

**A COMBINED H.T. AND L.T. UNIT—** See page 241

# Practical and Amateur Wireless

**3<sup>d</sup>**  
EVERY  
WEDNESDAY

Edited by F.J. CAMM

a GEORGE  
NEWNES  
Publication

Vol. 13. No. 322.  
November 19th, 1938.

AND PRACTICAL TELEVISION

*Operating the*

**"Trio-  
Pen  
S.W. 2"**

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# CAR RADIO INSTALLATION— See Page 235



## ROUND *the* WORLD of WIRELESS

### A Useful Mains Unit

USERS of battery apparatus are continually endeavouring to find some solution to the various problems which they meet in regard to the economy of operation of their equipment. The mains user generally finds that the greater efficiency which is available from mains-driven apparatus offsets the increased cost of installation and maintenance, and many battery users now find that they have mains facilities available. The use of an H.T. battery eliminator, or mains unit as it is more commonly called, enables an existing battery set to be operated with greater efficiency than from ordinary H.T. batteries, and this enables many listeners to retain a receiver to which they have become attached. The accumulator still remains a problem, however, and in many cases the receiver has to be put out of action for two or three days whilst the battery is charged. A spare accumulator enables this inconvenience to be avoided, but the obvious solution, where mains are available, is to charge the battery at home. In this issue we describe a useful combined unit from which H.T. for the set may be taken, and in addition the accumulator may be kept on charge or in good condition. We are confident that this unit will find considerable favour among those who are still using battery apparatus but who have mains facilities.

### More Novel Uses

WE recently mentioned that short-wave radio transmitters were being employed in locating harpooned whales, and we now hear of another development in this direction. A method has been devised whereby harpooned whales are inflated and small short-wave transmitters mounted on the inflated body. This is then left in the water and by this means many more whales may be killed, to be afterwards collected by a special ship which locates the floating bodies by picking up the signals transmitted from them.

### American Sales

IT is announced that the sales of radio during 1938 in the U.S.A. will probably only reach the 6,000,000 mark, representing a 25 per cent. drop on the sales for 1937. The sales of the smaller A.C./D.C. sets appear to be exceeding last year's totals.

### German Broadcast Extensions

PROPOSED extensions to the existing broadcast systems in Germany include a new transmitter at Berlin and in Pomerania. Relay stations are also to be built at Hanover and Dresden. Saarbrücken is also to have a new station.

### Photographing Television Pictures

MANY amateurs have made quite good pictures from the images received on their cathode-ray tube receivers. With

### Radio Prize

TO encourage radio development a special prize of Rm. 10,000 is to be awarded in Germany for the most interesting result of radio research. This will be an annual prize.

### Edna's Fruit Hat

THOSE listeners, and there were many of them, who enjoyed "Ethel and her Engine" and "Uncle Arthur" may be specially interested to learn that John Pudney has adapted yet another of his pleasantly fantastic short stories for the microphone. There is about a Pudney programme a sort of enduring lunacy that makes it an excellent relaxation from the stresses and strain of modern life. The adventures of poor, down-trodden Edna and her magic hat provide the author with one of his most diverting themes to date and all connoisseurs of the slightly crazy should listen to it. This will be heard in the National programme on December 2nd, and the producer will be Leslie Stokes.

### Variety from Bristol

IN the feature entitled "Theatres of Variety," a programme will be broadcast from the Hippodrome, Bristol, on November 22nd.

### Return of Suggia

SUGGIA, the great woman 'cellist, will broadcast again on November 24th, when she will appear as the soloist at the Reid Symphony Concert in the Usher Hall, Edinburgh. She will play the solo in Lalo's Concerto in D minor for Violoncello and Orchestra. Sir Donald Tovey will be the conductor.

### The French Voice of the West Indies

FZF6, Radio Martinique, Fort-de-France, on 30.93 m. (9.7 mc/s), of which mention was recently made in these notes, is devoting certain evening broadcasts to English and Spanish listeners overseas. These are given on Mondays and Wednesdays, between G.M.T. 23.00-01.00; on Tuesdays the studio also offers a special transmission to Spanish speaking nations from G.M.T. 19.00-22.00. On other days the broadcasts are made in the French language only, although occasionally in the course of the transmission an announcement in English or Spanish may be made.

good picture brightness and a fast film with a large-aperture camera very good pictures may be made, and Miss Elizabeth Cowell, the television hostess, has recently received a most excellent portrait of herself taken by a listener at Cinderford, Glos, more than 100 miles from the Alexandra Palace.

### Radio in Poland

SIGNALS from the Polish broadcast station, Polskie Radio, are now made on four short wavelengths simultaneously, with announcements in Polish, English, and Spanish. The wavelengths used are 19.84, 22.00, 25.55 and 26.01 metres.

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# ROUND the WORLD of WIRELESS (Continued)

## More Wavelength Changes

**R**ADIO MEDITERRANÉE, the privately-owned station at Antibes, on the southern French coast, recently moved from 235.1 m. (1,276 kc/s) to 209.9 m. (1,429 kc/s). As this channel has proved unfavourable, the station has now decided to work on 230.2 m. (1,303 kc/s) the frequency used by Danzig (Germany) and Naples 1 (Italy). The new Radio Normandie transmitter at Louvetôt has

## INTERESTING and TOPICAL NEWS and NOTES

The idea of the programme is a simple one—to let listeners in this country hear exactly how Christians and their families in other countries have spent the day. Not more than two speakers of each

month over 80 broadcasts take place actually in Esperanto, for the most part in Europe, but North and South America and Australasia are also represented.

## Orchestral Music

**O**N November 24th (National), Joseph Lewis, on the eve of his retirement, will conduct a programme selected from music which has been dedicated to him by various British composers during his fifteen years as a B.B.C. staff conductor. The composers to be represented in this programme are Frederic d'Erlanger, Haydn Wood, G. O'Connor Morris, Henry Geehl, Robert Chignell, Denys Grayson and Geoffrey Hanman.

## Tyneside Comedy-thriller

**"PERKIN'S PRIDE,"** a Tyneside comedy-thriller written for radio by E. A. Bryan (author of "The Last Coupon" and "Plate Day"), will be broadcast from the B.B.C.'s Newcastle-upon-Tyne studio on November 16th. Cecil McGivern will be the producer.

## Mendelssohn Programme

**O**N November 26th Midland and Regional listeners will hear the first half of the City of Birmingham Orchestra's Mendelssohn concert in Birmingham Town Hall, where the composer himself appeared at three Birmingham Festivals about a hundred years ago. Leslie Heward will conduct. The principal work is the Scottish Symphony.

## City of Birmingham Orchestra

**T**HE second part of the concert by the City of Birmingham Orchestra in Birmingham Town Hall on November 17th will be broadcast. Leslie Heward will conduct and Brailowsky will be the pianist for Chopin's E minor concerto.

## Ruby Moule

**W**ITH reference to the photograph of Ruby Moule which appeared in our issue dated October 22nd, Mr. Gerald Cock states that he did not make the statement attributed to him in the caption. This information was supplied to us by a News Agency.



Anne Zeigler, the B.B.C. television and variety star, and Webster Booth, the well-known tenor, who were married in London recently. Miss Zeigler first met Mr. Booth when she played Marguerite to his Faust in the British colour film.

been carrying out experimental broadcasts on 274 m. (1,095 kc/s). So far the older station has been operating on 212.6 m. (1,410 kc/s).

## From 60 to 300 Kilowatts

**F**OLLOWING the decision to increase the power of the Oslo (Norway) long-wave transmitter from 60 to 300 kilowatts, it is now proposed to transfer the station from Lamberseter, where it is now situated, to a more central position and, in consequence, more favourable site in the country.

## News in Seven Languages

**F**ROM the 100-kilowatt Melnik transmitter (Prague 11), operating on 269.5 m. (1,113 kc/s), news bulletins are broadcast daily in seven different European languages in order to counteract propaganda from other neighbouring countries.

## Christmas Day in Europe

**"CHRISTMAS Over the Frontiers, 1938"** is a new programme to be given on all Regional wavelengths at 5.40 p.m. on Christmas afternoon. Listeners will hear how the day has been spent by people in five or six northern and southern European countries. Moray McLaren and Laurence Gilliam leave on Monday to make arrangements. The countries visited by the two producers will be France, Italy, Germany, Greece and Sweden.

nationality—they may be men or women—will take part. Each will talk quite informally from his or her own country about their domestic celebrations. The talks will be linked together by music, commentary and recorded effects, which will take the form of an imaginative journey over Europe.

## New Marconi Station for Norway

**T**HE Norwegian Government has placed a contract with Marconi's Wireless Telegraph Co., Ltd., for the supply and installation of a 100-kilowatt Class B medium-wave broadcasting station for installation at Stavanger. The new broadcasting station will be housed in a building near Stavanger where in 1918 the Marconi Company installed, for the Norwegian Telegraph Administration, a long-wave timed-spark telegraph transmitter for communication with the United States, and the new transmitter will strikingly demonstrate the vast progress made in wireless design in two decades.

## Esperanto Broadcasts from South Africa

**T**ALKS about the Esperanto movement are now frequently broadcast from the radio-station in Pretoria, South Africa. Thus one more country is represented among the great number of wireless authorities who now recognise the international language to be of practical use. Every

## SOLVE THIS!

### PROBLEM No. 322

Jackson had a three-valve battery receiver (H.F., Det. and Pentode) and found that results were not up to expectation. After some thought he decided that the differential condenser may have been faulty and decided to replace this. He could not find a similar component in his spares box and therefore decided that an ordinary small variable condenser of the same capacity would do. He used this, but results were worse, reaction being very erratic. Why was this? Three books will be awarded for the first three correct solutions opened. Address your envelopes to The Editor, PRACTICAL AND AMATEUR WIRELESS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Envelopes must be marked Problem No. 322 in the top left-hand corner and must be posted to reach this office not later than the first post on Monday, November 21st, 1938.

### Solution to Problem No. 321

When Martin added the smoothing choke he increased the total resistance in the H.T. positive lead with the result that the voltage on the valves was lowered. Thus the valves all worked at lower efficiency. No correct solutions were received for Problem No. 320 and therefore no books are awarded this week.



# Car-Radio Installation

Helpful Notes for the Amateurs, Service Engineers and Radio Dealers

**D**ESPITE the fact that many makers of car-radio receivers insist that installation be carried out only by engineers who have been trained in their factories and service stations, the average practising service engineer should have a sound knowledge of the work entailed. He might at any time be called upon to install a receiver or to service one that is giving trouble. In most instances there is little difficulty in this, provided that the engineer has a sound knowledge of radio in general and is in possession of a few facts applicable particularly to car receivers.

As most readers are aware, the present-day car-radio receiver contains various

between the engine and the scuttle. If any doubt exists concerning the efficient earthing through the mounting bolts it is worth while to make an additional earth

*by The Experimenters*

connection by means of a short length of  $\frac{1}{8}$  in. copper braiding or a length of starter cable (this is less convenient and more bulky).

### Good Earth-bonding

The connection between the power-supply lead to the set (there is generally only one, because the earthed connection to the other side of the battery is made through the metal braiding surrounding the single lead) should be perfectly sound. In many respects, the ideal connection would be through a stout cable joined directly to the unearthed side of the battery, especially if this could be quite short, but it is invariably more convenient to make the connection to the "battery" side of the ammeter, or to the terminal marked AUX or A.2 on the cut-out and fuse-box. If a certain amount of interference is picked up by the lead—as it sometimes is—a .25-mfd. suppressor condenser should be joined between this point and the chassis; again keeping the connecting lead short and taking care that the body of the condenser makes good earth contact.

The screened supply lead to the receiver has the screening braid earthed at the

receiver end, but it should also be earthed at the supply end and, if more than a foot or so long, at an intermediate point as well. The car-radio installation engineer knows from experience that ample screening and plenty of earth-bonded connections are always desirable and cannot well be overdone.

### Other Accessories

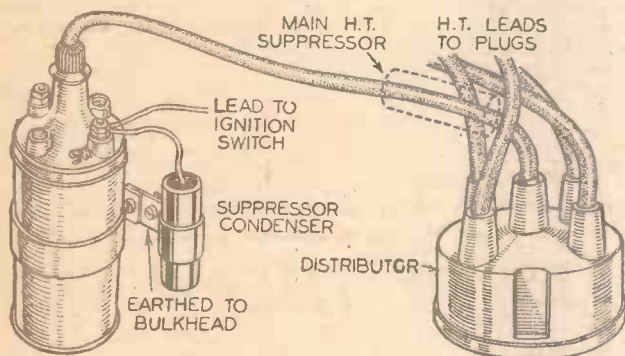
Besides the possible sources of interference which have been discussed, it will be obvious that any electrical device in which there is of necessity an intermittent contact might cause interference. For that reason it is in unusual cases desirable to connect suppressor condensers to the unearthed terminal of such items as stop lights, direction indicators, electric heaters and the like. It can be taken as a general rule, however, that these cause trouble only in rare cases, and that it is usual to find that a single resistor and one condenser are sufficient if earth connections receive their proper measure of attention.

### Aerial Type

The type and disposition of the aerial often has a marked influence on the amount of interference, or the absence of it. If we may generalise, it can be stated that the roof type of aerial is most free from interference troubles since it is most remote from the engine and electrical cables. The telescopic or "fishing-rod" aerial is next, since that is not usually very near to the most prolific sources of interference. It is usually found that the under-chassis or under-running-board aerial is most likely to pick up interference and most likely to make necessary the adoption of special methods of suppression.

When this type of aerial is employed it should be kept as far as possible away from the engine and the exhaust pipe. It is a fact that the friction of the gases with the inside surface of the exhaust pipe sometimes generates a small amount of static to which the highly sensitive car-radio receiver responds. The pipe can also pick up interference from the ignition system, especially if it is not well earth-bonded. When the pipe is carried in slightly flexible mountings—as is often necessary due to the flexible mounting of the engine—it is well worth while to scrape a portion of it clean and bright and to fit a metal clamp to which is attached a length of earth-bonding braid which can be securely fixed to a bolt through the chassis frame. In rare cases it is

(Continued on next page)



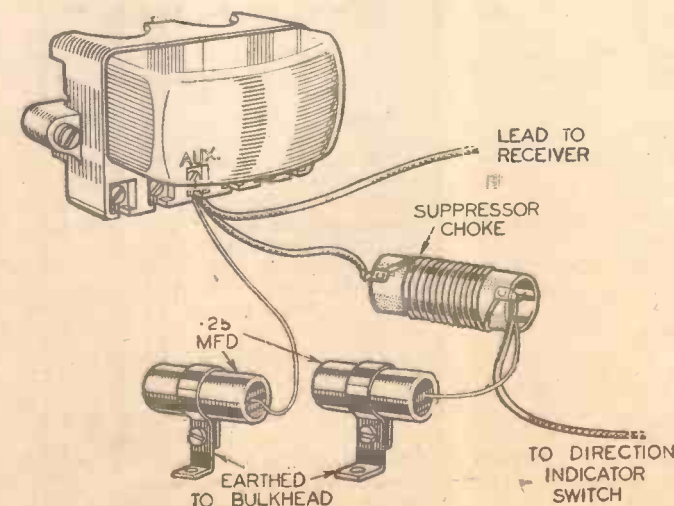
Positions of the suppressor resistor in the main H.T. lead to the distributor, and of the condenser which is sometimes required between terminal SW on the coil and earth.

suppressors—usually in the form of low-resistance H.F. chokes—so that the need for external devices is reduced very considerably. In the majority of cases it is necessary only to insert a resistor-type suppressor in the main H.T. lead to the ignition distributor, and to connect a fixed condenser between the dynamo lead going to the cut-out and earth. But there are more "difficult" cases where additional suppressors are required.

### Resistor and Condenser Suppressors

For example, when the car is fitted with magneto ignition it is generally necessary to include a resistor-type suppressor in each plug lead. This should be as close to the sparking-plug terminal as possible, just as the main H.T. suppressor should be as near to the central terminal on the distributor as it can be arranged. When using coil ignition it is sometimes desirable to connect a suppressor condenser of about .25-mfd. capacity between the terminal on the ignition coil marked Sw. and earth. In more stubborn cases it might also be necessary to wire a similar condenser between the unearthed lead to the windscreen-wiper motor and earth. In every one of the examples mentioned it is desirable that the lead to the condenser should be short, and that the metal body of the suppressor condenser should be well connected to the car chassis by means of the clamp with which it is supplied.

In addition to paying attention to the points enumerated it is, naturally, very important that the metal screening case of the receiver itself be well earthed to the chassis, metal bodywork or steel bulkhead



Small suppressor chokes can sometimes be included in the leads to certain accessories which cause interference.



### CAR-RADIO INSTALLATION

(Continued from previous page)

desirable to use screened cable for the lead to the rear and stop lamps, earthing the braid at two or three points.

#### Instrument Leads

Although unusual, it is sometimes found that interference is radiated by leads running to the instruments and situated behind the instrument panel. There are so many wires that testing is inclined to be rather tedious. A preliminary test can easily be made, however, by disconnecting the unearthed lead from the battery and taking a lead from the battery terminal direct to terminal Sw. on the coil. The lead originally joined to this terminal should, of course, be removed. When this is done the engine can be started by hand; if the interference has vanished it will be clear that it is in a circuit outside the ignition system. Tests can be made by by-passing (with a .25-mfd. condenser) the various instrument-panel leads, the condenser being connected to earth and to the respective instrument terminals.

#### Process of Elimination

If the fault remains it will be clear that it is in the ignition circuit. Provided that the lights and all other accessories are left out of use the dynamo will be isolated for the moment; remember that if any acces-

sories or lights were switched on they would probably be damaged due to the full dynamo output being applied to them. Should the interference be traced down to the ignition system, see that the sparking-plug gaps are correctly set, that all H.T. leads are well insulated and that the distributor condenser is not open-circuited. The latter can be checked by connecting a condenser of .25 to .5-mfd. in parallel with it and/or by connecting a suppressor condenser between coil terminal Sw. and the chassis.

As with the domestic receiver, it is often a good plan to make a test to see if interference is being picked up by the aerial, this being done by disconnecting the aerial lead and observing if the fault is removed. If it is and the aerial lead is not screened, try the effect of replacing the wire by a screened cable, earthing the screening braid.

Another possibility of interference when using an under-chassis aerial is from brake rods or cables, when these are used. They might be loose so that they make intermittent contact with a chassis point when the car is in movement. In some cases the rods can be prevented from rattling by renewing rubber grummets, and in others it will be necessary to earth them by means of copper braiding.

#### Choke Suppressors

Roof aeriels are generally fairly remote from interference sources, but interference

is sometimes carried by the wires feeding the direction indicators, roof lamp or wind-screen wiper. In such circumstances by-pass condensers might be rather difficult to fit; an alternative that often proves successful is to include a small choke of low-resistance wire in the "accessories" lead (usually marked AUX, A1 or A2) from the cut-out and fuse-box. The choke can be made by using about 12' turns of 16-gauge d.c.c. wire  $\frac{1}{16}$  in. in diameter. It might even then be necessary to connect a .25-mfd. condenser between each end of the choke and earth.

A kind of static interference sometimes observed with modern cars is due to the rubbing together of the leaves of road springs; this is particularly the case when the springs are carried on flexible bushes. Spraying the springs with graphited penetrating oil will probably remove the trouble, although it is sometimes necessary to connect a length of bonding braid between the rear axle and the chassis frame. A correlated form of trouble might be produced by friction between the brake linings and the brake drums. Bonding between the brake shoes and the hub or back plate is generally successful.

It should not be assumed from the above that one-tenth of the possible faults enumerated are likely to be encountered on any one car, but as every car has its own peculiarities it is well to be forewarned.

## IMPORTANT BROADCASTS OF THE WEEK

### NATIONAL (261.1 m. and 1,500 m.)

Wednesday, November 16th.—Dance Cabaret from the Royal Bath Hotel Ballroom, Bournemouth.

Thursday, November 17th.—Dance Band programme.

Friday, November 18th.—Orchestral Concert.

Saturday, November 19th.—Music Hall programme.

### REGIONAL (342.1 m.)

Wednesday, November 16th.—England v. Ireland: a commentary on the second half of the International Football match from Old Trafford Football Ground, Manchester.

Thursday, November 17th.—Radio Pie, variety entertainment.

Friday, November 18th.—Choral programme.

Saturday, November 19th.—Franz Liszt—6, a musical biography: orchestral and choral programme, from Midland.

### MIDLAND (297.2 m.)

Wednesday, November 16th.—Annually for Ever: A feature programme of Cotswold Charities.

Thursday, November 17th.—Orchestral concert.

Friday, November 18th.—Variety from the Hippodrome Theatre, Aston, Birmingham.

Saturday, November 19th.—Franz Liszt—6, musical biography: orchestral and choral programme.

### NORTHERN (449.1 m.)

Wednesday, November 16th.—Perkin's Pride, a Tyneside comedy-thriller by E. A. Bryan.

Thursday, November 17th.—Coal: the story of a way of life by D. G. Bridson.

Friday, November 18th.—Music of the People: Concert from Bradford.

Saturday, November 19th.—Spotlight on Sport: Racing Pigeons, a discussion.

### WEST OF ENGLAND (285.7 m.)

Wednesday, November 16th.—The Use of the Land—6, The Changing Processes of Agriculture, a discussion.

Thursday, November 17th.—Choral and orchestral concert from the Colston Hall, Bristol.

Friday, November 18th.—A la Carte, a mixed menu of light fare.

Saturday, November 19th.—Tennis: Covered Courts Championship: a commentary on some of the Finals, from the Palace Hotel, Torquay.

### WELSH (373.1 m.)

Wednesday, November 16th.—Mr. Anthony Eden at the Banquet of the Honourable Society of Gymnadorion at Grosvenor House, Park Lane, London.

Thursday, November 17th.—Cardiff City: a feature for the Soccer fans.

Friday, November 18th.—As I Have Seen Things, a talk by Ben Davies.

Saturday, November 19th.—Liverpool Welsh Choral Union Concert from the Central Hall, Liverpool.

### SCOTTISH (391.1 m.)

Wednesday, November 16th.—In the Village Hall—6, The Dramatic Society, a discussion.

Thursday, November 17th.—Scotland's Ain Game, a programme in celebration of the Centenary year of the Royal Caledonian Curling Club.

Friday, November 18th.—Scottish Dance music.

Saturday, November 19th.—Tongue Twister Bee: Listeners v. B.B.C.

### NORTHERN IRELAND (307.1 m.)

Wednesday, November 16th.—Variety from the Empire Theatre, Belfast.

Thursday, November 17th.—Instrumental programme.

Friday, November 18th.—Country Variety from Portadown, County Armagh.

Saturday, November 19th.—Irish Dance Music.

## "THE SEVENTH MAN"

A NEW art form, novels in pictures, which was featured in the television programme on November 8th, will be repeated on November 18th, when Robert Gibbing's "The Seventh Man" will be seen by viewers in the evening programme. Robert Gibbing writes stories in woodcuts, leaving the pictures to tell the tale. "The Seventh Man" is such a book, setting forth the true cannibal tale of the South Seas told in fifteen wood engravings and "precisely 189 words." The original woodcuts, which measure only three inches by two inches, will be enlarged for television presentation. It is believed that these pictures, with a brief commentary, will give a vivid account of the astonishing adventures of Captain O'Hara in the South Seas, his encounter with the Cannibal King, and marriage with the princess royal.



# METAL CABINETS

Hints on the Construction of Metal Cabinets for Multi-stage Receivers — By A. W. MANN

WHILST the resources and experimental equipment available to the average amateur are definitely limited, the general standard of workmanship is comparatively high. A notable feature is the almost universal adoption of chassis construction, metal panel, and efficient inter-stage screening by the more experienced amateur. The beginner, however, is apt to fight shy of inter-stage screening, and remain satisfied with a metal chassis and panel assembly,

is experienced, whilst in others, cracking and metallic noises due to imperfect mechanical and consequent faulty electrical contact. The basic requirement, in the interests of efficiency and freedom from extraneous noise, is close fitting surfaces and rigid construction.

In order to assure these, accurate work and plenty of bolts are essential. It should, however, be understood that I mention bolts advisedly, because in instances where extremely thin gauge material is used, the most liberal use of bolts will not ensure entire freedom from mechanical noise.

To adopt this method of construction in the case of small wavemeter type cabinets is unnecessary if stout gauge material is used, but is strongly advised in the case of cabinets intended to house multi-stage receivers.

Whilst aluminium is easy to cut and work, cadmium-plated steel, under average amateur workshop conditions, is rather difficult to work. It is best, therefore, to order materials cut to size ready for marking off and drilling. In the interests of accurate and rigid assembly care must be exercised in marking out the bolt holes.

## Drilling Templates

The use of sheet metal or plywood drilling templates is sound practice, and the following procedure will avoid mistakes and damage to crackle, or other finished panel faces. The marked out drilling template, a bottom board, and two sheets of thick blotting paper should be cut to the exact size of the panel and clamped together in the following order. Bottom board, blotting paper, panel, second sheet of blotting paper, with template on the top, all firmly clamped together. It will depend on the side of the panel from which the template was originally marked out, whether the crackle or plain surface is on the top side or otherwise. Make quite sure about this. In drilling individual holes, start with a small drill to assure accuracy. This method will avoid any possibility of the crackle finished face splintering or flaking due to the bite of the drill.

Before deciding as to the gauge of sheet metal to be used, a definite idea as to the weight of the chassis it is to house should be obtained, because appearances can in this respect be very deceptive.

## Ensuring Rigidity

Stout gauge material for the sides, and especially the bottom, which has to carry the full weight, is most desirable and necessary, not only in the interests of mechanical rigidity, but in order to avoid the permanent warping of the chassis and

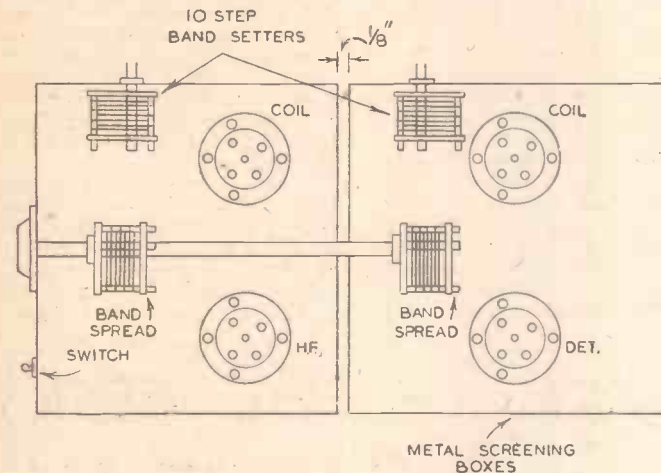


Fig. 1.—Suggested layout for an SG-HF combination.

together with the most elementary form of inter-stage screening. Fortunately, standard screening boxes and sheet metal in various gauges are available. With some amateurs, it is the practice to build their receiving apparatus on the unit principle, each stage being built as a separate and completely screened unit. This principle can be applied to various combinations, including simple regenerators and T.R.F. receivers.

## Suggested Layout

Fig. 1 shows the general arrangement of an SG-HF and detector combination, suitable for headphone reception. The two screening boxes are separated by  $\frac{1}{8}$  in. and mounted on a five-ply baseboard. Thus the spaced ends act as most efficient screens, and coupling effects are avoided.

In the suggested arrangement band-spreading is included, with separately controlled band setters, and ganged spreaders. The popular ten-step outfit could be used, together with a small capacity trimmer across the H.F. tank section, to assure accurate tracking. The use of flexible couplers in conjunction with extension rods is also recommended.

In some instances experimenters may prefer to make their own metal screening-boxes and cabinets.

Whilst those who are experienced metal workers find no difficulty, so far as the single stage types are concerned, considerable difficulty is sometimes experienced when an attempt is made to construct one of the larger types, as required to totally screen a multi-stage receiver.

## Rigid Construction Necessary

In some instances, especially if sheet aluminium is the material used, panel whip

is not the case. Copper, brass, cadmium-plated steel, or aluminium sheet can be used according to taste, provided that the gauge is in conformity with the work in hand; also the hardness, or otherwise, of the metal itself. Fig. 2 and Fig. 3 show a satisfactory method of ensuring a rigid assembly and freedom from mechanical noise.

## Strengthening the Corners

It will be noted that the sides, ends and screens are not simply bolted together,

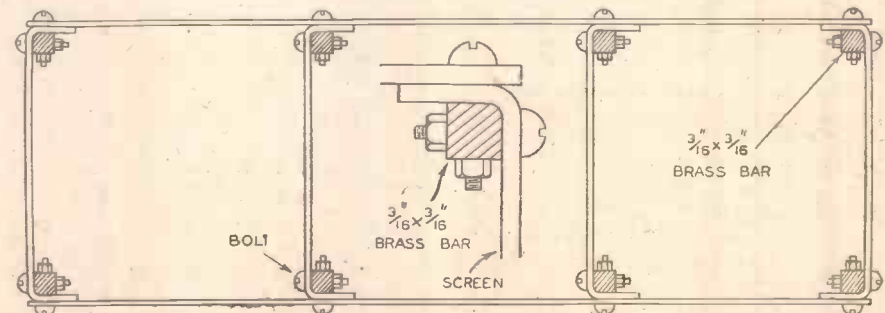


Fig. 2.—Method of bolting screens together to ensure rigidity Fig. 3 (inset) Detail of a corner fixing

and dependence is placed on this method to ensure a rigid unit.

In all instances the corners have been strengthened by pieces of 3-16in. by 3-16in. brass bar, the cabinet sides, ends and screens respectively being drilled and tapped to suit the bolts used. Each bolt is fitted with a locking washer, and the result is a rigid assembly entirely free from whip and metallic noise.

the probable breakdown or unsatisfactory operation of the receiver.

A well-designed sheet-metal cabinet will prove to be entirely free from metallic noises when the receiver controls are operated. It is better, and more satisfactory, to take every precaution at the start to ensure against such possibilities rather than to attempt to eliminate this most annoying trouble later.

# The Amateur Transmitter

THE term Power Amplifier might be confusing to the beginner when it is applied to a transmitter circuit, but if it is remembered that it is used to denote a valve or valves amplifying radio frequency currents of considerable power, the true meaning of the term is quite clear.

As the operating conditions of a P.A. stage are rather different from those normally dealt with in ordinary radio work, it is essential to get a clear understanding of the adjustment and operation of such circuits.

The easiest way of doing this is by making comparisons, and in this instance an ordinary L.F. output stage will be taken as the basis for the explanation.

Most valvo-makers supply with their products a leaflet giving the essential technical data relating to the characteristics and operation of their various types of valves.

It is also quite common for them to include on the leaflet reproductions of graphs showing the characteristic curves, and once one is able to "read" these curves, it is possible to tell the type, capabilities and the best voltage and current values to use to obtain maximum efficiency.

The most simple characteristic curve is

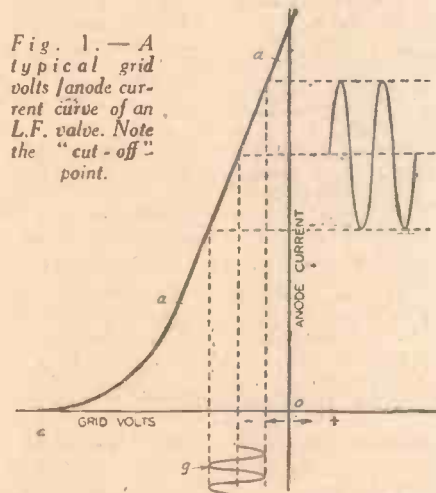


Fig. 1.—A typical grid volts/anode current curve of an L.F. valve. Note the "cut-off" point.

## Anode Circuit

With L.F. amplification, it is essential for the output, i.e., anode circuit, to reproduce faithfully the signal which is applied across the input or grid circuit.

If the curve is examined, it will be seen that to secure such conditions the operating voltages on both grid and anode circuits must be adjusted so that the valve is working on the straight portion of the curve. The part between the points "a" "a" on Fig. 1 denotes this section.

The point where the vertical line intersects the horizontal or base line represents zero grid bias; to the left indicates increasing values of negative bias, while to the right the conditions become positive.

It will be noted that the curve sweeps

down towards the base line and eventually merges into it at the spot marked "c." Now the vertical line, on which the anode current is marked off, has its zero position at the point where it intersects the base line, so when the curve reaches the spot "c" it denotes that no anode current is flowing.

## In this Article the Elementary Details of the Operation of a P.A. Stage are Given - - - - By L. O. SPARKS

The anode voltage has been maintained at a constant value, therefore it should be obvious from the graph that the no current condition has been produced by increasing the negative grid bias to the value denoted by the position of "c" on the grid volt base line. This point or value is known as "the cut-off point" for the valve concerned.

Many readers will already be familiar with characteristic curves, therefore I must ask them to appreciate that these details are made as clear as possible for those who have not yet reached that stage, and who must master them before they can proceed with transmitting.

## L.F. Stage

With the oscillator chassis already described, or with a simple L.F. stage, all the details given above can be checked by wiring up the circuit shown in Fig. 2, and I would advise all not too familiar with curves to do so and prove the points for themselves.

Referring to the straight portion "a" "a." For our purpose we will assume that the signal applied across the grid circuit is in the form of a single note, and can be represented by the small wavy line "g." The dotted lines taken vertically from the centre and each side of it indicate its amplitude or strength, if you like it better that way. At the points where these dotted lines intersect the straight portion of the anode current curve, more lines are taken out at right-angles and on these we reproduce the signal "g," but to a different dimension.

It should be noted that the change in dimension only applies to the amplitude of the signal and not as regards wave form or number of waves per second; in other words, the input signal has been amplified.

This example only holds good if the perfect operating conditions are maintained; supposing the input was applied to a part of the anode current curve which caused the left hand side of "g" to come on to the bend of the curve. It will be apparent that the output signal would not then be a true reproduction on the input, as the dotted horizontal lines would no longer be equal distances from their centre line.

When this state of affairs exists, pronounced distortion will be the result and the remedy is to adjust the value of the negative grid bias, or apply a higher value of high-tension to the anode.

## Harmonics

The distortion in the above L.F. example will cause the output to consist of not only the original signal, but also of harmonics, and the resultant effect would not be too pleasant to the ear.

With the P.A. stage, however, one is not concerned, in the same sense, with aural effect. In fact, the chief function of the P.A. is to amplify a signal having a constant frequency equal to that produced by the oscillator. For the present purpose, this can be considered as a single note, though in practice the frequency would be well beyond the audible range.

If it is possible to arrange the circuit so that harmonics, i.e., multiples of the original note, can be ignored, then it will be possible to increase the efficiency of the stage and obtain a greater output. Actually, the harmonics can be ignored; in the anode circuit of the P.A., a coil and variable condenser combination is embodied in a similar manner to that of the oscillator, and when the circuit is tuned to the pre-determined frequency it offers a high impedance to currents of that frequency, and causes them to set up an oscillatory voltage across the coil arrangement. The pre-determined frequency will, of course, be that of the oscillator or "doubler" stage, but as regards any other frequencies which might be present in the anode circuit, such as the harmonics, the coil and condenser—tank circuit—will offer to them a low impedance path and so prevent them from developing any power across the circuit.

From this it will be seen that the "drive" or signal can be of such magnitude that it swings the operating portion down on to the bend of the anode current curve without ill effect. In fact, one can go farther than this and operate down, round, and past the "cut-off" point, but more about that next week.

## Co-operation Circuit

J. R. C., of Ealing, is anxious to get in touch with other enthusiasts in or around his

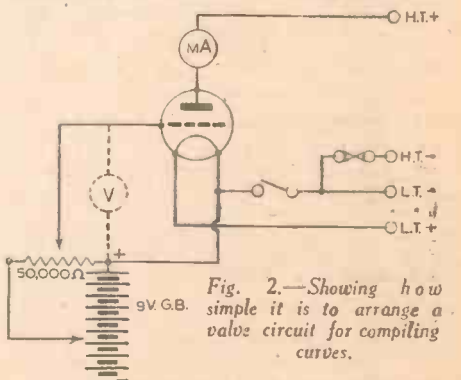


Fig. 2.—Showing how simple it is to arrange a valve circuit for compiling curves.

area. He is particularly interested in transmitting (A.A. stage) and short-wave work.

## Warning

One enthusiastic reader who allowed his enthusiasm to overcome his thought for others, went so far as to try the effect of coupling an outside aerial to the anode tank coil of the oscillator which is being used for the basic experiments outlined in these articles. Needless to say, all the broadcast listeners in his immediate area experienced severe interference, and in many instances their signals were literally wiped out. Such practice cannot be condemned too strongly, as it is a direct violation of the privileges granted to holders of A.A. licences.



# ON YOUR WAVELENGTH

## Through His Hat

I AM intrigued to know why it is that when I make some statement in these columns it immediately causes someone to rush off with a letter telling me that I am wrong. It seems that no matter what I say there is always someone who is waiting to attack my statements. There are still people who believe in Black Magic. There are also many who believe in Spiritualism (or should it be Spiritism?). But for anyone in these days to state that radio can influence the weather which we now experience is, as I said once before, talking through his hat. Scientists have repeatedly stated that the infinitesimal power which is radiated cannot affect the weather. Yet when I recently mentioned a reader's reactions to the vagaries of the climate during the past year or so, and stated that the radio was not responsible, I called forth a storm of protest. Mr. D. F., of Exeter, says: "I read an interesting letter on Wireless and the Weather, which Thermion dismissed by informing R. R., of Hull, that he is talking through his hat. . . . In the previous issue, a letter was published on the subject of the B.B.C. Sunday Programmes which should be suitable to the day, and also referring to his approval of them. In reply to this letter, Thermion expresses his sorrow, but states that he does not subscribe to the obsolete views expressed therein. Personally, I like to listen to a little music on Sunday, but switch off when 'rubbish' hits my ears. The Sabbath is as up to date to-day as it has always been, Thermion, as can be seen in world affairs. There are those who do not like Devonshire cream—but that is no fault of the cream!"

## What is the Relation?

WELL, that is that, but what is the relation between cream and programmes? And are the programmes so good? I seem to remember an association of religious students who said that it could be proved that everything prognosticated would come true, and the end of the world has been forecast by this means many times during the last few years. But what is so interesting is that the busybodies who support these views must inflict their views on others. It



## By Thermion

is not merely a question of trying to show the other man a different point of view, but trying to force it down his throat. The B.B.C. recently, undoubtedly in response to public demand, put over a "light music" programme on a Sunday morning. What was the result? Immediately protests were lodged by a certain body, and the B.B.C. gave way.

What is the reaction of the man-in-the-street to such treatment?

## Free Service

I WAS chatting to the Editor the other day and he told me some amazing facts concerning the special Free Service which is offered to readers, and the way this is abused. I thought it had been pointed out often enough in these pages that such service was only given in respect of receivers built to a published specification. The Queries Department is at your service when difficulty arises in getting a set working, and you should not, therefore, bring along your receiver, or send it to us, if you cannot make it work first time. Recently, I am told, a reader simply brought a parcel to these offices, left it with the doorkeeper, and upon

being opened it contained a commercial set which had been serviced by the makers, but which still did not work to his satisfaction. He asked the Editor to put it right for him. This is not a General Service Department, and the only apparatus which is serviced here is that which is built from designs published and guaranteed by the Editor. I wonder if you will remember this, and thereby avoid disappointment.

## Television

HAVE you looked in yet? I believe there are still many listeners who have not yet taken the opportunity of seeing what is offered on the television programmes, and



The Air Ministry are recruiting a reserve from Britain's many radio amateurs to provide an efficient emergency wireless organisation for the R.A.F. The new body is called the Civilian Wireless Reserve of the Royal Air Force, and will act as a reserve behind the R.A.F. Signals Branch. The illustration shows Mr. J. C. Hosburn, Chief Technical Instructor of the R.A.F. Civil Wireless Reserve, inspecting the apparatus of Mr. J. W. Matthews, of Cuffley, Herts, who is one of the first members of the new Civil Wireless Reserve.



in spite of what you might hear, you should take the earliest opportunity of having a look at one of the latest television sets. I understand that the Outside Broadcast department of the television service have some marvellous plans in hand for future broadcasts, some of which I must not disclose at the moment. Amongst important forthcoming broadcasts are those from London theatres, where the cameras are to be installed in the theatre, and first-night scenes are to be given in respect of one play, and the entire broadcast of another programme included. The modern television camera is apparently so good that no additional lighting will be used, and the audience will be almost unaware of the presence of the apparatus. By judicious "mixing" of scenes from the auditorium and the wings, some remarkable shots should be given and the play should come over very well.

#### R.A.F.—C.W.R.

**I** UNDERSTAND that the Civilian Wireless Reserve is getting going, and some interesting results have so far been achieved. I have heard many complaints regarding lack of attention from some amateurs, but I understand that for the start only those with full licences and a good deal of experience are being selected, after which the remainder will come into action. The Chief Technical Instructor of the Reserve is very busy inspecting amateur equipment and selecting those which will serve as instructional or relay stations, and the accompanying illustration is of interest as it shows Mr. Hoshburn, the instructor in question, in the process of examining an amateur station. This will serve as a guide to those who aspire to get on the air, and the fine standard set by this particular station should be the aim of every amateur. Note the professional finish which is given by the rack and panel method of assembly, and the use of meters wherever desirable.

#### My Competitions

**I** HAVE practically completed my examination of the entries for the competition, "What I would do if I were Director-General," but I am surprised at the entries for "The Best Set I Ever Built." It certainly appears that some old sets gave the best results, or is it that in the old days conditions in the ether were so much better? Do you remember how the single-valve and crystal reflex set brought in stations such as the Scottish Regional in London, whereas now it can hardly be heard on a three-valver under normal conditions. Per-

## Notes from the Test Bench

### Short-wave Coils

**W**HEN making short-wave coils of the type now in common use, there are three alternatives with regard to the aerial or primary winding. It may be placed at the lower end of the grid winding, and act as a continuation of that winding; it may be interwound with the lower windings of the grid coil, or it may be placed on a small former inside the main winding. There are advantages and disadvantages for each case, and as a general rule it may be said that down to 25 metres the first arrangement is satisfactory, and below that wavelength an interwound winding has certain advantages. Probably, for experimental use, the separate former shows up to best advantage as it enables changes to be made more easily without modifying the remaining windings.

### Quick Connections

**T**HE experimenter often finds it necessary to make connections quickly, and the usual terminal is not always the best arrangement to adopt. The use of large press-studs (such as are used on gloves) is one way of obtaining a quick contact which may be broken as quickly as it is made, or ordinary round-head terminals may be used in conjunction with the top-cap connectors which are now on the market. Some of these are particularly adaptable, and by bending the ends they may be made to push over various types of component or connector.

### Electrolytic Condensers

**A**DDITIONAL smoothing is sometimes found necessary in experimental apparatus, and generally this is carried out by mounting additional condensers on the chassis and connecting them in parallel. It is also useful at times to connect condensers in series, to give added protection against possible breakdowns. A typical instance is in the smoothing of a mains unit, where an electrolytic condenser which develops an internal short-circuit may damage an expensive rectifying valve or mains transformer. By mounting electrolytics on insulated brackets and joining them in series this risk can be reduced.

haps some of the older fans can remember some of the phenomenal results which were obtained with simple apparatus, and can offer some explanation. I remember, whilst on this subject, that it was at one time suggested that radio signals kept on going round and round the earth, and that the signals sent out in 1920 are still going round and round. I believe someone once claimed to have picked up yesterday's programme on the following day! This was not a joke, but a serious statement from a listener who stated that he could repeat the performance on any day. He was using a commercial set and the makers sent round a serviceman to look over the matter. Sure enough, when he was shown upstairs the listener showed him *The Radio Times*, and pointed out the previous day's Regional programme. He then went to the set, switched on, tuned to the Regional and there was that programme. The serviceman was startled for the minute, and tuned down to the National. But this was not obtainable, and after a short inspection he found that the set was badly out of trim, and the National was being tuned on the Regional setting on the dial. The programmes were repeated in those days, and quite often a play or talk in the National was given the following day in the Regional. The old days were certainly interesting. Remember, if you are entering for this competition, make your attempts not more than 250 words in length and put "Competition" in the top left-hand corner of your envelope. November 26th is the closing date.

### Christmas Number

**T**HE issue after our next will be the Christmas number, and I understand that there are some good things promised. A fair number of suggestions have been received, but there is still time for more before the issue is produced, and the Editor is anxious to study all suggestions so that the issue may be made as representative as possible. If you have not placed a standing order for your copies, make sure you are not unlucky, and order your issue right away.

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# A COMBINED H.T. AND L.T. UNIT

An Efficient Unit Designed to Supply Adequate H.T. for the Average Battery Receiver, Free from Hum. A Self-contained Trickle Charger Eliminates the Trouble and Expense of Visiting a Charging Station.

By THE TECHNICAL STAFF

**T**HE question of battery elimination is one which is ever before many owners of battery-operated receivers.

The majority are forced to use this form of supply for their high and low tension because they have no alternative, but on the other hand there is still quite a large percentage of listeners who still prefer batteries, although electricity is available, because they are of the opinion that reproduction is more free from unwanted interference and background noises than when the mains are used.

For those without electricity little can be said or done to help them solve the problem, although the new gas-operated H.T. unit produced by Messrs. Milnes is a step in the right direction and worthy of consideration.

This article, however, is concerned with those who are in the happy position of having their house wired for electricity and who do not wish to replace their battery set with an all-electric model.

It cannot be denied that the average dry battery source of high tension is not all that could be desired. It is not economical, its output is not constant for a prolonged period, and it has the objectionable quality of setting up instability when it starts breaking down through use or overloads.

Admitting that modern battery valves can give quite a good output for ordinary domestic purposes, without imposing a severe tax on the H.T. battery, one always has to remember that there is a definite limit to the current which can be taken from dry cells, and this restricts the choice of output valves and circuits and, consequently, power output. A well-designed H.T. eliminator overcomes all these snags, but it does not solve the question of the L.T. supply and regular visits to a charging station.

In the Unit to be described, considerable attention has been given to the H.T. supply, and at the same time a separate rectifier has been embodied to provide a means of keeping the L.T. accumulator in a fully-charged condition.

This dual-purpose arrangement makes a normal battery-operated receiver all electric so far as the replacement and upkeep costs are concerned, and it offers the additional advantage of freedom from mains interference and lower costs for valve renewals.

## The Circuit

After giving due consideration to valve and metal rectifiers, it was decided to use the latter, as it is more simple, less costly, and more robust.

An examination of Fig. 1 will show that separate rectifiers are used for the H.T. and L.T. supplies, and that their inputs are provided by one mains transformer having two secondary windings. The rectifier selected for the H.T. section is the Westinghouse Metal Rectifier No. H.T.15, which

requires an A.C. input of 140 volts at 120 mA's.

A voltage doubling circuit is used, and with reservoir condensers of 4 mfd. a rectified D.C. output of 200 volts at 30 milliamps is obtained. It would appear that these values are unnecessarily high for the average battery receiver, but the next type of rectifier can only supply 130 volts at 20 milliamps when reservoir condensers of 6 mfd. are used. As a certain voltage drop is bound to be produced across the smoothing choke, 130 volts does not allow sufficient margin for average requirements, and apart from this, the additional cost of the 6 mfd. condensers, compared with that of the 4 mfd., renders the selection of the H.T.15 a more economical and satisfactory proposition.

## Smoothing Considerations

To provide adequate smoothing a reliable L.F. choke must be embodied in the positive supply lead, and in this instance the Bulgin L.F. 15S model has been selected as it provides an inductance of 32 henries at 30mA's. To complete the smoothing cir-

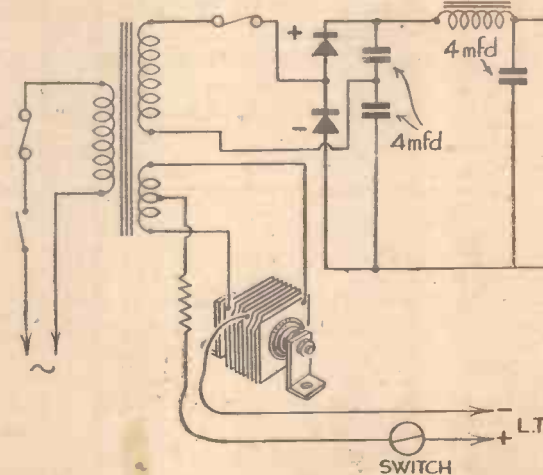


Fig. 1.—Theoretical diagram of the combined unit, showing the two separate rectifiers.

cuit, a 4 mfd. condenser is connected across the D.C. lines after the choke.

The resistance of the choke is 600 ohms and by applying the formula given below it will be found that when the total current output is flowing a voltage drop will be produced across the choke of 18 volts, thus reducing the available supply to 182 volts.

This value is, of course, too high for average requirements. Therefore, it is necessary to provide suitable resistances to break it down to that required for the various circuits. As it is impossible to provide independent outputs for every type of battery receiver, it was decided to arrange tapings for Power, the anode supply of an S.G. valve, the screening

grid of an S.G. valve and a final one for the detector anode circuit.

As the values of the resistances embodied depend on the current flowing through them, it will be advisable for simple measurements to be taken of the current consumptions in the receiver with which the unit is going to be used and, if necessary, substitute resistances of more suitable values. The values of the resistances are calculated by the simple formula: Resistance equals voltage to be dropped multiplied by 1,000 divided by current through resistance in milliamps. For example, it is assumed that the S.G. valve requires 120 volts on its anode and that its average current consumption will be 4 mA's. Applying the above we get  $\frac{182 \text{ minus } 120 \times 1,000}{4}$

which equals  $\frac{62,000}{4} = 15,000$  ohms. The 182

volts represents the value of the available supply, and as we are concerned with dropping the difference between that and the voltage required, namely, 120 volts, that is why the calculation is written in the above form. This may seem an unnecessary explanation, but many slip up through confusing the value of the volts to be dropped with that which is actually required.

For the anode supply, therefore, a series resistance of 15,000 ohms is used, and to ensure absence of feed-back it is decoupled to the common negative line by another 4 mfd. condenser.

## Screen Current

The next tapping is the screen supply. Here an average value of 70 volts is taken as being required, but to ensure a steady supply a fixed potentiometer is used to produce the necessary voltage drop from (note that this is connected to the 120 and not the 182 volt supply) 120 to 70 volts. It must be assumed that more current will flow through the potentiometer

formed by the resistances R2 and R3 than that required solely for the screen supply, and for the purpose of the calculation the value can be taken as being four times that of the screen current. An average current value for this electrode is .5mA, therefore the current flowing through R2 will be 2.5mA's, so its value will be  $\frac{120 - 70 \times 1,000}{2.5}$  which equals 20,000 ohms.

The bottom arm of the potentiometer has now to drop the 70 volts between the screen and the common negative line so the value of the resistance R3 becomes  $\frac{70 \times 1,000}{2}$  or, in other words, 35,000 ohms.

(Continued overleaf)



**A COMBINED H.T. AND L.T. UNIT**  
(Continued from previous page)

It will be noted that this resistance is not called upon to carry the screening current, likewise the current value is 2 and not 2.5 mA's as in the case of the upper resistance.

This supply is also decoupled by a 4-mfd. condenser to the negative line.

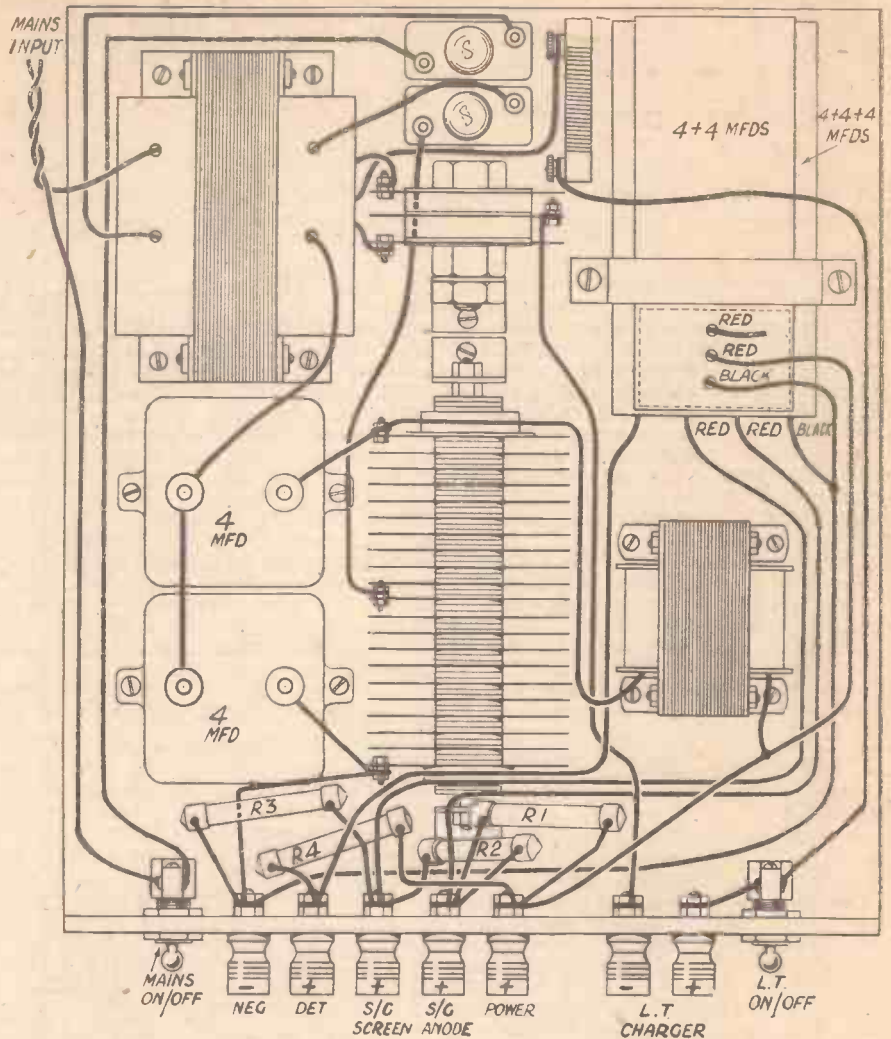
The detector supply is obtained by means of a series resistance of 40,000 ohms, this value being selected on the assumption that 100 volts will be required at an average current of 2 mA's. The final tapping point is left at 182 volts and it can be used for supplying the output circuit of a receiver, or for any other purposes which might arise. To reduce its value, it is only necessary to apply the calculations used for the previous examples by substituting appropriate current values.

With this type of eliminator it must be appreciated that the wattage output is constant, and if the total current available is not used a voltage rise must be expected, thus necessitating higher values of resistances in the various sections.

The rectifier used in this section is the L.T.7, which requires an A.C. input of 4+4 volts to give a D.C. output of 2 volts at 0.5 amps.

(To be continued)

**WIRING DIAGRAM OF THE COMBINED H.T. AND L.T. UNIT**



**LIST OF COMPONENTS**

- One Special Mains Transformer, Type H.L.C., T. W. Thompson, 15s.
  - One Westinghouse Metal Rectifier, Type H.T. 15, 12s. 6d.
  - One Westinghouse Metal Rectifier, Type L.T.7, 6s. 6d.
  - Two Dubilier Condensers, Type B.B., 4 mfd., 5s. 6d. each.
  - One Dubilier Condenser, Type 307 C, 4 + 4 + 4 mfd., 5s. 6d.
  - One Dubilier Condenser, Type 0286 C, 4 + 4 mfd., 4s. 6d.
  - Two Bulgin Switches, Type S 80 T, 1s. 6d. each.
  - One Bulgin L.F. Choke, Type L.F. 15 S, 9s. 6d.
  - One Bulgin Resistance, Type A.R.2, 1s.
  - Two Bulgin Fuseholders, Type F.5, 6d. each.
  - One Dubilier Resistance, One-watt Type, 15,000Ω, 1s.
  - One Dubilier Resistance, One-watt Type, 20,000Ω, 1s.
  - One Dubilier Resistance, One-watt Type, 35,000Ω, 1s.
  - One Dubilier Resistance, One-watt Type, 40,000Ω, 1s.
- Terminal strip, 7 terminals or plug sockets, insulating sleeving and connecting wire.



A front view of Italy's new broadcasting station recently opened by Signor Mussolini, at Prato Smeraldo, five miles to the south of Rome. It is claimed that this station, known as the Imperial Radio Centre, is the most powerful and best equipped in the world.

**TELEVISION FROM LONDON THEATRE**

ACCORDING to a recent B.B.C. announcement a performance is to be televised direct from a West End theatre. By arrangement with Basil Dean the whole of J. B. Priestley's comedy "When We Are Married" will be televised from St. Martin's Theatre on the evening of Wednesday, November 16th. This will be the first time that a play has been televised direct from a theatre.

Emitron cameras will be installed in three positions. One in the dress circle will give a comprehensive view of the stage, while two cameras at opposite ends of the stalls will provide close-ups. The play begins at 8.30 p.m. It will be presented as a theatre performance, and viewers will see the rise and fall of the curtain. The transmission, with two ten-minute intervals, will last just over two hours.

To ensure the success of the transmission the B.B.C. Productions Staff and technicians will attend performances of the play every evening for a week in advance to study the action of the play and arrange augmented lighting.



A PAGE OF PRACTICAL HINTS

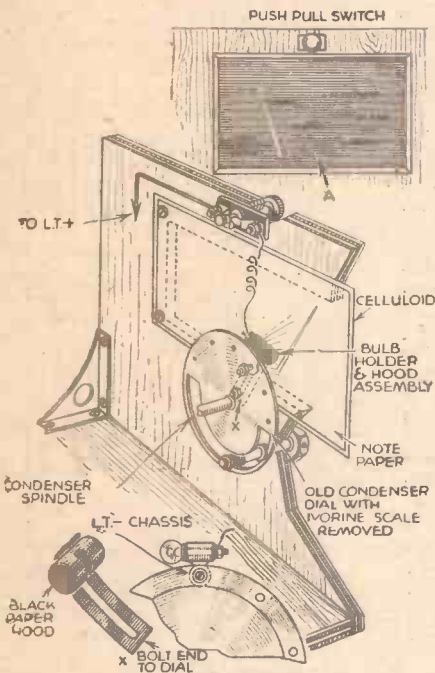
SUBMIT YOUR IDEA

READERS WRINKLES

THE HALF-GUINEA PAGE

A Tuning-dial Indicator

THE accompanying sketch shows a novel tuning-dial indicator which I have made, and which is now working on my set. The 2-gang .0005 variable condenser



A novel tuning-dial indicator.

which I used is an old pattern with an ivorine scale attached to the front portion, moved by the control knob, and having a bulb with holder fitted on the condenser frame to show a light through the scale. I removed the ivorine scale, and bolted the bulb-holder in position on the movable portion in a position so that when the bulb was fitted in place the filament was in the centre of travel.

I next cut a hood from some photographic black paper to fit over the bulb and holder, with a 1/4 in. hole cut from the portion over the bulb in front, and then fitted a strip of the same paper from the top of the hood to the centre of the spindle after having cut a tapered slot in it. The top of the strip was attached to the hood with adhesive, and the lower portion bolted down to the movable portion of the condenser.

For the bulb connection, a flex lead was taken from the nearest valveholder L.T. + to one side of a push-pull switch fitted above the dial, and from other side of switch to centre connection of bulb-holder. The circuit is completed via the condenser frame to earth, to which L.T.— is also connected.

The effect when the switch is closed is to throw a pointer of light on to the back of an oblong of white paper stretched over the dial opening, as in inset (A). On operating

THAT DODGE OF YOURS!

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

SPECIAL NOTICE.

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

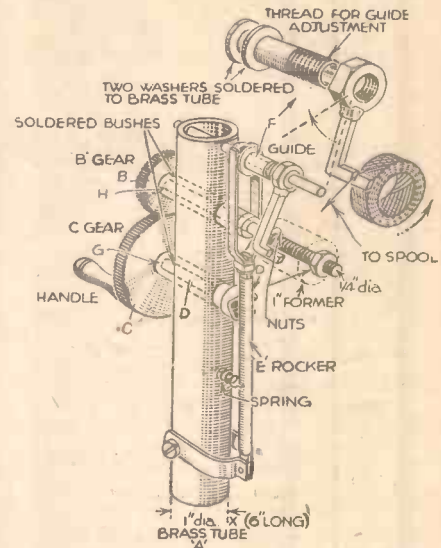
the set, when a station was identified, a pin-prick was made in the paper where the pointer indicated on a faint pencilled semi-circle (two semi-circles are drawn, one for each wavelength). When all stations required have been identified a piece of celluloid can be fitted in the oblong to finish it off.—A. F. J. VEAL (Mottingham).

Winding Machine for Honeycomb Coils

THE accompanying sketch is of a small hand machine for winding coils of the honeycomb type. I constructed it throughout from scrap materials, and have satisfactorily wound coils of various types with it. There should be no difficulty in making a machine of this kind, provided the gear ratio is correct.

The large gear (C) should be slightly smaller than four times that of the small gear (B), which is responsible for the overlapping and spacing of each winding. If the small gear has 10 teeth, the large gear should have 38 or 39. The latter is fixed to a shaft (D) made from a 1/4 in. bolt 2 in. long, the head being shaped with the corner of a square file, to form a cam which operates

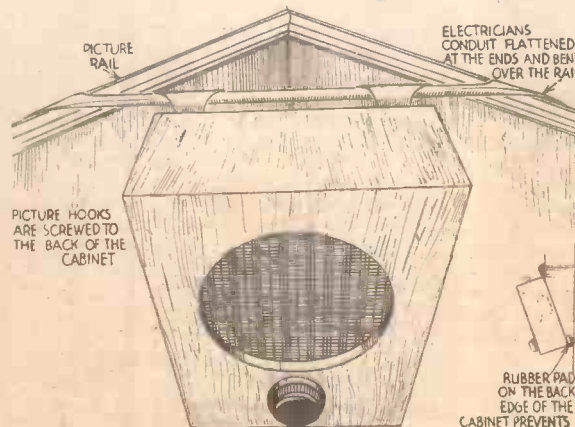
the rocker (E) which I made from a piece of 1/4 in. soft steel flattened at both ends, a fork piece being attached to the top end. The lower end is pivoted to a stirrup, as shown. The fork piece operates the slide (F), which is a small brass tube having a fine thread at one end for fixing the guide, which consists of a brass nut and a short length of 1/4 in. brass rod bent to an L-shape and soldered on. The opposite end of the slide tube has two washers soldered to it



A coil-winding machine made from scrap materials.

so that the end fork of the rocker fits between, as shown in the sketch.

To operate the machine the handle is simply turned, the wire being drawn through the thumb and finger with a slight pressure, the guide working automatically from side to side with the revolving former, thus making a neat and efficient coil.—W. MAYO (Tipton).



Method of suspending a speaker in the corner of a room.

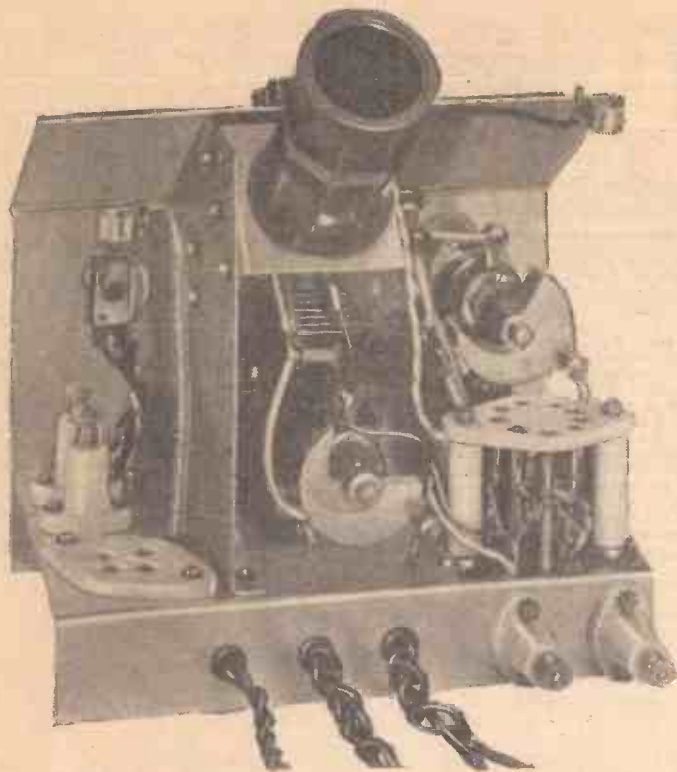
A Handy Speaker Suspension

I HAVE mounted my extension speaker at an angle by screwing two picture hooks to the back and suspending it from a short piece of electrician's conduit across the corner of the room. The conduit is flattened at the two ends, and bent to fit over the picture rail thus preventing the possible collapse by slipping from the rail. The weight of the speaker drags the bottom front of the cabinet back, and the whole stays in this desired position, a rubber pad being attached to the back of the cabinet, as shown in the inset.—E. TRAVIS (Chingford).



# OPERATING THE T

## Further Constructional Using this Novel Two-w



This rear view shows the position of the screening partition.

FOR earthing the screened leads, the covered wire should be worked through the screening braid at a point providing a suitable length of this braid for directly earthing to the L.T. negative valve filament socket of the PX230SW.

All metal-ended chokes should be kept free from short-circuiting to chassis, this also applying to the resistors, but when handling these chokes there is a tendency for the windings to work loose, and care should accordingly be taken.

When bringing the battery leads through the chassis a knot should be tied in each to prevent any possible strain on these leads from affecting the under-chassis wiring and connection; these knots are left out of the illustration for the purpose of clarity.

The leads to the insulating pillars for the aerial, earth and 'phones should be passed up each pillar and the ends secured under the terminal nuts as illustrated diagrammatically in Figs. 5 and 5a last week.

Although the grid-leak R3 is not shown in Fig. 5a, this will be located as illustrated in Fig. 9, which illustration shows the position of the bandspread condenser C1, the coil-base, and the condensers C7 and C8.

The grid-leak R1 is supported close to the top-cap connection to the TP230 by a short length of wire passed round a rubber grummet worked over this resistance, this piece of wire serving to clamp R1 to one of the fixing bolts of the coil-base. A grummet is also worked over each end of this resistance to prevent possible short-circuit of the ends to the coil-base bracket.

When ready for test, a torch bulb can be flashed across the filament sockets to ensure that there is no short-circuit.

The valves can now be inserted, and with a reasonable aerial and earth, the sensitivity of each coil can be checked.

### Operating Notes

Commencing with the C.C.6 coil, which is for the 44-100 metre band, and with the bandset condenser at zero, the reaction should be increased until the maximum point of sensitivity is reached, this constitutes that position verging on a state of reaction by the triode portion of the T.P. 230. Now very slowly operate the band-spread condenser at the same time maintaining this state of reaction until the characteristic carrier or signal is received, then

to tune this in exactly the band-set condenser can be brought into use, thus allowing the reaction to be brought to the most critical position. In the case of C.W. signals the point verging on reaction may be exceeded if a better "note" is desired, and the operator need have no fear, when the set is in this state of oscillation, of radiating interference. This is one of the many advantages to be gained in this class of circuit, due to the isolation of the aerial section from the tuning inductance.

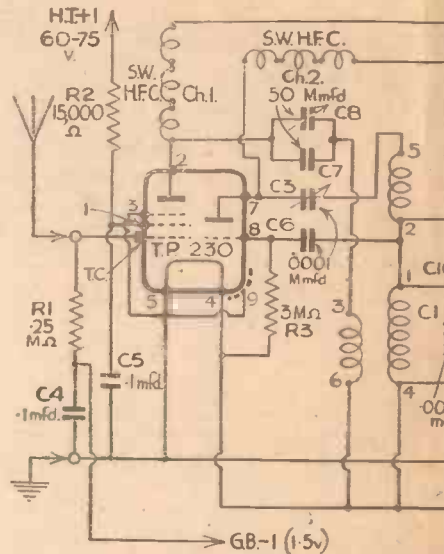
Gradually traversing the band, the absence of dead-spots will be apparent, but if there is any point throughout the wave-ranges where reaction seems to be slightly erratic, this will in all probability point to the presence of damping in the circuit of the H.F. choke Ch.2, and after first of all removing the battery plugs, this choke should be checked to see that it has not been inadvertently positioned too near the filter feed transformer, or that the windings are not pressed against the chassis.

The C.B.6 coil should next be tried out following this with the C.A.6, and on this test for general continuity, it must be pointed out that owing to the considerable increase in the H.F. the tuning will, of course, appear a trifle more critical, but there will be no difficulty in obtaining maximum sensitivity with the reaction control, provided that the same sequence of operations is carried out. Whilst the more experienced reader will appreciate these points, the beginner may miss some of the weaker signals in a hasty desire to cover each band.

With this increased H.F. will come the tendency to hand-capacity effects with resultant instability, so that a more careful check still should be made to the layout of the components, and the wiring generally, prior to commencing serious tests on DX.

### Aerial and Earth Leads

The aerial and earth leads should be arranged so that they are not in proximity to the 'phone leads; also, remove any tools or pieces of metal which may have been



Theoretical circuit of the

left lying near the set as this will obviate the possibilities of extraneous disturbance which may mar the reception of very weak transmissions.

The rather novel shape of the chassis

## CONTROL I

IT is interesting to study the various types of television sets now on the market, and see how they have been designed with a view to operating the essential controls. In some cases only a single major vision control appears on the front of the set and this is nearly always for the adjustment of picture contrast; the magnitude of the signal passed to the modulation electrode of the cathode-ray tube being governed by the degree of rotation of the knob. In other cases this control is supplemented with one labelled "brightness," for it is largely a question of securing the correct balance between contrast and brightness which has to be settled by the viewer if he is to secure the best pictorial range with good half-tone values. Most of the other controls are, as a rule, regarded as minor ones, and for this purpose are positioned on the side of the set or at the back so as to be out of sight, and remove the temptation for anyone in the household to handle them. It is impossible to generalise on this control question, for at the moment each manufacturer has different ideas on the subject, but it would seem a



# TRIO-PEN S.W. TWO

## Details, and Notes on Live, Short-wave Receiver

front panel does not prevent the fitment of this receiver into a cabinet, and although details are not given here of a suitable cabinet, since the requirements and conditions of use vary so considerably in

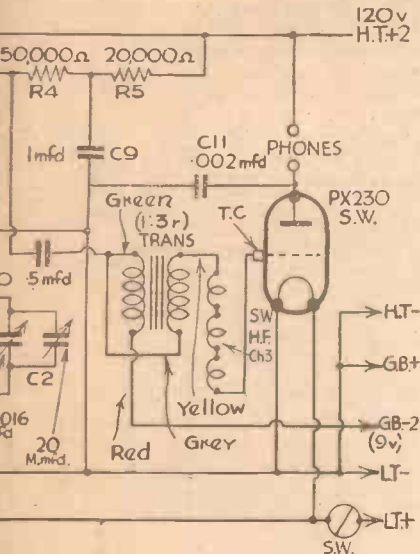


Fig. 2. Trio-Pen S.W. 2.

in this respect, the following suggestion is offered.

### Cabinet Details

A cabinet could be designed with a

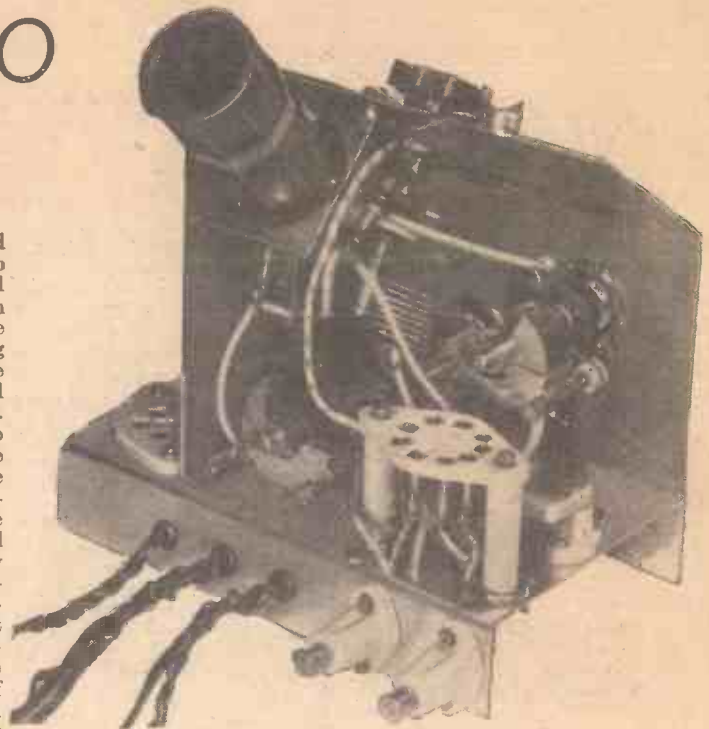
sloping front and slotted or holed top so that the set could be slid into position from the back, the hole or slot being provided for the protrusion and change of the coils. If it is proposed to have a hole for the coils, this should be sufficiently elongated to permit the removal of a coil when necessary, by the method of prising mentioned previously. The front panel could be arranged so that the aluminium panel of the receiver would not be completely obscured, thus lending a pleasing appearance and finish, whilst the knobs need not again be removed and reset.

Another point which requires mentioning here concerns the pillar-supported valveholder for the T.P. valve. Although this assembly is sufficiently rigid, the user will be well advised to prevent any undue strain being applied to this part when handling this valve.

### Final Notes

From the wiring diagrams it will no doubt have been noticed that different lengths of plugs are used for the H.T. and G.B. plugs, the reason for this being simply to serve as a useful reminder, during the handling of the receiver under different tests.

The L.T. switch key does not remain in



In this illustration the condensers may clearly be seen.

any way engaged in the lock when the set is "Off," so that it would be a wise plan to secure this key with a short piece of string to the back of the switch, and in the event of a toggle switch being preferred, one of the simple on/off type from the Bulgin range is recommended here.

For those who prefer a "matt" finish to the front panel, a little wire wool, which can be purchased from a well-known store, will prove the best way of obtaining this, but when using this wool it should be remembered that it disintegrates, and care should be taken not to inhale the resulting powder; and do not use any liquid during the process. The resultant matt finish should, if carefully carried out, prove very attractive, and the chance of impairing by scratching is then prevented.


## IMPORTANCE

reasonable contention that the more controls which can be pre-set at the works or by the engineer on installation the more remote is the chance for the set to be thrown out of adjustment; a case which can only be rectified by a very careful study of the instruction booklet usually furnished with each set. The proper education of the viewing public into a thorough understanding of the function of each control on a television set, whether major or minor, is likely to take a very long time, so the fewer there are to handle, the more likely is it possible for a receiver to obtain good results. If after a lapse of time there has been a settling down in the set as far as the valves and cathode-ray are concerned, and a possible drift from the optimum position by some of the controls, then the owner is perfectly justified in making an effort to restore the picture to its former high quality. Until this condition arises, however, it is better to leave the set alone, and rely on the skilled pre-setting undertaken by the engineer when the installation is made.

### LIST OF COMPONENTS FOR THE TRIO-PEN S.W. 2.

- |  |  |
|--|--|
| <b>Resistances (fixed):</b>  | One type V147 ceramic, with soldering connections (9-pin). (Clix.) |
| One 15,000 ohms, $\frac{1}{2}$ -watt type. (Erie.)                 | <b>Valves:</b>   |
| One 25,000 ohms, $\frac{1}{2}$ -watt type. (Erie.)                 | One type TP230. (Hivac.)   |
| One 50,000 ohms, $\frac{1}{2}$ -watt type. (Erie.)                 | One type PX230SW. (Hivac.)   |
| One .25 megohm $\frac{1}{2}$ -watt type. (Erie.)                   | Three reduction drives, type ERD. (Raymart.)                       |
| One 3 megohms, $\frac{1}{2}$ -watt type. (Erie.)                   | <b>Coils:</b>  |
| <b>Condensers (variable):</b>                                      | One set of 6-pin coils, type CA6, CB6, CC6. (Raymart.)             |
| One type V.C.160X. (Raymart.)                                      | One type VH6 chassis-mounting coil-base for above. (Raymart.)      |
| One type 900/100. (Eddystone.)                                     | Two dials, type DINJP. No. 1097, direct drive. (Eddystone.)        |
| One type 900/20. (Eddystone.)                                      | One black wheel knob. (Webb's Radio.)                              |
| <b>Condensers (fixed):</b>   | <b>Plugs:</b>  |
| One .001 mfd., type 665. (Dubilier.)                               | Three type No. 3, red, black, yellow. (Clix.)                      |
| Two .1 mfd. (Polar N.S.F.)   | Three type No. 5, red, H.T.1, red H.T.2, black H.T. (Clix.)        |
| One .5 mfd. (Polar N.S.F.)   | Two spades, type No. 14, red, black. (Clix.)                       |
| One 50 mmfd. (T.C.C.)  | One gross 6BA shakeproof washers, No. P917. (Bulgin.)              |
| One 1 mfd. (Weco.)   | 18 S.W.G. aluminium chassis. (Peto-Scott.)                         |
| <b>Condensers (pre-set):</b>                                       | <b>Miscellaneous:</b>  |
| One 50 mmfd. (Cylidon.)  | 6BA nuts and bolts. (Bulgin.)                                      |
| <b>Chokes (high-frequency):</b>                                    | 16 S.W.G. tinned copper wire. (Bulgin.)                            |
| Three type C.H.N. (Raymart.)                                       | Flex. (Bulgin.)  |
| One transformer, type L.F.33. (Bulgin.)                            | Sleeving, grummetts and bakelite tubing. (Bulgin.)                 |
| <b>Insulating Pillars:</b>   | One 120-volt H.T. battery. (Exide.)                                |
| Two $\frac{1}{2}$ in. type S.T. (Raymart.)                         | One L.T. accumulator, type JWK7. (Exide.)                          |
| Four 1 in. type S.S. (Raymart.)                                    | One 9-volt G.B. battery. (Ever Ready or Exide.)                    |
| Two $\frac{1}{2}$ in. type 1029. (Eddystone.)                      | One W.B. Junior Cabinet Loudspeaker.                               |
| <b>Brackets:</b>   | One Pair Ericsson Headphones.                                      |
| Two type EH9. (Bulgin.)  |  |
| One type 1007. (Eddystone.)  |  |
| One type On/off S.P. key switch, S. (Bulgin.)                      |  |
| One extra key for above. (Bulgin.)                                 |  |
| <b>Valveholders:</b>   |  |
| One type V147 ceramic, with soldering connections (4-pin). (Clix.) |  |





# Practical Television

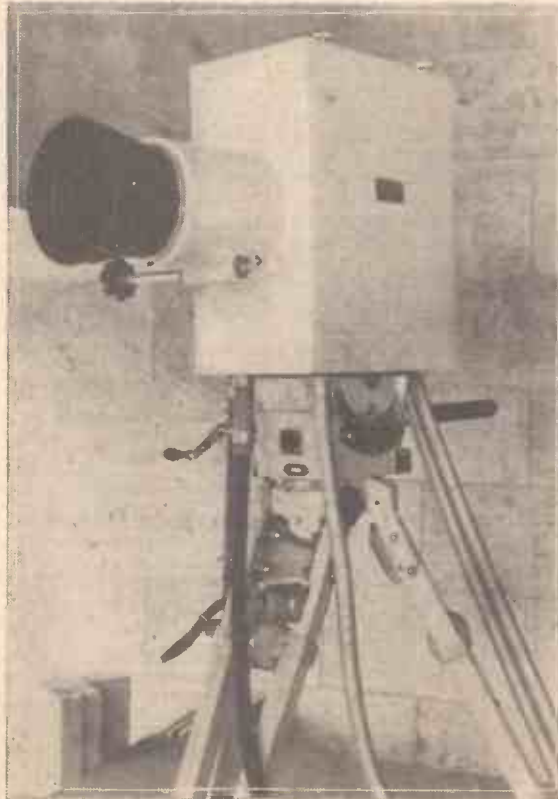
November 19, 1938. Vol. 3. No. 126.

## Film Transmissions

THE transmissions of talking films from Alexandra Palace have at no time reached the high standard achieved by the direct pick-up of interior or exterior scenes. This has been due to a variety of reasons, and among these the two most important are: (1) the presence of an unsaturated emission from the camera mosaic. Any sudden increase in the brightness of the image focused on to the signal plate, which is a common factor with films, tends to cause a temporary fogging owing to the slow dispersion of the locally increased space charge over the surface of the mosaic. Secondly, up to quite recently advantage was taken of the storage camera's "memory" in order to generate a picture signal when using the intermittent motion type film projector. If an image is formed on the mosaic and the electron beam is not allowed to scan it, no picture signal will be produced. If the light is cut off after it has acted momentarily on the mosaic it is found that the electrical charges produced by the light remain and scanning can then be undertaken. This light shut off period enables the interlace scan to be undertaken and the picture is not re-projected until a new film frame has taken its place in the gate of the projector. Although in theory this appears to be a satisfactory scheme, the results in practice have not been as efficient as anticipated. Indeed, on the Continent many companies have abandoned the storage camera for film transmissions and used one of three alternative methods, as was mentioned in these columns recently. In an effort to improve matters the B.B.C. are trying out a Mechau type of film projector. This was used many years ago for film projection in cinemas but was abandoned in this country because of the difficulties associated with its adaptability to sound reproducing systems. With this machine there is no shutter, and the film is made to move continuously over the mosaic so that there is a continuous and uninterrupted moving picture with no dark period. This is brought about by a very ingenious arrangement of rotating and cam-operated mirrors so that the film frame on the screen is really stationary. This continuous motion film projector has part of its mirror system interposed between the light source and the film and part between the film and the final objective lens. It was the same type of projector that was used by Baird in his Long Acre studios when carrying out his low-definition transmissions. It lent itself better to the disc form of scanning than the intermittent type and although more cumbersome in appearance the results were good. Whether the new scheme of the B.B.C. will be instrumental in bringing about a marked improvement in the televised film pictures remains to be seen but there still exists the lack of saturation in emission problem and the resultant fogging effects in the received pictures with half-tone reproduction below standard.

## Television in California

ALTHOUGH little has been heard for some time concerning the activities of the Farnsworth company in America, that they have in no way been marking time is borne out by the series of demonstrations given recently in California. The occasion was the introduction to that state of modern high-definition television on a 441 line picture standard, by the company which by general agreement in America is said to share the television leadership in that Continent with the R.C.A. To give Los Angeles an indication of what is to come when a station for transmitting is erected in that locality, equipment from the San Francisco laboratories was moved and set up in a building which curiously enough was close to where Farnsworth started his original work about twelve years ago and



A typical example of the compact form of the electron camera using an image dissector tube of the Farnsworth type, as referred to in the text.

succeeded in convincing people that electronic, rather than mechanical, television was the logical and most likely form of development. All the present demonstrations were carried out in "short circuit," a length of coaxial cable linking the studio with the television receivers located in another part of the building. This was an expedient adopted because it was felt unnecessary to obtain a special experimental licence for a few weeks' demonstra-

tion. The improved form of Farnsworth camera employed was similar to that shown in the accompanying illustration. It is developed from the original image dissector tube based on the generation of an electron image from an optical image, and its subsequent movement over a small mechanical aperture for dissection into picture signals. A simple tripod support gives easy movement in the studio, while provision is made for panning and focusing to take cognisance of any changes in the artist positioning while enacting the item before the camera. The pictures shown were declared by experts to have reached a very high standard indeed, and seem to have justified the financial interest which Philco have taken in this company in return for patent priorities which it is hoped to exercise when the promised American television service has its debut next year. There is no doubt that this form of electronic scanner, when used in conjunction with a secondary emission multiplier, has proved quite definitely that, at least for film television, it is capable of producing first-class pictures, and further work will be watched with interest.

## Mass Entertainment

ONE very important factor emerges from the recent Royal Photographic Society Festival Dinner which was held at the Dorchester Hotel, and that is, that a mass entertainment through the medium

of television is both thrilling and capable of maintaining interest in a satisfactory way. Apart from the top table where 39 guests were provided with pictures via nine receivers, the remaining 500 diners were served very adequately with 27 sets. The pictures varied from those provided by a 5in. diameter cathode-ray tube, to those furnished on the more elaborate sets housing a 15in. tube. During most of the time that the special B.B.C. cabaret was being watched the lights were lowered, but to enable the guests to appreciate the full contrast range of a modern television picture, the lights were extinguished for the final ten minutes of viewing. In the case of the top table the sets were arranged in pairs, one facing the privileged guests, and the other turned so that the back of the set was almost flush with the table edge. Although operated so close together the various makes and types of sets exhibited but little interference one with the other. With one main feeder cable linked to the distribution amplifier, and pad boxes located at intervals along the cable—one box for each set—the impedance matching and attenuation was so satisfactory that each manufacturer's set was able to operate under conditions simulating very nearly those that would be experienced if fed direct from a single dipole aerial of its own. Due to the careful placing of the sets, no diner found it necessary to move from his or her seat to watch the performance. Quietly and efficiently the engineers responsible for the work carried out their duties, and not one set failed.



# PETO-SCOTT

MANUFACTURERS of  
TRANSMITTING and RECEIVING  
GEAR to H.M. GOVERNMENT

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Experience gained in the design and production of efficient apparatus for various Government departments is, for the vast Peto-Scott Radio clientele, a safeguarding factor, ensuring since the early days an unsurpassed standard of perfection. Furthermore, the benefits of rationalised manufacturing have been passed on to our customers in the form of "economy prices"—not

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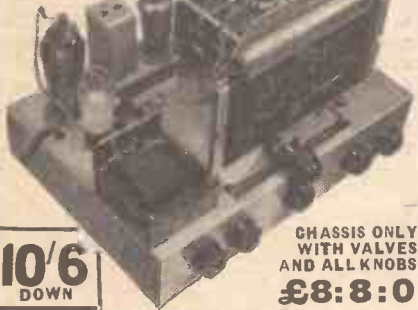
to be confused with misleading so-called bargains offers. Below is a further selection of QUALITY lines for the discriminating purchaser. The Peto-Scott Guarantee of complete satisfaction covers whatever your choice falls upon, a guarantee which has stood the acid test now for almost 20 years.

## PETO-SCOTT SHORT-WAVE COMMUNICATION SETS

### DUAL-PURPOSE 6-VALVE COMMUNICATION SET

GUARANTEED 12 MONTHS

10 to 2,000 METRES



CHASSIS ONLY WITH VALVES AND ALL KNOBS  
**£8:8:0**

10/6 DOWN

Size 15 1/2 in. wide, 11 in. deep, 11 in. high, complete with 6 valves. Fully tested. Terms: 10/6 down and 18 monthly payments of 10/3.

- 4 Wave-ranges—10-25, 22-65, 200-550 and 800-2,000 metres.
- Large illuminated metre - calibrated and station-name dial.
- 3 watts output.
- Beat Frequency Oscillator, A.V.C. on-off switch, RF and AF Gain Controls.
- Phone jack provided.
- Black crackle metal cabinet and high-fidelity speaker.

The Peto-Scott Dual-Purpose Communication type receiver is available alternatively complete with speaker in cabinet or in chassis form. Eminent technical authorities and users state that this inexpensive all-British 6-valve A.C. Superheterodyne receiver, employing the "Wireless World" 4-band tuner-unit, has all of the essential refinements demanded by DX enthusiasts. Complete short-wave communication advantages are provided and in addition a highly sensitive and selective set for medium and long-wave reception.

### COMPLETE RECEIVER

with high-fidelity speaker incorporated. Housed in pleasing black crackle steel cabinet, guaranteed, fully tested, H.P. Terms 12/6 deposit and 18 monthly payments of 13/-. Cash or C.O.D.

10/6 DOWN

### TROPHY 5 A.C. SHORT-WAVER

- 10-550 metres continuous.
- Illuminated and calibrated scale.
- A.V.C. on-off switch.
- Bandspreading with equivalents of 8 ft. scale length.
- Built-in Speaker and Phone Jack.



The TROPHY 5-valve junior communication receiver, as illustrated, is proving most popular among experienced DX operators and enthusiasts in general where a moderately priced and efficient short-waver has been needed for use on A.C. supplies. The wide coverage and improved method of bandspreading tuning are two of the outstanding features which have contributed to the success of the TROPHY 5. Entirely self-contained, guaranteed and ready for immediate use. Terms: 10/9 down and 18 monthly payments of 10/9. Cash or C.O.D. **£9**

### TROPHY 3 Short-Wavers

Highly efficient self-contained short-wavers. Speaker incorporated. Phone jack. Effective wave-range 6.2 (television) to 550 metres. Supplied with tuners for 12-53 metres

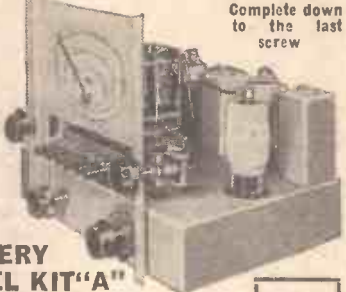
A.C. MODEL	Cash or C.O.D., 26 6s., or 7/8 down and 18 monthly payments of 7/9.	BATTERY MODEL	Cash or C.O.D., 25 15s., or 7/- down and 18 monthly payments of 7/-.
------------	---	---------------	--

N.B.—If coils required for complete coverage, 6.2-550 metres, add 10/9 to cash price or 1/- to deposit and payments.

## F. J. CAMM'S P.B.4 KIT "A" CASH, C.O.D. £5.5.0

or 9/- deposit and 12 monthly payments of 9/.

ORDER NOW YOUR EXACT TO BLUE-PRINT KIT OR ASSEMBLED CHASSIS



Complete down to the last screw

### BATTERY MODEL KIT "A"

Comprising all first specified parts for Mr. Camm's receiver, including Peto-Scott ready-drilled chassis, push-button unit condenser and dial, etc. Varley I.F. transformers, wire, flex, and screws, but less valves, speaker and cabinet. SET OF 4 SPECIFIED VALVES, 36/-, or add 3/- to Kit "A" deposit and monthly payments.

9/- DOWN

**KIT "B"** As for Kit "A," but including set of 4 specified valves. Less cabinet and speaker. Cash or C.O.D., 27:1:9 or yours for 12/- down and 12 monthly payments of 12/-.

**KIT "C"** As for Kit "A," but including valves and specified Peto-Scott valvaint finish consolette cabinet, less speaker. Cash or C.O.D., carriage paid 28:6:0, or yours for 14/3 down and 12 monthly payments of 14/3

### A.C. MODEL

A.C. P.B.4. KIT "A," comprising all parts exclusively specified by Mr. F. J. Camm for the mains model including drilled steel chassis, all-wave tuner, push-button unit, station-name scale, mains transformer, etc., but less valves cabinet and speaker. Cash or C.O.D. 7 gns. or 12/9 down and 12 monthly payments of 12/9.

## Peto-Scott BANDPASS ALL-WAVE S.G.3 KIT

KIT "A" CASH 3/6 C.O.D. 3/6

Or deposit 5/-. and 11 monthly payments of 5/9.

- 4 wave-ranges 16-2,100 metres.
- Amazingly efficient circuit.
- Station-name dial.
- Epicyclic slow-motion tuning.
- Easily assembled.



5/- DOWN

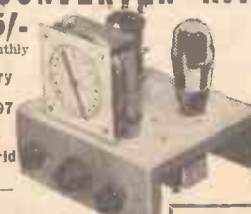
KIT "A" comprises everything needed to build this all-world receiver. Includes ready-drilled steel chassis, 4-band tuning unit, all variable and fixed condensers and resistances, wire, flex, screws and comprehensive instructions, less valves only. 2 matched and tested valves, comprising V.M.H.F. pentode, det. and pentode output, 22/9 or add 2/3 to Kit "A" monthly payments.

## Peto-Scott SHORT WAVE ADAPTOR-CONVERTER KIT

KIT "A" CASH 25/- C.O.D. 25/-

Or 2/6 deposit and 10 monthly payments of 2/4.

- For A.C. or Battery Sets.
- Wave-range 9-97 metres.
- Epicyclic tuning simplifies all-World S.W. reception.
- Complete kit—economy price.



2/6 DOWN

KIT "A" includes absolutely everything for the easy assembly of this up-to-the-minute unit. Complete with ready-drilled chassis, wire, flex and screws, less valve and coils only. Set of 4 low-loss .00016 mfd. tuning 4-pin Coils, covering 8.75 to 97 metres, 8/-, or add 9d. to Kit "A" deposit and payments. VALVE for using as a superhet. unit. Battery type 3/9; Mains type 7/6.

## REPLACE THAT OLD RADIO CHASSIS

### 1939 ALL-WAVE ALL-MAINS 5-VALVE SUPERHET CHASSIS

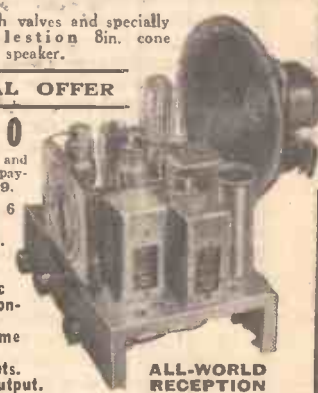
Complete with valves and specially matched Celestion Bin. cone speaker.

### SPECIAL OFFER

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7/6 DOWN

## PETO-SCOTT fully guaranteed 1/2-amp. TRICKLE CHARGER

● For 2-volt charging. ● Metal Rectifier. ● Nothing to wear out or go wrong. ● Saves £25 in battery charging.

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# TelevIEWS

## Picture Size

A GOOD deal of controversy is still taking place on the question of what is the best size picture for viewing purposes in the average type of home. The advent of the very small picture has undoubtedly been brought about by questions of receiver cost, and the degree of its popularity has yet to be established on the score of sales. Viewing distance and picture size are linked up irrevocably, so that for a family of three or four who can arrange themselves comfortably near a small picture, this type of set can give a lot of pleasure. For large audiences, however, there is no doubt that a picture of increased proportions gives much better results. In America there are at the moment practically no commercial television sets on the market, because of the absence of a regular transmission of broadcast service. The manufacturers in that country, therefore, are endeavouring to ascertain the needs of the public insofar as picture size is concerned. A recent investigation among the retailers showed that there was little need for the tiny picture, and the bulk of the requirements ranged from a picture 7ins. wide up to 24ins. wide. The general feeling seemed to indicate that the set should portray a picture in the neighbourhood of a foot wide. There is no doubt that the 15in. tube set is popular, but the designers of the receiver are still up against the problem of the length of the tube which this screen diameter seems to demand. The recent short-length tubes were certainly a step in the right direction, but for direct viewing the cabinet becomes unduly deep, and that is why indirect mirror viewing is so often resorted to with these tubes. Just as in radio there is a market for sets of all sizes from the simple two or three valver up-

wards, so the same situation is likely to rule for some time with television on the score of picture size because of the relative cost. It will be interesting, however, at some later date when the whole industry is a little more stabilised, and sales reach high figures, to carry out a census and so learn what are the tastes of the public in relation to the dimensions of the viewed picture.

## The "Acid Test"

WHEN members of the public have the opportunity of handling commercial sets, and criticising the programme from both the technical and production point of view, the acid test of any commercial or government enterprise begins, and that is an experience still denied to those in America. It is for this reason that any idle boasts emanating from the United States can be treated with a measure of scepticism, for they are given without the experience that has been gained in this country. Perhaps this position will be improved when Zworykin's scheme for long-distance television communication has been tried out thoroughly. The idea is based on the fact that high-frequency carrier waves meet complex atmospheric conditions when being radiated, and with every change that takes place in the ionised layers these waves are altered in their reflected paths. The invention is based on the use of two receiving aerials connected to a single receiver and combined with an automatic device which matches the wavelength to the conditions operative at any moment. This is said to ensure unbroken ultra-short-wave communication between the receiving and transmitting points, even when separated by a distance which normally exceeds the horizon length. If the scheme proves satisfactory under the rigours of a proper service, then many of the local difficulties with which the United States is faced, because of its local configurations, will disappear.

## Projection Screens

A VITAL section of any television equipment designed to operate with a projection form of cathode-ray tube, whether for use as a big screen for halls, or built in a more compact form for home use, is the screen itself on which the picture is reproduced. The events of the last two or three months have brought this factor into great prominence, and an outstanding example of what can be achieved in this direction was furnished by the Fernseh demonstrations at the recent Berlin Exhibition. It was generally agreed by all the visitors that while tube technique had made a material improvement, the success of the big screen apparatus featured by this company was undoubtedly associated with the entirely new form of screen employed. It differed radically from anything hitherto shown, and was an example of a design where all the factors of mass viewing were taken into careful consideration. With a normal screen, for example, the reflection occurs at every angle, and as the watching audience are more or less concentrated in a certain "solid angle," anything outside this is lost. The Fernseh Company therefore took steps to limit the space angle in which reflection occurred; the angle chosen being something of the order of fifty degrees. This was done by sectionalising the screen into small areas so that the actual scanning spot building up the picture covered about ten screen elements. The exact method employed in the construction has not yet been revealed, but it is learned that reflective elements in lenticular form were methodically mounted in a main framework, each being concave in shape. This, as a whole, gave the reflection limits desired, the cut off of light being exceedingly sharp, although the whole ensemble when first seen gave rather a lattice effect. After a period of observation of about five minutes, however, the human eye failed to take cognisance of the formation, and the marked increase in brightness—at least fifteen times—was predominant in a picture having a wealth of detail.

## Short-wave Mailbag

EVERY Tuesday at G.M.T. 22.30, W2XAD, Schenectady (N.Y.), U.S.A., on 15.33 mc/s (19.57 m.), broadcasts a short bulletin of interest to short-wave listeners under the above title.

## Radio Nations' Winter Channel

FROM November 8th, the Prangins (Switzerland), League of Nations transmitter, for its Sunday broadcasts between G.M.T. 00.00-00.45, changed over to 32.1 m. (9.345 mc/s), from 26.31 m. (11.402 mc/s). The transmitter now in operation is HBL.

## From the Borders of Patagonia

CD1190, the 250-watt station at Valdivia (Chile) on 25.21 m. (11.9 mc/s) is on the air nightly with concerts relayed from the capital city, Santiago. Occasionally when tuning into this station's wavelength one may pick up a wobbly carrier-wave on 24.96 m. (1.202 mc/s) which would appear to be the second harmonic of COCO, Havana, of which the basic frequency is 6.01 mc/s (49.92 m.).

## Australian Broadcasts on 25 metres

THE early-morning transmissions from Melbourne (Victoria), heard here from about G.M.T. 20.00, are carried out on 25.25 m. (11.88 mc/s), through the VLR, Lyndhurst station. Other frequencies allotted to this transmitter are 31.32 m.

## Leaves from a Short-wave Log

(9.58 mc/s), and 48.86 m. (6.13 mc/s). A news bulletin is broadcast at G.M.T. 20.50, followed by early morning physical "jerks" executed to the strains of the march "Blaze Away."

## Radio Sucre

A 500-WATT transmitter has been installed at Sucre—also known as Chuquisaca (Republic of Bolivia); it is said to be testing on 30.33 m. (9.89 mc/s) from G.M.T. 16.00-17.00, and from G.M.T. 00.00-03.00. The Spanish language alone is used for programme announcements.

## And Colombia

RADIO emisora Phileo, HJ4ABG, is the call of the 1-kilowatt station at Medellin (Colombia) regularly logged from midnight onwards on 48.85 m. (6.142 mc/s). Reception reports should be addressed to Apartado Postal (Post Box) 239, Medellin (Republic of Colombia, South America). It is an easy matter to confuse this station with HJ3ABX, Bogota on 49 m. (6.122

mc/s) or with HJ4ABE, also in Medellin, to be found on 49.2 m. (6.097 mc/s).

## New Short-wave Stations for Poland

TWO transmitters, SP19, on 19.84 m. (15.12 mc/s), 20 kW., and SP25, on 25.65 m. (11.695 mc/s) at Warsaw, have been recently used by *Polskie Radjo* for long-distance broadcasts.

## Allo Lobito!

ACCORDING to French wireless fans, CR6AA, Lobito, hitherto heard on 41.8 m. (7.177 mc/s), is now on 23.06 m. (13.01 mc/s). The address is: Estação Radiodifusora CR6AA, Caixa Postal (Post Box) 103, Lobito, Angola (Portuguese West Africa).

## Luncheon Programmes from Japan

BROADCASTS of musical programmes from Tokio are occasionally picked up between G.M.T. 13.00-14.30 on 29.21 m. (10.27 mc/s). The transmitter is JZO, Nazaki-Tokio (Japan).

## Abyssinian Concerts for Italy

THROUGH the Italian broadcasting network it is frequently possible to listen to Native programmes from Addis Ababa. These are usually given towards G.M.T. 20.00 and are relayed from IUC, Addis Ababa, working on 25.09m. (11.955 mc/s). Tests have also been carried out by this station on 31.49 m. (9.525 mc/s).



## RADIO IN THE LAND OF THE MIDNIGHT SUN

**F**EW of us realise what great changes have been wrought in those vast and trackless spaces of the Arctic Circle, where man is winning a long fought battle against the elements of nature with the aid of Radio.

Dickson Island is the base station from which the Arctic is served with radio reports; it is also the chief meteorological centre in the Polar regions, serves as a naval base for the Northern Sea Route, and passes the forecasts from all parts of the sea on to ships and aeroplanes.

There are six short-wave transmitters on Dickson Island, two with universal reach for long-distance telephony and telegraphy, and four for the daily communication with sub-divisional stations. The Weather Bureau at Dickson collects the reports of all district centres, and produces synoptic forecasts based on these many observations. These forecasts are radioed to the Air Ministry in London, and to all the principal Meteorological Bureaux of the world.

### Relaxation

Friendly rivalry and enthusiasm is shown amongst these Arctic radio operators when they are allowed to take part in their one relaxation from their duties, viz., "Radio Chess." Sometimes the two sides are as far as 1,600 miles apart. A move a day is the rule. That allows all the players at each station to reach their strategic decisions after careful considerations. Sometimes the radio operators play personally against each other. In this case they take the chess board to their desk, earphones over their heads, the right hand over the morse key, the left among the chessmen, and thus a very pleasant evening is passed.

### Radio Assists the Icebreaker

Ice-breaking is now greatly simplified, and when an icebreaker leaves the bay to cut its way through "the white enemy of shipping," it dispatches a radio message to the shore base for an observation aeroplane. Within a few minutes the ice-watch pilot is circling over the bridge of the icebreaker for his instructions; he then flies off to survey hundreds of square miles, rising high above the sea. The observer in the plane watches the slowly drifting fields and floes below. He then draws a plan of their arrangement, and advises the icebreaker by radio of his findings, and on his return journey flies slowly over the icebreaker and drops a parcel on its deck containing the maps he has made. And so with the combination of plane and radio, the captain is able to plan an immediate attack on the ice and is saved weeks of endless drifting among the ice fields.

### "Spotting" the Seals

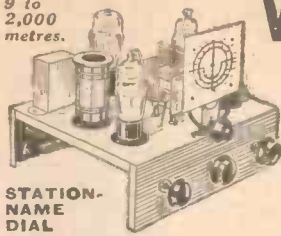
The seal fishermen have also to thank the radio for improvements in their working conditions. Until quite recently they had to spend days and weeks in endless, and sometimes hopeless, search for their catch. Now they wait for their reports, which are radioed to them by aeroplanes which spend their time "spotting" the wily seal herds as they bask on some far off ice-floe.

This "twentieth-century pioneering" in the Arctic is a wonderful thing, which will be watched with great interest by all, and much admiration must be accorded those whose zeal and untiring energies have made these results possible.

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9 to 2,000 metres.



STATION-NAME DIAL

COMPLETE KIT.—Comprising above kit with set of 6 Coils. Cash or C.O.D. 42/6 or 3/- down and 12 monthly payments of 4/-. VALVES GIVEN FREE.

**WORLD S.G.4** a more ambitious model with Pre H.F. S.G., Det., S.G. audio and Pentode output. All components supplied extra to 3-valve version including station name dial. 4 valves given FREE. Cash or C.O.D. 42/- or 2/6 down and 12 monthly payments of 3/9. Required coils special offer, set of 10 covering 9-2000 metres, list value, 27/-. Bargain 17/6. Or add 1/6 to deposit and payments.

## WORLD S.G.3 SECURE THIS NEW N.T.S. BEST SELLER BARGAIN 29/6

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**1939 S.G.4-VALVE MODEL.**—Complete matched and tested Kit with 3 coils and 4 FREE Valves, comprising S.G., Det., L.F. and Pentode output. List value £4:19:6. Bargain, 49/6, or 3/9 down and 12 monthly payments of 4/3.

**1939 3-VALVE PENTODE OUTPUT MODEL.**—Complete matched and tested Kit, with coils for 12-94 metres and FREE VALVES, comprising Det., L.F. and Pentode. List value £4:7:6. Bargain, 42/-, or 2/6 down and 12 monthly payments of 3/9.

**1-VALVE.—SPECIAL OFFER.**—Complete kit of parts for World-wide reception on 12-94 metres, including coils. FREE high efficiency valve and pair of light-weight Headphones. List value, 53/-. Bargain, 27/6, or 2/6 down and 11 monthly payments of 2/6.

## AMAZING BATTERY 3-VALVE S.G. BARGAINS



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Two brand new types with cabinet and M/C Speaker. These wonderful S.G. 3-valve pentode-output battery receivers give a marvellous performance with a wide choice of British and Continental stations. Wave-range 200-2,000 metres. Screened coils. Metro-calibrated scale. Amazing volume. Low H.T. consumption. Concert-grand moving-coil speaker fitted. Less batteries. Choose your model and order early.

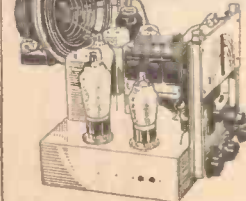
**UPRIGHT MODEL**  
Housed in the beautiful walnut finish cabinet on left, size 19 1/2" h. 14" w. 10" d.  
Guaranteed fully tested.  
**4/-** Yours for 4/- down and 10 monthly DOWN payments of 4/3.

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**BARGAIN 39/6 CASH**

**TYPE "H" MODEL**  
Handsome horizontal walnut finish cabinet, size 18" x 10" x 10". Exactly the same wonderful performance. Guaranteed fully tested.  
**4/-** Yours for 4/- down and 10 monthly payments of 4/3. DOWN



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- All waves 12-2,000 metres.
- Station-name dial.
- A.V.C. and tone control.
- 3 Watts output.
- Fully guaranteed.

Complete with 5 valves, knobs and escutcheon, lens speaker. Yours for 5/- down, balance in 12 monthly payments of 6/3. To tour the world is simple

on this amazingly efficient 6-stage all-wave superb. Wonderful selectivity and quality reproduction. P.U. sockets. No-trouble wave-change and gram switching. Chassis size, 11 1/2 ins. wide, 8 1/2 ins. high, 6 1/2 ins. deep. Ready to play; for A.C. mains only, 200/250 v. With specially matched moving-coil speaker. Cash or C.O.D. £6:5:0, or 5/- down and 12 monthly payments of 7:11.

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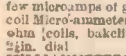
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**DIX-MIPANTA VEST POCKET**

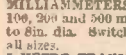
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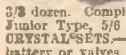
**MILLIAMMETERS.**—Moving coil. 5, 10, 25, 50, 100, 200 and 500 m.a., in various sizes, from 2 1/2 in. to 8 in. dia. Switchboard Meters for all purposes, all sizes.



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# Impressions on the Wax

## A REVIEW OF THE LATEST GRAMOPHONE RECORDS

**A** NEW recording of Schubert's Great C Major Symphony has been recorded this month and, in spite of its length, it is one of the favourite symphonies. It has been programmed as No. 7 and No. 9, as some doubt exists as to its precise chronological order. The usual practice now is to call it the Great C Major Symphony, to distinguish it from an earlier and shorter work. Bruno Walter, who, until March this year, was conductor of the Vienna Philharmonic Orchestra, is world famous as a Schubert exponent, and it is fitting that this lovely work should be played by the London Symphony Orchestra under his direction on *H.M.V. DB 3607-12*.

The Dresden State Orchestra introduce a novelty into this country in the Overture to Reznick's Comic Opera, "Donna Diana." It is one of the most popular Operas in Central Europe. On the second side of this record is Strauss's popular waltz, "A Thousand and One Nights." This orchestra is noted for its horn players, reputed to be the finest team in the world—*H.M.V. BD 4560*. Another Johann Strauss waltz, "Wine, Woman and Song" takes both sides of a 12 in. record and is played by the Boston Promenade Orchestra on *H.M.V. C 3036*. It is a big orchestra with some 90 players, and they show how effective this concert waltz can be. They also contribute a 10 in. record of two of Sousa's most popular marches—"Stars and Stripes for Ever" and "Washington Post"—*H.M.V. B8817*.

### Light Music

**T**HREE shows doing big business in London are represented. "The Lambeth Walk" from "Me and My Girl," can now be heard as it is done at the Victoria Palace, by Teddie St. Denis, Stanley Lupino and full company. If you have seen the show you may be listening to your own "Oi!" when you hear the record, since it was made at an actual performance—*H.M.V. BD 596*. "These Foolish Things" has settled down to full houses at the London Palladium, the orchestra of which has recorded a fine selection on *H.M.V. C 3032*; and two of the best individual numbers—"When you Dream About Hawaii" and "Love Makes the World Go Round" are sung by Gerry Fitzgerald, one of the original artists of the show—*H.M.V. D 8802*. One of the most amusing revues in town is "Nine Sharp," at the Little Theatre. There are many who may like to revive their memories with this record by the original artists, including Eric Anderson, Hermione Baddeley, George Benson, Kathryn Hamill, Gordon Little, Cyril Ritchard, Betty Ann Davies, and the full company. There are skits on the B.B.C. and a delightful sketch of a bridge four making their calls—*H.M.V. C 3026*.

Given the opportunity, most people love to join in the chorus. Here is a new idea. Favourite choruses compered by Tommy Handley. This is a really jolly record and the informal singing of the

choruses is an irresistible invitation to join in and "Let Yourself Go." The title of the record is "Let's all join in the Chorus" with Tommy Handley and his Pals—*H.M.V. C 3034*.

Many people consider the Comedy Harmonists to be the best close harmony team since the Revellers. This month "Heinie's Sing-Song" and a Tyrolean Woodcutters' song give them some fine opportunities—*H.M.V. B 8814*.

"She Was, She Was, She Was" and "Just for Fun" are two numbers recorded by Max Miller on *H.M.V. BD 957*. Betty Driver, the young singer who is making a big reputation, now sings "What goes on here in my Heart," from the film "Give me a Sailor," coupled with "The Red Maple Leaves" on *H.M.V. BD 605*, and the Henderson Twins, the popular singers who were featured in Jack Hylton's stage show, have recorded "Little Lady Make Believe" and "Meet the Beat of my Heart"—*H.M.V. BD 591*. Richard Hayward makes his first appearance on the H.M.V. list with "Down in Glasslough" and "Johnny I Hardly Knew Ye" on *H.M.V. BD 592*, both of which are traditional Irish ballads.

### Decca

**T**WO interesting records this month are Decca F 6831-2, both of which feature "Singers on Parade." On the first is Sam Costa singing "I'm Gonna Lock My Heart"; Paula Green singing "You couldn't be Cuter"; Helen Clare, "I'm sorry I said I Loved You"; George Barclay, "The Sweetest Song in the World"; Pat Hyde, "A-tisket A-tisket"; and Al Bowly, "Little Lady Make Believe." The artists on the other record are Marjorie Stedeford singing "Love Walked In"; Jack Plant, "Time and Time Again"; Dinah Miller, "It's D'Lovely"; Dan Donovan, "The Red Maple Leaves"; Alice Mann, "Says My Heart"; and finally Jack Cooper sings "Music, Maestro, Please."

Two organ solos are supplied by Reginald Foort with "I Love You Truly" and "Oh! Promise Me" on Decca F 6827. Lew Stoné and his Band have two records this month: "Alexander's Rag-time Band" from the film of the same name, coupled with "Everyone Must have a Sweetheart" on Decca F 6811, and "I'm Gonna Lock My Heart" paired with a novelty number "The Frog on the Water Lily" on Decca F 6812.

Frank Lutter and Company have made three records—Decca F 6823-5, of cowboy songs with guitar, violin and bass accompaniment. They are called "Home on the Range" and include most of the popular hill-billy songs.

**PATENTS AND TRADE MARKS.** Any of our readers requiring information and advice respecting Patents, Trade Marks or Designs, should apply to Messrs. Rayner and Co., Patent Agents, of Bank Chambers, 29, Southampton Buildings, London, W.C.2, who will give free advice to readers mentioning this paper.



# LETTERS FROM READERS

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

## A Universal Superhet!

SIR,—Like your correspondents, Messrs. Houghton and Brett, I would welcome a design for such a set as they describe. Actually, I have not come across a design for a battery set to make the most in the way of quality of the 30/40 mA discharge from the H.T. unit which I purchased a year or two back with that object in view. Failing that, I would scrap the unit if the alternative your correspondents mention could be made available.—P. WOODWARD (Leyton).

## A Car-Radio Hint

SIR,—I have read the Car-Radio hint in the October 22nd issue of PRACTICAL AND AMATEUR WIRELESS and agree with the idea of increasing the charging rate when the radio is in use. However, I don't agree with the method of inserting the resistance; surely the field circuit is the proper place to put it. On cars with a half-charge position of the switch the resistance is placed in the field, the field current is

much lower than that flowing in the main circuit, therefore a less hefty resistance would be required.

In the article it states that it is a simple matter to insert some insulating washers under the earthed brushholder, but what about riveted brushholders? The majority of cars that radio is likely to be fitted on use the C.V.C. method of charging which takes care of the extra load imposed by the radio.—G. GARSIDE (King's Lynn).

## Station TG9AA

SIR,—I am glad to notice the continuance of DX reports in PRACTICAL AND AMATEUR WIRELESS. Also, I notice the interest TG9AA caused on 20 metres, when he was coming in well. I did not log him, but logged TG5 on August 10th at 6 a.m. R8, Q5, working W9GGS, Denver, Col., who sent me his QSL. Also, I have just received a QSL from TG5. He gives his QRA as Apartado postal No. 12, Ciudad de Guatemala, C.A. (Op. John Guillen), working on 14,050 kc/s, 300 watts. I am puzzled

to know why he is TG5 only, with no letter after the 5.

I recently came across a note in an old wireless book which stated that International Reply Coupons were not exchangeable in Brazil, Nicaragua, and Guatemala, and wondered if this still holds good.—N. HOBURN (Wisbech).

## More Prizewinners' Thanks

SIR,—Many thanks for the W.B. Stentorian speaker I received a few days ago. It arrived in perfect condition and is working splendidly on a 3ft. square baffle which, in conjunction with another, I use for occasional light P.A. work.

I am nineteen years of age and all I know about wireless has been gleaned from the pages of your paper which I've been taking for about three years. I might tell you I got the shock of my life when I came across my name in the list of prizewinners, but the speaker was just what I needed.

Every success to your paper.—H. C. JONES (Ruthin, N. Wales).

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

*Copyright in all drawings, photographs and articles published in PRACTICAL AND AMATEUR WIRELESS is specifically reserved throughout the countries signatory to the Berne Convention and the U.S.A. Reproductions or imitations of any of these are therefore expressly forbidden.*

For that little extra sensitivity—  
and that little extra top response—  
that slight extra 'forwardness'—  
that slight extra smoothness—  
which add so MUCH to your set's value,

FOLLOW MR. CAMM'S EXAMPLE  
AND USE A



# Stentorian

The Universal Permanent Magnet Speaker

WHITELEY ELECTRICAL RADIO CO., LTD., MANSFIELD, NOTTS



	Chassis	Cabinet Models
Midget	17/6	—
Baby	23/6	29/6
Cadet	—	*39/6
Junior	32/6	*49/6
Senior	42/0	*63/0
Regent	—	*105/0
Emperor	—	*147/0

\* These models have constant impedance (3 winding) volume control, with push button for Long Arm Remote Control.





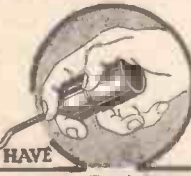
Said Hubby to  
Wife, "Look,  
Liza,  
Shall I build us a  
nice television?"  
Said Liza (she's  
bright!),  
"If you get some  
**FLUXITE**  
For our present set,  
that would be  
wiser!"

See that **FLUXITE** is always by you—in the house—garage—workshop—wherever speedy soldering is needed. Used for 30 years in government works and by leading engineers and manufacturers. Of Ironmongers—in tins, 4d., 8d., 1/4 and 2/8.  
Ask to see the **FLUXITE SMALL-SPACE SOLDERING SET**—compact but substantial—complete with full instructions, 1/6.  
Write for Free Book on the art of "soft" soldering and ask for Leaflet on **CASE-HARDENING STEEL and TEMPERING TOOLS with FLUXITE.**

**TO CYCLISTS!** Your wheels will NOT keep round and true, unless the spokes are tied with fine wire at the crossings **AND SOLDERED.** This makes a much stronger wheel. It's simple—with **FLUXITE**—but **IMPORTANT.**

**THE FLUXITE GUN**

is always ready to put Fluxite on the soldering job instantly. A little pressure places the right quantity on the right spot and one charging lasts for ages. Price 1/6.



ALL MECHANICS WILL HAVE

**FLUXITE**

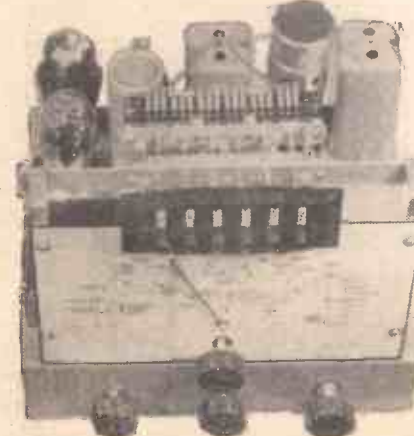
IT SIMPLIFIES ALL SOLDERING

FLUXITE LTD. (Dept. W.P.) DRAGON WORKS, BERMONDSEY STREET, S.E.1.

**ARMSTRONG 7-STAGE**

All-Wave Radiogram Chassis incorporating Push-button and Manual Tuning, supplied complete with 8in. Matched Moving-Coil Speaker, model A.W. 3PB. Price £7 18s. 6d. complete. Call at our Showrooms and hear this latest chassis.

Specification: New method of Push-button Tuning incorporating genuine Silver Mica Condensers to obviate station drift, principal Medium Wave Stations and Luxembourg can be obtained by the Push-button method. All latest refinements, including large Tuning Scale calibrated in degrees and station-names on all wavebands. Short-wave covers all principal bands from 15.9 to 50 metres. Volume and Tone Control work on Gramophone as well as Radio. Pick-up Leads may be permanently connected. Moving-coil speaker made especially for chassis.



Packing and Carriage Free. 7 Days Trial. Carriage Paid. Armstrong 12 months guarantee.

The above is only one of many attractive models and full details will be sent on application. 8 New Models, send for Catalogue.

**ARMSTRONG MANUFACTURING Co.**  
100, ST. PANCRAS WAY (Formerly King's Road),  
CAMDEN TOWN, N.W.1  
Phone: GULLIVER 3105.

**Practical and Amateur Wireless BLUEPRINT SERVICE**

PRACTICAL WIRELESS

	Date of Issue.	No. of Blueprint
<b>CRYSTAL SETS.</b>		
Blueprints, 6d. each.		
1937 Crystal Receiver	9.1.37	PW71
The "Junior" Crystal Set	27.8.38	PW94
<b>STRAIGHT SETS. Battery Operated.</b>		
One-valve: Blueprints, 1s. each.		
All-wave Unipen (Pentode)		PW31A
Beginner's One-valver	19.2.38	PW85
The "Pyramid" One-valver (HF Pen)	27.8.38	PW93
Two-valve: Blueprints, 1s. each.		
Four-range Super Mag Two (D, Pen)		PW36B
The Signal Two (D & LF)	24.9.33	PW70
Three-valve: Blueprints, 1s. each.		
The Long-range Express Three (SG, D, Pen)	24.4.87	PW2
Selectone Battery Three (D, 2 LF (Trans))		PW10
Sixty Shilling Three (D, 2 LF (RC & Trans))		PW34A
Leader Three (SG, D, Pow)	22.5.37	PW35
Summit Three (HF Pen, D, Pen)		PW37
All Pentode Three (HF Pen, D (Pen) Pen)	20.5.37	PW30
Hall-Mark Three (SG, D, Pow)	12.6.37	PW41
Hall-Mark Cadet (D, LF, Pen (RC))	16.3.35	PW48
F. J. Camm's Silver Souvenir (HF Pen, D (Pen), Pen) (All-wave Three)	13.4.35	PW49
Genet Midget (D, 2LF (Trans))	June '35	PM1
Cameo Midget Three (D, 2 LF (Trans))	8.6.35	PW51
1936 Sonotone Three-Four (HF Pen, HF Pen, Westector, Pen) Battery All-Wave Three (D, 2 LF (RC))		PW53
The Monitor (HF Pen, D, Pen)		PW55
The Tutor Three (HF Pen, D, Pen)	21.3.36	PW61
The Centaur Three (SG, D, P)	14.8.37	PW64
F. J. Camm's Record All-Wave Three (HF Pen, D, Pen)	31.10.38	PW69
The "Colt" All-Wave Three (D, 2 LF (RC & Trans))	5.12.36	PW72
The "Rapide" Straight 3 (D, 2 LF (RC & Trans))	4.12.37	PW82
F. J. Camm's Oracle All-Wave Three (HF, Det, Pen)	28.8.37	PW78
1938 "Triband" All-wave Three (HF Pen, D, Pen)	22.1.38	PW84
F. J. Camm's "Sprite" Three (HF Pen, D, Tet)	26.3.33	PW87
The "Hurricane" All-Wave Three (SG, D (Pen), Pen)	30.4.39	PW89
F. J. Camm's "Push-Button" Three (HF Pen, D (Pen), Tet)	3.9.38	PW92
Four-valve: Blueprints, 1s. each.		
Sonotone Four (SG, D, LF, P)	1.5.37	PW4
Fury Four (2 SG, D, Pen)	8.5.37	PW11
Delta Universal Four (SG, D, LF, Cl. B)		PW17
Nucleon Class B Four (SG, D, (SG), LF, Cl. B)	6.1.34	PW34B
Fury Four Super (SG, SG, D, Pen) Battery Hall-Mark 4 (HF Pen, D, Push-Pull)		PW46
F. J. Camm's "Limit" All-Wave Four (HF Pen, D, LF, P)	26.9.36	PW67
All-Wave "Corona" 4 (HF Pen, D, LF, Pow)	9.10.37	PW79
"Acme" All-Wave 4 (HF Pen, D (Pen), LF, Cl. B)	12.2.38	PW83
The "Admiral" Four (HF Pen, HF Pen, D, Pen (RC))	3.9.38	PW90
<b>Mains Operated.</b>		
A.C. Twin (D (Pen), Pen)		PW18
A.C.-D.C. Two (SG, Pow)		PW31
Selectone A.C. Radiogram Two (D, Pow)		PW19
Three-valve: Blueprints, 1s. each.		
Double-Diode-Triode Three (HF Pen, DDT, Pen)		PW23
D.C. Ace (SG, D, Pen)		PW25
A.C. Three (SG, D, Pen)		PW29
A.C. Leader (HF Pen, D, Pow)		PW35C
D.C. Premier (HF Pen, D, Pen)	31.3.34	PW35B
Ubique (HF Pen, D (Pen), Pen)	28.7.34	PW36A
Armada Mains Three (HF Pen, D, Pen)		PW33
F. J. Camm's A.C. All-Wave Silver Souvenir Three (HF Pen, D, Pen) "All-Wave" A.C. Three (D, 2 LF (RC))	11.5.35	PW50
A.C. 1936 Sonotone (HF Pen, HF Pen, Westector, Pen)		PW56
Mains Record All-Wave 3 (HF Pen, D, Pen)	5.12.36	PW70
All-World Ace (HF Pen, D, Pen)	28.8.37	PW80
Four-valve: Blueprints, 1s. each.		
A.C. Fury Four (SG, SG, D, Pen)		PW20
A.C. Fury Four Super (SG, SG, D, Pen)		PW34D
A.C. Hall-Mark (HF Pen, D, Push-Pull)	24.7.37	PW45
Universal Hall-Mark (HF Pen, D, Push Pull)	0.2.35	PW47
A.C. All-Wave Corona Four	6.11.37	PW81

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

Issues of Practical Wireless .. 4d. Post Paid.  
Amateur Wireless .. 4d. ..  
Practical Mechanics .. 7d. ..  
Wireless Magazine .. 1/3 ..

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

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

**SUPERHETS.**

Battery Sets: Blueprints, 1s. each.		
£5 Superhet (Three-valve)	5.6.37	PW40
F. J. Camm's 2-valve Superhet	13.7.35	PW52
F. J. Camm's £4 Superhet		PW58
F. J. Camm's "Vitesse" All-Waver (5 valver)	27.2.37	PW75
<b>Mains Sets: Blueprints, 1s. each.</b>		
A.C. £5 Superhet (Three-valve)		PW43
D.C. £5 Superhet (Three-valve)	1.12.34	PW42
Universal £5 Superhet (Three-valve)		PW44
F. J. Camm's A.C. £4 Superhet 4	31.7.37	PW56
F. J. Camm's Universal £4 Superhet 4		PW66
"Qualitone" Universal Four	16.1.37	PW73

**SHORT-WAVE SETS**

One-valve: Blueprint, 1s.		
Simple S.W. One-valver	9.4.38	PW88
Two-valve: Blueprints, 1s. each.		
Midget Short-wave Two (D, Pen)		PW39A
The "Fleet" Short-wave Two (D (HF Pen), Pen)	27.8.38	PW91
Three-valve: Blueprints, 1s. each.		
Experimenter's Short-wave Three (SG, D, Pow)	30.7.38	PW30A
The Prefect 3 (D, 2 LF (RC and Trans))	7.8.37	PW63
The Band-Spread S.W. Three (HF Pen, D (Pen), Pen)	1.10.33	PW98

**PORTABLES**

Three-valve: Blueprints, 1s. each.		
F. J. Camm's ELF Three-valve Portable (HF Pen, D, Pen)		PW65
Parvo Flyweight Midget Portable (SG, D, Pen)	19.0.37	PW77
Four-valve: Blueprint, 1s.		
"Imp" Portable 4 (D, LF, LF, Pen)	19.3.38	PW80

**MISCELLANEOUS**

S.W. Converter-Adapter (1 valve)		PW18A
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**AMATEUR WIRELESS AND WIRELESS MAGAZINE CRYSTAL SETS**

Blueprints, 6d. each.		
Four-station Crystal Set	28.7.38	AW427
1934 Crystal Set		AW444
150-mile Crystal Set		AW450

**STRAIGHT SETS. Battery Operated.**

One-valve: Blueprints, 1s. each.		
B.B.C. Special One-Valver		AW397
Twenty-station Loudspeaker One-valver (Class B)		AW449
Two-valve: Blueprints, 1s. each.		
Melody Ranger Two (D, Trans)		AW398
Full-volume Two (SG det, Pen)		AW392
Lucerne Minor (D, Pen)		AW426
A Modern Two-valver		WM409
Three-valve: Blueprints, 1s. each.		
Class B Three (D, Trans, Class B)		AW380
New Britain's Favourite Three (D, Trans, Class B)	15.7.33	AW301
Home-built Coil Three (SG, D, Trans)		AW401
Fan and Family Three (D, Trans, Class B)	25.11.33	AW410
£5 5s. S.G.3 (SG, D, Trans)	2.12.33	AW412
Lucerne Ranger (SG, D, Trans)		AW422
£5 5s. Three: De Luxe Version (SG, D, Trans)	19.5.34	AW435
Lucerne Straight Three (D, RC, Trans)		AW437
"Wireless League" Three (HF Pen, D, Pen)	3.11.34	AW451
Transportable Three (SG, D, Pen)		WM271
Simple tune Three (SG D, Pen)	June '33	WM327
Economy-Pentode Three (SG, D, Pen)	Oct. '33	WM337
"W.M." 1934 Standard Three (SG, D, Pen)		WM351
£3 3s. Three (SG, D, Trans)	Mar. '34	WM354
1035 £6 6s. Battery Three (SG, D, Pen)		WM371
PTP Three (Pen, D, Pen)		WM380
Certainty Three (SG, D, Pen)		WM393
Minitube Three (SG, D, Trans)	Oct. '35	WM396
All-Wave Winning Three (SG, D, Pen)		WM400



# RADIO CLUBS & SOCIETIES

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

## EXETER AND DISTRICT WIRELESS SOCIETY

At the meeting of this society, held on Monday, October 31st, a lecture was given by Mr. V. Searle, M.Sc., of the Physics Department of the University College of the South West. His talk was entitled "Pioneers of Radio," and he dealt mainly with the theorists and their ideas, which led to practical application. Mr. Searle went on to show how Maxwell found that the velocity of electrical radiation was the same as that of light, and foretold the existence of new types of radiation.

The lecturer mentioned all the work which had been done by various men connected with research, especially Professor Pearson, Hertz, and Sir Oliver Lodge. He concluded with Marconi's great contribution, and the birth of the thermionic valve, which owed its inception to Sir Ambrose Fleming.

All those interested should get in touch with the secretary, Mr. W. J. Ching, 9, Sivel Place, Heavitree, Exeter.



## Replies in Brief

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

**G. W. (New Malden).** We cannot recommend any of our receivers to incorporate the parts, and perhaps the suppliers would be the best people to advise you regarding the proposed modifications. We have not described an aerial system of the type you need and we suggest you get into touch with the makers of such a system explaining your specific requirements.

**L. J. A. D. (Lincoln).** The "Outline of Wireless" and the "Wireless Constructor's Encyclopaedia" would be the best for your purpose.

**J. R. B. (Loughborough).** Write to one of the Training Colleges whose adverts. will be found from time to time in our pages.

**C. S. J. (Limerick).** We cannot give constructional data in the form of a reply. The recent article on the subject should be of assistance to you.

**J. O'C. (Kilbarney).** Aerial winding should be separate, but same wire may be used. Full winding details will be found in our book, "Coils, Chokes and Transformers."

**J. H. B. (Coppall).** We regret that we have no details now available in respect of the coils mentioned.

**H. E. M. (Birmingham).** We regret that the issue is no longer available, and the blueprint has been withdrawn.

**G. L. J. W. (Rhayader).** We are unable to supply any further details. If you cannot yet follow the theoretical diagrams we advise you to obtain further knowledge before attempting to build the transmitter.

**R. W. (Luton).** We advise an A.C./D.C. or Universal receiver, which would then be usable on the mains when changed over. We have several of these from which a suitable model may be selected.

**M. L. B. (Wellington College).** We can supply blueprints, and details for modernising. The set is available in A.C. or battery types.

**H. P. (Bournemouth).** We regret that we cannot supply the details required, and can only suggest you communicate with the makers.

**J. H. (Brixton).** We cannot suggest alternatives and advise you to get into touch with the makers.

**G. W. (E.4).** You do not state what type of coil and thus we cannot recommend a blueprint. So far as we can trace no coil of this particular type has been used in any of our receivers.

**R. N. M. (East Barnet).** We cannot supply a blueprint or details, but hope to publish something on the lines indicated in the near future.

**A. E. H. (Birkenhead).** We regret that we have no blueprints or designs of a set using the coils mentioned. You would probably find that these are not suitable for modern conditions.

**L. D. (Eltham).** The set was described in a paper which is no longer on the market and we have no details or blueprints.

**W. J. P. (Wakefield).** The blueprint has now been withdrawn and no further details are available.

**D. W. M. (Halton).** The parts are all obtainable from Messrs. Peto-Scott.

## RADIO, PHYSICAL AND TELEVISION SOCIETY

ON Friday, November 4th, Mr. C. W. Edmans delivered a lecture in which he dealt mainly with the Testing of Transformers. To attempt to deal with such a complex subject from a non-mathematical viewpoint is neither possible nor desirable; nevertheless, by the liberal use of vector diagrams the lecturer was successful in stripping the mathematical bog of many of its terrors.

After giving a brief outline of the methods of testing mass-produced transformers for use in radio receivers, the lecturer went on to describe the final factory tests and heat runs to which expensive transformers, made by firms of repute, are usually subjected.

The lecture concluded with a few words on some of the difficulties met with by the transformer designer. When designing expensive transformers the designer has to bear in mind not only the design from a purely electrical point of view, but from a financial side as well.

Meetings of the society are held every Friday evening during the winter months at 8.15 p.m. at the society's headquarters at 72a, North End Road, West Kensington, London, W.14. New members are welcome any Friday, without formality, or further particulars may be obtained from the hon. secretary, at the above address.

## EASTBOURNE AND DISTRICT RADIO SOCIETY

At the meeting held by this society last Tuesday, Mr. G. Parr, of the Edison Swan Electric Co., Ltd., gave a lantern lecture and demonstration on "The Cathode-Ray Tube and Its Applications."

He explained the many uses the tube could be put to, such as: The purity and measurement of A.C. waveforms, phase relationship between two waves, measurement of modulation of transmitters, aligning band-pass coils (it would be well to mention that this is the most accurate way of doing such a process), and measurement of heart beats, which require an ampli-

fication of a million to get a decent deflection on a seven-inch tube; measurement of the strength of muscles needs even more amplification.

He also described time-base circuits, and pointed out certain snags. Television was also dealt with, and by use of the lantern, picture faults were pointed out. Hon. sec., T. G. R. Dowsett, 48, Grove Road, Eastbourne, Sussex.

## BRADFORD SHORT-WAVE CLUB

THE above club commenced activities on the 160-metre band on Sunday, October 30th, when the first meeting of the Sunday session was held. These meetings are to be held fortnightly from that date, commencing at 10.30 a.m. Meetings are still to continue every Friday evening, when a Morse class will be in progress, in addition to the interesting lectures that are already on the syllabus. Morse is taken from 20.00 to 20.30 G.M.T., and the lectures commence at 20.30.

Anyone hearing the club's transmissions (G3NN) should send their reports to the secretary, who will verify them. Further particulars of activities may also be obtained from him, and anyone interested should write to Mr. G. Walker (2AWR), 33, Napier Road, Thornbury, Bradford, Yorks.

## NOW READY!

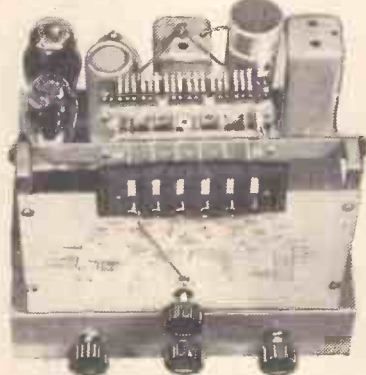
### WORKSHOP CALCULATIONS, TABLES AND FORMULÆ

By F. J. CAMM

3/6, by post 3/10, from George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

# WHATEVER YOU NEED IN RADIO

—HEAR FOR YOURSELF—  
WHAT MODERN RADIO CAN DO.  
WE ARE GIVING  
DAILY DEMONSTRATIONS  
OF THE NEW  
ARMSTRONG CHASSIS  
from 10 a.m. to 5 p.m.  
It's well worth a visit—no obligation to purchase.



## ARMSTRONG PRESS-BUTTON

Model AW3PB, 7-stage ALL-WAVE Mains Chassis. Manual and instantaneous Press-Button Tuning. Short waves from 15.9 to 50 m. Complete with 8in. Matched M.C. Speaker.  
CASH PRICE £7.18.6 or 12/6 with order and 12 monthly payments of 13/4.

## NEW ARMSTRONG 9-valve ALL-WAVE CHASSIS

Model AW93PF. Pre-Amplifier and 8 Watts Resistance Capacity Triode Push-pull Output.  
CASH PRICE £10.10.0 or 21/- with order and 12 monthly payments of 17/-.



THE equivalent of thirteen testing instruments in one. Measures Current, Voltage and Resistance with ease and accuracy. In handsome case with leads, interchangeable crocodile clips and testing prods.  
Universal A.C./D.C. Model (25 ranges) Cash Price £5.10.0 or 10/- with order and 11 monthly payments of 10/-.

—whether it be Chassis, Complete Set or Radiogram, Components, Speakers, Valves, etc.—we offer you the widest possible choice, and the Best and Lowest Easy Terms available. Prompt Delivery and Satisfaction Guaranteed. Let US quote and send you Full Specifications, Price Lists and Terms.



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# NOTES FROM THE TRADE

## New Cossor Receiver

THE accompanying illustration shows the new Cossor Model 45. This is of the "straight" type, incorporating a variable- $\mu$  H.F. pentode, H.F. pentode-detector, and a high-slope output valve. The reproduction is of excellent quality and is provided by an 8in. energised moving-coil speaker carefully matched to the output stage. The cabinet is of handsome design and the controls are simple. The range covered is the normal medium and long wavebands from 200 to 560, and from 880 to 2,100 metres. There are separate switches for on/off and wave-changing, and selectivity and volume. The receiver is available for D.C. or A.C. mains, and the price is 7 guineas. Hire-purchase terms of 14s. 6d. deposit and repayments of 12s. 8d. or 9s. are available.

## Skyrod Improvements

MESSRS. BELLING & LEE announce the withdrawal of two of the Skyrod models, and there are thus now four alternative models available. In addition, a number of improvements have been made to these models, and amongst these may be mentioned the use of cadmium, alloy plated, in place of galvanising. A gutter insulator has been added, and a diecast assembly is utilised for the transformer. Further details, and prices, may be obtained on application to the company at Cambridge Arterial Road, Enfield, Middlesex.

## Philips Transmitter for Burma

THE Burmese Government has ordered a 10 kW short-wave transmitter for installation at Rangoon. This transmitter has a range of 30 to 90 metres, and is of the same type as the four Philips transmitters already in use in British India. A studio installation for Burma will also be supplied by Philips.

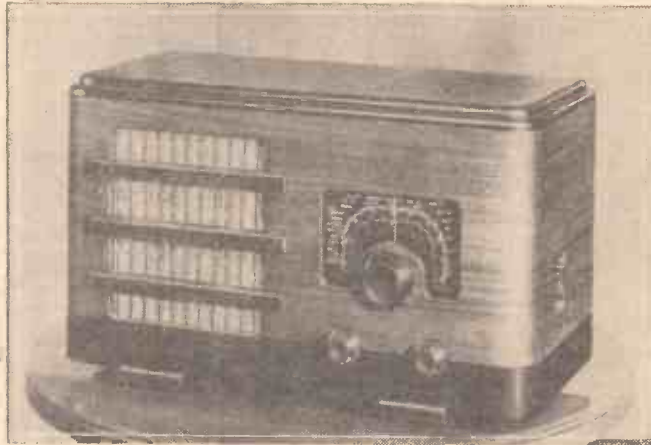
## New Philips Push-button Receiver

A THREE-BAND receiver of the push-button type is announced by Philips Radio, and this is of the four-valve type with automatic tuning by means of the special linear action condenser. There is a range of six medium and long-wave stations, variable at will by the user. Two versions are supplied, one for A.C. mains at

10½ guineas, and one for A.C. or D.C. at 11½ guineas. The latter is fitted with the Philips D.C./A.C. converter unit. The receivers are fitted with a new distinctive circular dial of new design, and delayed A.V.C., pick-up and extension speaker sockets, and similar refinements are included.

## Cossor Electric Clocks

THE clocks now available in the Cossor range include models E.C.250, E.C.426 and E.C.550. The former is a walnut-finished model with white dial and black figures, and measures 7½in. by 6in. by 2½in. deep. The second model is of walnut with chromium-plated base and bezel. A white dial with black figures is also fitted, and it is of the same size as the other model. The last is a handsome timepiece of modern design carried out in a beautiful figured walnut finish with ebonised base. A chromium-plated bezel, hands and figures, with dial in self walnut, completes it. The prices of these are 25s., 42s. 6d. and 55s. respectively. All models are silent in use, irreversible and are tested for twelve days before being sent out of the factory. They are, of course, all of the synchronous type, designed for use on frequency-controlled A.C. mains, 200/250 volts, 50 cycles.



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# QUERIES and ENQUIRIES

## Using a Monitor

"With regard to the transmitter you mentioned in your paper recently, I should be very pleased if you will tell me whether it will be possible to make a kind of receiving set to pick up the noises the transmitter turns out. If that is the case, will you please explain how to make the set, and also how to wire to the transmitter?"—N. T. (Holmfirth).

To receive the signals from a transmitter, you need a device known as a monitor. This is, in effect, a very simple receiver, not unlike a crystal set. In its simplest form it will consist of a tuned circuit (condenser and coil) with a metal rectifier and headphones in series across the circuit. It is coupled to the transmitter. Alternatively, you can use a simple one-valve set. Full explanations will be given in the series of articles now running.

## Reaction Condenser Connections

"In a recent issue you showed a short-wave circuit in which the reaction condenser is shown with the fixed vanes to earth. On another page the vanes are shown joined to the coil. I would like to know which is correct, please."—E. W. (Guernsey, C.I.).

If the circuit conditions permit, it is advisable to have the moving vanes of the reaction condenser at earth potential. Sometimes, however, the reaction winding is internally joined to the grid winding and thus the condenser cannot be placed in the desired position, and this point must be borne in mind when mounting a reaction condenser on an earthed metal panel. The ultimate effect is the same wherever the condenser is placed, but hand-capacity effects are avoided when the condenser spindle is earthed.

## Short-wave Performance

"Re the Hurricane 3. You have published 'logs' of a great number of stations received by some amateurs. How do they get and differentiate between the stations? I have received Bound Brook on 16.5 metres on a yard of aerial, but cannot get the imposing number sometimes stated. There seem to be thousands of Morse stations, however. On my dial I can turn at least 1 inch and receive no station, and then in 1½ degrees there will be five strong broadcast stations. Why are they so thick and not to be separated?"—W. H. L. (Penzance).

PROBABLY the lists you have seen are of code stations, and not telephony. You should remember that many long-distance amateur transmissions are made on C.W. and many readers can read this and are thus able to log the stations. Another interesting point is that the set in question utilises a .0005-mfd. tuning condenser, and this naturally makes tuning very sharp; it will be found that on the short-wave bands there are gaps reserved for commercial and other uses, the amateurs and broadcast bands being placed here and there. The hour at which you listen is also of great importance and you must remember not only the difference in time but the effects of daylight and darkness on the short-wave radiations. A band-spread condenser in parallel with the tuning condenser is of great help in separating stations.

## R.A.F., C.W.R.

"Would you kindly tell me the qualifications necessary for the Civilian Air Operator's certificate, also if my nationality (Irish) will affect me if I intend going in for the examination?"—F. P. (Dublin).

WE would refer you to our issue dated September 17th last wherein will be found complete details of the Civilian Wireless Reserve for the R.A.F. Application for further details should be made to the Under-Secretary of State, Air Ministry (Signals (C.W.R.)), Kingsway, London, W.C.2.

### RULES

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

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

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

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

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

## Extension Speaker Control

"I have a standard Moving-coil speaker which I am using as an extension speaker with a push-pull circuit. I wish to attach a volume control to this speaker to avoid going into the room where the set is, every time I wish to increase or reduce volume, but I am rather at a loss how to connect. I have tried a volume control on each of the three terminals but have been unsuccessful."—S. H. C. (Ilford).

THE only satisfactory way of varying the volume in your case is to connect a control across the speech coil. This is the small winding seen at the apex of the cone. A low-resistance is usually required, but before making any alteration or modification to the speaker we advise you to get into touch with the makers who will give you the correct value of the resistance needed.

## Dials

"I made some experimental units some time ago, but find that I require a reliable form of indicator, the standard condenser dials being too large. I have used pointer knobs and tried to engrave the panels but the result is not very neat. Is there any firm which sells dials which would be suitable for my purpose?"—F. R. (Hove).

THERE are several black dials in the Bulgin range which might be of use, engraved in most cases for the 300 degree movement of a volume control. Alternatively, in the Eddystone range you will find some more precision type dials, some of which are provided with indicators, and perhaps these will be more suitable. We advise you to obtain catalogues from both of the firms in order to make an appropriate selection.

## S.W. Sets

"I have lately become very interested in short-wave reception, and I wonder if you would tell me where I could obtain a book containing circuit diagrams and instructions for building 2- or 3-valve S.W. receivers. If such a book is available perhaps you could tell me where I may obtain it and how much it costs."—E. P. T. (N.8).

CIRCUITS and wiring diagrams of various short-wave sets will be found in our book "Television and Short-wave Handbook." In addition, we would refer you to the various constructional details which appear in our Short-wave Section each week, and to the Blueprints which are available in respect of receivers of this type.

## Cabinet Design

"I have noted several interesting features in the design of modern radio cabinets, and I should like your advice regarding design. Does the inclusion of batteries inside a self-contained set spoil quality? Is it better to build a separate cabinet, and if so, should it be lined, and so on? Perhaps you could give me some ideas to work on in this connection."—H. E. F. (N.W.10).

IF you are using a small battery set, you will probably gain very little by using a separate speaker cabinet with all the essential refinements. On the other hand, a mains receiver, or a high-class battery receiver designed for quality, would justify the building of a separate speaker cabinet with a reasonable baffle area, and to avoid boom and to obtain best results, some form of lining or anti-resonance device would be desirable. It thus boils down to the fact that the design of the speaker cabinet is dependent upon the receiver, and nothing will be gained unless the receiver is capable of delivering really good quality.

## Teleciné

"I should be glad if you would settle an argument regarding the method used to televise ordinary cinema film. Is this passed through a standard projector and then televised, or is it used in a separate machine. The argument concerns the speed of progression in view of the absence of flicker which is now noted in the transmissions."—R. E. F. (Margate).

THE teleciné transmitter is a special piece of apparatus, and the pictures are not first projected and then televised. In the teleciné projector the film is passed at a uniform rate, and is not moved in jerks as in a standard cinema projector. Scanning is effected by a perforated disc. Details of the apparatus have been given in our pages and will also be found in our "Television and Short-wave Handbook."

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



# LATEST PATENT NEWS

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes, price 2s. each.

## VALVE CIRCUITS FOR WIRELESS RECEPTION.—Cole, Ltd., E. K., and Brooke, H. A. No. 490244.

In a radio receiver comprising an oscillator-mixer circuit to which automatic volume control is applied, frequency drift

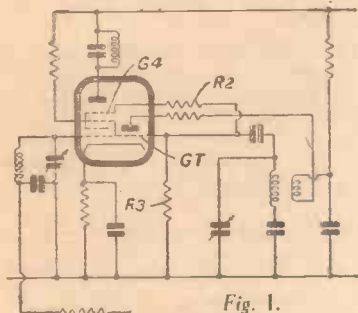


Fig. 1.

with change in signal strength is reduced by connecting a resistance R2 between the screen grid G4 and the oscillator grid GT. An increase of signal strength causes grids G4, GT to become more positive with the result that the impedance in shunt with the oscillator tuned circuit is reduced, thus compensating for the decrease in capacity which is otherwise produced. Resistance R3 is connected to earth or chassis instead of directly to the cathode and is of the order of 0.5 megohm. The oscillator-mixer may comprise a triode-hexode as shown, or two separate valves. (Fig. 1).

## WIRELESS RECEIVING APPARATUS.—Johnson Laboratories, Inc. No. 490224.

A wave band tuner comprises a short-wave coil 17 having an adjustable iron core 19, a medium-wave coil 25 having an iron core 26, and positioned with its axis at right angles to that of the short-wave coil, and a long-wave coil 28 having a trimmer condenser 29 associated therewith, the coils being mounted within a screening can 1. The short and medium-wave coils may have coupled windings to form transformers. Trimmer condensers 16 are provided for the coils 17, 25. A wave-change switch 4 is mounted at the base of the can 1. A number of such units may be mounted together and the switches coupled.

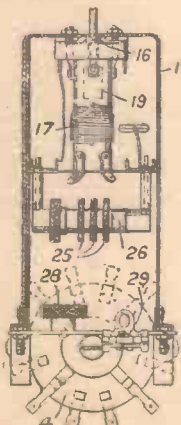


Fig. 2.

## TRANSFORMERS; WIRELESS RECEIVING APPARATUS.—Roberts, E. H. No. 489054.

A tuned H.F. transformer comprises primary and secondary windings spaced apart and associated with a movable iron core for varying the selectivity. In the form shown in Fig. 3, the primary and secondary windings P1, S1 are mounted at the ends of an insulating tube and are connected in series with auxiliary coupling windings P2, S2, with which is associated the movable core 13. Movement of the core increases the inductance of one circuit and reduces the inductance of the other circuit so that the operating frequency

remains constant, but the band width is varied. Stationary cores 11, 12 may be associated with the main windings. In a modification, a movable short-circuited ring may be associated with the coils P2, S2 and movable with the core 13. In a further modification, a further auxiliary winding may be associated with the secondary coil S2 to reduce the coupling. Fig. 4 shows a further modification in which separately adjustable cores 11, 12 associated with the primary and secondary windings P1, S1 are mounted in a tube 17 for simultaneous adjustment. A constructional form is made with a divided primary, secondary and coupling coils P1, S1, P2 and S2 being mounted on an insulating tube 10 supported in a screening can 28. The core 13 is mounted on a spring-urged plunger 24 adapted to be moved by a cam.

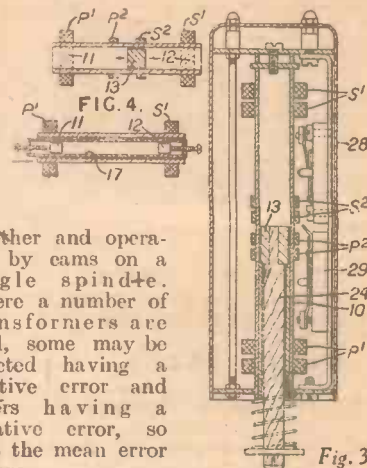


Fig. 3.

Preset condensers 79 are also mounted within the can 28. The Specification states that a number of these may be mounted

together and operated by cams on a single spindle. Where a number of transformers are used, some may be selected having a positive error and others having a negative error, so that the mean error is zero.

## NEW PATENTS

These particulars of New Patents of interest to readers have been selected from the Official Journal of Patents, and are published by permission of the Controller of H.M. Stationery Office. The Official Journal of Patents can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. weekly (annual subscription £2 10s.).

### Latest Patent Applications.

- 30559.—Chamberlain, M. W.—Programme indicator for radio sets. October 22.
- 30850.—Lorenz Akt.—Ges.—Radio transmitting system for producing a glide path for guiding aircraft. October 25.
- 30859.—Murphy Radio, Ltd., and Balean, J. H.—Tuning of super-heterodyne radio receivers. October 25.
- 30834.—Radioakt.—Ges. D. S. Loewe.—Coupling circuit arrangement for ultra-short waves. October 25.
- 30835.—Radioakt.—Ges. D. S. Loewe.—Coupling circuit arrangement for ultra-short waves. (Cognate with 30834.) October 25.

- 30488.—Scharf Nacht. Ges. fur Radio- und Phonotele, Geb.—Pick-up for electric sound-reproducing apparatus. October 21.
- 30732.—Wood, F.—Reception of pictures by television. October 24.

### Specifications Published.

- 494019.—Radio Corporation of America.—Recording and reproducing of sound.
- 494254.—Fernseh Akt.—Ges.—Television and like receivers.
- 494024.—Cole, Ltd., E. K., and Falkus, A. E.—Tone correction in low-frequency thermionic amplifiers of radio receivers.
- 494026.—General Electric Co., Ltd., Peters, W. H.; Hunter, S. G.; and Chubb, A. A.—Automatic tuning systems for wireless receiving apparatus. (Cognate Application, 14070/37.)
- 494201.—Kolb, O. K.—Apparatus for the photo-electric reproduction of sound films.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at the uniform price of 1s. each.

## INCREASING SIGNAL RANGE

IT sometimes happens that when survey and reception tests are undertaken in some localities with a view to fitting up a television receiver in a prospective purchaser's home, the signal strength is below that necessary to operate the set efficiently. Some receivers have been known to work with a signal input of only 50 micro-volts, but freedom from all possible interference is then essential. As a general rule, when the signal value as measured is one milli-volt then picture results can be assumed to be satisfactory, although some sets are better if the figure exceeds this. The use of directional aerials is often quite sufficient to provide that additional signal to interference ratio which is essential if the set is to work without having the sensitivity,

gain or contrast controls advanced so far that the quality of the picture is ruined. When interference is the main stumbling block then a unit can be added between the aerial and the set, and this has the property of materially 'cutting down the magnitude of these annoying light splashes which spread across the screen, but as a rule the detail of the final picture is reduced in consequence. Yet another method employed for increasing the reception range of a set is to fit up a pre-amplifier unit. This generally comprises a single stage of video-frequency amplification using a radio-frequency pentode valve with a high mutual conductance. It is not a question of dealing with power but merely one of stepping up the voltage value of the signal as applied to the input terminals of the vision set. This latter method is not always satisfactory unless the unit has been designed by the actual set makers, for questions of power supply, matching impedances, and so on, have a marked bearing on the final results observed.



**Miscellaneous Advertisements**

Advertisements are accepted for these columns at the rate of 3d. per word. Words in black face and/or capitals are charged double this rate (minimum charge 3/- per paragraph). Display lines are charged at 6/- per line. All advertisements must be prepaid. All communications should be addressed to the Advertisement Manager, "Practical and Amateur Wireless," Tower House, Southampton Street, Strand, London, W.C.2.

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Holborn 4631.

**HEADPHONES**, crystals, crystal sets, microphones, etc. List with diagrams free.—Post Radio, 2, Copenhagen Street, London, N.1.

**SOUTHERN RADIO'S** Wireless Bargains, guaranteed and post paid; Garrard radiogram units, 42/-; Telsen Midget iron-core coils, W349, 3/6; dual range coils, 2/6; with aerial series condenser W76, 3/3; triple-gang superhet W476, 14/6; triple bandpass W477, 14/6; twin-gang W478, 9/-; Telsen A.C./D.C. multimeters, 5-range, 8/6; Sunbeam 4-valve A.C./D.C. superhet receiver, complete with valves and moving-coil speaker, 50/-; brand new sealed cartons.

**22/6** 5-band Pentode 3-valve, All-wave Battery Kits, 10-2,000 metres, worldwide reception, works speaker or phones. Complete kit with wiring instructions, in sealed cartons, 22/6, with valves 32/6. American type valves, 6/-; parcels of useful components, assorted, value 21/-, 5/- per parcel; thousands more bargains.—Southern Radio, 46, Lisle Street, London, W.C.1. Gerrard 6653.

**BANKRUPT BARGAINS**.—List free. Good stock of 1938 receivers, all brand new, at keen prices. Replacement valves, components, repairs. State requirements.—Butlin, 6, Stanford Avenue, Brighton. Preston 4030.

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**TROLITUL S.W. CONDENSERS** 15 mmf., 1/6; 25 mmf., 1/9; 40 mmf., 1/9; 100 mmf., 2/-; 100 mmf., 2/3; 250 mmf., 2/6.

**SHORT-WAVE COILS**, 4- and 6-pin types, 13-26, 22-47, 41-94, 78-170 metres, 1/9 each with circuit. Special set of S.W. Coils, 14-150 metres, 4/- set, with circuit. Premier 3-band S.W. coil, 11-25, 19-43, 38-86 metres: Suitable any type circuit, 2/6.

**COIL FORMERS**, 4- or 6-pin low-loss, 1/- each. **MOVING COIL SPEAKERS**.—Magnavox Sin., P.M. Speaker, with Transformer, 10/6. Rola 8" P.M., 15/-, 10" P.M., 19/11.

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S.P. 351. 350-350 v. 150 m/A. 4 v. 1-2 a., 4 v. 2-3 a., 4 v. 4 a., all C.T., 13/-.

S.P. 352. 350-350 v. 150 m/A. 5 v. 2 a., 6.3 v. 2 a., 6.3 v. 2 a., all C.T., 13/6.

The above can be supplied fitted with Panel and Terminals, at 1/6 extra.

S.P. 500. 500-500 v. 150 m/A., 15/-.

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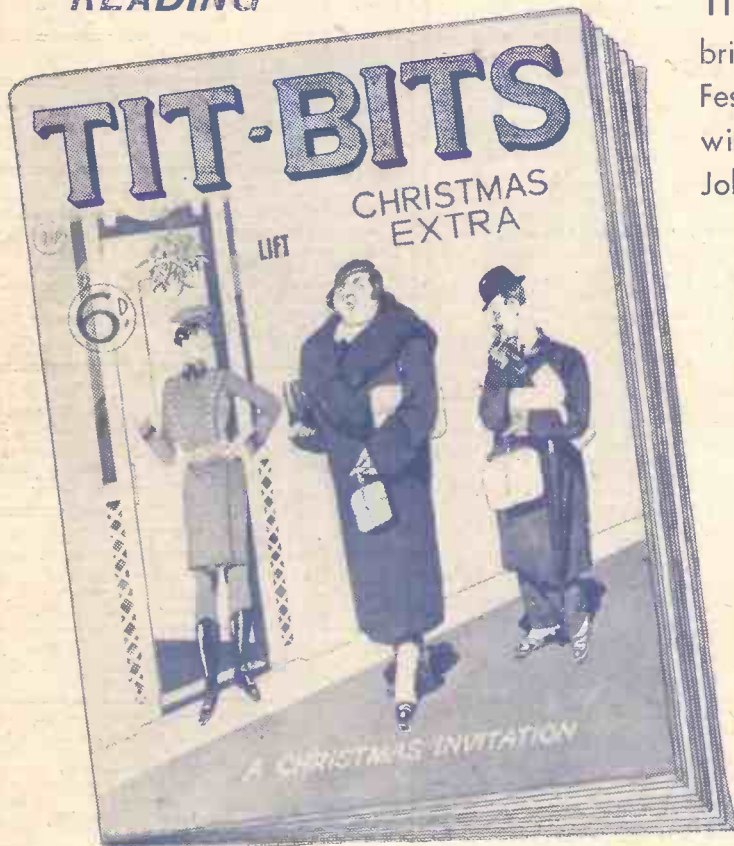
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