DETECTOR DEVELOPMENTS

Practical Wireless

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ROUND the WORLD of WIRELESS

Still Forging Ahead

The number of receiving licences in force from the Ministry of Propaganda, at the end of July, 1933, was 8,371,000 owing to an increase of 289,400 during that month. The sixth million mark should be reached very soon, and the Radio Exhibition in August, no doubt, will give us a good start towards the seventh million. Great Britain is "well away" at the top of the list of European broadcasting systems.

National Broadcast of a German Trial

In one of the Berlin Law Courts the Ministry of Propaganda, similar to the custom prevailing in Russia, has installed microphones in order that the proceedings may be recorded and later, at a more convenient hour, broadcast through the transmitters.

Tuning by Light

According to the New York Times, Paul MacGahan, an engineer of the Westinghouse Electric and Manufacturing Company of America, has invented a "shadow" meter which greatly facilitates the accurate tuning of a wireless receiver. The gadget consists of a small rectangle of transparent material in the front of the cabinet, over which a shadow travels, as the station is tuned in. At the outset the darkened line is a broad one which gradually narrows as the set is tuned close to the desired frequency. The meter itself is formed by a small aluminium vane which is mounted on a moving coil and in front of which a small shutter has been secured which masks the rays cast by a small lamp. In its normal position, namely, between stations, the shutter blocks out the light rays and thus provides a wide shadow. As the condenser dial is turned and the set tuned, the small vane revolves until at the moment sharp tuning has been reached; the shutter is almost parallel to the rays of the lamp thus casting the narrowest shadow or hair-line on the meter dial.

Teaching Americans the Technique of Speaking

At Georgetown University, Washington (D.C.), special classes have been formed for training students in the technique of speaking before the microphone. In this way, it is believed, public speakers may be trained, as for radio talks slovenliness in speech must be completely avoided.

Linking Up Swiss Radio

The Swiss broadcasting system, with the recent addition of Monte Ceneri, now permits the interlinking of Berne, Stuttgart and Berlin. The station provides the possibility of carrying a series of similar relays during the season.

German Interval Signals

Although, for the majority of its broadcasts, Nürnberg relies on the mother station, Munich, for its programmes, the two studios have different interval signals. Nürnberg has adopted a five-note phrase from The Mastersingers, and Munich a short theme from Wagner's Parsifal. Both are given in the form of bells.

Tuning in the Brewery!

Several of the Milwaukee and St. Louis breweries have installed wireless transmitters at Headquarters for the purpose of direct communication with their motor lorries. In this manner, cars fitted with receivers can receive immediate instructions regarding the delivery of beer. In some instances, these motors possess apparatus allowing them to remain in constant touch with the brewery.

Radio Tessin's Interval Signal

The Monte Ceneri transmitter now testing temporarily on 1,145 m., as an interval signal has adopted the chimes of the bells of the Campane di Pazzalino, an old church in its immediate neighborhood.

Through Strasbourg to Verdun

The Strasbourg studio is widening its sphere of action and promises during the summer a series of interesting relays of celebrations taking place at Metz and also at Verdun. Unfortunately, France, generally, is badly supplied with cables suitable for the transmission of music, and until special pupinized lines have been laid, overhead cables must be used for these relays.
French High-power Station

Work has already been started on the 120-kilowatt PTT transmitter to be installed at Thouie, some 40 miles to the North of Nantes, and it is expected that the station will be working towards the end of the year. If the French papers are to be believed, the wavelengths available in the new Lucerne Plan for France will not permit the inclusion of special channels for the privately-owned transmitters, and on this assumption, with the bringing into operation of Thouie, such stations as Radio Normandie (Écamps), Radio Lyons, etc., may be compelled to close down. It is further reported that the sum of two million francs has been voted for the reconstruction of the Pontoise Poste Colonial short-wave transmitter, and that the power is to be increased from 15 to 30 kilowatts.

Belgian Railway Radio

The great success obtained by the installation of a wireless receiver and loudspeakers in one of the Belgian expresses has induced the authorities to consider a similar equipment of a large number of trains running on the Arlon-Brussels-Ostende route, and between Liège-Charleroy-Mons and Liège-Bastogne-Liers, where wireless services will also be supplied with head-phones for the use of travellers.

Jamming the Russians

Apparently Soviet propaganda broadcasts can now be intercepted and decoded by German listeners, as on evenings when special transmissions are given for their benefit, the Nazi authorities jam the wavelengths used by Moscow and Leningrad. French radio fans complain that with the increase of the London allotted, the French transmitters of special interest to German political matters, the broadcasts are also subject to interference. If this is the case, all the heterodyning on the broadcast band is not necessarily accidental.

Spain's High-power Station

The original plan for the reorganization of the Spanish broadcasting system is making progress, inasmuch as the government has officially stated that the sum of four million pesetas has been earmarked for the construction of a 100 kilowatt transmitter at Madrid; it will, however, be entirely under State control. Economic conditions may prevent the installation of big stations at Barcelona, Valencia, and San Sebastian, but a promise has been made to increase their power to 20 kilowatts.

Radio Toulouse

Although on various occasions it has been stated that the French State had definitely refused to authorize the working of the new St. Agnan high-power transmitter, it is now rumoured in Paris that the Minister of Posts and Telegraphs has unofficially declared that a permit may be granted to the new station within the next few weeks.

French Broadcasting Bill

Notwithstanding considerable opposition the French Government has succeeded in passing the new bill concerning radio licence fees and taxes on valves, which is to provide an income for the transmitters to whom authority to broadcast wireless programmes is granted. The French listener, who so far has received such entertainments without payment, must now pay a fee of roughly 8s. (at par) per annum for a valve set and the equivalent of 2s. 6d. for a crystal receiver. In institutions to listen to lectures and talks provided by the State studios, public schools will not be required to pay these taxes.

Lucerne Wave Plan

Whatever decisions are taken at the Conference in respect of the new allocation of broadcasting channels, it is hardly likely that the actual plan will be brought into force before January, 1934. Listeners, generally, in most continental countries will be given six months' notice before the date on which their stations change over to the allotted wavelengths. In the meantime, there is no doubt that considerable experimenting, after broadcasting hours, will be carried out by individual transmitters, but it is evident that the actual "general post" must take place on one and the same date if chaos in the ether is to be avoided.

Holland's 570,000 Listeners

According to recent statistics there were 280,010 owners of wireless apparatus in Holland in April, 1933, and a further 291,628 subscribers to the radio distribution network. The proportion of listeners to population is high, working out at roughly 7 per cent. No registration is in force in Holland, and figures relating to the number of wireless enthusiasts are based on the membership of broadcasting associations; therefore estimated that Holland must possess at least another hundred thousand or more "free lances."

Switzerland and the Lucerne Plan

Although definite wavelengths have not yet been allotted, there is a likelihood that some alteration will be made in the channels allocated to the Swiss transmitters; however, it will probably work on about 539 metres, and Sottini will take over the frequency now used by that station. On the other hand, although Monte Ceneri has carried out tests on 1,145 metres, there is every possibility that it may have to work on the lower part of the broadcast band.

Vienna Retains Its Position

Little change is expected in the wavelength of the new Bisamberg transmitter; it is probable that it may be told to transmit on 615 m. as against 518.1 m., to which, up to the present, it has been tuned.

School of Accountancy: Change of Address

We are informed that the School of Accountancy has removed its headquarters for England and Wales to Bush House, London, W.C.2, which is one of the most modern office buildings in Europe and, in its new headquarters, the school has installed a highly efficient organization, which must prove of great advantage to its many students at home and abroad.

H.M.V. Move

As from June 1st, the new address of the Gramophone Co., Ltd., is 98-108, Clerkenwell Road, London, E.C.1.
INVENTING, it is true, is an art, and any new development of fundamental importance, based on a good and sound new idea, is what we call an "invention." Yet, important as it is, the good idea is only the initial step, and sometimes more spirit and work is involved in turning an invention into practice, and adapting it to the technical requirements, than in the initial inventive idea.

So, after having found the principle of the new iron cored coils satisfactory further work meanwhile has been done to adapt the new principle to the practical requirements and to utilize the chances it offers to the utmost possible extent.

Before describing the latest improvements thus achieved in Ferrocart coils, the fundamental considerations which induced me to create the new coils may briefly be outlined.

Physical Considerations
From a physical standpoint it is a very simple fact that the dimensions of a coil can be considerably reduced by winding it on a magnetic core, while the efficiency is increased simultaneously by the core. Fig. 2 will demonstrate this. The air coil on the left (Fig. 1), although being large, has a very weak magnetic field, and a great deal of the lines of force are strayed out. By introducing an iron core (coil on the left) the lines of force are concentrated and intensified; therefore, much less turns of wire are required to obtain the same amount of inductance. By reducing the length of wire required, the ohmic resistance of the coil, of course, is greatly reduced, and, due to the concentration of the magnetic field and avoiding of leakage field, any screening cover may be arranged very closely to the coil, and no additional losses will be produced in it by the leakage field.

Practical Difficulties
Accordingly, you might think it a very simple matter to make a small and highly efficient high-frequency coil by simply winding it on a magnetic core. Practically, however, it is not possible to do so; on the contrary, a simple test will show that the losses of a H.F. coil are advanced enormously by introducing a piece of iron into its interior space. This is because very considerable eddy current losses are induced in a solid core (Fig. 3). To prevent these eddy current losses, the core of low-frequency transformers and chokes is built up of a plurality of thin sheet iron plates with intermediate insulating layers (see Fig. 4). However, as I ascertained by tests in my laboratory, even this method cannot be applied in case of high frequency, for the eddy currents are increasing with the square of the frequency, and so they are one million times higher at a frequency of 1,000 cycles than at a frequency of 1,000 cycles. Therefore, tried to build up the core of insulated iron powder as per Fig. 5, but as it is very difficult to safely insulate the particles from each other and to prevent capacitive coupling between the particles, no definite success could be obtained even by this method.

A New Idea
Having found out that neither the finest lamination nor subdivision into pulverous material is sufficient alone, I tried to combine both methods, arranging very small
insulated magnetic particles in very thin layers separated from each other by intermediate insulating layers. Already the first tests on this line proved this method to be very effective, and after further improvements as regards insulating methods, size of particles, etc., the Ferrocart in its present form resulted, the structure of which is shown by Fig. 6.

**Coil Development**

It is one thing to make a new invention, and another to make it practically applicable. So, having developed the suitable magnetic material, the matter was not finished, as considerable work still remained to be done, consisting in creating coils of suitable construction of the new material.

Figs. 8 to 10 shows the progress made along this line in the last months, and the great progress of the new coil types as compared with the first toroid coil will be obvious. Special attention has been devoted to convenient construction so as to make the adjusting and fitting as simple as possible, and to create a compact self-contained inductance element. Fig. 8 is a toroid coil of obsolete type. It is difficult to wind, and matching has to be effected by inclining the two halves against each other, putting the coil into a box and filling up the box with a filling mass to solidify the whole. Subsequent matching of the screened coils fitted in the receiver cannot be realized with air coils, though this would be done, consisting in creating coils of suitable construction of the new material.

**Fig. 6.** A combination of the two methods, arranging a mixture of iron particles and insulating material in very thin layers on an insulating material.

**Fig. 7.** The small local eddy currents forming in the compound mass due to insufficient insulation and capacitative coupling are locked up by the intermediate insulating layers.

**Fig. 8.** The first type of coils with Ferrocart core. The coils of this kind are inconvenient to be wound and matched, and although by far superior to air coils they are still relatively clumsy. Subsequent matching is not possible as they must be made steble by putting them into the screening box and filling up the box by a filling mass.

**Fig. 9.** A pot coil. The wire coil (C) is completely enclosed in Ferrocart material (F). By handling the centre screw (S) the Ferrocart cover (FC) is approached to the core (F) and the airgap (a) is varied accordingly by pressing together the rubber ring (r). The inductance easily can be matched after the coil is fitted in the receiver, which is a further important advantage of the new coils over air coils and the old Ferrocart coils.

**Fig. 10.** A shell coil which is very useful from a practical point of view. The thimble gives a comparison of the size. With the latest construction of Ferrocart coils, on the contrary, this ideal method can easily be applied, and I consider this a very appreciable additional advantage of the new coils over air coils and the old Ferrocart coils.

**Fig. 11.** An inductance element consisting of a shell type core (a), the wire coil (b), the magnet bridge (c), the transparent casing of insulating material (d), and the transparent cover of insulating material (e). The complete element is shown at (f).
Making an All-Wave Receiver

In this Article the author tells you how to make a tuner for long, medium, and short waves, and also how to make a "universal" H.F. Choke.

A second short-wave tuning range could have been added, but it was considered that the extra complications involved would not be worth while in view of the fact that nearly all S.W. broadcasting takes place on wavelengths below 50 metres.

By pulling out the knob of the three-point switch marked S1, the two larger windings are short-circuited and the set tunes to the short-waves. When S1 is pushed in, the single-pole switch S2 gives long waves (knob pushed in) and medium waves (pulled out).

Reaction
The reaction circuit is unusual and interesting, since two separate windings are joined in series "through" a 0.0002 mfd. variable condenser. Thus, when the tuner is set to short-waves, one reaction winding is short-circuited by switch S1, and the moving plates of the reaction condenser are connected to earth. By using this arrangement the switching system is simplified and hand capacity troubles are avoided. To ensure that reaction control shall be equally effective on every wavelength a "universal" H.F. choke is employed. This really consists of a long and short-wave winding connected in series, but no switching is required because the S.W. winding is ineffective on long waves, whilst on short-waves the H.F. currents are kept well in check by the S.W. winding.

Making An All-wave Tuner
The form of construction employed for the all-wave tuner is perfectly simple and straightforward, as can be seen from

(Continued overleaf)
Fig. 2, and differs only from that of the usual dual-range tuner in so far as two extra windings are added. The materials required are—

One 4 in. length of No. 12 " Becol " 8 ribbed Elongate Coil Former 2 in. (outside) diameter.

Seven 6 B.A. Terminals, with soldering tags.

1 oz. 3 s.w.g. Enamelled Wire.

One Short Length 18 s.w.g. Tinned Copper Wire.

First of all the ebonite former must be prepared by making three sets of notches in the ribs at the positions indicated in Fig. 2, and differs only from that of the usual dual-range tuner in so far as two extra windings are added.

Fig. 2, and differs only from that of the usual dual-range tuner in so far as two extra windings are added.

The easiest way to attach it to the baseboard is by means of a wooden disc 1 in. diameter and 1 in. thick. This can be screwed in position and the ebonite former will be a tight fit over it.

**Winding the Tuner**

First of all, the notches can be made with a small file, and easily be twisted together before soldering. This completes the constructional work and the all-wave tuner is now ready for use.

Here, the wiring plan showing the detector valve only is given, it would not be a difficult matter to give the normal tuning condenser, and this can then be used for "searching" on short waves after making a rough adjustment on the .0005 mfd. component.

The reaction condenser may be of either the air- or solid-dielectric pattern, either kind being equally effective.

**Tuner and Choke Connections**

As an alternative to the vernier dial, a .0005 mfd. variable condenser might be connected in parallel with the normal tuning condenser, and this can then be used for "searching" on short waves after making a rough adjustment on the .0005 mfd. component.

**A SWITCH IMPROVEMENT**

D. E. H. (Wimbledon).

The easiest way to attach it to the baseboard is by means of a wooden disc 1 in. diameter and 1 in. thick. This can be screwed in position and the ebonite former will be a tight fit over it.

**Making the H.F. Choke**

The method of winding the H.F. choke is described. The easiest way to attach it to the baseboard is by means of a wooden disc 1 in. diameter and 1 in. thick. This can be screwed in position and the ebonite former will be a tight fit over it.

**Materials required are—**

One 3 in. length of No. 2 " Becol " 6-ribbed Elongate Coil Former 1 in. (outside) diameter.

1 oz. 3 s.w.g. Enamelled Wire.

One Short Length 36 s.w.g. d.c.c. wire.

Two 4 B.A. Terminals, with soldering tags.

**The arrangement of the windings is illustrated in Fig. 3.**

**The reaction condenser**

The reaction condenser consists of a single condenser, and this may be of either the air- or solid-dielectric pattern, either kind being equally effective.

Notice the H.F. choke connections; the terminal at the short-wave end must be joined to the plate terminal on the detector valve holder.

**PRACTICAL WIRELESS**

July 1st, 1933

**FIG. 4. PICTORIAL WIRING PLAN FOR THE "UNIVERSAL" H.F. CHOKER**

N. H. Hurst (Wimbledon).

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Although only a Detector-L.F. circuit is given, it would not be difficult matter to arrange two similar tuners in an S.G. circuit and in that case the reaction windings of the aerial tuner would be used. Ganged tuning is quite out of the question for short-wave reception.
**Some Useful Hints on Outdoor Reception.**

By A. V. D. HORT.

If you live in a big town, you will almost certainly find that the performance of your receiver is far better when you take it away from its normal surroundings. Modern flats, in particular, contain steelwork in their structure which is definitely inimical to long-distance reception with anything but the most powerful set.

Apart from these considerations, a great deal of enjoyment can be obtained from your receiver in out-of-doors conditions. Take your receiver with you when you go off in the car, and you will have a pleasant companion for your journey, and a pleasant companion to provide you with entertainment when more active occupations begin to flag.

When you pack up the receiver, do not forget that you must take an aerial-earth system for it as well. If you go by car, you will almost certainly use the car batteries for power supply, so that you need not worry about weighty accumulators. But an aerial you must have, and a last-minute makeshift with odd bits of wire is rarely satisfactory. Even the receiver with a built-in frame aerial will have a wider range, and will give improved signal strength with the addition of a short external aerial, and an earth connection.

For the receiver which has no frame aerial you must provide an adequate overhead aerial to replace the one at home, using all the parts mentioned. Take your receiver with you when you go off in the car, and you will have a pleasant companion for your journey, and a pleasant companion to provide you with entertainment when more active occupations begin to flag.

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Short Wave Circuits

The Author Here Describes Super-Regenerative Circuits.

By FRANK PRESTON, F.R.A.

Of all the short-wave receivers in use to-day (and there must be many thousands) it is more than probable that something like eighty per cent. of them employ the same circuit arrangement. The reason is, no doubt, that the Reinartz circuit, shown in Fig. 1, has become so popular that no one thinks of trying to improve upon it. But despite the undisputed efficiency of the Reinartz circuit there are others which are better in many respects, and with which every short-wave enthusiast should experiment.

The Hartley Circuit

The first of these which comes to my mind as a real old favourite is the Hartley circuit, shown in Fig. 2. This was actually developed before the days of broadcasting, and was intended for transmitting purposes. It is, nevertheless, a particularly good arrangement for a short-wave receiver, principally on account of the ease of action control which it provides, but also because of its simplicity and adaptability for experimental use. You can see from Fig. 2 that a single winding acts as combined aerial, grid and reaction coils. The whole winding is tuned by the usual 0.0015 mfd. condenser, but only one half of the whole winding is connected between grid and filament. 0.00015 mfd. condenser, but only one half of the reaction coil is connected between the anode and earth (marked C.3) for the sake of convenience, the other (marked C.2) being taken up by the detector valve.

Making "Hartley" Coils

Almost any type of S.W. coil can be used in the Hartley circuit, but it must, of course, have a centre tapping. For experimental purposes, however, it is much better to make up a few coils like that shown in Fig. 3. Bare 16-gauge wire is employed, and this is first wound round a 22m. diameter former, which may consist of a bottle or cardboard tube. After winding, the coil is removed, when it will expand to about 2 ins. diameter, due to the springy nature of the wire. The turns are then rigidly fastened together by means of four strips of ebonite, as shown. All connections may be made by means of crocodile clips, or terminals can be soldered to the wire if desired. Instead of joining the aerial lead directly to the grid end of the winding as shown in Fig. 2, it can be tried in various positions along the coil.

A coil consisting of 4 turns will cover a wavelength range of approximately 15 to 30 metres, whilst one having 8 turns will tune from about 28 to 60 metres. Others to tune up to 100 metres or so could be made by using proportionately larger numbers of turns, but these will not generally be required since most of the more powerful stations work on wavelengths below, roughly, 50 metres.

Preventing Hand Capacity

Perhaps the greatest objection to the "Hartley" circuit is that the tuning condenser is "in the air" (not connected to earth), and this is liable to cause hand capacity unless precautions are taken. The difficulty can best be avoided by operating the condenser through the medium of an extension spindle, and using a vernier dial provided with a metal screening plate which can be earthed. On completing the receiver, condenser C.2 should first be adjusted to its most suitable position. This is done by setting both the reaction condenser C.3 and the tuning condenser C.1 to 90 degrees and screwing down the knob of C.2 until oscillation just commences. After this, C.3 will provide full control over the whole waveband.

Another particularly interesting circuit is that known as the Armstrong Super-Regenerative. This also was first "invented" before the days of broadcasting by an American engineer named Major Armstrong. The Super-Regenerative circuit met with a fair measure of success as a medium-wave receiver some ten years ago, but although it was extremely sensitive it suffered from the serious objection that it was "noisy." That is, in addition to the signals which it brought in, there was a continuous "hiss" forming a more or less strong background sometimes even a foreground. Besides this, the set was rather tricky to adjust and was very prone to cause strong interference with other receivers operating within a comparatively wide area. It is interesting to observe in passing, however, that the last-named objection was almost entirely removed by working on a small frame aerial; and, most amazing of all, reception of American medium-wave stations in this country was often accomplished by means of the single valve Armstrong when used on the small frame.

(By to be continued.)

Fig. 1.—The "Reinartz" circuit, which is most popular for S.W. reception.

Fig. 2.—The "Hartley" circuit, referred to on this page as an excellent and simple arrangement.

Fig. 3.—A convenient way of making coils for the Hartley circuit.
Inductive Coupling for Aerial Coil

No doubt a large number of short-wave listeners use coils wound on the bases of old valves, and have hitherto used capacitive coupling of the aerial, but would like to try out inductive coupling. In the arrangement described old valve bases are also used for the variably coupled aerial coil, and in this case two of the pins in the base are removed and the coil plugged into two suitably spaced sockets screwed into a narrow strip of ebonite. The ebonite strip is mounted on a portion of old lead-in tube of the requisite length. The rod passing through the centre of the tube is fixed to the baseboard by means of two hexagon nuts, the one on the lower side being in a hole countersunk in the under surface of the baseboard, whilst the upper one holds down a soldering tag. The strip carrying the coil sockets is secured to the top of the tube by two hexagon nuts and a spring washer, whilst a soldering tag is also fitted here. The pressure on the spring washer is adjusted until the ebonite arm can be swivelled, but the whole is free from vibration, then the two hexagon nuts are locked to prevent them working loose. The soldering tag at the bottom of the pillar is connected to the nearest earthed point, whilst the tag at the top is connected to one of the two sockets on the ebonite arm. The aerial is connected to the other socket by means of a crocodile clip, and the degree of coupling can be varied by swivelling the aerial coil. In practice, two aerial coils are used, one having twenty turns, and the other five turns, and the variation of coupling will be found of great assistance in removing blind spots and the variation of coupling will be found of great assistance in removing blind spots.

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A Wristlet Voltmeter

The accompanying sketches show the construction of a simple wristlet voltmeter. The contacts consist of a phosphor bronze spring, or springs, as the case may be. The brass segments on the base have small counterknocks drilled in them in the "on and off" positions and the balls drop into these and so locate the switch in the required position, and also ensuring a better "on and off" action. The lower sketch (knob removed) shows the arrangement for a double-pole switch, which type will be found very reliable for wavelength selectors, "on and off," and many other purposes where a small current is passed. As the movement of the balls is a combined rolling and slipping one, they are always kept clean. I have used these switches successfully on 200-volt work for small current purposes. - D. Tanguy (Portsmouth).

Curing Corroded Accumulator Terminals

When creeping once commences upon the brass parts of accumulator terminals it is very difficult to arrest. I had similar trouble with one which corroded very badly in a month or so, and the screw shank was commencing to deteriorate. After trying many methods of cleaning, painting, and coating thickly with vaseline, the dodge shown in the accompanying sketch effected a complete cure. A cardboard washer, thoroughly soaked in hot vaseline, is clamped between two screwed brass discs. The cardboard washer is also screwed on tightly, and should be slightly larger than the brass clamps to isolate the metal parts, and so prevent future creeping. The terminal shank should be well cleaned and coated with vaseline before the parts are fitted. - W. Black (Coventry).

(Continued overleaf)
Supporting a Panel When Wiring

A DIFFICULTY often experienced by constructors who favour fixing certain components "under-baseboard" is that of holding the baseboard and panel firmly in a suitable manner to facilitate reversal of the assembly, and so ease and quicken the job of wiring. When the area of only one or the two sides of the board are filled to capacity with components, propping-up the job on books is invariably out of the question—and so is holding the work with one hand, and with the other trying to perform actions which obviously can only be done with both hands. The accompanying sketch shows an extremely easy method of overcoming this drawback.

The length (according to height of panel and components underneath) should be screwed or nailed in position, and it must be remembered that two nails or screws in the centre of each leg will be necessary.

W. W. (Leicester).

A Useful Grooving Tool

TO those who like constructing their own radio or speaker cabinets the accompanying details of a home-made grooving tool may be of interest. The cutter is made from a piece of old band mouldings can also be scratched along rails, etc.—H. F. Collins

(Plymouth).

A Combined H.T. and L.T. Switch

MOST readers who possess a set which derives its H.T. from an eliminator, and its L.T. from an accumulator, realize the desirability of ensuring that the L.T. is switched on before the H.T., in order to avoid the strain on components caused by the peak voltage of an unloaded eliminator. Many employ two separate switches, and make a habit of operating the L.T. first, but the gadget described combines the two, and so ensures that even if the set is operated by an unenlightened member of the household, the H.T. cannot be applied before the L.T.

The switch is not at all difficult to construct, to anyone who possesses the usual tools found in a constructor's kit. The framework is built up of four strips of ebonite mounted on a strip of sheet brass. The four H.T. contacts—the switch is double-sole—are of the type found in aerial earthing switches, and are mounted on a strip of ebonite fixed on edge to a wooden baseboard. The two blades are also of sheet brass—or copper if preferred—pivoted at one end to brace angles while at the other end is a spiral spring to give a quick break action. The L.T. portion of the switch has contacts of sheet brass, bent into the usual form—as in push-pull switches—the blades also being of sheet brass, bent to the shape shown, and fixed to the ebonite cross bar by screws and nuts. Its length must be such that contact is made between A. and B. before the H.T. blades touch their respective contacts. When completed, the switch should be enclosed in a wooden box, in one end of which a slot has been cut to accommodate the operating handle—which may be in either of the two positions shown—and the whole mounted on the side of the cabinet, in the case of a radiogram or large set, or on any other convenient position. To make the switch still more effective, a fuse should be inserted in each pole of the H.T. supply on the mains side. These may be fixed to the backboard, making the whole unit self-contained. In my case I have added a pilot light on the side of the box, wired in the filament circuit, which gives a visual indication as to whether the set is on or not.—A. J. P. Morling (Norwich).

A Weatherproof Aerial Joint

N THE majority of cases amateur's aerials consist of horizontally-suspended wires and lead-ins of the T or inverted L type. Often the lead-in is joined to the aerial in a haphazard manner, and is just twisted round a few times and left. Here is a good method of making a weather-proof joint box to protect the joint after it has been well connected up. Insulated aerial wire should be used for ensuring a trouble-free aerial. Procure an electric light plug adaptor, and in the bakelite top drill two small holes opposite each other about 5 in. below the rim, and just large enough to take the aerial wire, which is threaded through; afterwards sliding the top along the wire to wherever the joint is required. Thread a bored end of the lead-in through the flex hole of the plug top, and twist round the aerial wire, after the latter has been bored just inside the plug top. Solder the connection and bind with insulating tape, afterwards pushing the joint down in the flex hole, and filling the top with bitumen, taking care the joint is covered entirely with it. Remove the contacts from the plug base and screw on in the ordinary way, scaling the contact holes with more bitumen. Make sure the wire insulation enters both drilled holes and flex holes, otherwise corrosion will set in. The cardboard, indicated in the sketch, is to prevent the bitumen running out of the holes when filling.—Joseph A. Wilson (Gidea Park).

Keeping Soldering Irons Clean

THE simple apparatus shown in the sketch can be made up from iron tubing and strip iron combined. Two pieces of tubing are required, and two pieces of strip. A slot is cut in the lower piece of tubing, to clear the tube on the bunsen burner. The strips are riveted to the tubing, and if light irons are used the arrangement will remain steady. If too heavy irons are used an extra support must be fixed. The arrangement prevents the flame from reaching the iron. In this way the iron is kept clean, and will keep much longer than when used in the bare flame. Copper tubing can be used if obtainable, as it holds the heat longer.

W. H. Glavilino (Cambridge).

A dodge for keeping soldering irons clean...
WE PLANNED  
and NOW THE EXPERTS CONFIRM  

WE PLANNED to make a new Superhet Selective Five powerful enough and sensitive enough to cope with every need of today's most experienced listener. We planned a receiver which should not only satisfy the keenest musical ear with "true-to-life" tone from an energised-field moving-coil speaker; but should sell at a price the average listener was able to pay—15 guineas. And before being put on the market it passed two searching tests—one at Prague, where the ether is more congested than anywhere else in Europe—one within sight of Brookman's Park, to prove its freedom from "second channel trouble"—both with flying colours!

AND NOW THE EXPERTS CONFIRM that all these aims have been fully realised, as is proved by the following extracts from the "Wireless World":

SENSITIVITY. "The range on both long and medium waves is probably the maximum commercially obtainable with four stages. It is certainly equal to, if not slightly better than, that of any other Superheterodyne of its type so far tested."

SELECTIVITY. "Not a single station is lost on the medium waveband from second channel or image frequency interference."

TONE "...speech, natural and free from hollowness."

VALUE "...a first-class job which sets a new standard of value."

Hear this model at any "His Master's Voice" dealer—and see how completely the set lives up to the verdict of expert technical opinion.

"His Master's Voice"  
ALL-ELECTRIC RADIO RECEIVERS

REAL selectivity, well-balanced reproduction, ease of control and long range—these were the points which struck me very forcibly on first taking the controls of the "Three Star Nicore." After examination of the circuit, and bearing in mind that the new Varley "Nicore" metal-cored tuning coils were incorporated, I rather expected to find these features, but it was a very pleasant surprise to discover how nicely they combined to make a most likable receiver. In a low-priced set, such as this undoubtedly is, one rather expects that some slight compromises would have to be made; I found nothing of the kind.

The expression "real selectivity" was used above, so perhaps an explanation of its meaning is called for. With most small sets selectivity is almost entirely dependent upon the use of reaction, but in this case the degree of selectivity was found ample to permit of eliminating the local station entirely by turning the condenser dial through two or three degrees even when the reaction control was "full out." This applies both to medium and long wave programmes under all circumstances. It would not necessarily apply to readers' sets, which depend for their results principally upon local conditions. Nevertheless, it would be an interesting point to mention ease of control. As a result the "Three Star Nicore" is easily capable of bringing in a very good selection of alternative stations without complications.

Operating Notes

And now a few notes on operating the set will perhaps be useful, especially to the less experienced constructor. Obviously, the first thing is to connect up the batteries, loud speaker and the aerial and earth leads. Terminals are provided for all except battery connections, and as these are clearly marked, there will be no difficulty in identifying them. If the battery leads that marked "G.B." should be connected to the positive socket of the grid bias battery. The "G.B." lead attached to the low-frequency transformer should be connected to the 6 volt grid bias tapping, whilst the other "G.B." lead may first of all be taken to the 6 volt socket on the bias battery; it will be removed later, but it is best to start with a low voltage so as to bring the variable-mu valve into its most sensitive condition.

The high-tension wander plug marked "H.T.+1" should be plugged into the 66 volt socket of the battery, and that marked "H.T.+1 1/2" should be plugged into the 70 volt socket of the battery.

LIST OF COMPONENTS FOR THE THREE STAR NICORE

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>One pair Varley Nicore Coils</td>
<td></td>
</tr>
<tr>
<td>One J.B. Two Gang Unitone Condenser</td>
<td>0.005 mfd.</td>
</tr>
<tr>
<td>One British Radiophone Duovol Control with 25,000 ohm resistance</td>
<td></td>
</tr>
<tr>
<td>One Dynamic Nicore 3-l.f. Transformer</td>
<td></td>
</tr>
<tr>
<td>One Wright and Weare H.F.P.A. Screened Chokes</td>
<td></td>
</tr>
<tr>
<td>One Lissen H.F. Choke (L.N. 5092)</td>
<td></td>
</tr>
<tr>
<td>One Graham Farish Ohmico Resistances</td>
<td>25,000, 10,000, 20,000 and 150,000 ohms</td>
</tr>
<tr>
<td>One Graham Farish 1 megohm Grid Lead</td>
<td></td>
</tr>
<tr>
<td>One T.C.C. &quot;S&quot; Type Condenser, 0.1 mfd.</td>
<td></td>
</tr>
<tr>
<td>One T.C.C. Type &quot;S&quot; Condenser, 0.001 mfd.</td>
<td></td>
</tr>
<tr>
<td>One T.C.C. 50 Type Condenser, 25 mfd.</td>
<td></td>
</tr>
<tr>
<td>Three T.C.C. Type 50 Condensers, 1 mfd.</td>
<td></td>
</tr>
<tr>
<td>One T.C.C. Type &quot;S&quot; Condenser, 0.001 mfd.</td>
<td></td>
</tr>
<tr>
<td>Two Clix 5-pin valveholders</td>
<td></td>
</tr>
<tr>
<td>One Balgon Junior Expanding switch</td>
<td></td>
</tr>
<tr>
<td>One Severequality-set condenser, 0.003 max.</td>
<td></td>
</tr>
<tr>
<td>One Bellinger-Lea 5-pin Battery Coil</td>
<td></td>
</tr>
<tr>
<td>Two Bellinger-Lea Terminal Mounts</td>
<td></td>
</tr>
<tr>
<td>Four Bellinger-Lea Type B Terminals (Aerial, Earth, L.S.--- and L.S.---)</td>
<td></td>
</tr>
<tr>
<td>One pair Bulgin Type 3 Grid Bias battery clips</td>
<td></td>
</tr>
<tr>
<td>Three Bellinger-Lea Wander Plugs-G.B.1 and G.B.2</td>
<td></td>
</tr>
<tr>
<td>Two coils Glazeite, odd length flex, screw, etc.</td>
<td></td>
</tr>
<tr>
<td>One Bred Ebonite Panel, 12in. by 7in.</td>
<td></td>
</tr>
<tr>
<td>One Carrington &quot;Aston&quot; Senior Cabinet, with baseboard, 14in. by 10in.</td>
<td></td>
</tr>
<tr>
<td>Two Side Runners, 10in. by 10in.</td>
<td></td>
</tr>
<tr>
<td>One Bred Ebonite Panel, 12in. by 7in.</td>
<td></td>
</tr>
<tr>
<td>One Cossor 220 V.G.G. (metallized)</td>
<td></td>
</tr>
<tr>
<td>One Cossor 220 S.G. (metallized)</td>
<td></td>
</tr>
<tr>
<td>One Cossor 220 H.P.T.</td>
<td></td>
</tr>
<tr>
<td>One Smith's &quot;Anodes&quot; 120 volt H.T. Battery</td>
<td></td>
</tr>
<tr>
<td>One Smith's &quot;Anodes&quot; 16 volt G.B. Battery</td>
<td></td>
</tr>
<tr>
<td>One Smith's 2 volt, 40 amp. L.T. accumulator</td>
<td></td>
</tr>
<tr>
<td>One Blue Spot 29 P.M. Loud-speaker</td>
<td></td>
</tr>
<tr>
<td>One British Radiophone Receptors Lead-in</td>
<td></td>
</tr>
<tr>
<td>One Graham Farish Filt for earth</td>
<td></td>
</tr>
<tr>
<td>One Bulgin Indicator Q.M.B. Lightning Switch</td>
<td></td>
</tr>
<tr>
<td>Approximate cost of all the above parts</td>
<td>£12 15s.</td>
</tr>
</tbody>
</table>
WINTER time is the station hunter's paradise, but in the summer time he is confronted with conditions for distant reception entirely different from those ruling in the cold weather period. During the winter, foreigners roll in one after another with monotonous regularity and even the modest two-valver can be credited with a performance. But during the summer months conditions are vastly different and more difficult, slowly but surely, so that by the time July is out, it will have to be a well maintained three-valver which will give its owner a fair bag of Continental programmes. The main reason for this falling off is, of course, due to the absorbing effect of the sun's rays, which are more powerful in the summer time than in the winter, and, of course, hours of daylight are very much longer. Although a station may radiate the same power, the waves which reach the aerial in summer time will be very much weaker than in the winter.

Compensating for Weak Signals
Much of this loss can be compensated for by a well designed modern receiver, but even then, it will only be possible to get consistent results, that every part of the equipment is kept right up to scratch. The receiver is not the only part which must be kept in order. Batteries are likely to run far more quickly in summer due to the loss by evaporation of the electrolyte; the earth will no doubt become very dry and the aerial become coated with a hard baked deposit. Another thing also counts, and that is the loss of skill. In the winter we all become experts at tuning because we sit for hours at the controls, and we become fully acquainted with the individual idiosyncrasies of our equipment, but in the summer we are out of doors far more and the receiver does not receive any attention until we return from our sport or other occupation, very often too tired to meddle with the receiver very much, and in consequence we turn to the local and don't bother to tune in the distant programmes. Atmospherics are also a little more troublesome in summer than in winter, but quite a lot of static can often be traced to a faulty earth which only requires a good soaking to bring it up to standard again. Valves, after hours of continuous life during the winter, begin to lose their emission and although the effect may not be noticed because the loss is so gradual, a new set of valves may easily make all the difference. All these things taken singly during the winter may not amount to much, but a sum total of them during the summer may make all the difference between indifferent and successful reception.

The receiver, being the most important part of the equipment, should receive attention first. Before starting it is as well to remember to provide the family with an alternative bath while you examine before pulling the set to pieces. It is surprising, especially if the receiver is in a room heated with a coal fire, how much dust does accumulate inside the set, even if it is enclosed in a cabinet. Most cabinets are supplied these days with backs, generally for acoustical reasons and these cabinets require special attention. Start with a good spring clean of this item, the reason being that it will then be ready to receive the set when that important item has been dealt with, and there will be no necessity to leave it about collecting more dust.

Remove the receiver and the loud-speaker from the cabinet and any other gadgets which may have been fixed to it. If the material which covers the fret looks dirty, take this off and have it washed or if a change in design is required, fit a new piece. The easiest way to remove the material if it is wanted again is to damp round the edges where it is glued with warm water. The glue will soften and the material may be gently pulled away. If the material is not required again, it can be torn out carefully and the excess glue and odd ends removed with a scraper.

When everything is clear, go over the inside of the cabinet and all the interstices of the fret with a small, stiff brush and remove all traces of dust that could not be removed when the silk was in. Go over the outside with a rag doped with a good furniture polish and regain some of the original finish. Any hinges or locks are fitted to the cabinet, these should be cleaned up and treated to a spot of oil. Many broken hinges are the result of not looking after this small point.

Spring-cleaning the Receiver
Having dealt with the cabinet, the receiver should now be dealt with. The most thorough way in which to overhaul a receiver is to pull it to pieces. Subject every connection (Continued overleaf).
PREPARING FOR SUMMER CONDITIONS (Continued from previous page)

Fig. 4.—Never add acid when "topping up" accumulators.

individual part to a good scrutiny and if possible give it a test. Remove all the components from the baseboard and if of wood, treat it with a coat of vernish or stain, or if of metal with a little metal polish. There can be little chance of an error in replacing these components, because the holes in the metal cannot shift and the holes in the wood baseboard will be used again. Then go over all the components, such as transformers and tighten up the bottom nuts, replacing the soldering tags if these have been used, after the old solder has been removed and they have been retinned. If the terminals only are used, clean up the faces with smooth emery paper. Do not trust the plating for a good connection, however bright and polished it may appear, as it is often covered with a film which may be very thin, which might easily cause an indifferent connection. Replace the top nuts and tighten them up hard before replacing the components on the baseboard or the panel. Go over the components with variable adjustments and see that the spindles work freely and apply a small spot of oil if necessary. See that the pigtail connections are intact and replace them if they appear to be weak. Clean the dust from the vanes of variable condensers with a pipe cleaner. Dust born on the vanes may account for some of the assumed summer atmospheric disturbances. If you feel confident that you can put all the pieces back where they came from, a sound scheme is to dismantle this type of component completely, and clean every part separately. Besides doing the job properly you will have learned something of the construction of the components themselves. The more simple components such as valve-holders should most certainly be dismantled and the contact springs given a good clean up, and more than summary attention given to all switch contacts. If the springs are of a material which is likely to oxidize easily, the surfaces of the contacts should be given a thin coat of tinning with the soldering iron.

Grid leaks, which often vary after they have been in use for a year or more, should be tested for correct value, and replaced if necessary. This also applies to the carbon type of anode resistance to a certain extent, but the trouble usually only occurs either with the higher values or with the low valued resistances used for the grid bias carrying their maximum permissible current. A variation of ten per cent. in the value of the bias resistance may affect the volume current with possible damage to the filament of the valve. The value of anode decoupling resistances can vary as much as twenty per cent. without seriously affecting the emission of the valve or the performance of the receiver. Reassemble the components, and commence the wiring of the receiver, using new wire and skewing if necessary. All battery leads should be carefully inspected for perishable rubber covering and replaced if necessary with new flex. Carefully inspect all wander plugs and spade terminals to see that the ends of the flexible leads are making good and proper connection. Clean up the pins and the faces of the spade terminals with emery paper.

The loud-speaker should then receive attention. The simple types of iron armature units can be dismantled, but the complicated types of balanced armature are best left for the attention of the manufacturers, as special tools and jigs are often required to reassemble them correctly. Units should be returned to the manufacturers if any doubt is felt, so that they can thoroughly inspect and remagnetize if necessary. Moving-coil loud-speakers should be carefully dusted, and if the construction allows, remove the cone and the centre.
In This Article the Author Deals with the Underlying Principles, and the Construction of Several - Types of H.F. Chokes

By HAROLD DOWNING

FIRST ARTICLE

Probably one of the most neglected and yet most interesting components in a wireless receiver is the high-frequency choke. Because it consists merely of a number of turns of fine wire wound on a sloped bobbin or tube it is frequently regarded as being of little importance. But that the H.F. choke is of great consequence is proved by the numerous types of this component on the market and by its several uses in a modern receiver.

Chokes have a tremendous effect on the proper functioning of a wireless set, and an understanding of their properties and uses will go a long way towards the gaining of a clear idea as to how they can be made and what points must be watched in designing them.

What is the Purpose of an H.F. Choke?

One might well start to consider the high-frequency choke by asking "What does it do?" This question may be prompted by your having found that it is often possible to short-circuit the choke in certain receivers without affecting results in the slightest degree. In such cases one can be sure that either the choke is inefficient or that its work is being performed by some other component. But to answer the question: expressed somewhat blandly, the object of an H.F. choke is to check the flow of high-frequency currents in a circuit, and at the same time to allow free passage to low frequencies.

This reply, however, will not satisfy the person who really wants to know the exact "why and wherefore" and he will probably ask, "How can a choke differentiate between the two kinds of current?"

In the detector valve. This assumes that the choke has, the impedance of the currents. Hence, its impedance to low frequencies (which we generally take as those up to about 8,000 cycles per second) is much less than to high frequencies (which for our present purpose we can consider as being above some 150,000 cycles, or below 2,000 metres).

The "Reaction" Choke

Before going any further it will be best if we examine the function of a choke in respect to some particular use in the circuit. Its best known use is in the anode circuit of a detector valve, which is connected as shown in Fig. 1. Assuming that the set tunes up to 2,000 metres (150,000 cycles) our choke must offer a high impedance at this frequency and a comparatively low one at the highest audio frequency, say 8,000 cycles. We cannot assess definite values of impedance at the two frequencies, but must work on a comparative basis. Actually we find that the choke will require an inductance of some 150,000 cycles, or about 100,000 ohms; its impedance at 8,000 cycles will then be approximately 4,000 ohms, or 20 times less.

To fulfill these conditions the choke will require an inductance of 100,000 microhenries. This assumes the component has no self-capacity, because if it had, the impedance at high frequencies would be very much reduced and consequently the...
The choke would be less efficient. In practice it is impossible to eliminate capacity entirely, due to the proximity of adjacent turns, but we can cut it down to reasonably low limits by dividing the winding up into sections and arranging the terminals fairly well apart. The constructional part of the work will be considered later.

Preventing Feed-back

There is another point to consider because a choke, like a tuning coil, has a certain magnetic "field," and therefore if it is placed near to a coil or another choke the fields of the two will link together and cause feed-back, or unwanted reaction. This difficulty can be minimized in three ways. One is to arrange the two components with their axes at right angles, another is to make the choke of binocular form (see Fig. 2), when the fields of the two halves will neutralize each other, and the third is to fit the choke with a screening box. The third method is best, but certain precautions must be taken in using it. Since a metal screen lowers the inductance, precautions must be taken in using wire of turns than otherwise; the screen must not be placed too near the windings, and the choke must have a greater number of turns, but this can be done quite safely because the impedance for any given frequency becomes greater as the wavelength is reduced. For example, a 1,000-microhenry choke has an impedance of something like 40,000 ohms at 6,000,000 cycles (50 metres), and of only 50 ohms at 5,000 cycles (500 metres), a component of that value would therefore be perfectly suitable for a receiver working on wavelengths between 10 and 50 metres. I have quoted 10 metres as the lowest wavelength limit, since for still shorter waves a choke of but a few microhenries, and having an almost negligible self-capacity, is better.

S.G. Chokes

In addition to the "reaction" choke already referred to, there is another kind which is connected in the anode circuit of an S.G. valve and is used in conjunction with a tuned-grid coil for high-frequency coupling purposes. The connections are shown in Fig. 3. It is not generally realized that this choke must have quite different characteristics to that used for reaction purposes. It must match the anode impedance of the S.G. valve, having an impedance about twice as great at the lowest frequency (highest wavelength) to which the set will tune. As the average impedance of modern S.G. valves is 300,000 ohms the choke must approximate to 600,000 ohms. This means that its inductance should be about 500,000 microhenries. Besides having a high inductance, however, the choke must have a very low self-capacity or else it will be inefficient at the higher frequencies.

Special Uses for H.F. Chokes

Other uses for H.F. chokes are represented in the skeleton circuit diagram of Fig. 4. The component marked Choke 1 is a by-pass for the B.P. coupling condenser, and its purpose is to feed the grid-bias supply to the V.M. valve; an ordinary "reaction" choke may be used here. It is more usual to employ a resistance in this position, but the choke is often better when certain forms of low-frequency interference are experienced. Choke 2 really supplements the reaction choke and serves to prevent the leakage of H.F. into the low-frequency stages. Here again, a fixed resistance is generally employed, but a choke is sometimes better; one of the "reaction" kind is quite suitable. The two mains-chokes, marked Choke 3 and Choke 4, are often helpful with any mains receiver (either D.C. or A.C.) since they prevent interference due to H.F. currents which are sometimes superimposed on the mains supply. A suitable inductance for these chokes is about 100,000 microhenries, and they must be able to carry the total current drawn from the mains, generally up to .5 amp. or so.

Fig. 4 shows yet another choke marked Choke 5—and this is generally referred to as an "anti-break-through" choke. Its purpose being to prevent interference from a nearby medium-wave Regional station when listening on the long waves. To be effective it is clear that this choke must have a fairly high impedance at about 300 metres, and a much lower one at 2,000 metres. An inductance of about 1,000 microhenries is a good average value.

Short-wave Chokes

Short-wave chokes are, theoretically, just the same as those used for the longer wavelengths, and in fact many of the "broadcast" chokes available will work satisfactorily down to so low as 10 metres. At the same time, it is generally better to employ special S.W. chokes designed so as to have a very low self-capacity, since this is of increasingly greater importance as we move down the wavelength scale. To cut down capacity means reducing the number of turns, but this can be done quite safely because the impedance for any given number of turns becomes greater as the wavelength is reduced. For example, a 1,000-microhenry choke has an impedance of something like 40,000 ohms at 6,000,000 cycles (50 metres), and of only 50 ohms at 5,000 cycles; a component of that value would therefore be perfectly suitable for a receiver working on wavelengths between 10 and 50 metres. I have quoted 10 metres as the lowest wavelength limit, since for still shorter waves a choke of but a few microhenries, and having an almost negligible self-capacity, is better.

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FROM THE FLASHLAMP

By Photon

DESIGNING A LOUDSPEAKER HORN

It is generally considered that the correct shape of a horn, whether be for a gramophone or for a speaker, is that given by the logarithmic curve or "exponential law." Although the logarithmic law gives a good form of horn, the mouth or termination of the horn ceases to be logarithmic—at the mouth there is a sudden change whatever the theoretical form or contour of the horn may be. If it were not for this question concerning the mouth of the horn, there would be nothing amiss with an ordinary cone, because the conditions in a cone are precisely the same as those which obtain when sound radiates from a source in three-dimensional space. The point is that, whatever the basis of design may be, the mouth itself should be "flared" in order to shunt the change.

Fig. 1.—Illustrating a property of the logarithmic curve.

There is a beautifully simple method of constructing a horn of the form given which is within reach of anyone whose resources include a pair of scissors and a gluepot. From the fact that the length of the arm $s$ is constant, it follows that if we consider the horn made up of a number of circumferential strips, all the strips when developed on the flat have the same radius of curvature. Hence, in order to build up the horn we have only to cut up a quantity of paper segments as in Fig. 4, whose mean radius $r = s$, and build up these one on the other as in Fig. 5. The foundation can be made from stout cartridge paper or Bristol board. When that is dry, and set, the necessary thickness of papier maché can be built up by pasting on layer upon layer of newspaper or "lining paper." Every piece of paper is cut to the same segmental form and pasted circumferentially round the horn, each layer ing with that previously laid.

Fig. 3.—Illustrating the use of trammel for laying out horn contour $b$, $b$, also departure from true log from a, a.

Fig. 2.—Trammel with tracer point and wheel.

Fig. 4.—Form of segments from which horn is built.

where the horn opens into the world at large.

A well-known property of the logarithmic curve is illustrated in Fig. 1; a tangent to the curve at any point $p$ follows a logarithmic curve so long as its angle to the base line is small. When this condition no longer applies, as when the angle of the trammel increases, the projection of the length $s$ on the base line (or horn axis) diminishes and the $r$ of Fig. 1 is no longer constant.

If we continue to develop the trammel curve laid off by the tracer wheel outwards, we find that the departure from the logarithmic curve is as shown in Fig. 3, and the diameter of the mouth of the horn, where the trammel has become vertical, is equal to $2s$.

Fig. 5.—Showing how a horn is built up with paper segments.
DETECTORS are common to all wireless receiving sets; the first set had one, and the latest designed Class "B" Ferrocarb receiver has one. Any device used for the reception of wireless signals is really a detector of the small alternating currents set up in the receiving aerial. Since wireless waves were first produced by Hertz in 1868 many types of detectors have been employed before reaching the advanced and efficient methods of to-day.

The First Detector

Hertz's receiver took various forms, the wire type of which was simply a certain size of wire ring with two spark balls separated by a small air gap. The size of the ring was adjusted until the best effects were obtained, employing the principle of resonance. The impact of the wireless waves cause induced charges to surge backwards and forwards within the ring, these surges manifesting themselves as minute sparks at the air gap. Such a device, although of no practical use, constituted the first wave detector. The detector is illustrated in Fig. 1 and is sometimes called a resonator.

The Coherer

Probably the earliest form of detector to be used was the improved form of coherer. This is based upon a peculiar microphonic behaviour of loose metal contacts to electric waves. This was first brought into prominence by Professor Branley in 1890, and afterwards more thoroughly investigated by Sir Oliver Lodge, to whom the term "coherer" is due.

It was found that the impact of electric waves upon a glass tube filled with nickel and silver filings would cause them to cohere, making them conductive to a direct current which could flow through it. The coherer, in its simplest form, was not reliable, and it was much improved by Marconi. His pattern consisted of an evacuated narrow glass tube containing accurately fitting silver terminals (Fig. 2), separated by a small gap, between which are the metal filings. Connections to the plugs were made by means of wires sealed in the glass, and the complete coherer placed in a circuit with a cell and some form of relay or recording instrument. The potential applied to the coherer, by means of the cell, was adjusted until just insufficient to cause the metallic filings to cohere without the additional potential of an incoming wave. To the coherer was added an automatic tapper to "decohere" after each signal. Although this necessitated a slow rate of signalling, this delicate receiver of electric waves made wireless telegraphy practicable. The coherer constitutes the first detector to give an audible signal produced, or rather resulting from, electric waves. It was with this improved form of coherer that Marconi, in 1899, established communication by wireless across the English Channel.

The Magnetic Detector

Following this, Marconi, in 1902, made another important step forward by developing a more sensitive detector known as the mag-netic detector, or resonator.

Fig. 2.—A Marconi coherer.

The magnetic detector consists of two magnets A, A, with like poles placed together so as to magnetise an endless band of stranded iron wire B, continuously moving through coil C. The hysteresis lag causes the field to be carried on by the wire a little beyond the central point, and when oscillatory currents flow through coil C the residual lagging flux is annihilated, and the magnetism may be said to jump to the central position. This slight shift of flux induces a current in the coil D, so that a click is heard in the telephone E, for each spark transmitted, and received by the circuit. Thus a dot is rendered by a short crackle, and a dash by a buzz. The sounds are not very loud but the action is regular.

The Valve Detector

The magnetic detector constitutes a current-operated device, and is inserted directly between aerial and earth. Before coming to the introduction of the valve detector, it is necessary briefly to describe rectification.

Rectification

The high-frequency alternating currents used in wireless broadcasting consist of two components, the high-frequency carrier current, and, superimposed on it, the low frequency, or microphone current. The high-frequency current is useless in itself as far as the diaphragms of the telephones are concerned, its variations are so rapid that no diaphragm could possibly follow them. It is the low-frequency component that matters to the receiver, and the work that the detector has to do is to separate the low-frequency component from the high-frequency one. In doing this, a current is obtained which is varying in accordance with the variations of sound in the studio at the transmitting end, and is capable of making the diaphragms of the telephones or loud-speaker responsive. This work of the detector is known as rectification.

Whilst it is true to say that the above devices described were detectors of wireless signals, they could not do what the detectors of to-day accomplish, i.e., rectify the high-frequency currents set up in the receiving aerial. There are two kinds of detectors to do this: the crystal detector and the valve detector.

Crystal Detectors

The discovery by General Dunwoody of the rectifying property of carbonamid was made in 1896, it being subsequently found that certain other crystals of mineral alloys were excellent rectifiers. A popular form of detector is shown in Fig. 4. The main property of the crystal lies apparently in its varying conductivity of electrical currents in different directions. A crystal that rectifies may be described as a conductor of electricity in one direction only. The advantages of crystal detectors lie chiefly in the fact that they are cheap, simple, and compact. They cost nothing to maintain, and for these reasons they had a good general run of popularity for several years, and passed the advent of broadcasting, until rivalled strongly by the valve.

Crystals, however, rectify only; there is no amplification. Their range is short, selectivity rather difficult, and they are unable to handle strong impulses, so it was left to the valve to overcome this.

The Valve Rectifier

The introduction of the vacuum valve as a rectifying detector was made in 1904 by Professor Fleming. We all know that after an ordinary electric lamp has burned for a time it acts as a crystal detector.
As we have seen, up to the end of 1926, quite large sets, including five-valve types with two high-frequency stages, employed general purpose valves throughout. Even in the early months of 1927 the same state of affairs persisted, but then, quite suddenly, the result of months of patient experiment, and the outcome of several years' accumulated experience were showered upon us in a flood of new valve types which greatly modified set design. Earlier among the new arrivals were special high amplification valves for use in resistance capacity coupled stages. R.C.C. had become popular on the score of good reproduction—chiefly because low-frequency transformer design often left much to be desired. But the low stage gain possible with general purpose valves coupled in this way, however, was not often necessary to employ as many as three low-frequency stages. With the new high magnification valves the gain per stage was greatly increased, and two low frequency stages became the rule.

More New Valves

Swiftly following the R.C.C. valves came power and super-power output valves of the dual-cathode type. It was interesting to note the advantages of greater output and better reproduction to be enjoyed by listeners who were restricted to comparatively small low-tension batteries. The power valves gave reasonable output, and certainly better quality than the old general purpose valves, while the super power type, with its much greater grid acceptance, resulted in enormous improvements in reproduction with the popular sets of the day with their multiplicity of low-frequency stages.

I have just been looking at a description of a September number of the set published in the early summer of 1927 and typical of large numbers of sets produced about that time. It comprises a detector valve and three resistance-capacity-coupled low-frequency stages, the output valve being of the power type. With such a set, volume control became of considerable importance, because although the full amplification available would be necessary on weak signals, serious overloading might be experienced with the local programme. Accordingly, we find that in addition to the reaction control, there is a complicated system of jacks, by means of which either one or two valves can be cut out as required, while further control is possible by means of filament rheostats.

Tetrode

But valve development did not end with the introduction of the new output valves. For some time past, interest had been shown in tetrode or four-electrode valve. This valve, possessing two grids, was employed mainly as a means of reducing the anode voltage required for receiving valves. The reason why high tension voltages of 50 to 150 volts were necessary is that the electrons—minute negative charges, emitted by the filament—mutually repel each other. Unless the H.T. voltage is high enough to overcome these forces, an undue number of electrons will be forced back to the filament while many others still hover in the space between the filament and the control grid, forming the so-called "space charge," in which position they tend to "blanket" further emission.

In the early tetrode an auxiliary grid, situated between the control grid and the filament, gave perfect space charge neutralization for one particle of the frequency of the filament. Its duty was to neutralize the charge and, by its attractive force, give the electrons emitted by the filament such a high velocity that a large proportion of them passed through the auxiliary grid into the influence of the true, or control grid, and thence on to the anode. The device was very successful in that satisfactory results could be obtained with anode voltages as low as 15 volts. But somehow the idea did not take on as well as it deserved—probably because the newer types of dual emitter valve had such generous emission that the tetrode scheme did not seem worth while. Out of the four-electrode principle, however, came an entirely new valve form which eventually solved many problems that had been worrying designers, and ushered in a com-
AN AID TO DIAL LOGGING

Showing how a small pocket magnifying glass can be mounted to ensure accuracy in logging condenser dial readings.

WITH so many high-powered broadcasting stations on the air it is becoming a problem of great importance to log the dial readings accurately when you have tuned in the various stations correctly on your wireless set. Not only is it desirable to have slow-motion dials or condenser dials, but in some cases it becomes necessary to add simple device which will enable the proper condenser markings to be noted.

The simple method for this to be carried into effect is shown in the accompanying illustration. First of all procure a small thin pocket type magnifying glass and remove the cover. These glasses are really quite powerful and have a focal length of anything up to two inches. Take a short strip of thin brass and fix one end to the glass frame with a SBA screw. Drill a hole in the ebonite panel of the wireless set, slightly to the right and above the top of the condenser scale as shown and, bending the brass strip at right-angles at each end, attach it to the panel with a SBA screw and nut. The lens can be held away from the panel a distance just sufficient to give correct focussing and can be swung in and out of use as desired. As the photograph shows, the dial divisions are magnified, and in this way it is possible to log more accurately the station settings for different stations.

Are YOU interested in 5-METRE WORK?

Then see Next Week's Issue.
The Best Position for an Indoor Aerial

I recall a somewhat odd experience I had a short time ago. A friend had bought a rather unselective two-valve set and asked my advice in regard to the most suitable type of aerial. A short inside one was suggested and this was duly erected as an insulated wire running along two sides of the room and loosely tacked to the picture moulding. Results? Practically nil, for even the local station was barely audible. Investigation showed that the wire was running almost parallel with an electric conduit pipe, which was (as is always the case) earth connected.

Figure 1—Parallel-fed reaction circuit.

By moving the aerial to the two opposite walls, all was well. Apparently the earthed conduit was acting as an efficient, though unwanted, screen.

The moral is, if you employ an inside aerial, try it in different positions until the best one is found.

Instability with Class "B"

A difficulty which is occasionally experienced with a class "B" output stage is that there is a certain amount of parasitic oscillation due to slight variations in the two halves of the class "B" valve, or to other causes. This is generally evidenced by a faint, high-pitched whistle or by a peculiar form of distortion on certain high notes.

A satisfactory cure can nearly always be effected by connecting a condenser of about .005 mfd. across each half of the primary winding of the "driver" transformer. The condensers also have a tendency to reduce the high-note emphasis which is liable to be magnified and to cause serious low-frequency instability and distortion.

The usual expedient, of inserting a .005 mfd. fixed condenser between the ends of the secondary winding of the first L.F. (or "driver") valve, is usually sufficient but occasionally a better effect is produced by wiring a 50,000 ohm resistance in shunt with the primary winding of the first L.F. transformer.

The Screening Grid Potential

Because a short indoor aerial generally gives more selectivity than the usual elevated wire there seems to be a good many people who think that it is also better for eliminating electrical interference. This may or may not be the case— it all depends on the circumstances. If the interference is definitely due to an outside source the aerial will probably prove helpful. But if it is coming into the house via the electric lighting mains its effect will be much greater when the aerial is comparatively close to the mains leads.

Aerials and Interference

The usual expedient, of inserting a .02 mfd. fixed condenser, is usually sufficient but occasionally a better effect is produced by wiring a 50,000 ohm resistance in shunt with the primary winding of the first L.F. transformer.

The moral is, if you employ an inside aerial, try it in different positions until the best one is found.

Interference is definitely due to an outside source the indoor aerial will probably prove helpful. But if it is coming into the house via the electric lighting mains its effect will be much greater when the aerial is comparatively close to the mains leads.
IF WIRELESS IS STILL A "MYSTERY"

The parallel-fed reaction arrangement is applicable to any type of set using either plug-in coils or the more usual dual-range tuner, but it is of particular value on the shorter wavelengths.

The Latest From Lucerne

ALTHOUGH "long" wavelengths at the time of writing have not yet been definitely allocated, it is easy to foresee that considerable alterations will have to be made in the dials of receivers bearing the names of stations. The latest proposal involves some well-known transmitters in the following order. Kalundborg (1,183 m.); Huisyen (1,198 m.); Oslo (1,238.7 m.); Madrid, Ankara, Kaunas (1,292 m.); Motala (1,327.4 m.); Warsaw (1,383.9 m.); Daventry National (1,522.8 m.); Königs Wusterhausen (1,604.3 m.); Radio Paris (1,694 m.); Buzarest, Reykjavik and Porto (1,775.1 m.); Lahti (1,863.3 m.); Moscow (1,973 m.). It will be noticed that no provision has been made for Eiffel Tower and that France may thus lose one long channel. If allocated in this manner the bands do not take into consideration a number of transmitters already working in the band, and some of the wavelengths may still be shared.

The Westector

The progress of the three-electrode valve (Fig. 6) since broadcasting commenced is well known. Developments from bright emitters to dull emitters, the introduction of mains valves, their application as leaky grids or anode band detectors, the introduction of more electrodes, as in the screened grid detector, etc., all seemed to point that valves would be the last line of detectors. And now comes the new cold valve.

These permanent junctions. The Westector will handle large inputs, but it only rectifies—it will not amplify—a particular advantage being that no heater or anode currents are necessary for its operation. As they are particularly suitable to sets of superb design they can certainly be classed as a possible rival to the valve rectifier. However, in comparison with grid detectors, we have to-day reached such a stage of efficiency in detection that it will be difficult to revolutionize these methods by any new means of detection.
BY THE PRACTICAL WIRELESS TECHNICAL STAFF

PILOTCLASS "B" CONVERSION KIT

This illustration shows the Peto-Scott "Pilot" Class "B" Conversion Unit, which retails at 37/6d. The unit must be wired exactly as in the sketch, terminal No. 6 being left blank.

This Unit will operate on the majority of sets without any alteration to the existing receiver. In operation the existing P.F. power valve acts as the driver valve, and, unless a Triode, the normal small power valve holder to the anode of detector valve holder. The feed resistance which is connected between the "A" or "P." terminal of existing L.F. stage to the name implies, its object is to prevent fading, and it accomplishes this by acting as a form of automatic volume control device. The makers are very modest in their claims and we were pleasantly surprised to find how efficiently the unit operated; stations such as Fecamp, which normally fade badly, were receivable at practically constant strength during the whole of a fairly long test. Complete with a sheet of wiring diagrams and full instructions for use, the unit retails at the attractive price of 10s.

THE PLEW ANTI-FADING UNIT

WE have just received an excellent little device from the Phonoype Radio Co., 22 George Street, Hanover Square, London, W.1, called the Phonoype Anti-Fading Unit. This consists of a small moulded bakelite case fitted with four terminals which are marked "P.", "O.", "H.T." and "8." respectively. The unit is connected in the anode circuit of the detector valve and is made to vary the sounding grid potential applied to the preceding R.G. stage. The component is very ingenious and works well. As the name implies, its object is to prevent fading, and it accomplishes this by acting as a form of automatic volume control device.

The Unit should be connected to the loud-speaker terminals, P. and H.T. on transformer being connected to LS- and LS+ respectively.

The filament connections should be made to a 2-volt accumulator. The filament connections should be made without altering existing arrangements. The Peto-Scott Class B unit, which gives excellent results under test.

The first L.F. valve can be taken out of set to save filament current, as it is no longer used.

The Unit should be connected to the loud-speaker terminals as previously described.

The operation of your set is exactly as before. The first L.F. valve should be removed and the anode terminals of detector valve must be connected to plate of output valve and H.T. respectively.

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A REVIEW OF THE LATEST DISCS

By E. Reid-Warr

There is still a shortage of the more ephemeral type of orchestral works on records, most of the lists being made up of records of famous operatic music. We will begin with the songs which still top the lists. Another Caruso record has been a real sensation. John Hendrik, that very good German tenor, has made another excellent record in Partenope RI1617. He sings two Lehár songs in German—Gipsy Love and The Chocolate—a kind of cinematic effect. This young man is so very good that it is difficult to believe that he was working as a clerk less than four years ago. Now he is well on the way to fame. Another cheering example for amateurs!

Talking of amateurs, have you heard the Hon. W. W. G. Hay? Here is a baritone who is a very fine artist from every standpoint. The entire rewards of his efforts benefit charity, hence his amateur status. His last record contains two light trifles, This Lovely Rose and When I Think of You, on Columbia DB1.120. A vocal record which has much to commend it is Robert Burnett’s Edward and Wee Willie Winkie and Jenny Wf the Lang Pock on Parlophone RI1236. This Scottish baritone has a rare dramatic gift. His singing of that gruesome poem of Dalmyne’s is positively eerie. The two arias are admirably sung with the new process Calliope & Damp-Proof cone—no warping or fouling in the cap & Copper-plated Chassis with fall surround. No excessive bass, no shrill top.

Write for Catalogue P.R. 18, giving full details of this and other Blue Spot Speakers.

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CABINET MODEL 24 P.M. In oak with 29 P.M. movement and output transformer 21/6 Extension cabinet model without output transformer 40/6.


The London Palladium. Here you have a symphony performance, quite in the grand manner and yet the melody stands out in very fine relief. On H.M.V. C2563.

Medleys that are different are the two from this actual execution, and A Vision of Spring, played by the New Mayfair Orchestra. Vocals for colouring such pieces as Come, Lassies and Lads and Offenbach’s Barcarolle help to make two quite attractive pictures on H.M.V. C2565.

Another Little Time! The Comodore Orchestra (and Organ) play and broadcast 3309. It is competent—the Comodore always is—but they should have locked the organ out when the piece is too classical. Now for a really brilliant bit of playing. This is The Enchanted Forest by Ija Livshakoff’s Orchestra on Decca F3565. This new instrument is used, and the result is uncommonly attractive. The Little Company takes it up. I mention here with pleasure The Black Gipsy and The First Flowers May—two tangos by the Dajos Fels Dance Orchestra. These are Parlophone RI1510.

I like Mark Hambourg’s playing of Beethoven’s Sherry Minor (The Moonlight) better than anything by him for a long time, not, perhaps, so much from the actual execution, but from the artistic interpretation, which is very satisfactory. Hear H.M.V. C2547 with the fourth side containing a positively enchanting piece—Beethoven’s Adagio from his concertante. The chief interest lies in this new instrument which has no hammers, but electro-magnets and a loud-speaker! The result is a kind of cinema organ effect with amazing swell effects. John Hunt plays these pieces delightfully, and has great skill with this new invention. Definite a record to have—H.M.V. C2567.

The best humorous record comes from Ronald Frankan, who gives pungent impressions of the Preparatory School, The Public School and TheVarsity, on Parlophone RI1515. The other side is Let’s Go Mad. That loving couple (H. Billy and Hilda Munday exchange more amenities on Broadcast) 3311 (Home Chat). Then two excellent songs on Decca, Eucalyptus and The Golden Shores of Wigan on Sterno 1195. You doubtless heard Duke Ellington’s broadcast and formed, your own views! I will say that he has no doubtless heard Hot Feet and The Blues I Love to Sing on B.M.V. B6343, I feel that we should have understood it all better, had we lived in either 0000 B.C. or A.D.!
I have read in *Practical Wireless* recently quite a lot about Class B Amplification, and I would very much like to adopt this form of amplification. I understand, however, that it is practically impossible to work Class B off an average H.T. unit. If we were to scrap them and buy new ones, it is a splendid chance for the technicians for Class B, but it is rather expensive. Here on the market at present -designed specially for Class B, but it is rather expensive. Here are a few units which we generally build them so that it is merely a question of changing coils for each wavelength.

The ideal circuit for us is one with S.G., det., and 2 L.F., as with this and the necessary coils the world is within our reach. On such a set the Empire S.W. station comes in at full L.S. strength when we cannot hear our local (Colombo) owing to atmospherics. Now, sir, if you can describe a set using such a circuit the last stage might with advantage to Class B, and Class B Amplification, giving details for making the necessary coils, you would be conferring a boon on all readers outside England.

**CUT THIS OUT EACH WEEK**

**DO YOU KNOW?**

- THAT if signal strength is not reduced when the earth is removed the earth connection is inefficient.
- THAT a mains A.C. receiver can always be used on mains of higher frequency than that for which the set was designed, but it should not be used on mains of lower frequency.
- THAT at no time can a Detector receiver be used on mains of higher frequency than that for which the set was designed.
- THAT if signal strength is not reduced when the earth is removed the earth connection is inefficient.
- THAT a mains A.C. receiver can always be used on mains of higher frequency than that for which the set was designed, but it should not be used on mains of lower frequency.
- THAT to make a portable set it is always best to convert the loudspeaker back to the original mains system.
- THAT when selecting the value of bias resistance for an A.C. pentode the anode and screen grid currents must be added together.
- THAT good reception can often be obtained by dispensing with an aerial and connecting the earth lead to the aerial terminal.
- THAT fitting ear valves to an old set often causes instability.
- THAT when decoupling is provided there is no harm in wiring a new high-voltage battery in series with a partly exhausted one.

**NOTICE.**

Articles should be written on one side of the paper, with neatly printed titles and address of the sender. All correspondence should be addressed to the Editor, *Practical Wireless*, 2nd Floor, 30 Southampton Street, Strand, W.C.2.

Upping to the rapid progress in the design of wireless transmitters and receivers it is time for the manufacturers to think of new ideas. Such ideas are not only useful, but they are also a boon to all readers outside England.

**THE SUN DRIES**

**26 FILT EJACH**

**HOME-MADE ATMOSPHERICS!**

Before engaging yourself to "atmospheric" examine your receiver for faulty contact points. Then fit Clix Perfect Contact Terminals, Plugs, Spades, Valve-holders, as consistently used by the designers of "Practical Wireless" sets, and enjoy reception free from home-made interruptions.

**LECTRO LINX LTD., 79a, Rochester Row, London, S.W.1.**

**FIT THIS ELECTRIC CLOCK TO YOUR SET!**

**COMPLETE WITH BATTERY**

**176 COMPLETE WITH BATTERY**
PRACTICAL LETTERS

(Continued from page 522)

Price of Components Wanted in Specification

In my opinion, it is generally better to
maintain its high standard, and I must say it is its style that attracts me, almost as much as its contents. Furthermore, the authors express themselves very clearly, so that the average amateur can understand, and not only quickly, but the little.

But there is one complaint to make. Quite sensibly you give a clear and definite list of all the parts required to build one of your sets. But why give your price as well?

I know you say that advertisers state prices for kits; but this is not really satisfactory. To my mind it is an unfeatherweight possibility, for instance. About one advertisement appears. This states price of kit, excluding panel, baseboard, cabinets, and speaker.

What about the cabinets, baseboard and panel? Have I got to wade through all the literature about the set to find out about these; and then remain ignorant of the price? Why could you not put the price of the components in the specification?

It would be so much more convenient.

After all, the very first thing one must know about a set is its price.

O. C. Cauty (Marlborough).

[This matter is under consideration. — Ed.]

From a South African Reader

Sir,—I have been a subscriber to at least two wireless papers since wireless existed. The circumstances here are somewhat similar to those existing in England in 1903. We have no necessity for selectivity and dual range coils. Our nearest station is Johannesburg three times as far as the City of York in England.

We have not had an opportunity to look carefully through it yet, but a rough glance at the early eighties I have been interested in electricity, and the earlier numbers of the wireless papers were devoured by me. Lately I have devoted (as far as I'm concerned) time to selectivity, etc., and in the above circumstances these things do not interest me. Consequently the coming of Practical Wireless has been a godsend. I like your paper because you discuss fundamentals as well as the technical requirements of the conditions in Europe.

Here is a suggestion: Why not publish a series of articles dealing with the signal man's problems and with the operation of certain stations, tracing it through the receiver until it emerges from the loud-speaker, treated with the same care as a boy of fifteen can understand. Youths of that age are better qualified to study wireless than older people.

Thank you for the wonderful Encyclopaedia which has just come to hand— I made use of the moment I received it, to decide what mode resistance to use in an R.C. coupled L.F. valve.

In my opinion the four most outstanding events in wireless to date are: the Screen Grid, Class B amplification, The Empire Short-waver, and Practical Wireless.

M. C. Calmore (Salisbury, Rhodesia).

The Faultfinder's Vade Mecum.

Sir,—My copy of "The Wireless Constructor's Encyclopaedia" is to hand. I have not had an opportunity to look carefully through it yet, but a rough glance at the early editions was very interesting.

I am a television enthusiast, having had some experience on the manufacturer's side in its early days.

Coil winding data is also exceedingly useful, and other material seems to be level with radio progress. As a faultfinder on cellular phones, and with nearly twelve years' experience, it is my opinion that all faultfinders should be in possession of a copy of the Encyclopaedia; it would light up my dark studio. Suggestions to your instructive journal, and please carry on the good work, and boost up television progress.

W. J. Butterfield

(Seven Kings, Essex).

PRACTICAL WIRELESS

July 1st, 1933

BLADE RADIO

SLADE RADIO

WIRELESS

THE THREE STAR NICORE

(Continued from page 512)

"H.T. +2" will require the full 190 volts. Connections to the accumulator require no explanation and the spade terminals are approximately marked with plus and minus signs.

After everything is connected up the set is ready for its first trial. By tuning in on, just examine the drawing which shows the positions of the controls and which was reproduced at the foot of page 488 in last week's issue. The waveband switch to the waveband required—clockwise rotation gives medium and anti-clockwise rotation gives high waveband. The spade terminal of the on-off switch is the "in" and the corresponding one is the "out". When the key is pressed on the tuning knob the on-off switch is thrown to "in" position.

The final step in the process of making the receiver really work is to turn the trimmer on the side of the second section of the tuning condenser. This latter is operated by means of the tuning coach. It can be easily turned with the finger tip. First tune in a fairly weak signal about the location of the station and, leaving the trimmer knob on the panel in the central position, move the tuning coach until the signal is as strong as possible.

This setting will hold over both tuning ranges so that all delicate and final tuning adjustments can be made for any station merely by turning the panel trimmer knob, which incidentally operates on the first or aerial section of the gang condenser.

If D.X. reception is your favourite occupation you can now commence to "search" in confidence that the set is working efficiently. Should it ever be found that some fault has crept in, I am sure you will agree that giving good speaker reception, its volume can be increased by screwing down the control. Should you wish to reduce the bias voltage applied to the first valve, the bias voltage applied to the first valve.

In connection with this latter point it might be explained that signal strength is greater with "H.T. +2" than with "H.T. -2", but that selective tuning, which is improved by increasing the voltage, has become a universal practice. Hon. Sec., 110, Hilliers Road, Gravely Hill, Birmingham.
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The coupon on this page must be attached to all letters containing queries.

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PRACTICAL WIRELESS
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A range of “Square Peak” mains receivers and radio components, which will welcome a new and comprehensive catalogue recently issued by Ward and Goldstone, Ltd., Wood Street, Pendleton, Manchester. A useful range of domestic and portable aerials, made of fine nickel-chrome wire embedded in bakelite. The action is through a slipper plate, giving a smooth, silent operation. Among the other components listed are a new B.F.C. choke, grid leaks, “Obilite” resistance, direct and indirect filament, valve holders, and “Fit,” the new geriatricus tube. The address is Mason’s Hill, Bromley, Kent.

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TIT-BITS

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GEO. NELL, I.
STRAND MAGAZINE

In the July Number

FRANCIS BRETTR YOUNG

the famous author of “The House Under the Water,” the year’s best seller, “Portrait of Clare,” and other novels, very rarely writes a short story, and the STRAND has been very fortunate to secure his latest one, which is entitled “The Magnet.”

GILBERT FRANKAU
returns with a very clever story, “The Little Bride.”

F. TENNYSON JESSE
has an exciting adventure and mystery story entitled “The Human Touch.”

ROLAND PERTWEE
writes a fine romantic story called “Getting Happy.” W. B. Maxwell, Elidor Mordaunt, and H. H. Bashford are other well-known authors with complete stories in this number.

SIR JOHN FOSTER FRASER
contributes a very entertaining article on holidays at sea, entitled “Those Cruises.”

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