	
Battery Operated	
One-Valve : Blueprints, 2s. each.	
Beginners' One-valver ..	PW85
The "Pyramid" One-valver (HF Pen) ..	PW93*
Two-valve : Blueprints, 2s.	
The Signet Two (D & L F)	PW76*
Three-valve : Blueprints, 2s. each.	
Selectone Battery Three (D, 2 LF (Trans)) ..	PW10
Summit Three (HF Pen, D, Pen)	PW37*
The "Rapide" Straight 3 (D, 2 LF (RC & Trans)) ..	PW82*
F. J. Camm's "Sprite" Three (HF, Pen, D, Tet)	PW87*
Four-valve : Blueprints, 2s. each.	
Fury Four Super (SG, SG, D, Pen)	PW34C*
Mains Operated	
Two-valve : Blueprints, 2s. each.	
Selectone A.C. Radiogram Two (D, Pow)	PW19*
Three-valve : Blueprints, 2s. each.	
Double Diode - Triode Three (HF Pen, DDT, Pen)	PW23*
Four-valve : Blueprints, 2s. each.	
A.C. Fury Four (SG, SG, D, Pen)	PW20*
A.C. Hall-Mark (HF Pen, D, Push-Pull) ..	PW45*
SUPERHETS	
Battery Sets : Blueprints, 2s. each.	
F. J. Camm's 2-valve Superhet	PW52*
Mains Sets : Blueprints, 2s. each.	
F. J. Camm's Universal £4 Superhet 4 ..	PW60
SHORT-WAVE SETS	
Battery Operated	
One-valve : Blueprint, 2s.	
Simple S.W. One-valver	PW88*
Two-valve : Blueprints, 2s. each.	
Midget Short-wave Two (D, Pen)	PW38A*
Three-valve : Blueprints, 2s. each.	
Experimenter's Short-wave Three (SG, D, Pow)	PW30A*
The Prefect 3 (D, 2 LF (RC and Trans)) ..	PW63*
The Band-spread S.W. Three (HF Pen, D (Pen), Pen)	PW68*
PORTABLES	
Three-valve : Blueprints, 2s. each.	
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)	PW65
Parvo Flyweight Midget Portable (SG, D, Pen)	PW77
Four-valve : Blueprint, 2s.	
"Imp" Portable 4 (D, LF, LF, Pen) ..	PW86*
MISCELLANEOUS	
Blueprint, 2s.	
S.W. Converter-Adapter (1 valve)	PW48A*

AMATEUR WIRELESS AND WIRELESS MAGAZINE

	No. of Blueprint
CRYSTAL SETS	
Blueprints, 1s. each.	
1934 Crystal Set ..	AW444
150-mile Crystal Set ..	AW450
STRAIGHT SETS	
Battery Operated	
One-valve : Blueprint, 2s.	
B.B.C. Special One-valver	AW387*
Two-valve : Blueprints, 2s. each.	
A modern Two-valver ..	WM409*
Three-valve : Blueprints, 2s. each.	
Economy Pentode Three (SG, D, Pen)	WM337
PTP Three (Pen, D, Pen)	WM389
Mains Operated	
Two-valve : Blueprints, 2s. each.	
Consoelectric Two (D, Pen), A.C.	AW403
Economy A.C. Two (D, Trans), ...	WM286
Four-valve : Blueprints, 3s. each.	
All-Metal Four (2 SG, D, Pen)	WM329
Harris Jubilee Radiogram (HF, Pen, D, LF, P)..	WM386
SUPERHETS	
Battery Set : Blueprints, 3s. each.	
'Varsity Four	WM395*

SPECIAL NOTICE

THESE blueprints are drawn full size. The issues containing descriptions of these sets are now out of print, but an asterisk beside the blueprint number denotes that constructional details are available, free with the blueprint.

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

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

	No. of Blueprint
PORTABLES	
Four-valve : Blueprints, 3s. each.	
Holiday Portable (SG, D, LF, Class B) ..	AW393*
SHORT-WAVE SETS	
Battery Operated	
One-valve : Blueprints, 2s. each.	
S.W. One-valver for America	AW429*
Two-valve : Blueprints, 2s. each.	
Ultra-short Battery Two (SG, det Pen).. ..	WM402*
Four-valve : Blueprints, 3s. each.	
A.W. Short-Wave World-beater (HF Pen, D, RC, Trans)	AW436*
Standard Four-valver Short-waver (SG, D, LF, P)..	WM385*
Mains Operated	
Two-valve : Blueprints, 2s. each.	
Two-valve Mains Short-waver (D, Pen), ..	AW453
Four-valve : Blueprints, 3s.	
Standard Four-valve A.C. Short-waver (SG, D, RC, Trans)	WM391*
MISCELLANEOUS	
Enthusiast's Power Amplifier (10 Watts) (3/-)	WM387*
Listener's 5-watt A.C. Amplifier (3/-) ..	WM392*
Harris Electrogram battery amplifier (2/-)	WM399*
De Luxe Concert A.C. Electrogram (2/-) ..	WM403*
New Style Short-wave Adapter (2/-)	WM388

HINTS COUPON

This coupon is available until Sept. 5th, 1949, and must accompany all Practical Hints.

PRACTICAL WIRELESS, SEPT., 1949

Published on the 7th of each month by GEORGE NEWNES, LIMITED, Tower House, Southampton Street, Strand, London, W.C.2, and printed in England by W. SPEAIGHT & SONS, LTD., Exmoor Street, London, W.10. Sole Agents for Australia and New Zealand: GORDON & GOTCH (A/sia), LTD. South Africa: CENTRAL NEWS AGENCY, LTD. Subscription rate including postage, for one year: Inland and Abroad 10s. 6d. (Canada 10s.). Registered at the General Post Office for the Canadian Magazine Post.