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ROUND the WORLD of WIRELESS

Concert from Midland Regional

In a Midland Regional studio concert on September 10, Eveline Stevenson (soprano) sings two songs composed by Michael Mullinar, the Birmingham pianist, and four of Liza Lehmann's Cycle of Bird Songs. Later on in the evening The Three Knaves (Jack Wilson, Jack Hill and Basil Hempseed, pianists), with Gerald Martin as vocalist, will give a programme of tunes old and new entitled "At Random."

In the Scottish Regional Programme

On September 12 variety will be broadcast to Scottish Regional listeners from the Empress Playhouse, Glasgow, one of the most popular variety theatres in the country.

The Scottish Military Band will give the T.T. course (226 miles, completed in six laps) under T.T. conditions, they must needs do it for the fun of the thing alone, not for a living.

"Amateur Film Societies"

This is the subject of the talk which Mr. F. Heming Vaughan, Honorary Secretary of the Merseyside Film Institute, will contribute to the "Schemes" series on September 14. Mr. Vaughan's scheme is a simple one: he would like to see the establishment of more film societies working on similar lines to the Merseyside one. That is to say, they would confine themselves to "documentary" pictures—constituting valuable records of local life, scenery and customs—rather than vying with, as is the general practice, the productions of commercial film companies.

The St. Leger

A running commentary on the St. Leger race at Doncaster will be broadcast by Mr. R. C. Lyle on September 12. This race dates back to 1776, when Colonel Sir Anthony St. Leger instituted a sweepstake of twenty-five guineas each for three-year-old fillies and colts. In 1861 six horses were entered, and no one can then have anticipated that from so small a beginning would result the famous "classic" of to-day.

Glanhowy Concert Party

A Welsh concert will be given on September 12, when the Glanhowy Concert Party, conducted by D. M. Williams, will sing choruses and glees. This concert party has broadcast on many occasions, singing both Welsh and English part-songs; it has also had special engagements for film productions. Tom Williams (baritone) will be the soloist at the concert, singing two groups of Welsh songs: he won the baritone solo competition at the Wrexham National Eisteddfod last year.

"Last Load Home"

After-Harvest celebrations in the Tithe Barn at Little Twittering will be broadcast in the National programme on September 22, producer Frederick Grisewood, of "Our Bill" fame. The customs in the British Isles associated with the end of harvesting are a curious survival of pagan rites. Mr. Grisewood will introduce just that touch of tradition to his programme to justify the description of "good old-fashioned harvest" as a sub-title to "Last Load Home."

Seaside Variety

Another programme of seaside variety will be broadcast to the Scottish Region on September 14th, relayed from the Winter Gardens, Rothesay, when a popular cast will include Charlie Kemble, Jack Antony, Terry Wilson, Billy Oswald, Alan Montgomery, Hilda Mescham, Sylvia Watt, Janette Eadie, Mary Thomson, The Caledonians, and the Rothesay Entertainers' Band.
ROUND the WORLD of WIRELESS (Continued)

"Golden Dragon City"

THIS is the title of a play which will be broadcast on September 17th in the National programme. It is a fantasy typical of the manner of the author, Lord Dunsany, and has been written specially for broadcasting as were his previous plays, "The Use of Man" and "Bureau de Change." As there are only three characters in the production, it will be an all-star cast. The play will be produced by Lance Sieveking, who adapted for the microphone Dunsany's stage play, "If," and in which Henry Ainley played his original part in the broadcast version.

The Final Assault at Baku

IN the late summer of 1918, 1,200 British troops, drawn exclusively from Midland and Northern units, and commanded by Acting Brigadier-General L. C. Dunsterville (original of Kipling's "Stalky"), defended the great Caspian oil centre of Baku for six weeks against repeated Turco-German attacks. One of the combatants, Mr. Leslie R. Misen (now Director of Education for Wigan, but formerly captain and adjutant in the 7th Battalion the North Staffordshire Regiment), will broadcast a description of the final assault and the subsequent evacuation, on its sixteenth anniversary, September 14th next.

H.M. Royal Marines Band

ON September 14th West Regional listeners will hear the Band of His Majesty's Royal Marines, Plymouth Division, conducted by Lieutenant F. J. Ricketts, which will be relayed from the bandstand, sea front, Paignton. Included in the programme will be the March Fantasia, "Colonel Bogey on Parade," which was written by Lieutenant Ricketts under the name of Kenneth Alford. In front of the bandstand (there is a large awning under which the audience sit as a protection from the sun and rain) when the weather is bad the sides are covered with canvas so that it can become effect a marquee.

Cabaret Concert from Burnham-on-Sea

PLAYTIME," the original cabaret concert party presented by Nat. Day will be relayed from the Esplanade Pavilion, Burnham-on-Sea, to West Regional listeners on September 15th. This production has now played its tenth summer: it has been engaged for resident summer at such popular centres as Folkestone, Ramsgate, and St. Leonard's.

Welsh Girls' Broadcast

FOUR girls will entertain in a Welsh programme which is described as an interlude—amusing and grave—on September 11th. The artists will be Mair Howells (song and satire), Dilly Griffiths-Davies (merry and serious), Amy Thomas (singing penillion) and Rhiannon James (harp). The programme has been arranged by Idwal Jones.

The Marconi 20 kilowatt transmitter at the Trondelag Broadcasting Station in Norway, which has just commenced operation. This transmitter embodies the "series modulation" system.

SOLVE THIS!
PERMEABILITY
AND OTHER MODERN TUNING SYSTEMS

The Design of Tuning Circuits has been Considerably Improved of Late, and Some of the Latest Principles are Described Below. By FRANK PRESTON

Permeability Tuning seemed to be an obvious application of the iron-cored principle because, if the core was very long, it had the effect of increasing the inductance—and hence the wavelength to which it would tune—of a coil, it should be quite possible to secure a uniform variation in inductance by sliding the core into, and out of, the windings. When experiments were first taken in hand, however, it was immediately realized that many serious difficulties existed. Not the least of these was that of designing the shape of the core and of the former upon which the windings were placed that a uniform variation in frequency or wavelength could be produced by a steady movement of the core. It is not necessary to point out all the various troubles which were encountered, but it is sufficient to say that they have all been solved by at least two coil manufacturers. The solution has been found in the use of two cores and a conically-shaped tubular coil. The latter statement is not quite correct because one of the ferrous "cores" can more correctly be described as a shell, since its position is outside the windings.

Uniform Efficiency and Selectivity

The advantages of permeability tuning are many, although the mere fact that the tuning condenser is entirely dispensed with is of little significance. The chief advantages are in respect of the far greater efficiency and uniformity of results which the condenserless tuning system gives. It is well known that the efficiency, and also the selectivity, of an ordinary coil-and-condenser tuning system varies appreciably between the extents of its wavelength range. For example, the dynamic resistance (which is a measure of tuning-circuit efficiency) of a coil-and-condenser combination is roughly inversely proportional to the capacity in circuit. In other words, efficiency falls off as the wavelength is increased by advancing the condenser setting.

On the other hand, the magnification afforded by the circuit, which is a measure of selectivity, varies in the opposite manner; that is, the degree of selectivity provided becomes less as the capacity in circuit is reduced, or as the combination is tuned to a lower wavelength.

Both of the objections just referred to are almost entirely obviated by employing a permeability tuner, in which the capacity remains sensibly constant regardless of the wavelength to which it is adjusted. Besides having these important advantages, the permeability tuner also possesses the advantage of the increased efficiency given by the iron core, which permits the use of far fewer turns of wire for any given inductance value.

The Effect of Permeability upon Receiver Design

The benefits to be derived by the use of permeability tuning which have just been referred to are of particular importance in the case of a "straight" circuit, whilst they are by no means insignificant even in a superhet. They make it possible to design a "straight" circuit receiver which is simply selective for all purposes, and which is uniformly sensitive and gives the same degree of selectivity over the whole of both wavelength ranges. Bearing these facts in mind, it is safe to speculate that, despite the firm hold which the superhet has now obtained, the popularity of the multi-H.F. receiver might increase very considerably during the coming months.

Permeability tuning is extremely beneficial in any receiver which has band-pass tuning, because it makes it a far simpler matter to obtain a constant band-width over the whole range of wavelengths.

(Continued overleaf)
With other more conventional tuning systems it is common to find that, although the band width covered at, say, 200 metres, it is reduced to, perhaps, 5 kilocycles at 600 metres. This means that if the receiver is adjusted so as to give the best quality reproduction at one wavelength, its performance will fall short at another. It might be argued that such irregularities could be overcome by the use of some control, but that involves further complications, and does not prove so efficient; after all, it is only a case of earing, rather than preventing, the trouble.

**Permeability I.F. Transformers**

Not only has permeability tuning been applied to circuits of the high-frequency type, but also to intermediate-frequency transformers used in superhet. It has been the custom to design these to give a certain band width of between 4 and 9 kilocycles, but such a fixed frequency was often found to be unsuitable in many instances. The narrow band width was required in order to obtain the degree of selectivity necessary in certain instances, which was to be retained when good quality reproduction was desired. Certain makers overcome the trouble in some measure by winding the primary and secondary I.F.coils on separate formers which could be moved in relation to each other. This was not an ideal arrangement, because it necessitated the removal of the screening cans when adjustments were to be made. This difficulty has been completely overcome by adopting permeability principles, and providing an adjustable coupling between the primary and secondary, the variation being secured by the movement of a small ferrous core. When the core is passed through both coils the coupling is at a maximum, but when it is moved along, the coupling is diminished and the band width narrowed.

The R.I. "Mitron" coil, which was one of the first to employ permeability tuning. Sliding cores are used to match up exactly the coils and to secure correct matching over the wavelength range.

**GRID-BIAS DIFFICULTIES**

Our post-bag always contains a large number of letters from constructors who are not satisfied with the quality of output from their receivers, and when we go carefully into these complaints we often find the causes are usually unsuspected by the owners and all sorts of tricks are tried but the right one.

One of the commonest complaints is that the volume is poor, and when the volumes are adjusted anywhere near the maximum point there is a continual procession of crackles and sibilant sizzles in the loud-speaker. In several cases the constructors have endeavoured to overcome the difficulty by fitting lower impedance valves using higher plate voltages and necessarily higher grid-bias because they have read somewhere, or an expert has told them, this would be the remedy for their trouble. After wasting lots of time and a considerable amount of money, they find the defect persists and are then at a complete loss to know what to do.

**Measuring the Current**

The first thing the Sherlock Holmes of radio would do would be to buy, purloin, or borrow a milliammeter to assist in the research, and then remember that it is no use going to a considerable amount of trouble with the output stage until you are sure the preceding valves are behaving themselves and that the work which you are called upon to perform correctly. For instance, what is the use of having an output valve which will deal with a big grid voltage swing when the first low-frequency valve is being overloaded? No amount of correction in the latter stage will overcome the trouble if the preceding valve is suffering from such a bad complaint. If it is passing bad material on to the next valve the only thing that valve can do is to make the best of a bad job.

It is, of course, quite an easy thing to find out whether such a fault is taking place in the first I.F. stage. First of all, connect the milliammeter in series with the plate lead of the valve and watch carefully the movement of the needle. It will generally be found that when certain notes are sounded the pointer will give a big kick. Should this occur you may be quite sure in your mind that the valve is not capable of handling the big changes in grid swing, because the adjustments you have made with the grid-bias are incorrect and prevent the valve from doing its work advantageously. Try various tappings in the G.B. battery, and if you find it is impossible to correct the fault in this way then you can rest assured that the correct valve is not being used in that position and one should be chosen with a lower impedance. There is one very interesting point in employing a milliammeter for this purpose, and that is that only draws your attention to the fact that distortion is the taking place, but it permits you to adjust the voltage.

(Continued from previous page)

PRACTICAL WIRELESS

September 8th, 1934

The second-channel interference and in many instances makes it possible to dispense with the usual band-pass input filter. Provided that the I.F. transformers are carefully designed and the capacitance of the low-loss coupling condenser— it is actually possible to secure increased efficiency by their use.

**Variable Selectivity**

Because of the extreme selectivity provided by the superhet, this type of receiver has been open to the criticism that it could not possibly provide "quality" reproduction. The band-pass input filter was designed in many cases to respond to a band of frequencies no wider than about 5 kilocycles in order to ensure the greatest possible freedom from interference. Although this was good enough in the case of long-distance reception, the reproduction was by no means as good as many desired. Several superhet are now fitted with a variable-selectivity device, by means of which the band width of the input filter can be varied at will. In one example, in which the band-pass coupling is inductive, the coupling coil is tapped so that portions of it can be short-circuited by means of a rotary switch. This is to be tried out by the constructor who makes his own coils, whilst the similar device used in strictly low-loss coupling condenser in a capacitative filter can also be experimented with. In the case of inductive coupling, the larger coupling coil gives a greater band width, and with capacitative coupling the band width is reduced by increasing the capacity of the coupling condenser.
AUTOMATIC PROGRAMME SELECTION
How a Receiver Can be Converted for the Automatic Selection of Alternative Programmes

As it is possible to receive alternative programmes in most parts of England, it is convenient to construct a receiver which will be automatic in its selection of these programmes. Of course, battery adjustments and adjustment of volume will still have to be carried out by hand, but the actual tuning-in can now be dispensed with, and a "fool-proof" receiver made up which can be operated by the lady of the house or the youngest member of the family with the very simplest of movements.

Semi-variable Condensers
The necessary accessories to convert an existing receiver into an automatic one are—

for a two-station selection—one single pole change-over switch (of the push-pull type) and two pre-set condensers. These latter are sometimes known as semi-variable condensers and are quite small, being adjusted by means of a small knob on one side of the component. The switch and two condensers will, of course, take the place of the usual tuning condenser, and in the majority of cases the switch can be affixed to the panel in the hole previously used to hold the tuning condenser. These components usually have a three-eighths fixing bush if they are of the one-hole variety. The two small condensers may be screwed to the baseboard in any convenient spare place, provided that they are not too far removed from the actual tuning coil. One terminal on each of the condensers is joined to the longest and shortest arms of the switch, and the remaining two terminals are connected together and then taken to the grid condenser. The medium arm of the switch is connected to earth. Particular attention should be paid to this method of connection, or troubles may be experienced in accurate tuning. The sketch, Fig. 1, should make the arrangement perfectly clear.

To Operate
Place the switch in one position and then carefully adjust the condenser which is in circuit. This should be done with a long, thin strip of wood having one end sharpened in the manner of a screw-driver, or some other device which enables the knob to be adjusted from a distance to avoid hand-capacity effects. Tune in one of the stations to its loudest (ignoring, if possible, for the time being, the reaction control, if the receiver is fitted with one). When perfectly tuned in, change over the switch and do exactly the same thing with the other condenser, this time tuning-in the alternative station. The operation of the switch will now enable either of the stations to be heard, and the tuning of each condenser is entirely independent. The reaction control, in receivers where such is fitted, may be operated simply as a volume control, being turned in the required direction to bring the volume of the received signal to the desired strength. If you do not own a receiver at present, but contemplate building one, and wish to use this method of tuning, simply ignore the tuning condenser shown in the wiring diagram of the receiver you intend to construct, and substitute the two pre-set condensers and the switch.

Automatic Switching
If more than two stations can be clearly received in your locality, and you desire to employ automatic switching, the simplest way to arrange matters is to use Clix sockets and a Clix plug, as shown in Fig. 2. The sockets should be arranged in any desired pattern on the panel, each socket being connected to one side of the pre-set condensers and the plug being connected to earth. The free terminals of the condensers are then all connected together and connected to the grid condenser. Fig. 3 shows this arrangement, whilst Fig. 4 shows how to gang a pair of push-pull switches.
Some Interesting Details Concerning the Subdivision of Receiver and Amplifier, and other Points Relating to Controls

Eliminating Hum

The main trouble with receivers which are operated from the A.C. mains is hum, and although smoothing circuits may be fitted to reduce the amount of hum, there is always the possibility of hum being introduced through the medium of induction, and the only cure for this type of hum is complete and adequate screening, or wide separation of the components which carry alternating currents. Therefore, by using a separate small chassis for the mains equipment this may be widely separated to prevent hum being picked up by the H.F. or detector stage. This is done in the Armada Mains Three, where the mains unit is stood above the receiver chassis. We may go farther than this, however, as the low-frequency stages are very unlikely to suffer from the induction of A.C. currents, although, should they do so, the subsequent amplification is not sufficient to make the hum troublesome. The receiver may, therefore, be quite comfortably split after the detector stage, so that one chassis will contain the H.F. stages and the detector valve with its associated anode load, whilst the second chassis will contain the L.F. stages and the mains equipment. In this condition the experimenter has a very valuable arrangement, as he may try any type of circuit by building it on a separate chassis connecting the finished apparatus to the amplifier, and knowing the performance of this part of the complete equipment, he will be in a more favourable position to judge the performance of the experimental apparatus.

Easier Accommodation

In these days of multi-valve receivers it becomes something of a problem to house a complete chassis in a cabinet, unless the double scheme is adopted. Even with a radio-gramophone cabinet the shelf which is provided at a suitable height for control purposes is generally too narrow to accommodate a really substantial chassis, and therefore the subdivided arrangement has to be adopted, with the result that the mains section, together with the L.F. equipment, is placed on the floor of the cabinet and this spacing undoubtedly does much to eliminate hum troubles. The question of the controls may also be considered, as it is obvious that the majority of people to-day do not like the appearance of a range of knobs on the front of a cabinet. Apart from the difficulty of the uninitiated knowing how to adjust more than three controls, there is the untidy appearance which results from vari-sized knobs, with white-filled lettering and the cut-out tuning scale which is seen on the majority of receivers to-day. By way of illustration concerning all the above-mentioned points, the two pictures on this page will give the reader a good idea of how these various points have been carried to a really logical conclusion. The receiver is the new H.M.V. radio-gram, and it will be seen that not only has the complete equipment been divided as mentioned above, but a further novelty has been introduced by mounting the H.F. and detector stages (this is a novelty) in a vertical position on the side of the cabinet. Another departure from accepted practice is to be found in the fact that the tuning and other controls are operated from one end of the chassis, and thus 'they protrude in an upward direction, and as the apparatus is a radio-gramophone, a space has been provided at the side of the turntable for the control panel. Here also are to be found the radio-gram switch, the on-off switch, and all other essentials, except the volume control. Thus, the lid is raised to tune in a station or place a record into position for playing, and the lid is then closed. Thereafter, if any modification in the volume of sound is required, one small knob situated on the front of the cabinet may be adjusted, and this is gauged to operate on both radio and gramophone.
A Novel Electric Lock

A novel electric lock for a wireless cabinet can easily be constructed from a few odds and ends, as shown in the accompanying sketches. The parts required are a small bell coil, one bell push-button, two strips of brass, one metal pin or nail. In the edge of the cabinet two slots are cut, in the upper one of which the bell bobbin is mounted. In the piece of wood separating the slots a hole is made to take an iron pin or top part of a stout nail, as shown. On the edge of the door a bent piece of brass, with a hole through it, is screwed in place so that when the door is closed the brass piece enters the lower slot, allowing the iron pin to enter the hole, so locking the cabinet. The winding of the bell bobbin is connected to the L.T. supply, a bell push being inserted in the circuit, as indicated. On pressing the push the iron pin is raised thus allowing the door to be opened.—R. HUGHES (Wallasey).

A Valve Oscillator for Morse Practice

The use of an old intervalve transformer forms the basis of the idea described below. The transformer was used in a valve oscillator built for morse practice, the circuit used being as shown in the accompanying diagram, in which R is a high resistance (a 4-megohm leak). If the valve still oscillates when the key is raised the value of R should be increased. The condenser C shorted across the primary of the transformer is optional; the larger the value of C the lower the note heard in the telephones. It is essential that the transformer is connected up in the correct way. An old power valve was used with perfectly satisfactory results. If it is found that the note heard is too low, the core should be removed from the transformer and the strappings replaced one at a time until a suitably pitched note is heard. The core can then be built up with cardboard if it is desired to place the transformer back in its casing.—T. B. LANE (St. Albans).

A Handy Holder For Screws

This easily-made holder will be found very handy on the workbench. It is made with an old gas bracket, four electric light switch caps (either brass or bakelite) and two pieces of strippwood. I have used white bakelite covers, and washers large enough to cover the threaded holes are used to clamp the covers to the wooden rods by means of 6B.A. nuts and bolts, small screws, nuts, bolts, etc., can be kept always at hand in this simple holder, and small labels can be stuck on the side of each "tray" to indicate the contents.—F. SANDERS (Paignton).

An Adjustable Wire Stripper

The accompanying sketch shows a pair of buttonhole scissors converted for wire stripping. The "V" notches, which are bevelled to provide cutting edges, were formed with the aid of a triangular file. The gauge screw (S) limits the movement of the blades. To set the screw the scissors are lightly closed on a bared portion of the wire in use. The screw is then adjusted to restrict further movement, and locked by means of the milled nut. In the wire stripping operation the wire is placed in the "V" notches, and the blades closed as far as the screw will permit. The wire is then rotated and pulled, when the insulation will come off in the form of a tube. By suitably filing the edge of the blades, other uses may be found for these scissors. —STEEFSON RAINES (Wishaw).
**READERS' WRINKLES**  
(Continued from previous page)

**Safeguarding Small Drills**

UNLESS great care is taken when using small diameter drills, breakage is almost certain owing to the drill bending and then snapping off. This can be obviated by using a short, hard brass sleeve having a longitudinal saw cut, as shown, to within a quarter of an inch of one end. The saw-cut enables the sleeve to grip the drill when the whole is assembled in the chuck. The bore of the sleeve should be just slightly larger than the drill to be used.—H. H. CRAWLEY (Oxford).

**An Easily-constructed Wireless Switch**

THE only materials required for this novel switch are: one wooden spring clothes-peg, one piece of wood 3 in. square by 3/16 in. thick, two lengths of copper wire, and four 3 in. nails. Use two of the small nails to fix the clothes-peg to the 3 in. square of wood, then drive into the square of wood the other two nails, one on each side of the jaws of the clothes-peg. Attach one length of the insulated copper wire to one of the nails, then across the lower jaw of the clothes-peg, and attach to other nail. Next, attach the other length of insulated wire to the top of clothes-peg, then bring it over the front and underneath the top half. Bare the copper wire where it touches the other wire, which must also be bared, i.e., in the jaw of the clothes-peg. Now bare the other ends of the insulated wires and attach one of them to the positive terminal of the accumulator and the other to the negative terminal (L.T.) to the wireless set. Switch the set on, and it can then be switched off and on either by hand, or by placing the switch on the floor and working it with the foot (a method which will probably greatly mystify listening friends).—D. A. GREEN (York).

**Self-indicating Fuse**

A RATHER novel self-indicating fuse can be constructed by shunting a neon lamp across a fuse board. A standard 220-260 volt neon lamp can be purchased through any electrical dealer for about 3s. Fix a bulb socket beside the fuse and connect the terminals of the latter to the fuse as illustrated, and insert the neon lamp. As it contains no filament inside it offers no resistance and consumes no current so long as the fuse remains intact. But on the fuse burning out the current will pass between the electrodes inside the lamp and impart a soft red glow.

**A Turntable for a Portable Receiver**

THE sketch shows how a turntable can be made for a portable wireless receiver. All the parts that are required are given below:

- 3 pieces of wood 15 in. long 1 ft. wide and 3 in. thick.
- 2 pieces of wood 15 in. long, 1 in. wide and 3 in. thick.
- 2 pieces of wood 9 in. long 1 in. wide and 1 in. thick.
- 1 cotton reel with 1 in. flange.
- 1 11/2 in. screw.
- Half-a-dozen 3 in. nails.

Take one of the large pieces of wood for the stand and nail the four smaller ones around the top edge. Saw the cotton reel through at an above the flange and screw the plate in the centre of the stand. The top of the boards which are around the edge of the stand must be level with the top of the flange of the cotton reel. A hole is then bored in the other large board so as to enable the cotton reel to pass through it. The flange of the cotton reel now acts as a turntable for the top board, upon which the set is placed.

**Home-made Pick-up**

MOST amateurs have in their "junk-box" an old telephone ear-piece and possibly possess a portable gramophone whose sound-box is no longer a thing of value. The diaphragm and needle-arm are removed from the sound-box, and the cylindrical piece which fits into the tone-arm is sawn off and the hole enlarged by drilling, or filing, until the pole-pieces and coils of the earphone magnet (previously removed) can pass freely through it.

**A novel aerial-earth switch.**

**An Improved Aerial-Earth Switch**

FIRST of all remove the knife blade and insert a strip of copper after bending it at an angle of about 14 degrees. Drill a hole in one end and attach a 2 B.A. rod with an ebonite knob at the other end. Bend it at an angle of about 14 degrees. Drill a hole in one end and attach a 2 B.A. chuck. The bore of the sleeve should be almost certain owing to the drill bending and then snapping off. This can be obviated by using a short, hard brass sleeve having a longitudinal saw cut, as shown, to within a quarter of an inch of one end. The saw-cut enables the sleeve to grip the drill when the whole is assembled in the chuck. The bore of the sleeve should be just slightly larger than the drill to be used.—H. H. CRAWLEY (Oxford).

**CONVERTING A SOUND-BOX INTO A PICK-UP.**

A ring of rubber is then cut from an old motor tube, having the same outside diameter as the sound-box, the inside diameter being slightly larger than that of the hole made in the sound-box. Near the edge of the hole in the sound-box two 1 in. holes are drilled diametrically opposite each other. A piece of stout brass plate is then cut, 1 in. long and 3 in. wide. This is then drilled with three holes, the two outside ones being exactly the same distance apart as those in the sound-box. A wood screw is passed through the central hole into a slightly tapered cylindrical piece of wood about an inch long to fit tightly into the tone-arm.

Two 1 in. screws are then passed through the holes in the sound-box and the rubber ring placed in position on the back of the sound-box. The magnet is then placed in position resting on the rubber, and made stable with small strips of wood. The brass plate is then placed over the screw ends, and nut screwed on to clamp the magnets tightly in position. These nuts provide a means of adjusting the distance between the magnet poles and the diaphragm. The main diaphragm of the sound-box is then replaced by the iron one of the earphone, which is drilled with a central hole for the purposes of the unit can be overcome by arranging a counterpoise on the tone-arm.
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Some Details Concerning a Number of Interesting Components which appeared at the Recent Radio Exhibition

Although the recent exhibition featured radio receivers as the main portion of its exhibits, there were several stands upon which components specially designed for the home constructor were to be seen. It was noticed that of these many were shown for the first time, and low price was one of the principal points of interest. On this page may be seen some sketches drawn by our artist during a tour of the exhibition, and no doubt constructors will be very interested in details concerning them.

The British Pix Co. had two new items, both designed for improving aerial and earth efficiency. As a safety precaution many listeners prefer to have some form of lightning arrestor fitted to their aerials, and the neat arrestor here illustrated (4) shows a device which Messrs. Bulgin have termed a "group board," and this has spring clips provided with soldering ends, and is designed to hold resistances or tubular condensers, and will be found of great use in both mains and battery receivers for simplifying the connection of these parts. The base is constructed from bakelite, and is attached to the chassis by two screws. It is obtainable in five- and ten-way types.

Bulgin Accessories

The Bulgin stand formed a most attractive display, and it was noted that several components had been reduced in price, and amongst the new lines were some very interesting items shown in the sketch at the foot of this page. For switching purposes various suggestions have been made, and various types of contact have been devised from time to time to avoid the difficulty of noises and poor contacts caused by weakened springs and other defects. The rotary stud switch (1) is a panel-mounting device of the normal one-hole fixing type, and it will be seen that a spring arm bears on small tags, and thus cleans the contact points as it is operated, and is similar in this respect to the old-fashioned selector switches which passed the panels of the early wireless receiver. Connection to the contact points is made highly satisfactorily owing to the fact that the wires have to be soldered, and a switch of this nature should give years of service.

It is available in three types, three-way, four-way, and five-way, the prices being Is. 6d., Is. 9d., and 2s. The toggle switch, provided with a rotary movement instead of the familiar dolly action, is also shown (2), and this forms a very neat method of mounting a switch on the panel in order to maintain symmetry in control layout. This is obtainable in all the usual types, such as on-off, D.P.D.T., 4-point, wave-change, etc. A switch of more complicated form is shown in (3), and this is designed primarily for wave-change purposes. The action of this switch is very definite, and again a trouble-free type is provided, and the contacts are so designed that the switch may be used with practically any type of coil.

When constructing a mains receiver, it is generally found that a number of resistances have to be connected to the voltage supplies, and it is often convenient to connect these resistances together at one end instead of throughout. The illustration (4) shows a device which Messrs. Bulgin have termed a "group board," and this has spring clips provided with soldering ends, and is designed to hold resistances or tubular condensers, and will be found of great use in both mains and battery receivers for simplifying the connection of these parts. The base is constructed from bakelite, and is attached to the chassis by two screws. It is obtainable in five- and ten-way types.

The suppression of interference from the mains is usually carried out by connecting two fixed condensers across the mains with a centrepoint earthed, and although several suppressors specially designed for this purpose are obtainable, the connection of the device is rendered exceedingly simple in the new Bulgin Suppressor shown at (5) in the sketch. As may be seen, this consists simply of a plug which is fitted with pins on one side and sockets on the other, and it is interposed between the receiver plug and the mains socket, and thus connects the suppressor condensers in circuit without any difficulty. The addition of an earth wire is all that is required.

Volume controls have previously been dealt with, and the model shown in (6) is one of the three-watt type controls manufactured by Messrs. Bulgin, and may be used for various purposes in mains receivers.

One skeleton Q.P.P. transformer is also obtainable in the new Bulgin range, and this is provided with leads instead of terminals, and consequently is obtainable at low price.

For visual tuning, the new Cossor neon will no doubt prove very attractive during the coming season, and a special holder with a small escutcheon has been designed by Messrs. Bulgin, and is shown in (8). This will add to the appearance of home-constructed receivers as well as providing a useful indication for tuning purposes where A.V.C. is fitted.

Some New Polar Devices

We have already mentioned the Polar Midget Variable condensers, and the three-gang model shown on the facing page is only approximately 2in. wide by 3in. high by 5in. deep. It will thus be seen that...
it enables a very compact receiver to be constructed when modern iron-core coils and other midget accessories are employed. For tuning indication purposes the drives shown with this condenser are very satisfactory, and these provide a full vision scale with a very smooth action and a pointer which is clearly visible, and thus provides a very accurate reading of the condenser settler. The escutcheons are of moulded bakelite, and are attached to the panel by bolts which are fixed to the moulding, and thus no difficulty is experienced in giving a receiver a really finished appearance.

Baker (Selhurst) Radio

A new type of speaker was produced by Messrs. Baker for the coming season, and was seen at the Exhibition for the first time. This is known as the Fydelitone and is obtainable in two models, the major (45s.) and the minor (35s.). A matching transformer is included in the cabinet, which is of modern design, moulded in bakelite and obtainable in walnut or black and chromium. The overall dimensions are only 8in. by 8in. by 3in., and a new type of permanent magnet manufactured from nickel aluminium steel gives very high efficiency in a minimum of space. If it is desired to use the speaker with an existing output transformer, it may be obtained without the transformer for 37s. 6d. and 29s. 6d., respectively.

The Sinclair Speaker

A loud-speaker of very novel and striking appearance is shown at the top of this page, and this is a matched two-in-one speaker, manufactured by Sinclair Speakers, a firm which, of course, specializes in speaker manufacture. A 9in. cone operated by a special cobalt steel magnet (or an energized field where desired) is mounted in such a manner that an extension chassis may be bolted to it, and this extension has a ring magnet which operates a special high-impedance speaker coil attached to a 5in. or 7in. cone, the common output transformer being connected to act as a choke for this second speaker. The construction is very novel, and the speaker may be obtained with one permanent magnet and one energized or with two permanent magnets for 84s.

Belling Lee

We have already mentioned in our pages the novel valveholder which has been developed by Messrs. Belling Lee for the new side contact valves designed for universal mains working. The sketch on this page gives a very good impression of the method in which the contacts are embedded in slots in the moulded space, and it will be seen that this method of construction renders the valveholder very efficient and removes all the solid material from inside the pins and thus reduces the capacity. Connections are made by means of soldered joints to the pins, which may be seen at the bottom of the holder, and these are actually continuations of the contact strips. A wander plug may be the cause of very much trouble, although being a small component it very often does not receive the attention which is warranted by its use. The plug illustrated in the Belling Lee group is known as the Air Force wander plug on account of the fact that it has been developed especially for use in the Air Force where vibration would be likely to loosen an ordinary type of plug. In addition to the normal pin which makes contact in the socket, two spring-arms are provided and the socket with which the plug is used is provided at its upper surface with a lip. Consequently when the plug is pushed home, the springs grip the top of the socket and it is thus impossible to move the plug without opening the arms which requires some force. The small section of the plug will give a very good idea of the complete arrangement.

For making connection to the top tap of the screen-grid valve, a novel combined device has been developed which also makes connection with the metalised coating of the valve, and thus renders much quieter working possible. The lead is passed through a small opening at the side of the plug and a spring contact enables it to be instantly placed into position. By using a metal screened lead, the screening is developed especially for use in the Air Force wander plug on account of the fact that it has been developed especially for use in the Air Force where vibration would be likely to loosen an ordinary type of plug. In addition to the normal pin which makes contact in the socket, two spring-arms are provided and the socket with which the plug is used is provided at its upper surface with a lip. Consequently when the plug is pushed home, the springs grip the top of the socket and it is thus impossible to move the plug without opening the arms which requires some force. The small section of the plug will give a very good idea of the complete arrangement.

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AN ALTERNATIVE STATION CONTROL

By Adding This Simple Unit to Your D.C. All-mains Set, You Will be Able to Switch on the Desired Programme from Any Room in the House

The one outstanding disadvantage of the modern D.C. all-mains wireless set is that it cannot be easily moved from room to room. This means that most listeners have to content themselves by installing the instrument in the place where it is likely to be used most, and running loud-speaker extension leads to the other rooms.

It is not a very satisfactory arrangement. Even if some form of battery-operated relay switch has been rigged up so that the set can be switched on and off from the extension, it does not help the listener when he wants a change of programme. Then he has no alternative but to walk back to the other room, taking the loud-speaker with him, if he has only one, to do a little tuning.

Often he thinks what a difference it would make if he could only install some device that would give him a choice of programmes from the extension room at the touch of a switch, but up to the present no satisfactory arrangement of this sort has been suggested.

Now the solution of the problem is here. The alternative station control herein described has been designed not only to overcome this difficulty, but also to simplify the operation of the set for those numbers of the family who are not very expert at tuning in. Once fitted, it enables anyone to switch on either of two previously-determined stations from any room in the house to which the extension is run. No batteries are required, and only a length of double lead-covered cable and a single wire need be run from room to room; in fact, it is just as easily wired as an ordinary loud-speaker extension.

The Working Principle

The principle of the alternative station control is quite simple. When it is in action, each essential tuning condenser in the set is supplemented by a small pre-set condenser, adjusted to bring the wavelength up to that of the station required when the former is left at zero. One of the mains leads is left connected to the set, but the other feeds it through one of the extension wires, from the room in which the loud-speaker is being used.

The second extension wire is also used to feed the set in the same way, but in this case the condenser is first made to pass through an electro-magnet which operates an automatic switch. The engagement of this switch brings into circuit another set of pre-set condensers which boosts up the wavelength to that of the second station available.

A pair of ordinary tumbler switches, fitted in each room to which the extension runs, allow the current to be passed through either wire to the set; therefore, either of the two stations can be switched on or off at will. The single wire feeds the loud-speaker, whose return circuit is completed through the lead-covering of the cable.

The Control Unit

The control unit is built up on a baseboard large enough to carry the requisite number of condensers, the special auto-

Pre-set Condenser

A modern three-valve set having one tuned H.F. stage, may demand only the same number of pre-set condensers—two to cover the aerial tuning and two the H.F. tuning—for probably no reaction need be used to get either of the two local stations at full strength. But if the alternative

station chosen is a distant one and reaction becomes necessary, then two extra pre-set condensers, making six in all, must be used. A powerful five-valve set, incorporating two screen-grid valves with tuned circuits, should require only the same number, for with an instrument of this sort reaction is seldom called for.

First, inspect your set, tune in the stations likely to be wanted, and decide on the number of pre-set condensers needed. Remember that the units of a ganged condenser must be considered independently in spite of the one-knob control. As near as possible, to each of the condensers affected, fit the base of a small two-pin plug, connecting the two sockets one to either terminal of the condenser. Be careful to keep the leads as short as possible and yet fix the plugs in an accessible position so that the pins can easily be withdrawn when it is desired to put the alternative station selector out of action, and use the ordinary tuning controls.

The control unit is built up on a baseboard large enough to carry the requisite number of condensers, the special auto-
matic switch, and six small terminals (see Fig. 1). For the average set, where two or three units are to be controlled, a baseboard 6 in. square will do nicely—or a standard-size cigar box will accommodate the whole thing.

The Automatic Switch

This is the variable quantity, so it is best to get this rigged up first, and then mount the condensers and terminals in the most convenient positions. It will facilitate matters if an old car-lighting cut-out from some local garage can be obtained. Any type will do, and its condition doesn't matter as long as it includes a "heavy-wound" electro-magnet in working order, and a soft-iron armature for it to pull down. If this is not forthcoming, an electric bell will serve just as well when the small electro-magnets have been replaced by one with a much heavier winding—capable of carrying at least half an ampere.

The Winding

The size of this winding is most important, so before going ahead it is as well to test it out. Hook it up in series with the mains running to the set by breaking a connection at some convenient point, and then plug in an either of the leads and joining it in between. Directly you switch on the magnet should pull down the armature, which is normally held a little away from it by the action of a spring.

If the magnet works but the set will not function properly, this proves that the winding offers too much resistance, and must be replaced by one for which a heavier gauge of wire has been used. With too heavy a winding, the magnet will not become sufficiently energised to attract the armature. Should this state of affairs arise, make certain, before you go in search of another magnet, that the trouble is not being caused by the return spring being unreasonably strong. It need only just lift the armature away.

For each pair of pre-set condensers in use a pair of contacts will be needed on the automatic switch (see Fig. 2). In the case of the average set, that will mean two pairs of contacts. They can all be conveniently made from thin 1/2-in. brass strip. The moving contacts fixed to the armature are simply inch lengths of this strip mounted 1/2 in. apart on a 1/4-in. wide strip of ebonite, so that they project over the edge. A single screw will serve to keep each strip in position if the back edge is bent over to prevent it from swivelling. The ebonite is mounted on the top of the armature right at the end so that the contacts form extensions to it.

The Fixed Contacts

Before making the fixed contacts it is best to mount the electro-magnet on the baseboard—in an upright position, of course. Another piece of ebonite, exactly the same size as the first, is now screwed down on to the baseboard, parallel with its partner but 1 in. in front of it. This ebonite carries the fixed contacts, which are simply suitable lengths of the brass strip cranked so that they will meet the moving contacts when the armature is drawn down. Only a small clearance, say 1/16 in., is necessary. Small contact points can be riveted in if desired, but they are not essential.

Next secure the pre-set condensers on the baseboard, grouping them in such a way that a clear space is left at one of the edges where the lead-covered cable can be brought in. As both the leads of this cable will be connected to the mains, a pair of safety fuses will be needed. These fuses are easily made by mounting two terminals—the insulated type are best—1 in. apart, on a 1/4-in. ebonite strip. Distance pieces keep the fuses clear of the baseboard, and they are fitted an inch or so away from the edge at right angles to it. The remaining two terminals, which will be used for the loud-speaker connections, can conveniently be mounted on ebonite in a similar way and fixed parallel to the edge of the board.

The Wiring

This is shown in Fig. 3. One of each pair of pre-set condensers is fitted with a twin-fused lead of suitable length, terminating in a two-pin plug which will engage one of the sockets fitted in the set. In addition, one of its terminals must connect it to its partner, and the other to a fixed contact on the automatic switch. The corresponding moving contact is coupled to the unoccupied terminal of the plug.

The cable is secured at the edge of the baseboard by means of a small clip, which must make good connection with the lead covering. The two leads are taken, one to either fuse, the second terminals of the fuses being attached to the two wires from the automatic switch coil. In both cases, the circuit is completed through a piece of 2-ampere fuse wire joining the two terminals. From either of the fuse terminals carrying the coil wires a lead is taken off for subsequent connection to the mains input of the set.

Only the two output terminals remain, but before dealing with them it is necessary to inspect the set again. Most D.C. all-skin instruments are wired with a suitable output transformer, or filter, which obviates the necessity of connecting the loud-speaker direct to the high-tension supply. Actually, when a loud-speaker extension of any sort is installed, such an arrangement is essential to comply with I.E.E. regulations.

An Output Transformer

Make sure that a output terminals of the set are fed from a transformer or through condensers. If you find that one of them runs direct to the plate of the last valve, and the other to I.E.E., an output transformer must be added. There are plenty of suitable ones on the market and they are not expensive—but it pays to buy a reliable brand. The transformer can be fitted either inside the set or on the baseboard of the control unit, the "in-

extension unit following the loud-

speaker terminals of the set. One of the final output terminals must then be con-

nected to "earth"—if the transformer or filter is included, this connection might already be made.

The two final output terminals from the set are joined to their partners on the control unit, the earth connection being made complete by a wire running from the appropriate terminal to the clip securing the lead covered cable. So single lead covering, besides acting as one of the loud-speaker feed wires, is earthed, and the wiring complies with the I.E.E. regulations in this respect. The unearthed output terminal on the control unit takes the single wire which joins the lead-covered cable on its extension trip. Ordinary bell wire will do, but single rubber-covered flex is much better. Incidentally, this is the best material to use for wiring the control unit and extension units.

The Extension Unit

Presumably an extension unit will be wanted in the same room as the set, so that full advantage can be taken of the alternative station idea. These units consist of two ordinary turner switches and a loud-speaker plug-socket mounted on standard blocks, as used for electric lighting (see Fig. 4). Before going ahead with the extension wiring, it is best to get this first extension unit in action. The block can, of course, be fixed in any convenient spot in the room, not necessarily anywhere near the set. Probably the most convenient place to put it is on the skirting board, in which position it is
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WHEN several tuned circuits in a receiver are used, the constructor more often than not experiences considerable difficulty in ganging the circuits properly. There are so many conditions that must be satisfied before such operation is accomplished correctly. Certainly, many carefully designed circuits, both factory made and home constructed, do give satisfaction, but it is not always found that they are as selective as they might be, and while they might be quite all right at one point on the tuning dial they fail at other points.

**Correct Condenser Design**

It can safely be taken for granted that the first condition which must be satisfied is the rate of change of the capacities of all the condensers comprising the gang. This would not mean, of course, that all the condensers must be equal, although if they are equal the condition is more likely to be satisfied. Equality of the rate of change of the capacities does not alone depend on the construction of the condensers, but the distributed capacities of the circuits have to be taken into account. The mutual inductance between the primary windings will cause the zero setting capacities can always be equalized so that this condition really depends upon the construction. High quality condensers, rigidly constructed, made of plates of equal thickness and spacing are usually sufficiently alike to satisfy the condition. If condensers of different types are used and it is practically impossible to use them satisfactorily. The corresponding plates of the condensers should be made by the same tools, out of the same stock, and in jigs made with the same tools. Not only is this a definite requirement but each set of rotary plates must be mounted in the same manner with respect to other conductors, such as shields, frames, and coils. If we assume that all the condensers in the gang are equal with respect to the rate of change of capacity when the gang condenser unit is mounted in the receiver, not counting the effect of distributed capacity, several means can be found of effecting equality of the tuned circuits right through the tuning range. Shields around or near a coil will change its effective inductance, and this change will depend on frequency. The effect is usually to decrease inductance because of the bucking effect of induced currents in the shielding. Essentially, the remedy for this defect is to mount every coil in the same manner with respect to the shielding, and since it is a fact that different metals will react differently, the shields should be of the same type and thickness of metal. Another reaction effect is that of the primary coil on the secondary coil winding. The mutual inductance between the primary and the secondary will change the effective inductance in the secondary, and, therefore, the required capacity to tune the secondary to a given frequency. This demands not only that the primaries be equal, but they should be correctly placed and mounted in relation with each other and the secondary coils. Care should also be taken to choose the same type of valve to precede each primary winding.

**Choosing Coils**

When choosing coils and carefully examining them, it is not easy to tell when the inductances are equal because there is no simply way of measuring them in the circuit. They can be compared outside the receiver with a standard, but there is no assurance that the effective inductance will be the same when the coil is put in the circuit. For the purpose of this article it has already been assumed that the tuning condensers are of equal value and have the same rate of capacity change throughout their range before they are put in the circuit. But the rate of change is affected by the various distributed capacities in the circuit, such as the capacity of the grid circuit of the valve, the capacity of the secondary winding of the coil, the capacity between the two windings, and other stray capacities. All these may be considered as one fixed capacity, usually called the zero setting capacity of the circuit. It determines the highest frequency to which the circuit can be tuned or the lowest wavelength.

Most condensers are mounted in gangs and provided with small trimming condensers. The object of these condensers is to equalize the zero setting capacity of the various tuned circuits. If the normal zero setting capacity in a given circuit is equal or in some others, more or less, the trimming capacity is used in that circuit and conversely, if the normal zero setting capacity in a circuit is higher than those in the other circuits, less of the trimmer capacity is used. Just as it is difficult to tell when the inductances in a circuit are equal, it is difficult to tell when the inductances in a circuit are equal or in some cases, the trimmer capacity is used. The result is, of course, that both the inductances and the rates of capacity change may be different. Suppose the trimming condensers are adjusted at a low wavelength (high frequency) end of the dial until a given station comes in with the lowest possible signal strength. Then, when the condensers are turned so that the tuned circuits will resonate with lower frequencies (longer wavelengths), they will pull apart because neither the inductances nor the capacity rates of change are equal. The result is, the circuit will not be selective at the lower frequency end of the scale. Neither will there be sensitivity. It is quite possible that a given station will come in at two different settings. The same thing exactly can be done at the other end of the tuning dial (longer wavelengths), and it will be found as soon as the condenser is moved for the shorter wavelengths (higher frequencies) the tuned circuits will pull apart. The set again loses its selectivity and sensitivity. Now the low-wave stations may come in at two or more points on the dial or they may come in with practically the same signal intensity over a large portion of the dial. Some radio experts recommend that the trimming should be done on a distant station which comes in on the middle of the tuning dial. Some improvement in the circuit can be effected in this manner because any de-tuning effect that may result on one circuit will be compensated by the de-tuning effects resulting from either of the other two adjustments. But this is not necessarily the case, for if the trimmers are adjusted, there will only be one point at which the set works as it should and that is the point of adjustment. The best way is to set the control at the short-wave limit and then adjust the trimmer condensers until the lowest-wave station can be tuned in with the greatest strength.

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**How to Match Circuits**

Generally speaking, the difficulty of "trimming" a circuit arises from the fact that both the inductances and the rates of capacity change may be different. Suppose the tuning condensers are adjusted at a low wavelength (high frequency) end of the dial until a given station comes in with the lowest possible signal strength. Then, when the condensers are turned so that the tuned circuits will resonate with lower frequencies (longer wavelengths), they will pull apart because neither the inductances nor the capacity rates of change are equal. The result is, the circuit will not be selective at the lower frequency end of the scale. Neither will there be sensitivity. It is quite possible that a given station will come in at two or more points on the dial or they may come in with practically the same signal intensity over a large portion of the dial. Some radio experts recommend that the trimming should be done on a distant station which comes in on the middle of the tuning dial. Some improvement in the circuit can be effected in this manner because any de-tuning effect that may result on one circuit will be compensated by the de-tuning effects resulting from either of the other two adjustments. But this is not necessarily the case, for if the trimmers are adjusted, there will only be one point at which the set works as it should and that is the point of adjustment. The best way is to set the control at the short-wave limit and then adjust the trimmer condensers until the lowest-wave station can be tuned in with the greatest strength.

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The majority of the difficulties of ganging are completely overcome by using an assembly of this type, where the condenser has been chosen to accurately match the coils. A further advantage is that a wavelength-calibrated scale may be fitted.
The Pilot Kit SERVICE was founded in 1910.

### IMPORTANT

Wireless transmitting equipment, parts, kits, finished receivers for domestic or Q.S.P., or on our own system of Easy Payments. Send us a list of your wants. We will quote low prices. Domestic orders up to £10 ex-carriage and post charges paid. GREAT BRITAIN ONLY. OVERSEAS CUSTOMERS CAN SEND TO US WITH CONFIDENCE. We enjoy a special export staff and know all tariffs. We can fulfil any order, send for full list of parts, etc. Terms are NOT available to Irish and Overseas Easterners.

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**W.B. STENTORIAN BABY PERMANENT-MAGNET M.C. SPEAKER.** With matching Power Transformer, Class B or Q.P.P. Cash or C.O.D. £11/8/6. Balance in 6 monthly payments of 5/-.

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MAGNET M.C. SPEAKER.** For Power Pentode and Class B. Cash or C.O.D. £4/8/6. Balance in 6 monthly payments of 5/-.

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MAGNET MOVING-COIL SPEAKER.** Complete with matched Input Transformer. Cash or C.O.D. £1/8/6. Balance in 10 monthly payments of 6/-.

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WAY CHASSIS MODEL.** Complete Kit, comprising 4 components, including set of 4 Lenses, Valves, Cash or C.O.D. £7/17/6. Balance in 12 monthly payments of 5/-.

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Everyone is talking about the new W.B. STENTORIAN, the wonderful new Speaker with an exclusive "Nita I" Magnet which gives nearly double the power of any previous 'commercial' speaker, whilst a new method of speech coil assembly obtains astoundingly lifelike reproduction. It also has an improved 'Microlode' device which provides accurate matching with any set, or when used as an extra speaker. Whatever your set, the STENTORIAN will definitely effect an unbelievable improvement.

YOU MUST HEAR THIS MARVELLOUS NEW SPEAKER ON YOUR SET

Here's our offer to approved customers Send only 2s. 6d. deposit and we will send you the W.B. Stentorian Senior 'carr. paid) for 7 days' trial with your set. If satisfied, you pay further 2s. 6d. at once, then 8 monthly payments of 5s. Od. (Cash, in 7 days, 42s.)

SEND OWL 2'6 DEPOSIT

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NUMBER ONE, EDMONTON, LONDON, N. 18
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Simple rules for Disturbance Suppression

Always fit a Suppressor (H.F. Mains Filter) as near as possible to the interfering appliance and as far as possible away from the radio receiver. The best position is at the source, next best at the listener's main switch (meter board). In 9 cases out of 10 the standard 10/6 condenser filter in one of these positions will suffice. The remaining cases require special suppressors as examples shown.

Write for this book which gives details of the methods evolved by the Post Office and by engineers throughout the world for the suppression of electrical interferences with Broadcasting. Write now, enclosing 6d. in stamps, for NEW 1935 RADIO HANDBOOK describing these chargers and showing how to build your own mains unit, etc.

Pr. W. 8.9.34
SUPPLEMENT TO "PRACTICAL WIRELESS"

AMATEUR TELEVISION

TELEVISION AT OLYMPIA

By H. J. BARTON CHAPPLE, B.Sc., A.M.I.E.E.

EACH year, as the time for the annual radio exhibition at Olympia approaches, rumours and stories are current concerning the exhibits which will be shown dealing with radio's newest ally, namely, television.

One item which undoubtedly had a marked bearing on any proposals which were advanced concerning possible exhibits was the fact that the Television Committee, appointed by the Postmaster-General some four or five months ago, had not yet completed its report, and in consequence the nature or form of the television service to be recommended was not known. The television exhibits which were featured in the main, therefore, served the purpose of indicating the progress that had been made to date.

The New Apparatus

One of the main exhibits would be seen the familiar disc television receiver, "dressed" up in various garbs but having the three essentials of a thirty-apertured scanning disc, driving motor, and neon lamp as light sources. This could be seen on the stands of Wolsey, Eccle, and Practical Television, Ltd., attracting large crowds with their disc machine. This company were featuring a receiver having a solid apertured scanning disc, neon lamp, and lens magnifier, but the most novel feature was the method of driving the disc. The motor was fed from the mains to form the actual drive, but to maintain the steady speed a phonic wheel (something like an enlarged gear wheel). This combination functioned as a phonic motor and, being connected to the disc time-controlled mains, kept the speed steady at 750 revolutions per minute.

The drive between the motor and the disc was a friction one, with the disc at right angles to the motor. To compensate for any speed differences that inevitably arise when true automatic synchronism functioning from the incoming television signal is not incorporated, provision was made for adjusting the relative position of the drive on the disc.

On both the Cossor and Ediswan stands the cathode-ray tube exhibits created considerable interest, since it was known that they had been employed for television reception both with low- and high-definition transmissions. In addition, several stands displayed amplifiers and mains equipment suitable for television reception on the 30-line B.C.C. television service.

Bush Radio

It was on the stand of Megas, Bush Radio, Ltd., however, that the most complete exhibit was arranged. First of all, Bush's new Televisor, suitable for 30-line reception and similar to last year's model was included, but undoubtedly the greatest interest was created by the new cathode-ray tubes and cathode-ray tube "Televisor" complete.

To give the public an idea of the nature of the results to be expected on the ultra-short waves, an untouched photography of a 180-line image received by this method was incorporated in the normal screen aperture. The detail observed on this picture was outstandingly good and represented real entertainment value.

Concerning the complete receiver itself, the apparatus was of a dual character, having a solid apertured scanning disc, neon lamp, and lens magnifier, but the most novel feature was the method of driving the disc. The motor was fed from the mains to form the actual drive, but to maintain the steady speed a phonic wheel (something like an enlarged gear wheel). This combination functioned as a phonic motor and, being connected to the disc time-controlled mains, kept the speed steady at 750 revolutions per minute.

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A direct viewing tube of unique shape, as embodied in the new "Televisor" just described, was also shown. The fluorescent screen in this case was 11ins. in diameter, giving a resultant television picture 3ins. by 6ins. Finally, there was shown a small type tube suitable for measuring or measurement purposes, the screen size of 7ins. diameter, producing a 6ins. by 4ins. picture. A tube of this nature would be commercially suitable for the home constructor or experimenter, and no doubt arrangements will be made to market this tube for that purpose. As the electrode assembly for each of the three tubes is the subject matter of some important patents, no details could be learned concerning the actual construction and operation, but judging from the crowds which assembled throughout the period of the Exhibition, the exhibit was one of considerable and topical interest.

THE TELEVISION COMMITTEE

T HE task confronting the Television Committee set up by the Postmaster-General to investigate the present television situation is a very big one. Evidence from all quarters has been given to the members either as a written communication, a personal appearance, or as special demonstrations. Anyone who felt they had some form of constructive criticism to make was able to state his case, and in consequence the volume of evidence that has to be sifted and sorted must be enormous. It will therefore be some weeks before the report of the committee can be expected.

One very striking fact emerges, however, and that is subsequent to the committee's appointment a very large number of so-called new television systems came to light. Prior to this nothing was heard of methods for producing images except those sponsored by one or two large companies. Now the news columns of the daily Press have been giving details of so-called new methods which claim to revolutionise the whole science.

This state of affairs is no doubt inevitable, but readers are warned against expecting anything epochal in character at the moment.
Do You Know What This Graph Means?

The man who can analyse these curves and understand what they indicate knows his job. But if they do not convey to him perfectly definite information, it would appear that he needs more training than he has had. He is not competent to fill a responsible position in wireless.

Radio has developed so rapidly throughout the last ten years that it has now greatly outgrown the supply of technically qualified men required for the better posts. Moreover, it continues to develop with such speed that only by knowing the basic principles can pace be kept with it.

The I.C.S. Radio Courses cover every phase of radio work. Our instruction includes American broadcasting as well as British wireless practice. It is a modern education, covering every department of the industry.

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Included in the I.C.S. range are Courses dealing with the installing of radio sets and, in particular, with their Servicing, which to-day intimately concerns every wireless dealer and his employees. The Operating Course is vital to mastery of operating and transmitting.

There is also a Course for the Wireless Salesman. This, in addition to inculcating the art of salesmanship, provides that knowledge which enables the salesman to hold his own intelligently concerning every wireless dealer and his practice.

Then there are Preparatory Courses for the City and Guilds and I.W.T. Exams.

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- WIRELESS ENGINEERING
- COMPLETE INSTRUCTOR
- EXAMINATION (state watch)

Name
Address

September 8th, 1934

PRACTICAL WIRELESS

REVIEW OF THE LATEST RECORDS

ON THE WAY

By T. Onearm

"I'll String along with You" and "Fair and Warmer" by the Two Million Sweethearts, on Sterno 1468; "So Help Me" on Sterno 1471. A fair selection of dance tunes from which to take your choice.

Light Music

If your taste turns to light music, then I make a point of the following disc from which to make your selection: "Sylvia Ballet" and "Coppelia Ballet," played by Joseph Lewis and his Orchestra—a really fine performance; Eric Coates' "By the Sleepy Lagoon" and "London Bridge," two fine tunes by an equally fine composer on Sterno 1469, played by the above orchestra; and "Snowflakes" and "Song of Paradise," played by Reginald King and his Orchestra, on Sterno 1470.

Parlophone Records

Richard Tauber, the world-famous tenor, makes a very beautiful record this month on Parlophone BO 20256, which is undoubtedly a masterpiece. He sings two songs from his recent film success, "Mozart's Time," "Love lost for ever more," from the church scene of this spectacular film, shows Tauber at his best, accompanied by the organ and choir of St. Joseph's Retreat, Highgate, and on the other side of this disc in songs there lived a Lady Fair." Both songs are sung in English, and I have no hesitation in recommending this record. Another beautiful record is Parlophone R1886, on which the famous tenor Joseph Schmidt gives a fine rendering of Verdi's "Il Trovatore" (Di Qualla Pira) and "Rigoletto" (La Donna è Mobile), both of which are sung in Italian.

Sophe Tucker needs no introduction, and "That's Something to be Thankful For," and "Lawd you made my night too long," on Parlophone R1890, is just another record that may be added to her long list of successes. If you like that clever quartette, the Moderniques, then you can hear them this month on Parlophone R1892. "Chinatown my Chinatown" and "Don't let your Love go Wrong" shows them at their best.

THE WIRELESS CONSTRUCTOR'S ENCYCLOPAEDIA

(2nd Edition)

By F. J. CAMM

(EDITOR OF "PRACTICAL WIRELESS")


5/-
RADIO GOLF
A New Game for the Winter Evenings.

I HAVE just become acquainted with a new game. A provincial radio society secretary explained the game to me and says it has created a considerable amount of interest among the members during the last few months. The golf course of the radio fan occupies all space, and is known as the ether. The game is played at night and anyone with a radio set can play it, though those people with a short-wave receiver appear to get in the loudest shots. The idea is to tune in as many stations as possible. The society in question gives a valve as prize every week to the member who tunes in the most stations.

Patience Required

When a broadcast listener gets a mental picture of the radio golf course, it is a wonder to him that a radio receiving set can distinguish and understand the largest number of waves or ripples. Skill in tuning is, of course, a leading factor in being a really good radio golfer. Some sets receive more distant stations than others because the operator knows how to obtain a good score in radio golf can be accomplished in introducing the idea to his members. Still, as I told him, I prefer to have the book of answers in front of me rather than wait for an announcer to tell me who he is. This is easily accomplished if you are fortunate enough to have a well-calibrated heterodyne wave meter in the wireless den.—C.K.
EASY TERMS

Every Radio requirement, however extra- 
cost or modest, is supplied on the most 
convenient terms and, with the utmost ex- 
dition and courtesy. Continuously established 
since 1925, we maintain a service upon which 
increasing numbers rely. We deal with you 
direct and all transactions are strictly private. 
May we have your orders, and inquiries?

New Calor 3-V. Battery Receiver. Model 
S80. In cabinet, complete with valves and 
built-in speaker. Cash Price £2-19-6, or £/- 
with order and 11 monthly payments of 10/-.

New Blue Spot STAR JUNIOR L.S. Unit. 
Cash Price £3-18-6, or £/- with order and 
7 monthly payments of £7.

New R. & A. " Magnolia " L.S. Unit. 
Cash Price £2-2-0, or £/- with order and 
8 monthly payments of £7.

All the new valves supplied on the lowest 
terms. Please state requirements and we 
will be pleased to quote you.

Full Specification and illustrated list of any of 
the above will be sent with pleasure.

Everything shown at Radiolympia can be 
supplied by us on the most convenient terms.

Quotations by return of post.

All Carriage Paid.

To avoid delay, will customers kindly send first 
engagement with order.

Estd. 1925 THE NATIONAL LTD., 
LONDON RADIO SUPPLY COMPANY 
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WHEN BUYING A HORSE YOU 
LOOK AT ITS TEETH

WHEN BUYING A RECIPIER, 
LOOK AT ITS VALVEHOLDERS

T-CLIX
LECTRO LINX, LTD.
79* ROCHESTER ROW LONDON S.W.1

PRACTICAL WIRELESS

THE FUTURE OF RADIO

September 8th, 1934

Some Interesting Points Concerning the Growth of Radio 
and its Development in the Home

I

n all the technical arts no particular 
branch has given a greater opportunity 
to the inventor than radio. Every 
branch of technical engineering has pro-
vided its own men who have 
created most of the new things that 
have been done in their particular sections, but 
the peculiarity about radio is that it has 
become the playground for all, both young 
and old, and male or female. It seems to 
be the favourite child of all the other 
technical arts and sciences, and a general 
meeting ground for the exchange of ideas 
and mutual inspiration. In its scope there 
are at least three generations of radio- 
minded people. It behoves those of us 
who are of the second and third 
generation to pay a right tribute to those 
who gave us our original inspiration and prepared 
the path for the advancement which has 
already taken place.

The original pioneers were the most advanced 
thinkers in physical science and electrical 
engineering and they opened a new field of 
human endeavour. The most significant 
fact is the unprecedented rapidity 
with which this new knowledge has spread. 
It has been done in this direction by the 
technical press of this country in putting 
before the public the rudiments of its 
intricacies in such simple language and 
pictorial form. New generation almost every 
school boy, thanks to the popularity of wireless, has 
some intimate knowledge and wiring every 
room in the house; radio has music for the family and 
its service has outgrown that of all the 
literary periodicals. Wireless, not long ago, 
was confined to the attic or cellar of the 
house ; radio has music for the family and 
its service has outgrown that of all the 
literary periodicals.

Radio is no longer a living 
thing that attention has been given by 
builders to installing indoor aerials under 
the roofs, and wiring every room so that 
wireless could be enjoyed in any part of 
the house. The detracting element of 
almost any of the new garden suburbs is 
the unsightly array of bent wireless poles 
and masses of wires running in every 
conceivable direction without any apparent 
study of the amenity of the situation.

Radio having established itself in the 
homes of millions, its service has outgrown 
the limitations of the same for almost every home 
and awaiting development for the good of 
the human race.

House Builders and Radio

From one end of the country to the other 
during the last few years we have been 
experiencing a building boom which is 
unprecedented in our history. Both archi-
tects and building contractors have been 
constantly engaged in producing dwellings 
which are models of inventive genius. Civilisation 
had decided that the home is the playground 
of the householder, its amenities and 
scientists of to-morrow not by thousands, 
educate the younger generation. If we should project into the future 
we can see some very great developments 
made into an indispensable servant in every town, village, and farm, 
and the engineers who invent, plan, and 
operate these new developments are at 
present being trained in the radio play-
ground. The creation of light by means of 
magnetic waves, transmission of power, a 
perfected system of television in harmony 
with the human eye, and heat or refrigeration 
for every home are but a few of the secrets 
lying in the path of these building geniuses 
and awaiting development for the good of 
the human race.
The latest home-constructed kit to be released by Messrs. Lissen embodies a number of very unique features, and enhances still further the range of "Skysscraper" receivers which have been issued by that firm. In the latest model an all-metal chassis is employed, and the standard S.G., detector and output circuit is utilised. These three stages are equipped with Lissen valves, the first being of the variable-mu type, the second a sensitive power detector, and the output valve is one of the economy pentodes, which is capable of delivering a really good output without distortion. The circuit is of the standard and well-tried arrangement and possesses no unusual details, but is thoroughly decoupled and has such important items as an H.F. stopper in the output grid circuit; alternative series aerial coil assembly, in addition to changing the connections.

The control knob on this coil assembly, in addition to changing the wave-band over which the receiver tunes, also brings the set into operation and switches it off. This combined control enables the complete receiver to be constructed with the minimum of control knobs, and only two further controls are provided, namely the main tuning control and a volume control. The tuning control is of the slow-motion straight-line full-vision type, attached to a substantial three-gang condenser. The volume control is of the dual-type which has previously been incorporated in the Lissen receivers, and it embodies a reaction condenser as well as a variable resistance. In addition to controlling the amount of feedback, therefore, it also controls the bias on the H.F. valve and thus provides a most sensitive and smooth control of volume. The remainder of the components, consisting of fixed condensers, H.F. choke, valve-holders, etc., are either bolted to the chassis with the nuts and bolts provided, or are suspended in the wiring. The kit, as supplied, contains a number of envelopes or packets containing the appropriate fixing screws and nuts. The actual assembly is thus rendered exceedingly simple, and provided a child was old enough to read, the receiver could certainly be said to be simple enough to be constructed by the youngest member of the family. Yet it is of importance to note that this simplicity has been attained without the omission of any of those details which contribute the efficiency of a factory-made receiver.

A Test

Mounted in the upper part of the neat walnut cabinet which contains this receiver is a moving coil loud-speaker, provided with a tone control and terminals for the addition of an external speaker when such is required. The batteries are housed on a shelf behind this speaker, and the battery leads, which are clearly identified, pass through a hole in the chassis and are joined to the accumulator and H.T., the grid bias being incorporated in the H.T. battery. The sensitivity is of a high order, and the receiver will provide a number of alternative programmes in practically any part of the British Isles. The volume control operates in the following manner. The H.F. bias operates over the first half of the volume control knob movement from minimum to maximum. At this point the S.G. is working at its highest amplification. When the volume knob is advanced beyond this point, the reaction condenser begins to play its part and further amplification is obtained until, of course, the detector valve starts to oscillate, which it will do if the knob is turned too far. The tone control may be adjusted to provide a more brilliant tone by removing it from the terminals to which it is attached, under which condition the full brilliance of the pentode stage is obtained. A slight high note cut-off exists when this is replaced, and no doubt to many this tone is more pleasing, although for good reproduction we prefer it removed. Battery consumption is fairly low and does not warrant the employment of a super-capacity type of battery, although the normal volume of the pentode valve is ample for normal requirements. Consequently there is no necessity to consider the fitting of a battery economiser or other device, and this is a very good point for the standard type of receiver. Selectivity is adequate for all normal requirements, and the choice of the band-pass couplings provides a satisfactory 9 k.c. separation on all stations. For the constructor who prefers to obtain all the necessary parts for a receiver, complete in one box, and who is desirous of possessing a receiver of this type, the kit represents a splendid value for money and should have an enormous success. Complete with valves, and all wires, screws, etc., the kit costs 9s. 6d. The walnut cabinet, complete with moving coil loud-speaker, costs £2 5s., or the speaker may be purchased separately for 27s. 6d.
**PRACTICAL WIRELESS**

September 8th, 1934

**Random Jottings**

By Jace

Radio Instruments' New Signal Generator

In spite of the introduction of the latest type supplied by Messrs. Standard Telephones and Cables, Ltd., this equipment supplies five frequency channels to twelve testing cabinets, and when in full operation enables receivers to be calibrated for frequency performance and output. There is absolutely no interference between testing points, the frequencies and load remaining constant. The tester in each cabinet is in a position to check the uniform performance of every receiver over the complete range. When the installation is in full operation it will deal with the testing and calibration of 3,000 receivers per week.

The illustration on the right shows the frequency controls, screened conductors, and junction boxes. Each cabinet is fitted with an input attenuator, output meter, and isolating transformers and filter apparatus. The sets pass along a line and into the cabinets on one side and out the other. Uniform efficiency and performance is guaranteed with an up-to-date equipment of this type.

Grid Breakdowns Increase Battery Set Sales

THE recent electric power breakdowns all over the country during the few weeks—before the opening of the Radio Show—appear to have had a remarkable effect in speeding up the sales of battery sets.

The Ever Ready Company stated recently that—

"In spite of the introduction of the Balanced Tone Pick-up, the sale of battery sets has steadily increased. In 1930 there were produced and sold in this country 450,000 battery-operated receivers, and by last year this number had increased by some 200,000. Quite apart from the direct effect of recent electric power breakdowns in making people reluctant to rely on all-mains sets—to which we must attribute at least one large order from an unexpected source—the battery set is popular on account of its superior purity of tone and its freedom from outside interference that characterizes the all-mains set."

Radio on Trains

It is reported by the L.N.E.R. that 12,000 passengers have hired headphones to listen-in to broadcast programmes while travelling on East Coast route expresses. The first train in Great Britain to be fitted with wireless receiving apparatus was an L.N.E.R. express between King's Cross and Leeds, which was equipped in 1930. Owing to the running times not coinciding with the best broadcast period, this equipment has been withdrawn and two Anglo-Scottish expresses have been fitted instead. These trains leave King's Cross for Edinburgh at 1.20 p.m. and Edinburgh (Waverley) for King's Cross at 2.5 p.m., arriving at 9.10 and 9.55 p.m. respectively. An electric gramophone is also installed on each train so that passengers are entertained by means of gramophone records when the broadcast items are unsuitable.

Lithuania Orders Radio Sets

ACCORDING to reports from various sources a large volume of business, eclipsing all previous records, was done at Radiolymia last month. Another interesting point is the diversity of countries from which the orders came. The new trade agreement between Lithuania and this country has opened up an entirely new market and has already had a marked effect on export business, as reports from Messrs. Pye Radio show that large orders for sets of all types have been received from this country. The demands from the near East, Bombay, and South Africa are already well up on last year's returns.

1,000 Miles a Minute

LONDON, Paris, Mühlacker, Budapest — 1,000 miles a minute—that was the record of the wireless express on Philips' stand at Radiolymia; yet since the total "mileage" of the track was more than 200 feet, its speed was really only one mile per hour. The miniature line connected the broadcasting stations of Europe; and when the tuning knob was turned to the required destination on the dial, the aerial lit up, the train started off, and stopped at any one of fifteen stations selected.

Launching the New Cunarder

THE launching ceremony in connection with the new Cunarder 534 is to be broadcast in the National programme on September 26th. A large order from the Cunard Company, will welcome Their Majesties the King and Queen in a short speech. The King will reply and the Queen will then perform the naming ceremony. A descriptive commentary on the proceedings will be given by Mr. George Blake, and an electrical recording of the event will be transmitted subsequently to the Empire.

(Continued on facing page)

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**Random Jottings**

**COSMOCORD**

BALANCED TONE PICK-UP

Exceptional high volume, delicate but balanced tone, entirely free from resonance are the qualities that make this pick-up so popular. All bakelite construction, with swivelled head for easy needle-change. Complete with volume control, rest and M.T. covered leads.

**WIRELESS for the MAN-IN-THE-MOON**

by COULOMBUS and DECIBEL

2/6 NET

"If you want a really gorgeous 'text-book' on Wireless do read WIRELESS FOR THE MAN-IN-THE-MOON," said the Manchester Evening News reviewer. And referring to this book and its authors, the Midland Daily Telegraph says, "They succeed in imparting a real knowledge about Wireless. It is both good fun and sound theory."

This book should be in the hands of all who are interested in wireless and wish to acquire a complete knowledge of "how it works."

At all Bookstalls or by post from

GEO. NEWNES LTD., 8-11, Southampton St., Strand, London, W.C.2.
Belfast Radio Exhibition

Plans are at present under discussion for the Belfast Radio Exhibition, to be held in October. This year the organizers propose to make the show the most important of its kind ever held in the city, and details are shortly to be available.

Scottish National Players

On September 7th the Scottish National Players, now on their eighth annual autumn tour of the country districts of Scotland, will present two one-act Scottish plays. The first is "The Broken Fold," by George Reston Malloch, and the second, "The Miracle," a comedy, by Joe Corrie. The Scottish National Players, who began their chequered but triumphant career in 1921, have produced over a hundred plays in the past, of which more than seventy were original plays given for the first time on any stage. They have appeared before the King and Queen at Balmoral, and have toured not only Scotland, but England.

Roar in the Speaker

One of my correspondents is evidently making up receivers for his friends, for he tells me he has made many sets from a well-known and much discussed circuit, and satisfaction has been given in every case with one exception. Of course, it is for the "exception" which he asks my assistance. It is the only one in which he has met trouble, and this is spoken of as a "strong roar" in the speaker whenever he turns up the volume above bare audibility, and wishes to know the reason, as he has searched every avenue where he thinks he might have located the trouble.

Oscillation at some frequency is very often the cause of such a condition. The frequency at which this oscillation may take place may have any value from zero to millions of cycles per second. It may be due to "feedback" in the high-tension supply, if the frequency is within or below the audio range. If the frequency is a very high one, as is likely, it may be due to capacity feedback in the radio-frequency portion of the set, and not unlikely may be found between the elements of the valve or valves. The circuit should first be tested for oscillation by noting if the plate current increases when the roar starts. Then try to determine the frequency. If it is low, the decoupling and by-pass condensers should be examined. If the frequency is very high, two million cycles or more per second, use grid suppressors. For extremely high frequencies the suppressors may be a choke coil which can be made by winding a few turns of wire on a former the size of a lead pencil.

Existence of Ether

I am called upon to settle two differences which have evidently been raised in the usual manner, that is, by arguments in the train on the morning journey to town. One question is, "If there was no ether, would we have daylight?" Because I happened to be connected with the radio press, I suppose, the individual in question referred the question to me. Light is theoretically transmitted by vibrations in the ether which is supposed to exist. It may be well to recall to your mind that an ordinary electric light bulb has its filament in a vacuum (ether exists there, however) so as to prevent its oxidation or burning up. Of course, we know that light is emitted when the current flows through the filament. Presumably, without ether, there would be no light.

A Nightmare of "Crackles" and "Buzzes" has ended for this Southampton listener who fitted a T.C.C. Anti-Interference Unit. Neon signs, motors and generators do not exist for him as far as his radio is concerned. Don't let your listening be marred by such "man-made static"—the T.C.C. Unit will cut it out. Ask your Dealer to-day.

"A TREAT TO LISTEN NOW" with the

The Telegraph Condenser Co., Ltd., Wales Farm Road, N. Acton, W.3

T.C.C. CONDENSER
ANTI-INTERFERENCE UNIT

PRICE complete with Instructions

10/6
The Varley range of coils has now been considerably modified, and the Duo Nicore coils form the latest addition to the range of iron-core coils. These, as may be seen from the illustration below, are of very small dimensions, and are not provided with the customary wave-change switch. Consequently they are much cheaper than the standard type of coil, and yet they retain all the essentials of canned coils, as well as the square peak coil, and H.F. inter valve coil (with and without switch). The range of Nicore coils (BP 32 to 40) is also withdrawn, and is replaced by more compact types. The resistance-capacity coupling units have also been removed from the catalogue, whilst the push-pull output choke (DP 8), the double push-pull input transformer (DP 17), the pentode push-pull output choke (DP 19) and the Rectani transformer are also new obsolete.

New Lissen Lines

A NUMBER of new components are now added to the Lissen range of components, and two interesting items are shown below. These are an Asotic H.F. choke and a lightning arrester. The choke has extremely small dimensions, measuring 2½ in. from end to end and has a total diameter of 1½ in. A slotted ebonite former is employed, and the windings occupy adjacent sections, so rendering the field extremely small and removing the necessity for screening. The total inductance is 150 millihenries, and the self-capacity only 3 microfarads. The component may be recommended for H.F. coupling with S.G. valves, as well as for short-wave receivers where it is customary to insert a short-wave and a medium-wave choke in series. The price is 3s. 9d.

The second component which is illustrated is a lightning arrester, and this is totally enclosed in bakelite. Two terminals are fitted, and the letters A and E are engraved on the bakelite case to identify these terminals. Inside the case two brass arms are attached to the terminals, and these are held apart in order to provide a suitable path for a powerful discharge, whilst offering a very high resistance to wireless signals. Thus there will be no loss of signal strength when the device is joined across the aerial and earth circuit, but ample protection is afforded in the event of a heavy static discharge across the aerial-earth system. The price of this component is 1s. 6d.

Hivac Valve Price Reductions

The popular Hivac battery valves have now been reduced in price, and these valves represent a considerable saving to the home constructor. The following prices show the types of battery valve, together with the old and the new prices:

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Use</th>
<th>Old Price</th>
<th>New Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>H210</td>
<td>H.F. Amplifier</td>
<td>4/6</td>
<td>3/9</td>
</tr>
<tr>
<td>L210</td>
<td>L.F. Amplifier</td>
<td>4/6</td>
<td>3/9</td>
</tr>
<tr>
<td>D210</td>
<td>Detector</td>
<td>5/6</td>
<td>5/6</td>
</tr>
<tr>
<td>Y220</td>
<td>L.F. Pentode</td>
<td>12/6</td>
<td>10/6</td>
</tr>
<tr>
<td>Z220</td>
<td>L.F. Pentode</td>
<td>12/6</td>
<td>10/6</td>
</tr>
<tr>
<td>H221</td>
<td>H.F. Pentode</td>
<td>12/6</td>
<td>10/6</td>
</tr>
<tr>
<td>V221</td>
<td>H.F. var-mu Pentode</td>
<td>12/6</td>
<td>10/6</td>
</tr>
</tbody>
</table>

This range of valves has been augmented, as previously stated on these pages, by a complete range of A.C. mains valves, which range in price from 8s. 6d.

New Universal High Voltage Radio Programme

UNIVERSAL HIGH VOLTAGE RADIO LTD., of 28/29, Southam pton Street, Strand, W.C.2, have announced their new season's programme for their new season's models, and from the details given it appears that a very extensive range of valves will be produced.

Three attractive features are common to all models:

1. All valves are suitable for operation from either A.C. or D.C. mains, from 100 to 250 volts, and in the case of A.C. mains they can be used with supplies from 25 to 100 cycles. Special models are also available, at a slightly additional charge, for 100-volt A.C. or D.C. mains only.

2. All models, with the exception of the miniature model, cover not only the long and medium wave bands, but also one ultra-short-wave band, and in the case of the de luxe model two ultra-short-wave bands, thus making these sets truly "universal."

3. All models are available as table radiograms, in entirely original cabinets, which are only slightly larger than the ordinary radio cabinets. A horizontal design of cabinet has been adopted in which the speaker is mounted beside the chassis, and the design is modern, without being ultra modern, thus blending well with existing furniture.

Other interesting points are to be found in the fact that the Ostar Ganz high-voltage valves which are being used in the sets are extremely economical in operation, as no barretters or dropping resistances are employed, and the filaments are connected directly across the mains. The sets are completely hum-free both on A.C. and D.C. mains. An accurate full-vision illuminated drive has been adopted, which is calibrated in metres, on all metre-boxes.
To some readers trouble, we undertake to send on catalogues at any time. Simply write, giving the title of the new season's catalogue just issued by Graham Farish Ltd., 9111, Farringdon Road, London, E.C.1, to which address should be sent with application for catalogues. No other correspondence whatever should be enclosed.

**Graham Farish Components**

A NEW range of production methods must be used to produce the vast quantity of radio component parts which are demanded by the public each year, such methods can be made to turn out parts as accurately as they are made by hand. Such is the case with the popular Graham Farish components, which are well known for their efficiency in use. A varied range of these components, including the latest type valve-holders, screened chokes, fixed and differential condensers, and transformers, is given in a folder from Graham Farish Ltd.

**Cossor** "Super-Ferrodyn" Radio-gram

The achievements of Rens. A. C. Cosson's new season's programme have been greatly enhanced by the introduction of the Cossor "Super-Ferrodyn" radio-gram. The new model gives assured selectivity, and the specification includes such refinements as super-selective low-loss coils, H.F. screened detector, power-pendulum output, illuminated tuning scale, and silent running induction motor with fully automatic step. The instrument is housed in a well-finished cabinet and is priced at the low figure of 10 guineas. Interested readers should obtain a copy of an attractive folder which gives full particulars of this remarkable radio-gram.

**Wearite Components**

BROADCASTS TO SCHOOLS

Three innovations are announced. A course on rural geography, called "People, Their Environment," is intended to help teachers with their environment. The third, new course, "Music and Movement," is intended to help teachers with the physical development of their pupils. Music and Movement, called "Districts of England," will be broadcast on Friday mornings between 11.30 and 11.50. A variant of the school year, beginning in late September, contains notes on all the courses, and an easily read address should be enclosed with applications for catalogues. No other correspondence whatever should be enclosed.

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

Local Experts

Sir,—A word in defence of the "local expert." Your correspondent of Margate hit the nail truly on the head when he said that "really good service men are few." They are! So why condemn all "local experts"?

I would remind your correspondent that not all amateur wireless enthusiasts are the half-wit he fondly thinks they are. And not all are ignorant of the principles of even mains receivers. The aspersion regarding shocks is typical of the "service" man. Your correspondent, after all, is merely blowing his own horn.—E. Jackson (N. Ireland).

Sir,—I have been very interested in your correspondence regarding local experts. The local man is often the only one who pays some consideration when dealing with the question of repair to receivers by service men. (Kindly to "dabblers." This is true. The dealer has generally experimented and started from the very beginning, and his experience has been obtained from actual construction. On the other hand, the majority of service men have received a fairly good education, and as a result have attended either a technical college or a school provided by a radio firm, and their experience is thus of a theoretical nature. Of course, the service man's theoretical training cannot be denied, but there is no school like experience, and whilst a service man may be an expert in understanding the wiring and peculiarities of a "named set,” he may not be quite so at home with another receiver built by a different firm. Consequently, when called in to see troubles, he may spend longer, due to his unfamiliarity, than the local dabbler, who will probably locate the trouble at a first glance. I have heard a number of cases where the local service man has felt secure of his position and has charged exorbitant prices without doing a great deal of good. Everyone likes to save money, and therefore buys in the cheapest market, and the word is soon passed round when difficulty arises to "let Brown see it.” He will put it right in ten minutes," and this type of recommendation is always a sure guide to ability.—Barbara (North Allerton).

Short-wave Set

Sir,—You have not yet published constructional details of a short-wave receiver covering all the practical short-wave bands, plus the medium-wave band. For colonial use this type of receiver is essential, and we outposts of Empire desire to hear the Daventry Empire transmissions as well as local transmissions. We naturally feel that we have not lost anything in the long-wave band. Could you not design a superhet for our especial needs?—R. Green (Kenya).

[We will bear the request in mind when setting out our winter programme.—Ed.]

Our Free Gifts

Sir,—I have just received my Coronet D20 Camera, and am highly delighted with it. The quality of the workmanship is excellent, and the camera worthy of your paper. This is the first time that I have taken advantage of your generous offers, and I have not been disappointed. I hope to avail myself of any further gifts, and regret my not having received any of your former ones. Again let me re-echo the praises of your wonderful paper.—J. A. Robinson (Cardigan).

Quality Receivers

Sir,—As an experimenter of some standing, I should like to offer a suggestion. Practically every receiver which you have produced so far, although admirable from a technical standpoint, has been designed to cover a great range, and is thus of the type which cannot be stated to be a quality receiver. In order to obtain real quality, flat tuning is one of the essentials, and a flat-tuned set cannot receive foreign stations. It is, therefore, not favoured by the majority of listeners. Having heard the Science Museum receiver and others which have been designed to receive only the local stations, with really admirable results, I think many listeners would be very pleased to construct a receiver on the lines if only you would show them how. Could you not give us a constructional receiver or, alternatively, furnish details to enable us to build a receiver of a certain type?—A. Boyt (Harrow).

(We agree that quality reception is a subject which requires treatment in a specialized manner; but we do not think there is sufficient interest to warrant a description of a quality receiver designed to receive both local and foreign stations. We are, however, preparing an article on the subject which will be published in an early issue.—Ed.)

An Exhibition Echo

Sir,—I should like to express my appreciation of the assistance which was given to me at Olympia by your staff. Although my questions covered a very wide range, and some of them were certainly not related to radio, I was treated with every courtesy, and received some very valuable information, which will prove of inestimable value in my daily work. I might mention that some of the points raised by me had already been carefully searched for in several public libraries, but I had been unable to find any detailed information, and only came to the exhibition and to your staff to find it. Again thanking you.—D. Vernon (Bristol).

Impressions on the Wax

Sir,—I note that you do not devote a column each week to your gramophone record review. Although you cannot obviously give a full test report of the quality of records, and so on, your point is well made. The list of titles certainly enables the user of a radiogram to select records for his own particular tastes. It should be known that lists are issued by the companies periodically, but it is nice to be able to find the information in your book as a regular feature and to be guided by your advice.—R. Wilson (Peterborough).

"Practical Television"

Sir,—While at Radiolypia I purchased a copy of your new monthly. Whilst I fully appreciate that the growth of this new branch of radio renders it necessary to devote a monthly to the interests of the science, I should very much regret to see a restriction in the amount of space in Practical Wireless which is devoted to television. You have not given much practical material concerning this subject in your recent issues, and I should not like to see the feature confined only to news. Please, therefore, remember the amateur who wishes to keep in touch without going so far into the subject that he requires to chase a copy of your new monthly. Whilst I would certainly buy it even weekly, when I would certainly buy it even weekly, I notice that the parts at present are still expensive, but presumably, as with radio, prices will fall as soon as the demand becomes sufficiently large.—K. Stokes (Nottingham).

Sir,—Allow me to congratulate you on your new monthly. The amount of material contained in it is great, and will certainly take up the study of this new branch of radio. I notice that the parts at present are still expensive, but presumably, as with radio, prices will fall as soon as the demand becomes sufficiently large.—K. Stokes (Nottingham).

Sir,—Congratulations on your new monthly. I can only wish that this was a weekly, when I would certainly buy it every week. It will be a great disappointment to me to be waiting for No. 2, but I hope that the transmissions will not be curtailed as has sometimes occurred in several quarters.—R. S. T. Whitley (Iarnet).

Sir,—I was highly delighted with Practical Television. I hope that future numbers will deal with cathode-ray systems and other high-voltage systems, and that you will not restrict your energies to the low-priced simple apparatus.—A. Trail (Rugby).
A.D.C. Problem

"When connecting a commercial two-valve all-mains D.C. receiver to the supply I had the misfortune to burn out a resistance, due, I am told, to connecting the earth lead straight to the set instead of through a fixed condenser. Is this correct, please?"—J. B. (Highgate, N.19).

When the positive mains lead is earthed it is quite possible to introduce a short-circuit into a receiver which has not been suitably wired. Practically all commercial receivers, however, are fitted with a condenser in the earth lead so that when the earth is fitted no short can arise. Without knowing the exact circuit employed in the receiver we cannot state whether a resistance has been destroyed as a result of using the earth without a condenser. With all D.C. receivers it is preferable to use a fixed condenser between the aerial lead and the aerial terminal and also between the earth lead and the earth terminal.

Operating a Neon Lamp

"I am interested in television and should like to try out a small disc receiver. What is the current which must be passed through the lamp, and will my S.C. detector, and L.F. receiver be good enough for average results? I am operating the receiver from an A.C. eliminator."—T. H. (Barnet).

At your address the three-valve receiver will probably produce a sufficiently strong signal to give fairly good results. The current which should pass through the normal neon is in the neighbourhood of 25 milliamps, and therefore the output valve should be of the type which passes this current, although the effect of the voltage drop through the neon must be borne in mind. If your eliminator does not deliver sufficient H.T. to enable this method of connection to be employed you will have to use a 1 to 1 transformer, with the primary joined in the output circuit, and the neon joined in series with the secondary across the H.T. Supply. The extra current will have to be delivered by the eliminator and you should be careful that you do not overload it. If there is a simple current to spare, a 5,000 ohm resistance may be joined in series with the neon lamp in order to regulate the brilliancy and so balance the microammeter.

Short-wave Coils

"I should like to carry out some experiments on the short waves, but do not want to build up any clumsy coils. I have seen in an American book a scheme for using old valve bases for coil formers, and as I have about a dozen of such old valves at home, all burnt out, I have the necessary bases by me. I am not certain regarding the windings for the coils and should be glad of your advice."—A. K. L. (Hull).

To build a range of coils on valve bases can be done with the minimum of trouble and expense. The coil former is simply a base into which the wire is wound. The number of turns can be varied to suit your requirements. A coil former can be made from a discarded valve base, but the case is the negative pole and the carbon rod the positive pole. The amount which can be learned in this way is tremendous, but I have now come to a point where I must ask you for some information. I have dismantled an H.T. battery and I find that in addition to the zinc cell there is a canvas bag with a lot of wet stuff in it. One pull and it's gone down and leaves no mark. No danger from lightning, reduces static interference and increases selectivity. Ideal for receiving short wave circuits. Obtainable everywhere. British Pix Co., Ltd., London, S.E.1.

H.T. Battery Constituents

"I have become interested in wireless and have started the 'pull it to pieces' craze. The amount which can be learned by this means is tremendous, but I have now come to a point where I must ask you for some information. I have dismantled an H.T. battery and I find that in addition to the zinc cell there is a canvas bag with a lot of wet stuff in it. One pull and it's gone down and leaves no mark. No danger from lightning, reduces static interference and increases selectivity. Ideal for receiving short wave circuits. Obtainable everywhere. British Pix Co., Ltd., London, S.E.1."

Superhet and Converter

"I have had an argument with a friend who knows something about wireless, and in order to clear up the matter we should like your ruling on the following point. For short-wave work with a standard broadcast receiver it is possible to use an adaptor or a converger. So far as I understand it, the adaptor simply takes the place of the tuning circuit and is used with a normal detector stage, so that it may be used with a set using detector followed by L.F. stages, or even with sets employing H.F. stages, if these are eliminated by plugging into the detector stage. The converter is for use with sets having H.F. stages, and these are converted into L.F. stages. The problem is, that does one use in a superhet circuit, where frequency changing is already in existence?"

For a superhet receiver the most satisfactory method of adaptation for short-wave work is to build a frequency changer, and when this is coupled to the superhet the normal tuning circuits are adjusted to the frequency employed in the additional unit. Thus, a frequency changer, consisting of a detector and oscillator (or alternatively one of the new combination valves could be used), may be built to convert the received signal into, say, 500 kc/s, and the tuning circuits of the superhet receiver should be set to that frequency.

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SOUTHERN RADIO'S Bargains.—Set manufactured surplus.

VARIABE Condensers.—Loros 5-gang 0.000,12/6; Loros 5-gang 450K 4-1/2 5/6; Loros 4-gang 500K 4-1/2 2/-6; Loros 6-gang 450K 2-1/2 7/6; Loros 7-gang 450K 1-1/2 15/-.

SPEAKERS.—Blue Spot permanent magnet, with universal transformer for power, super power, complete with valve holders, grid leak, fixed condenser, and transformer.

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SOUTHERN RADIO'S Bargains.—Set manufactured surplus.

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