AUTOMATIC SET FOR LOCAL—5GB—5XX

A ONE-VALVE UNIT FOR EXTRA RANGE

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Amateur Wireless

and Electrics

The Leading Radio Weekly for the Constructor, Listener and Experimenter

Edited by BERNARD E. JONES

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A Poldhu Memory—Exhibition Number Next Week—Exit Static!—"Proms." Success—No Demonstrations at Olympia—A Year for 5GB

Special Exhibition Number!

NEXT week's greatly enlarged issue of AMATEUR WIRELESS will contain an exhaustive survey of the exhibits at the forthcoming National Radio Exhibition (Sept. 24—Oct. 1). Besides a number of other outstanding features this issue will be especially useful as a complete guide to the exhibition. As there is certain to be a big demand for next week's number we strongly advise readers to order in advance.

On the Carpet!

SEVEN New York broadcasting stations have been "called on the carpet" by the Federal Radio Commission, the reason being that transmissions have not been kept constant to within half a kilocycle of the allotted frequencies. Chaos will soon be a phantom if the Commission goes on with the good work.

A Poldhu Memory!

TWO masts, over 300 ft. high, have been taken from the old Poldhu station—well known to old hands at radio—and are to be erected at 5GB, thereby solving one or two aerial problems that have arisen.

"Proms." Success!

THEATRICAL managers will find food for thought in the assurance that broadcasting the "Proms." has had no adverse effect on the size of the Queen's Hall audiences. On the contrary, far more often than not the hall has been absolutely full and every audience has been at least 25% larger than the corresponding night of last year's season. In any case the season has been financially successful from the B.B.C.'s point of view, a fact which will undoubtedly encourage further efforts in this direction.

NEED JOINTS BE SOLDERED?

Although we have been so frequently exhorted to "solder all joints" when building wireless sets, the fact remains that nearly all modern components, such as variable condensers, valve-holders, transformers, anode resistances, etc., are still provided with terminals.

The home constructor may well ask himself whether he cannot make use of these terminals, as they are obviously intended to be used, without experiencing all the troubles prophesied by the "solder fanatics." Many of the sets now being made are not intended as permanent receivers, but will be "scrapped" in a month or two in order that the components may be used in some other arrangement.

In such cases it will be quite satisfactory to make connection to the various components by clamping the ends of the leads beneath the various terminals.

Wireless to the Rescue!

AN amazing operation was performed on board the steamer *Waipatu* during its voyage from Cook Islands to Auckland. The captain became seriously ill, and there was no doctor on board. A wireless call was sent out to the warship *Veronica*, whose doctor radioed advice by which a difficult operation was performed by the Chief Steward. The operation was successful and the captain recovered.

No Demonstrations at Olympia

ON the second thoughts of the organisers of the Wireless Exhibition, no demonstrations will be allowed. The small sound-proof cubicles have been found to have undesirable effects on loud-speaker reproduction, and manufacturers prefer not to modify their praises of their units by "Of course, it wouldn't sound like this at home!" Again, a *little* interference could not be avoided—and a little interference goes a long way!

A Possible Regional "Layout"!

AS far as can be ascertained at this early stage the five regional stations when completed will be situated near London, between Leeds, Manchester and Sheffield, Scotland, Northern Ireland, and South Wales.

A Year for Daventry Experimental

AN official statement has been made by the B.B.C. to the effect that Daventry Experimental, 5GB, will remain in operation for at least a year. Amateurs therefore need no longer hesitate to alter or build receivers for the reception of this station.

Exit Static!

OUR American cousins are waxing enthusiastic over the fact that experimental transmissions now being conducted by WGY are overcoming the atmospheric problem. As Schenectady's power is 100 *kilowatts*, we easily understand that the strongest static feels rather weak!

Radio and the Gramophone

THE rapid development of magnetic "pickups," with which it is possible to work the gramophone in conjunction with the wireless set, has been investigated very fully by the Technical Editor. The result is that next week Mr. J. H. Reyner will disclose first details of a receiver which will be of great interest to all owners of gramophones.

PRINCIPAL CONTENTS

PERFECTING "SIMPLER WIRELESS"

By J. F. JOHNSTON

EASE OF ADJUSTMENT.

INTRODUCING REACTION

LAST week's "Simpler Wireless" article dealt with certain difficulties and peculiarities met with during early experiments with the new system. This article describes how these difficulties are overcome.

It should be understood that the whole trouble originates in the detector stage, as it is only here that rectification takes place. The whole problem resolves itself into that of preventing an alteration in the *mean* potential of the first grid from affecting the *mean* potential of the grids of succeeding valves. If a transformer, choke-capacity, or resistance-capacity coupling were used immediately after the detector valve no trouble would ensue if the remaining valves were direct-coupled, as all their grids would have sufficiently negative mean grid potentials to prevent any grid current flowing and, therefore, to prevent rectification.

But one of the chief advantages of the direct coupling used in the "Simpler Wireless" circuits is that it overcomes the defects of transformers and coupling condensers, and, fortunately, the difficulty can be overcome while still retaining direct coupling between all the valves.

This may be done by replacing the anode resistance shown in the original circuit by an L.F. choke coil. The D.C. resistance of such a choke will be almost negligible with respect to the internal resistance of a valve rectifying on the anode-bend principle. Owing to the much lower voltage-drop across the choke a lower voltage must be applied between the filament of the first valve and the end of the choke than is applied between the filament and anode resistance in Fig. 1 (No. 274, page 299). In fact, if the end of the choke farthest from the plate of the first valve is connected directly to the negative side of the filament of the second valve, the slight drop in voltage across the choke will usually be just sufficient to apply a suitable negative bias to the grid of the second valve. The use of the L.F. choke is shown in Fig. 2 (No. 274, page 299).

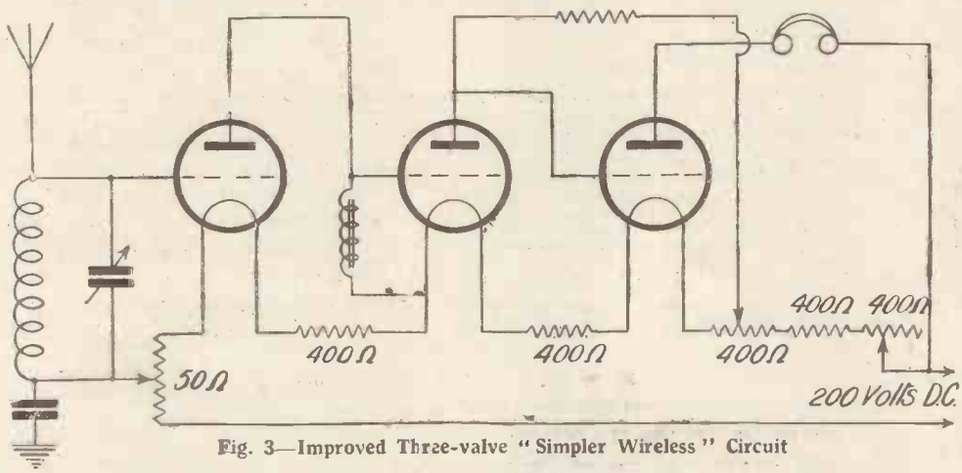


Fig. 3—Improved Three-valve "Simpler Wireless" Circuit

NEXT WEEK

FULL CONSTRUCTIONAL DETAILS OF A "SIMPLER WIRELESS" THREE-VALVER

The use of the choke in the plate circuit of the detector valve has many advantages. When it is employed the *mean* potentials of the second and any succeeding valves are to all intents and purposes constant. As one end of the choke can be connected directly to the second filament a variable control is eliminated. The grid potential of the anode-bend rectifier can be adjusted without necessitating a re-adjustment of the other controls. Altering the tuning no longer causes distortion, and (this is important) when the choke is used in the "Simpler Wireless" circuits the "cancel-out" of the commutator hum is still more complete.

For it must be remembered that the function of this choke is to prevent alternating impulses passing to the H.T. supply. If the choke is effective in doing this it will equally well serve the purpose of preventing an alternating component in the supply (such as forms the commutator ripple) from being impressed on the plate of the detector valve.

The revised "Simpler Wireless" circuit, using anode-bend rectifier and two L.F. stages, is shown in Fig. 3. Several sets using this circuit have been built, and the presence of the choke appears to increase signal strength somewhat, while the quality of reproduction is not in the least impaired, for it must be remembered that the signals have *not* to pass *through* the choke on their way to the grid of the next valve. Therefore, the fact that the impedance of a choke coil varies for different frequencies is in no sense an obstacle to obtaining distortionless reproduction by the use of the circuit shown in Fig. 3.

(*Concluded on page* 346)

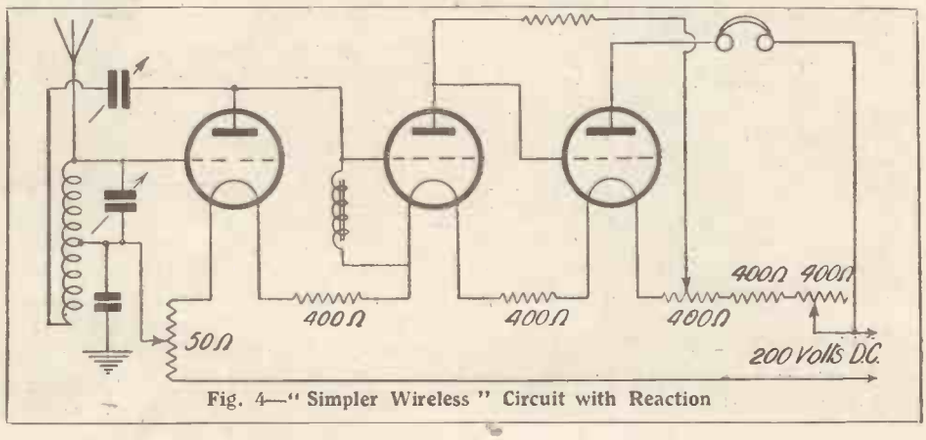
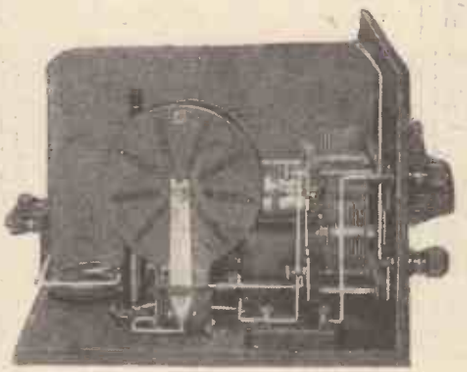


Fig. 4—"Simpler Wireless" Circuit with Reaction

A One-valve D.X. Unit

By The "A. W." TECHNICAL STAFF

HIGH-FREQUENCY amplification is looked upon by many as an unnecessary luxury. For those living under the shadow of a powerful broadcasting station, this is certainly true. But there are a good number of listeners who are



outside the "safe" range of 30 miles from a main B.B.C. station. Then there are others who have ambitions to bring in several Continental stations on the "local" loud-speaker set.

A D.X. Unit

For these listeners there is a simple solution to their difficulties. It is to add a single stage of efficient H.F. amplification. The advantage of the separate "D.X." unit is that when not required it can be "unhooked" from the main receiver without much trouble. A suitable H.F. amplifier circuit is shown by the diagram on the next page.

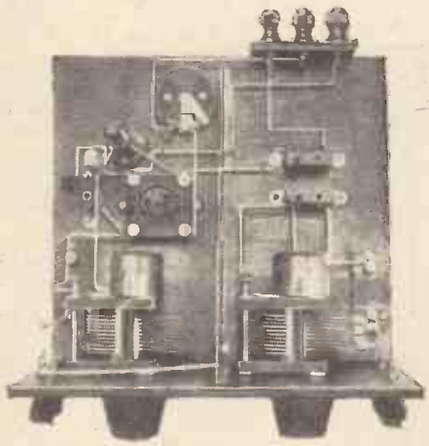
This arrangement enables the unit to be connected or disconnected from the receiver with the minimum of complication. By adopting the scheme to be outlined, it will not be necessary to modify the receiver itself in any way. The tuning circuit of the receiver becomes part of the secondary circuit of the H.F. valve, with the result that great selectivity is obtained.

Terminal Arrangements

It will be seen that on the right are five terminals, marked "H.T.+," "A on set," "E on set," "L.T.—" and "L.T.+." The "H.T.+" terminal can be connected to the H.T. battery direct or, if more convenient, to the H.T. + terminal on the receiver.

The terminals "A on set" and "E on set" replace the usual aerial and earth leads which latter are taken to the A and E terminals shown on the left in the circuit diagram.

The L.T. — and L.T. + terminals on the unit can be connected to the accumulator or to the corresponding L.T. terminals on the receiver. Of course, no H.T. — connection is required for the H.F. unit, because the H.T. and the L.T. are already linked in the receiver. Some receivers have L.T. + connected to earth, whereas



The three photographs on this page show clearly the general lay-out of the D.X. Unit.

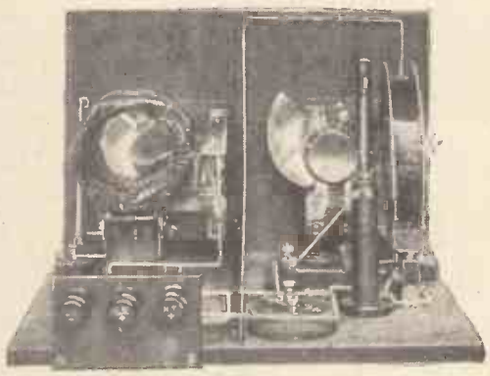
in others L.T. — is earthed. It was this fact which necessitated the use of the five terminals on the right. For example, suppose that in the unit "E on set" were connected to L.T. — and in the receiver L.T. + were earthed, then it will be clear that in this case when all the terminals were connected up the accumulator would be short-circuited. There is no possibility of such an occurrence if the "five terminal" system is adopted.

As regards the H.F. tuning system, this requires some comment. Although a neutrodyne circuit, plug-in coils, such as most readers have already a stock of, are utilised throughout.

The H.F. grid coil is a Gambrell centre-tapped one, and this is tuned by a .0005-microfarad variable condenser. The lower half of the winding also serves as the neutralising winding. The earth is taken to the centre tap, and the free end of the coil through a neutrodyne condenser to the anode of the H.F. valve.

In series with the anode and H.T. + is an *untuned* plug-in coil. Closely coupled to this is another plug-in coil tuned by a .0005-microfarad condenser.

A simple H.F. transformer is thus formed by means of the untuned and tuned plug-in coils. These coils are separated from the centre-tapped grid coil by a copper-foil partition. With the coils in the positions indicated in the reduced reproduction of the blue-print and photographs the *magnetic* coupling between the H.F. transformer coils and the aerial coil is appreciably reduced. The purpose of the copper-foil partition is to cut down the capacity coupling which exists between the coils.



Selectivity

Other points of interest in a consideration of the circuit are the following; (1) The inclusion of a .0002-microfarad fixed condenser in series with the aerial and centre-tapped coil considerably sharpens

the tuning adjustment of this coil. (2) A "variable fixed" resistor is connected in the L.T. + lead, the assumption being that the switching of the accumulator is controlled by a filament switch in the receiver.

Those readers who wish to assemble a unit similar to that shown in the photographs will require the following components and materials.

Ebonite panel 10 in. by 7 in. by ¼ in. (Peto-Scott or Becol).

Baseboard 10 in. by 9 in. by ⅜ in. (Carrington Mfg. Co.).

Cabinet to take panel and baseboard specified (Carrington).

Copper-foil partition, 6½ in. by 9 in. (No. 26 s.w.g.)

Two .0005-microfarad variable condensers with slow-motion controls (Ormond or Cyldon, Centroid, Ediswan).

Neutralising condenser (Gambrell or Peto-Scott).

.0002-microfarad fixed condenser (Dubilier, or Lissen, T.C.C.).

.0003-microfarad fixed condenser (Dubilier or Lissen, T.C.C.).

Centre-contact coil holder (Gambrell).

2 single coil holders (Lotus or Lissen).

Valve holder (Benjamin or Lotus, Lissen).

7-ohm baseboard-mounting resistance (Lissen or Igranic).

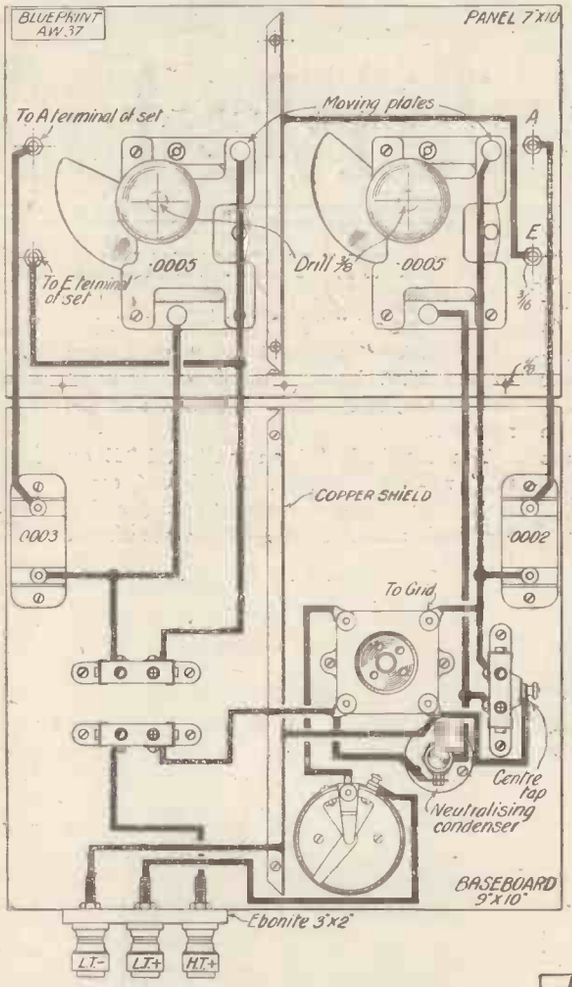
Terminal strip 3 in. by 2 in. by ¼ in. (Becol or Peto-Scott).

Seven engraved terminals, one each marked A1, A2, H.T. +, L.T. +, L.T. —, and two marked E. (Belling Lee).

Connecting wire (Glazite or Junit).

An examination of the various photographic views and the wiring diagram and layout will enable constructors to visualise very clearly the completed unit.

The panel layout is symmetrical. On the left are the two unit A and E terminals and on the right the A and E terminals which are connected to the corresponding receiver terminals. The two condenser dials control the H.F. tuning condenser



Wiring Diagram (Blueprint available)

(left) and the right-hand condenser tunes the "secondary" plug-in coil. The copper-foil partition is bolted to the panel 5 in. from the right-hand end.

Two 4 BA bolts and nuts are required for this purpose.

Baseboard Layout.

The baseboard layout is clearly seen in the plan view and the wiring plan. Behind the H.F. — tuning condenser is the H.F. valve holder, Gambrell coil holder, neut. condenser and variable fixed resistor. The .0002-microfarad series fixed condenser is seen on the extreme left. This group of components is screened from the remainder by the copper-foil partition. The other compartment consists of the second variable condenser, the two plug-in coils mounted as shown and a .0003-microfarad fixed condenser.

The terminal strip at the back measures 3 in. by 2 in. and on it are mounted, one inch apart, the L.T. — L.T. + and H.T. + terminals.

When the panel components are fitted, attach the panel to the baseboard with three woodscrews. The copper-foil partition can then be bolted to the panel and screwed to the baseboard as indicated.

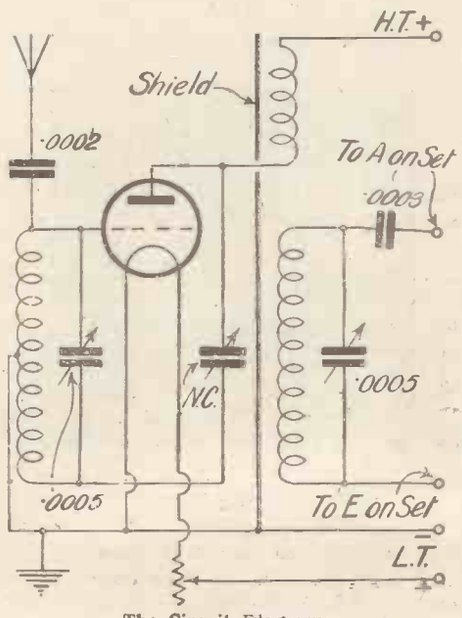
Reference to the reduced reproduction of the blueprint will enable the constructor to arrange the baseboard components and terminal strip.

A full-size blueprint of the amplifier can be obtained at this office, price 1/-. Covered Glazite wire was used in the amplifier described for connecting purposes. For the connection between the anode and "primary" plug-in coil this type of wire is essential, because the wire passes through a hole in the metal partition. Note that some wires are soldered to the partition, as this procedure simplifies the wiring.

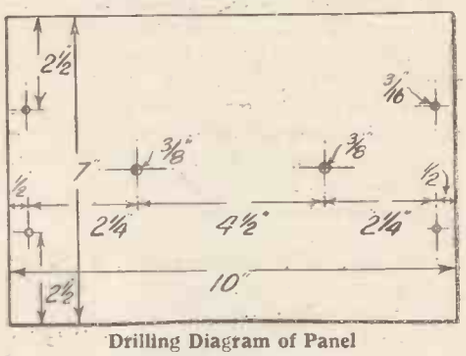
When completely wired and checked, the unit can be attached to almost any ordinary type of broadcast receiver.

Suppose that the unit is connected to a straightforward detector and L.F. set, then the usual coil-and-condenser tuning circuit will become part of the secondary tuning of the H.F. transformer. The purpose of the .0003-microfarad fixed condenser connected between the top of the "secondary" plug-in coil and the terminal marked "A on set" will now be appreciated.

Were it omitted, the "secondary" plug-in coil, the variable condenser across it and the receiver tuning circuit would all be in parallel, which would be an inefficient arrangement.



The Circuit Diagram



Drilling Diagram of Panel

By the inclusion of this small fixed condenser the two tuned circuits, namely the H.F. transformer secondary and the receiver tuning circuit, are linked together by a capacity coupling, and the result is an extremely selective series of tuned stages.

ARMOURED-CAR WIRELESS

Wireless Telephony Enhances the Utility of the New Mechanised Army

EXPERIMENTS in telephony on low power between moving armoured cars recently carried out by the 23rd (London) Armoured Car Company, while in camp at Moulsford, near Goring, are likely to be of considerable importance in making the new mechanised army yet more valuable as a war weapon.

These experiments were carried out by men who are keen amateurs and who, while doing their annual Volunteers' training, were having something of a busman's holiday.

One of the wireless-equipped Armoured Cars

Special Demonstration

As a representative of AMATEUR WIRELESS I had the opportunity of being present at a special demonstration carried out between two armoured cars and a stationary radio car used as "headquarters." The results obtained were really extraordinarily good and I was assured that the "regulars" could not put up anything like such a good show!

The brief tests I witnessed proved beyond any doubt that telephonic communication can be carried out by moving cars with ease, up to a range of ten miles or so, even with a transmitting power as low as 30 watts.

When one considers the limitations of space, noise due to the car engine, mechanical vibration of armour plating and absence of aerial accommodation it will be realised that the results are an achievement worth noting.

All the work has been carried out under the direct supervision of Capt. K. E. Hartridge, who himself has designed and built most of the apparatus. Upon raising the question of expense I was told that, although the War Office has given permission for the experiments to be carried out and was following the results with interest, they gave no financial aid at all, and it is a fact that this important work has been carried out at Capt. Hartridge's own expense.

Equipment used

Each of the two armoured cars is equipped with a low-power transmitter (of approximately 30-watts rating) and a seven-valve receiver, while the headquarters van, seen in one of the photographs on this page, has a slightly more powerful transmitter and also a seven-valve receiver, which is so arranged, however, that only six-valves need be used when required. High tension for the transmitters is obtained from Mackie generators, while Osram valves are used.

For this work a low wavelength in the band allocated for military purposes is employed—something around 130 metres being found suitable. Shorter waves could be used, but it is thought that they would give rise to increased complications with very little corresponding advantage.

Undoubtedly the most outstanding feature of all three installations is the ingenious form of aerial, a special development of Capt. Hartridge's.

This view of the "Headquarters" Car give a good idea of the arrangement of the collapsible aerial

As can be seen from the photographs on this page, the aerial consists of a vertical aluminium rod mounted on the roof of the car. In each case the base of the rod is mounted on an pneumatic "door-stop" so that should the rod be hit by an overhanging tree when the car is on the move the rod will simply swing back momentarily and then automatically raise itself when the obstruction is passed.

Hauling down the Aerial

When the cars pass through very thickly wooded areas it is possible to haul the mast down from inside the car by means of a halyard. This is arranged in much the same way as the trolley arm of a tramway car.

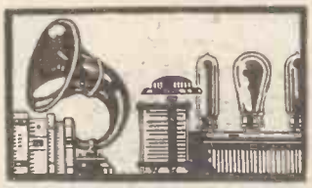
Sitting in the van at headquarters with Capt. Hartridge I was able to follow with perfect ease—for the quality of speech was mostly of "broadcast" standard—the movements of the Ace and Dragon (the names by which the two armoured cars are known) for a couple of hours or so.

We learnt that the Ace had gone on in front and that it had apparently had some trouble with its apparatus (a jolting armoured car is as good a test for finding weak connections as could be devised!) and instructed the Dragon to push on and find out what was the trouble.

Soon afterwards we learnt that the Dragon had broken a petrol pipe and Capt. Hartridge was then able to send out a relief car with some rubber tubing to make an emergency connection.

These examples will amply demonstrate how valuable such intercommunication between units of a fleet of armoured cars really would be during war. There is little chance of a short length of vertical rod—such as the aerial is comprised of—being shot down, and no time is lost in coding and decoding messages for transmission by morse.

With a low-power transmitter, of which the range could be restricted as circumstances demanded, the enemy would not overhear much to its advantage, for by the time the conversation had been understood (not likely unless every radio operator in enemy armoured cars could talk English!) our mechanised force would already have carried out its intended manœuvre.



PRACTICAL ODDS & ENDS

Some Wiring Hints

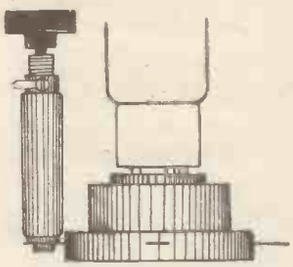
WHEN putting sistoflex over thick wire remember that pulling stretches the sistoflex and makes it narrower; pushing makes it wider and easier to slip on. Put the sistoflex on first and bend the wire afterwards when possible. Always space all H.F. wires as much as possible.

A good screw-down connection is better than a badly soldered joint.

When heating the soldering bit on a gas ring, let the tip protrude beyond the flame. If a coal fire is used rake a hole in the glowing heart of the fire, place a poker across the hole and rest the bit on the poker in such a way that it does not touch the coals. The quickest way to clean the soldering bit is to rub it on a piece of sand-paper. H. P.

Using Rheostats as Resistors

IN these days of fixed and semi-fixed resistors many constructors must have rheostats out of commission, because they



Rheostat used as Resistor

are of the type intended for panel mounting.

The illustration, herewith, shows a method of using rheostats of the Lissenstat variety mounted upon the filament soldering tag of the popular anti-microphonic type of valve holder. The rheostat is mounted by means of its bottom contact screw through a hole in the soldering tag. There is usually a small hole in the tag and this can easily be enlarged if necessary. Not only does this method of mounting save the wiring between the rheostat and valve holder, but it also saves baseboard space and permits of ready adjustment, since valve holders are always placed in an accessible position.

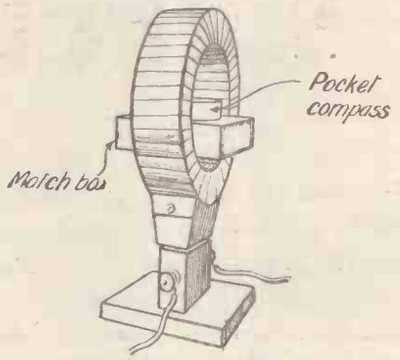
W. M. Y.

An Emergency Galvanometer

QUITE a useful emergency galvanometer can be rigged up in the simple way shown in the drawing. The largest available coil is plugged into a holder and a matchbox is laid inside it.

On the top of the box is placed an ordinary pocket compass. The coil holder is then turned until the compass needle is over the north point.

The passage of current through the coil will cause the needle to be deflected to one side or the other. The more sensitive the



A Simple Galvanometer

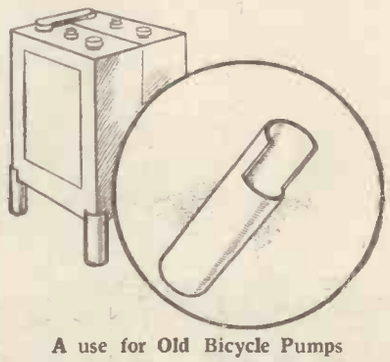
compass and the greater the number of turns in the coil used, the more delicate will the emergency galvanometer be.

With a 250- or 300-turn coil a current of only 2 or 3 milliamperes will produce a very respectable deflection. R. W. H.

Insulating the Accumulator

THE barrel of an old celluloid bicycle pump may be found useful for making insulating feet to keep the bottom of an L.T. accumulator away from the surface on which it is placed.

Four short lengths of the barrel are parted with a hack saw and a portion at one end



A use for Old Bicycle Pumps

of each piece removed with a flat file as shown in the illustration.

The feet are then placed at each corner of the bottom of the accumulator case and secured with celluloid solution, applied with a clean brush. The case should of course be wiped dry and cleaned of any acid before applying the solution. A. P.

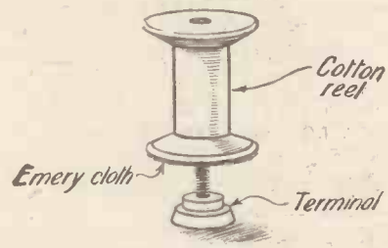
Cleaning Terminals

THE contact surfaces of terminals, particularly those of the accumulator and the high-tension battery, should be cleaned from time to time, for they are apt to develop films of oxide which offer a high resistance to the passage of current.

Dirty terminals on an accumulator may lead to a considerable amount of noisiness in the receiving set. It is easy enough to get the flat surfaces of the milled nuts bright simply by rubbing them upon a sheet of emery cloth.

But what of the flat surfaces surrounding the base of the central screw? Here is a tip which makes it the simplest matter to get these as bright as the others.

Obtain an empty cotton reel and seccotine a disc of emery cloth to each of its ends, making a hole in the cloth to correspond with that through the middle of the reel. Having removed the milled nut from the terminals slip the reel over the screw,

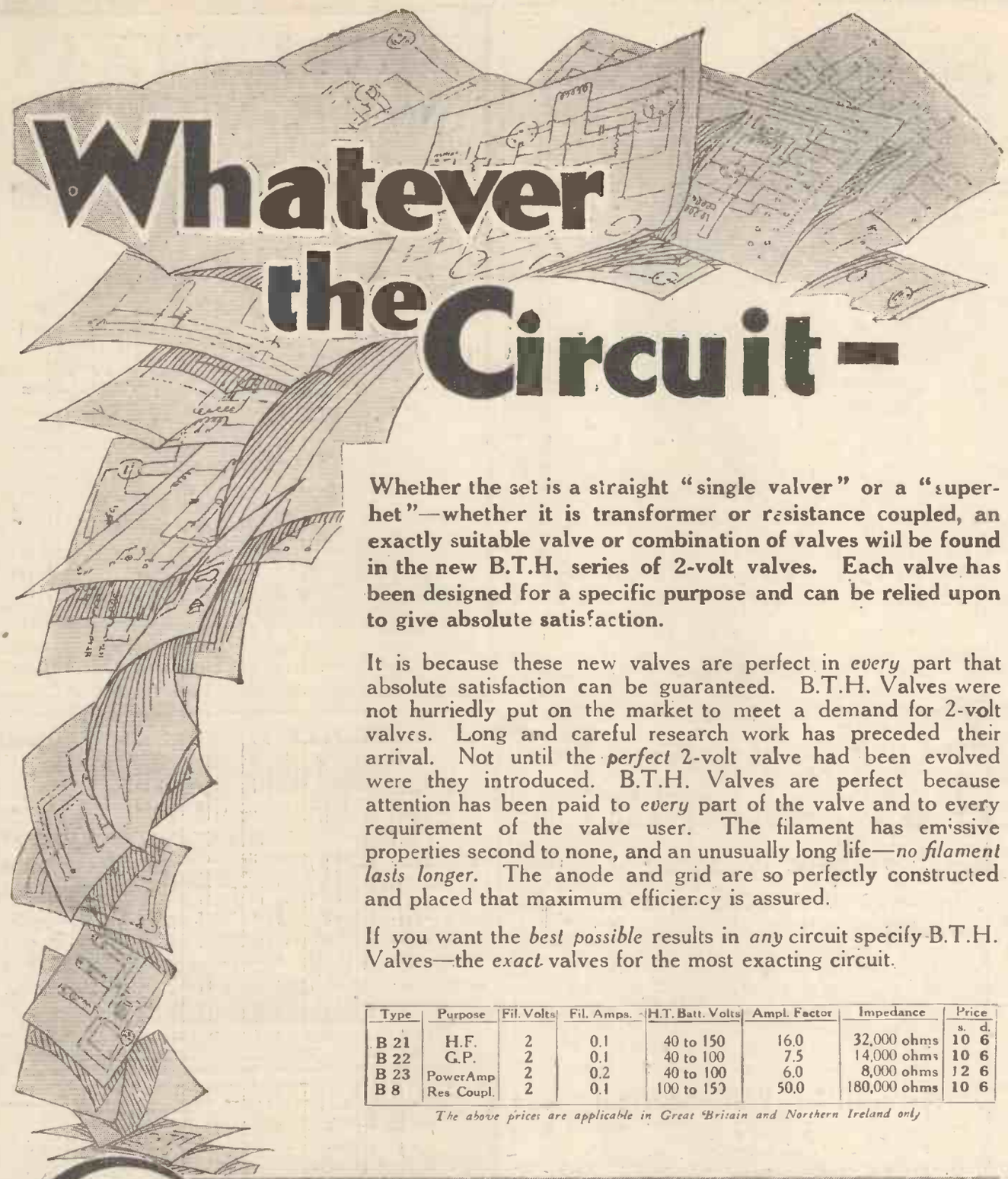


Cleaning Terminals

press it down hard and give it two or three turns to and fro. H. R.

It has now been discovered that the sulphides of calcium, barium and zinc have the property of giving off a copious flow of electrons at low temperatures. This *may* have an effect on valve prices!

To translate wireless into terms of age-old symbols was the task the Royal Heralds had set them when the B.B.C. asked them for a coat of arms—to which the B.B.C. is entitled, as it was incorporated by Royal Charter. A terrestrial globe on a blue shield, representing the ether, encircled by a golden ring, and surrounded by seven planets, has been finally produced and adopted by the B.B.C. The crest consists of a British lion holding a thunderbolt which denotes electrical transmission. On each side is an eagle with a trumpet round its neck, representing speed and proclamation. The motto is: "Nation shall speak peace unto nation."



Whatever the Circuit—

Whether the set is a straight "single valver" or a "super-het"—whether it is transformer or resistance coupled, an exactly suitable valve or combination of valves will be found in the new B.T.H. series of 2-volt valves. Each valve has been designed for a specific purpose and can be relied upon to give absolute satisfaction.

It is because these new valves are perfect in *every* part that absolute satisfaction can be guaranteed. B.T.H. Valves were not hurriedly put on the market to meet a demand for 2-volt valves. Long and careful research work has preceded their arrival. Not until the *perfect* 2-volt valve had been evolved were they introduced. B.T.H. Valves are perfect because attention has been paid to *every* part of the valve and to every requirement of the valve user. The filament has emissive properties second to none, and an unusually long life—*no filament lasts longer.* The anode and grid are so perfectly constructed and placed that maximum efficiency is assured.

If you want the *best possible* results in *any* circuit specify B.T.H. Valves—the *exact* valves for the most exacting circuit.

Type	Purpose	Fil. Volts	Fil. Amps.	H.T. Batt. Volts	Ampl. Factor	Impedance	Price s.	Price d.
B 21	H.F.	2	0.1	40 to 150	16.0	32,000 ohms	10	6
B 22	G.P.	2	0.1	40 to 100	7.5	14,000 ohms	10	6
B 23	Power Amp	2	0.2	40 to 100	6.0	8,000 ohms	12	6
B 8	Res Coupl.	2	0.1	100 to 150	50.0	180,000 ohms	10	6

The above prices are applicable in Great Britain and Northern Ireland only

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A COMPLETE RANGE OF VALVES—

2 VOLT VALVES

FOR ALL SETS AND CIRCUITS

B21 (HF & DET)
B22 (General Purpose)
B23 (Loud Speaker)
B8 (R.C.)

If you are interested in R.C. Coupling, write for a copy of the "RESISTOR" Booklet to Publication Dept., The British Thomson-Houston Co., Ltd., Rugby

2804

On Your Wavelength!

Bravo, Marcuse!

EVEN before his one-man Empire service was officially opened, Mr. Gerald Marcuse scored an outstanding success by reaching New Zealand with a telephone transmission. The programme was sent out in the ordinary course of his experiments, and he was surprised and delighted later to receive a call in morse from a New Zeland amateur, who reported that both speech and music had come across very well indeed. If you examine a map of the world made on a great circle projection with England at the centre—this is the only kind of map that gives a true idea of the distances to be covered in Empire broadcasting—you will find that New Zealand is the farthest of all countries from us; so far in fact, as wireless waves are concerned, it lies on the other side of Australia.

To span this vast distance successfully with a power of but one kilowatt is indeed a feat to be proud of, for the well-known distance getters amongst the short-wave broadcasting stations use far more. The Americans 2XAF and 2XAD are rated at 10 kilowatts, and I have heard that PCJJ uses 20, at times, anyhow. Bravo, Marcuse—and more power to your aerial!

The Australian Broadcast

I am of the opinion that most readers will agree that the B.B.C. scored a marked success on Sunday, September 4 by the relay it made through its Keston station of the first British Empire broadcast carried out by 2FC, the short-wave telephony transmitter erected at Sydney, New South Wales. Personally, I listened to this transmission without interruption from start to finish and was easily convinced that sufficient progress has already been made by wireless engineers on short-wave transmission to warrant the establishment of a regular service without undue delay. Atmospheric conditions generally were more favourable to reception on this particular Sunday than they had been at the time the preliminary tests were carried out on previous days by the B.B.C. experimental listening post, for I understand that on those dates statics were prevalent and the transmission suffered considerably more from fading than it did when the actual organised broadcast programme was put on the air.

The Value of Short-wave Transmissions

An adequate proof of the great value of direct short-wave transmission was given to us on the following day when in conjunction, I believe, with the French and Swiss Posts and Telegraphs, the B.B.C. relayed the opening speeches of the Conference of the League of Nations at Geneva. On this occasion, land-line distortion was so great that for a long period it was almost impossible to understand entire sentences. Such was not the state of affairs with the Australian broadcast, of which both music and speech came through with awe-inspiring clarity. The question of interference, however, from extraneous sources, is one against which special precautions must be taken. In the course of the transmission, towards 6.30 p.m., the quality of the broadcast suffered considerably, and it was apparent that the engineers were meeting with unexpected trouble. Later, it turned out that a motor-car which had reached the Keston huts had been left with its engine running; interference was caused by the magneto, and this was stopped so soon as the engine had been switched off. Great credit is due to the B.B.C. engineers for the work carried out by them.

5GB's Shortcomings

Voices of lament are still being raised in the Birmingham area. Sets in private homes, sets in hospitals, etc. refuse to function, and letters pour into Savoy Hill demanding a way out of the difficulty.

The trouble is coming from that area where previously the signals of 5IT were so strong that hardly any aerial was needed. The B.B.C engineers maintain that the strength of 5GB's signal in this area is equivalent to the signal of 2LO at a distance of a mile. Thus it is argued that if the crystal listener in Birmingham puts up an efficient aerial about sixty feet in length all will be well. The answer to this advice is that sixty feet of aerial in many districts is an impossibility. So pressing are the Birmingham people that it has been decided to send experts to the area to see exactly what can be done.

Further Trouble Ahead

What a pretty kettle of fish the B.B.C. engineers are brewing for themselves. As the regional stations come into being a similar wail of misery will arise from other areas in which the local stations cease to function. The regional transmitters will be placed outside the centres of population, in order that the centres may have an opportunity of choosing what stations they wish to hear —otherwise the densest centres of population would be reduced to one regional station.

Compromise

Now these centres are all used to strong signals from their local stations. Under the regional scheme they will have a minimum of three normal signals—thus the cry of Birmingham will be repeated in many counties. If the B.B.C. find it very necessary to put up local transmitters then the regional scheme becomes one of compromise, and that with only eleven wavelengths on which to do it. Another alternative is to put up the power of the five regional stations. This would materially increase the cost and also enlarge the areas in which the listener could listen to the local station only. Whatever the outcome, the B.B.C.'s mail will be lively for some time to come.

Contrasts

Another amusing point that is being raised is, what are contrasts? The B.B.C. opine concentration and relaxation. It is the only safe plan. Many listeners have flown to pen and ink and said that this won't do. The trouble seems to be that both programmes are good and a large number of people would like to listen to both at once. They argue that there is good music and light music in both. Also that on one there is a story or play that they wish to hear while at the same time their favourite concert is being broadcast on the other. Another correspondent blames the B.B.C. for breaking up the family circle. They have only one set, and are hopelessly divided in taste, thus arise words and one side marches out into the night to pictures or dance clubs. This regional scheme will brighten the winter evenings.

Radio Opera

Whatever is said of the British public's tastes for opera, it does not apply to the wireless audience. Opera is one of the most popular numbers in the broadcast programmes. If the listener is armed with the book of the words the story can easily be followed, while the best English vocalists can so frequently be heard.

The new season opens with "Il Trovatori" on September 27 and 28. This is a new departure, and will give more listeners a chance of hearing these well-produced musical works. Many listeners complain that being limited to one day they frequently miss them. This season the operas will be relaid from 5GB and then all other stations on successive days. An alternative programme will always be available.

Automatic Reception

Last week I paid the promised visit to Hertfordshire where I heard for myself the automatic receiver which Mr. Reyner

On Your Wavelength! (continued)

has developed for the *Wireless Magazine*. The set at first sight presents that pleasing "knobful" appearance which used to delight the heart of the amateur, but I soon discovered that only one or two of them were used at any one time. There was a little array of switches down one side and I amused myself by pulling out the various switches in turn when I received alternative programmes without the slightest trouble.

Tiring of this toying I essayed something that I thought would be a little more difficult, namely the tuning in of some foreign station on the single dial. Here, however, I was disappointed, for on both long and short waves the stations fell over themselves in their anxiety to present themselves to the ear. Indeed, I had to use the volume control on quite a number of distant stations.

Before I was finally dragged away, I found one more little knob which I hadn't pushed, pulled, or twisted. I therefore gave this a hearty twitch and was rewarded with a green effulgent glow emanating from behind the dial which was of the illuminated variety. It is some time since I have seen such a pleasing array of thoroughly useful gadgets, and I feel sure that this receiver will do particularly well.

An "A.W." Production

With my ears flapping slowly at a rate estimated to be between 2.5 and 3.7 cycles per second, I was led to another bench where Mr. Reyner proceeded to play me fox trots, organ music, and some Sarasate interpreted by Heifetz on a special gramophone amplifier which he had developed for AMATEUR WIRELESS. He tells me that this is to be the nucleus of a special AMATEUR WIRELESS receiver which will be made in several units.

The ultimate receiver will comprise a high-frequency amplifier, a detector and special low-frequency amplifier with provision for switching in a gramophone pick-up, a moving-coil loud-speaker and finally a mains unit to go with it. These various units will all be described individually while the whole system will comprise a thoroughly up-to-date practical receiver. It will have the advantage that those readers who already possess certain portions of it and do not feel disposed to duplicate their present apparatus could just build up such units as they found attractive.

The first unit to be described, which I understand, is to appear in the next issue is the detector and amplifier. Looking at this I was surprised to find, not a resistance amplifier as I expected, but a series of parti-coloured transformer-looking gadgets. Upon enquiry, however, I found that these were not simple transformers, but were one of the latest developments in the low-frequency side. They were apparently a particular form of dual-impedance coupler in which a measure of step-up was obtainable. Apparently, all the advantages of the dual impedance system can be obtained while the amplification itself can be made somewhat more. By the use of this system, I was told that the requisite volume could be obtained with one valve less than would be the case if resistance coupling were employed.

I naturally asked how the arrangement compared as regards purity of reproduction, and I was told that the system was very good. Owing to the fact that inductances are used, there is naturally a cut-off point, but this occurs quite low in the scale, and the bass notes are in consequence, reproduced quite effectively. I was told that for average purposes they suited excellently. For use with ordinary speakers, they would bring out the bass notes to the best that the speaker itself was capable of, while with a moving coil speaker, there was very little difference between this amplifier and a resistance coupling. Mr. Reyner explained that he found the tone rather more natural and pleasant, for with a moving-coil speaker there is a tendency to overemphasise, which gives a slightly unnatural tone to the reproduction. Apparently the use of these new couplers just adds that spice of naturalness without losing the low notes.

I was also told that they have other rather interesting properties, one of which is that they give a more proportional amplification rather in the same way as dual impedance couplers will. However, I rather lost myself here, and as the whole system is going to be explained next week, I need not trouble to say more about it. I also had a glance at the remainder of the special AMATEUR WIRELESS set which had just completed its final test, and was still in hook-up form, and if the results are anything like the standard obtained on the amplifier, the whole receiver promises to be one of particular interest.

A Lopsided Effect

Having grown a little tired of the gramophone for the moment, Mr. Reyner simply threw over a simple switch, and forthwith we were connected with 2LO, which was rendering an orchestral piece at the time. Incidentally, I was surprised at the strength at which 2LO came in. I found a simple anode-band detector valve was being used without any reaction (although I understand reaction is being fitted to the set for the benefit of the more remote dwellers). I commented on the strength of signal, however, and was informed that 2LO at the laboratory was about twice its theoretical strength. Curves were produced showing me that, for some reason, the strength in a north-westerly direction keeps up well, whilst in the reverse direction it falls off rather more rapidly than it should do. North-east and south-west the strength at a given radius was intermediate between these two extremes and was more of a normal character. Probably, the phenomenon has something to do with the orientation of the aerial at 2LO or with some local conditions around the transmitter, but I was informed that it made 2LO quite difficult to cut out, and that a receiver which would eliminate London at that spot could be counted on giving the same performance at a radius of 5 or 6 miles in other parts of London, and naturally still closer to provincial stations owing to the smaller power.

THERMION.

Operating the "Tetrode Three"

The Receiver with the New Shielded Valve

By J. H. REYNER, B.Sc. (Hons.), A.M.I.E.E.

THOSE readers who have built up the "Tetrode Three" described in last week's issue will have been surprised at the ease with which the various stations can be picked up at extraordinary strength for a three-valve set. The screening, both in the valve and externally, obviates any coupling between the H.F. circuits, so that a perfectly stable amplifier is obtained and good amplification results without any trouble.

An Important Point

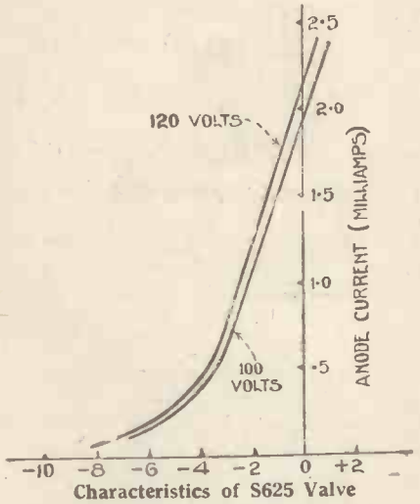
With certain types of valve-holders it is possible to push the valve pins right through the holder. In this particular set such action may result in the anode pin touching the screen which is at earth potential. If this occurs the high-tension battery may be short-circuited through the valves.

It is desirable, therefore, to insert a small disc of fibre, cloth, or other insulating material underneath the valve-holder before finally screwing it down on to the screen.

After a little preliminary handling it becomes obvious that this new screened valve behaves exactly as an ordinary valve. The only difference is that we are able to obtain a greater amplification factor relative to the internal impedance than we could normally do with a valve of the three-electrode type. In order to make this clear I have plotted the characteristic of this S625 valve showing the relationship between the anode voltage and the grid voltage in exactly the same way as is done with a valve of the usual make. It will be seen that the characteristics are similar.

The characteristic curves for two different values of anode voltage are close together, indicating a high internal impedance, while the steep slope of the curve indicates a high amplification factor. As a matter of fact, the figures for the valve are as follows: With zero grid bias the internal impedance is 120,000 ohms with an amplification factor of 70. Both these factors are increased by adding negative grid bias, and at a value of 3½ volts negative the impedance is 300,000 ohms, while the amplification factor rises to 135.

The particular point to be noted is that if the internal impedance rises, the amplification factor also rises almost in the same proportion. This is by no means the case with the ordinary type of valve, where a limit is experienced, and this effect has been baffling valve manufacturers for some considerable time. For example, if we have a valve of 50,000 ohms impedance it would have an amplification factor of the order of 30. If with a normal valve, however, we increase the impedance to 100,000 ohms the value would only increase to about 40 instead of doubling itself. With a screened valve, however, we have increased the impedance to 120,000 ohms, but the amplification factor is increased in the same proportion to about 70.



Characteristics of S625 Valve

Now, an increase in the internal impedance of the valve is all to the good, as it obviates the valve damping, which is so commonly experienced in normal circuits. If the shunting effect of the valve on the tuned circuit is reduced the circuit is more sharply tuned. At the same time, the increase in the amplification factor enables us to use plain tuned-anode circuits without the necessity for a transformer, and still obtain a high amplification from the stage.

The Long Waves

I indicated last week that the particular set discussed gave excellent results on the long waves, and by changing the coils to those suitable for the longer wave bands this effect can readily be verified. I used a 250 Atlas double-tapped coil for the aerial coil and a 250 coil for the anode circuit, with a 75 reaction coil. The results were very good, the following stations being obtained strongly on the loud-speaker. The dial settings, as in the previous case, are those on the H.F. dial, the aerial dial being about the same at the top of the scale and a little greater towards the bottom:

150	Scheveningen Haven.
142	Radio-Paris.
130	Daventry, 5XX.
113	Moscow. (Slight interference from 5XX.)
82	Königswusterhausen.
64	Gisselore.
43	Hilversum.

The reason for this excellent performance on the long waves can quickly be seen. The actual amplification we are obtaining from the valve obeys very similar laws to those which apply for ordinary cases. The full amplification is only developed when the external circuit is of a high impedance compared with that of the valve, and if this is not the case, then we only obtain a proportion of the full amplification factor depending on the ratio of the external and internal impedances.

The valve in this particular circuit is being used with zero grid bias, so that it has an internal impedance of about 120,000 ohms and an amplification factor of 70. The impedance of an ordinary tuned-anode circuit, using a 250 coil tuned with a .00025 condenser (which is about the middle of the scale), is in the neighbourhood of 1,000,000 ohms, which is very large compared with the valve; so that practically the full amplification is being obtained from the valve, and the strength with which the long-wave stations come in is an adequate testimony to this fact.

Limitations

When we consider the short-wave stations, however, the position is not quite so favourable. Here, using a 75 coil, again tuned with a .00025 condenser, the impedance is only in the neighbourhood of 100,000 ohms, which is of the same order, or, if anything, a little less than that of the valve. Consequently, we cannot obtain more than about 60 or 70 per cent. of the full amplification. Moreover, if we increase the impedance of the valve by applying grid bias, we increase the amplification factor, but we are unable to make use of it, owing to the relatively low anode impedance.

(*Concluded in second col. of page* 340)

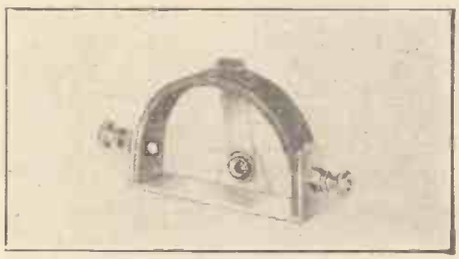
"A.W." TESTS OF APPARATUS

Conducted by our Technical Editor, J. H. REYNER, B.Sc.(Hons.), A.M.I.E.E.

Peerless Semi-fixed Resistor

A PEERLESS semi-fixed resistor has been received from the Bedford Electrical and Radio Co., Ltd., of 22 Campbell Road, Bedford.

This consists of a flat strip of insulating material carrying a resistance winding which is bent into a half-circle and held in a small metal clamp. A contact, pivoted at the centre of the circle, rotates over the resistance, so that the amount of resistance in circuit can be varied between zero and



Peerless Semi-fixed Resistor

maximum. Terminals are provided at each end and a definite "off" position is available if it is desired to switch the valve completely out. Two holes are provided in the stamping, forming the base whereby the component may be screwed down to a baseboard or fitted at the back of a panel as required. These holes, however, are not directly accessible, it being necessary to apply a screwdriver at an angle, and although this can easily be done, we think this is a point in which the design could be improved.

The particular sample was rated at 6 ohms and was found to have a resistance of a little over 7 ohms, giving an ample margin of safety. The contact between the moving arm and the resistance was good and the whole instrument is well finished. It sells at the low price of 1s. 3d. and should prove attractive to many constructors.

Tandco and Tunewell Coils

A TANDCO plug-in coil has been sent in for test by Turner & Co., of 54 Station Road, New Southgate, N.11.

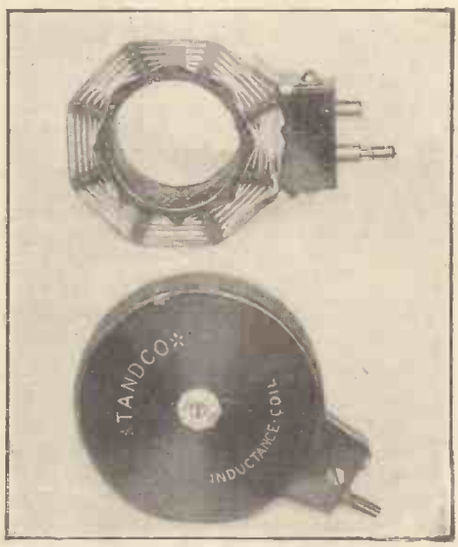
This consists of a moulded former, of 2 in. outside diameter, having eight ribs round its periphery. A winding is placed thereon, the first layer being wound on the former direct, whereby an air spacing is obtained owing to the ribs, while subsequent layers are kept apart with fibre spacers situated between the ribs on the centre former. The turns in any one layer lie over the spaces in the layer underneath, thereby minimising the self-capacity effect to some extent.

The particular coil submitted had 75 turns of 26-gauge enamel-covered wire, the ends of the winding being brought out to the usual plug and socket, which are arranged to conform to the standard conventions. The whole coil is housed in an attractive brown moulded case, which is provided with fins on the inside which hold the coil rigid.

On test it gave satisfactory results in a receiver, whilst its light weight and robust finish are a further feature. The over-all size of the former is 3¾ in. diameter, 4½ in. to the bottom of the plug, and 1 in. wide.

We also received a cheaper pattern of coil, known as the Tunewell coil, which is manufactured under Tandco patents, the method of winding being exactly the same.

The sample submitted comprised 150 turns of 26-gauge d.c.c. wire. The coil in this case, however, is finished by connecting the leads to an ordinary plug, while a layer of celluloid is placed round the whole coil. The component is quite robustly



Tunewell and Tandco Coils

constructed, but is, of course, a cheaper proposition than the Tandco coil itself owing to the absence of a moulded case. The construction of the coil is also less efficient, but it serves for ordinary purposes where a particularly low ratio of resistance and inductance is required.

Atlas Aerial Coupler

THE Atlas aerial coupler consists of a simple unit whereby the advantages of a tight-coupled aerial are obtainable when ordinary plug-in coils are being used.. The component consists of a single layer of wire of twenty-four turns housed inside a hollow tube of insulating material which is designed to fit in the centre of a plug-in coil. This number of turns would be suitable for a coil having about seventy-five turns, which is about the usual value; while, of course, it may be used with coils of slightly different values if desired. The

Atlas Aerial Coupler

actual coupling is variable, to some extent, by the distance which the coupler is inserted inside the coil.

The coupler is primarily intended to be used with Atlas coils, and it will not fit all other makes of coils. The actual dimensions are 1¾ in. diameter and 2¼ in. long, so that readers may judge for themselves whether it will fit their own coils or not.

The particular instrument supplied was provided with two earth terminals connected together, presumably in order to allow the earth end of the circuit to be connected to earth if desired.

The instrument was tested in a number of coils and was found to give satisfactory results. It should prove useful in obtaining a little extra selectivity in order to cut out the local station on 5GB. H. Clarke & Co. (Mcr.), Ltd., of Old Trafford, Manchester, are the manufacturers.

Preparations are now nearly complete for the Radio World's Fair, to be held at Madison Square Garden, New York, on September 19 to 24. In addition to the usual exhibits, there will be personal appearances of radio artistes, and broadcasting direct from studios located on the exhibition floor. Twenty-two leading radio organisations will sponsor the annual banquet, to be held on September 21, at the Astor Hotel. The largest "link" of stations ever formed will broadcast the entertainment features of the banquet. Mr. J. Andrew White will act as master of ceremonies.

THE NEW RADIO SIMPLICITY

MAKE THE ACQUAINTANCE of Marconiphone Mains-Driven Wireless—the greatest Radio convenience since Broadcasting began.

A Marconiphone Mains - Driven Receiver operates direct from the mains, just like an electric lamp—and costs no more to run. The set when first installed has simply to be connected to an electric light socket and it is instantly ready for action. Afterwards, whenever the wireless is needed, you just switch on.

With but slight alteration most existing receivers can be converted to this new radio simplicity by means of the Marconiphone All-Power Units.

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MARCONIPHONE MODEL 32, the new season's 3-valve receiver, exemplifies how aptly Marconiphone have sensed the requirements of the modern listener. Not only is range and power exceptional, but control has been reduced to the turning of a single knob. Stations once logged can be recorded on the unique tuning scale and brought in with effortless accuracy whenever desired. The standard tuning units cover ranges of 250-550 metres and 1400-1900 metres.

Receiver only with Broadcast and Daventry tuning unit (Royalty paid) .. .. *Battery Base £1 12s. 6d. extra.*	£13 17 6
Complete with D.C. mains equipment (Royalty paid) ..	£22 8 6
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There is a very complete range of Marconiphone receivers, loudspeakers, components, etc., each one the leader in its class. All Marconiphone products costing £10 or more can be purchased on the simplest of Deferred Payments. Full particulars on request.

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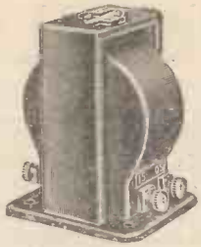
Some interesting booklets on radio matters can be obtained by writing us for publication D 60 —a postcard will bring them.



Smoothing Choke

Smoothing Choke for H.T. Supply Unit.—Has high inductance and very effective for smoothing purposes. Completely enclosed in an attractive metal shield with suitable terminals. Specially suitable for use with Power Transformer.
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"F" Type Transformer.—A successor to the popular "E" Type L.F. Transformer. Considerable improvements in design, although the same external appearance. Ratio, 3½ : 1. An excellent Transformer at a moderate price. **Price 16/-**

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Not another Igranic Circuit but the range of Igranic Transformers and Chokes

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Power Transformer for H.T. Supply Unit.—A highly efficient Transformer suitable for full wave rectification, similar to those employed in the well-known Igranic H.T. Supply Units. Suitable for operating off A.C. to the voltages and aperiodics stated. Separate winding giving 4 volts for lighting filament of Rectifying Valve. Output 250 volts to each anode, 75 milliamps.
100-110 and 200-220 volts A.C., 40-60 cycles.
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"C.C." (Choke Capacity) Output Unit.—A filter for use after the last valve of a receiver. Prevents anode current passing through loud-speaker, thus protecting its windings, and preventing demagnetisation. Improves quality. Prevents low-frequency oscillation. Long loud-speaker leads permissible.
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H.F. Choke.—An exceptionally compact H.F. Choke. Effective from 3,000 metres to lowest broadcast wave-lengths. Very small external field, low self-capacity and high inductance. Mounting bracket provided. Enclosed in Bakelite case. **Price 5/-**

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Power Transformer

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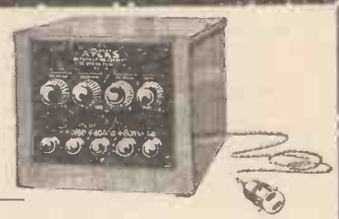
"ATLAS"
RADIO SPECIALITIES



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AMAZING RESULTS!

You can get marvellous selectivity without ANY alteration to your set by using Clarke's "ATLAS" Low Loss Coils. The famous twin wire winding ensures lowest H.F. losses, together with maximum distance and signal strength.

"Radidea," of the Allied Newspapers, Ltd., says:

"There is no doubt that Clarke's Atlas Centre-Tapped Coils make even the straight set more selective. Stations of 5 metres above or below the local station wavelength could be tuned in with ease and without interference. Daventry is easily separated from Radio Paris on almost any set. It is interesting to note that the *tappings are taken at the true electrical centre* and not merely at the centre of the windings."

The coils are all standard fitting. No special bases are required.

PRICES: General Purpose Coils:
Nos. 25-50.....2/6; No. 65.....3/-; Nos. 75-150.....3/6.
Centre-Tapped Coils:
No. 40, for 200 to 400 metres, and No. 60, for 350 to 600 metres, 4/3 each. Special Coil for Daventry, etc., 6/6 each.
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WITHOUT FEAR OR FAVOUR

A Weekly Programme Criticism by Sydney A. Moseley

AFTER Australia there are surely no more thrills to be had! And the man without a wireless set who can read of these astonishing achievements without rushing to the nearest wireless stores and spending his last bob on a set—well, his name is Mr. Stick-in-the-Mud.

◆ ◆ ◆

In regard to my recent notes on the subject, I ask: What about the Sunday sermons now? Admittedly the last two or three have been more in the nature of addresses than lectures, but surely the time has come to reconsider the whole position in relation to the alternative programmes. Unless the B.B.C. wishes to make the listener religious by order, there is no reason why Daventry *and* the experimental station should each give the same services at the same hour and with the same sort of sermon. I suggest that a public speaker of renown should broadcast earlier in the evening an uplift talk of the widest appeal.

◆ ◆ ◆

I find the problem of which to switch on—5XX or 5GB—becoming more and more insistent. Actually that should not be the case, for the programmes could be so contrasted as to leave no doubt as to one's choice. Possibly it is due to my catholicity of taste (said he, modestly!). Therefore the advent of the alternative programme is turning out to be not altogether an unmixed blessing. From being able to switch on in the evenings and recline undisturbed on the settee, taking the good with the bad, I find myself perpetually on the move, first turning here and then there. Incidentally, the foreign stations come in unasked.

◆ ◆ ◆

I was listening to Mr. Richard Hughes reading "a short story"—well, hardly that. It was more of a well-written extract from one of his works, with a sort of "for sequel see my book" kind of thing. It was quietly and effectively read, although one hardly expected such details of ladies' attire as combinations, stays, etc. Usually the B.B.C. doesn't say these things.

◆ ◆ ◆

Mr. Tom Clare excels with his time-honoured monologue, "At the telephone." To hear Tom definitely bridges the new generation and the old.

◆ ◆ ◆

As regards *Tosca*, I heard most of the two broadcast performances from London and from the experimental stations. It was amusing to hear it announced from 2LO as Puccini's "immortal melodrama," but I find no such patronising description being given to any other operas, the themes of which are equally as melodramatic. *Tosca* is one of Puccini's most popular operas, and it should be left at that. The story is as stupid as that in *Madame Butterfly*, *Rigolleto*, *Faust*, and others. Nearly all of them have the same threadbare sex interest, which is the despair of all normal-minded film fans. But as for the music of *Tosca*, it is absolutely haunting. Parts of it, true enough, are blood-curdling, but some of the arias are intensely appealing, and for several days after I could not get the melodies out of my mind.

◆ ◆ ◆

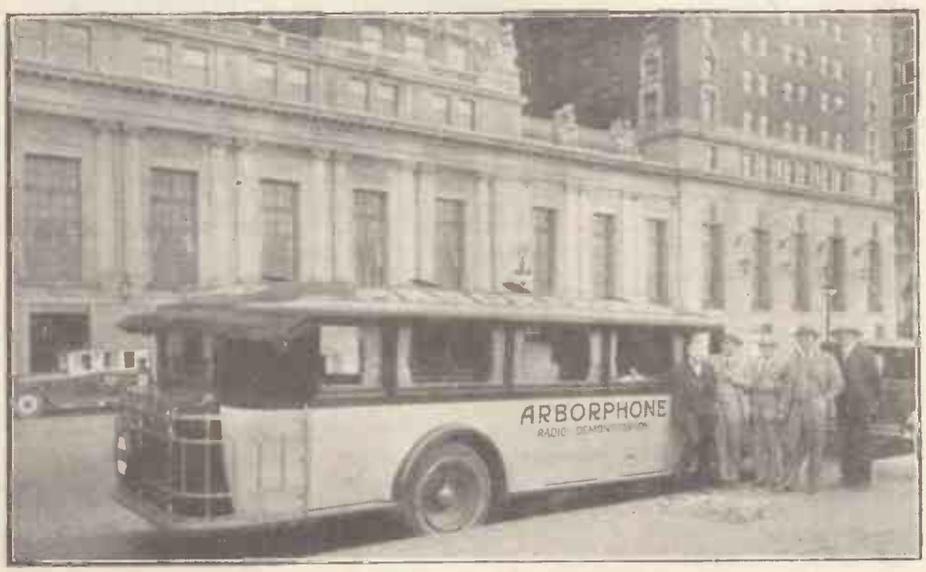
It was interesting to compare the two receptions, and, strangely enough, I found that 5GB behaved itself thoroughly well. Together with this improved transmission, the singers seemed to lose that slight trace of "first-nightishness," so that the second performance was almost without a blemish. There is no doubt, however, that Harold Williams carried off the honours as Baron Scartia, chief of police, while Rachel Morton made a most effective Tosca. She especially, improved immensely at the second time of asking. Tudor Davies was—well, just Tudor Davies, but Sydney Russell—contrary to Mr. Scholes' view—hardly seemed to me to be up to opera form.

◆ ◆ ◆

Incidentally, there was some very bad timing of the first performance, which was supposed to end at ten o'clock, but when that hour was reached only two of the acts had been sung. How was this? It has been done before. London was also late for the news bulletin this same evening, but that was more excusable, and one could certainly afford to wait for the excellent speech delivered by Sir Arthur Keith at the British Association. I read the speech and realised how thrilling it must have been to have heard it.

◆ ◆ ◆

A first-class bass is Mr. Harry Brindle, who sang at the Friday Promenade concert. And, talking about the "Proms," I was very glad to hear the B.B.C. music critic read, *and support*, a criticism from a correspondent bearing out the view expressed in these notes, viz., that the applause is rather overdone and is sometimes ill-timed. Not that this exhibition of enthusiasm is without its interest, for it disproves once and for all the foreign criticism that we are a cold, callous, and unmusical nation.



A Radio Demonstration Bus in the U.S.A.

DAVENTRY, 5GB LOC

The ALTERNATIVE-

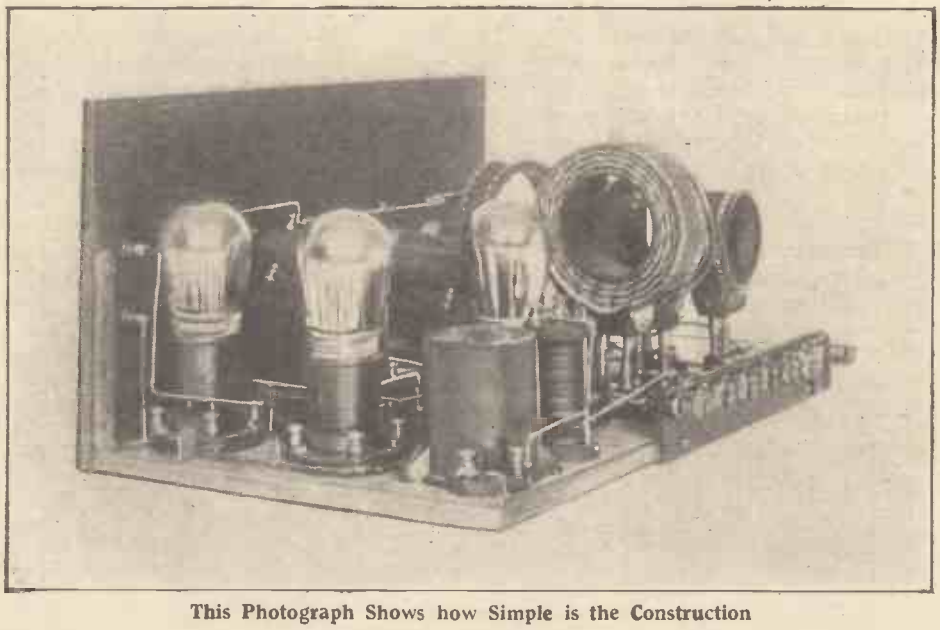
Just Pull a Knob for—

By J. H. REYNER, B.

THE general principles underlying this receiver were discussed in last week's issue, wherein I showed that after some consideration it was decided to employ three entirely separate circuits for the three stages, each one being independently adjustable as regards tuning and reaction control. This is really the only satisfactory means of achieving the result required without introducing complications.

By the adoption of this arrangement, however, we are enabled to obtain a comparatively simple receiver. We require three pairs of coil-holders, and since a fine and close adjustment of the moving coil is not required, I have used fixed coil-holders in each case. One of these is definitely screwed down to the baseboard, while the other is merely held by one screw, so that it can be swivelled about this point, and thus roughly adjusted to give the required degree of reaction. Close and careful adjustment of the reaction is not necessary in any case, so that this method suffices admirably.

As already explained in the preliminary article, Formo-Densers have been used for tuning the circuits. By suitable choice of the plug-in coil used for the tuned circuit, it is possible to tune in to any wavelength desired, and as these are only half-a-crown each, they form a very simple and cheap tuning system. The switches are special two-pole on-off switches. One pole connects the appropriate tuned circuit to the grid of the rectifying valve, through a condenser and leak, in order to obtain rectification, while the other pole of the switch changes the aerial and reaction lead on to the moving coil coupled to the same tuned circuit.



This Photograph Shows how Simple is the Construction

Components

The components you will require for the receiver, therefore, are as follows. The names of the manufacturers of the apparatus actually used are specified immediately after each article, while the second and third names give some alternative makes. Other apparatus of good quality may, of course, be used if it is of correct size and type.

One ebonite panel, 14 in. by 7 in. (Becol, Peto-Scott).

One cabinet to suit, with baseboard, 9 in. deep.

Three valve-holders (Lotus, Lissen, Benjamin).

Six coil-holders, baseboard mounting (L. & P., Lissen, Lotus).

One H.F. choke (Detex, Lissen, Wright and Weaire).

Two L.F. transformers (Lissen, R.I. and Varley, Ferranti).

One baseboard-mounting rheostat (Igranic).

Three double-pole on-off switches with panel indicator (Bulgin).

One .0003 fixed condenser (Dubilier, Lissen, T.C.C.).

Three Formo-Densors, .0005 to .00015 (Formo Co.).

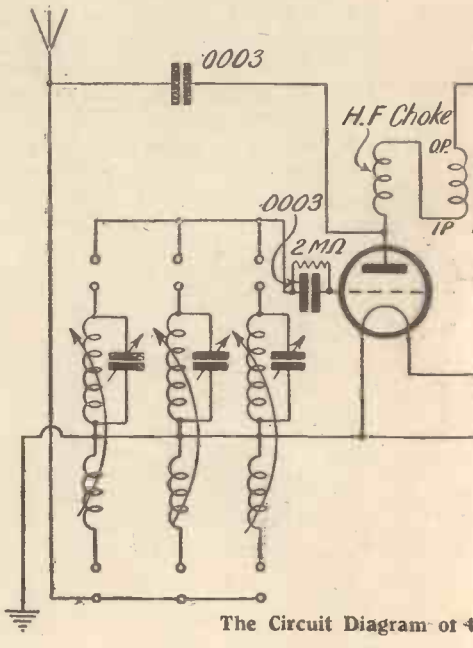
One .0003 fixed condenser, with clips for grid leak (T.C.C., Dubilier, Lissen).

One 2-megohm leak (Lissen, Dubilier).

One on-off switch (Bulgin Midget, Lissen).

Two panel brackets (Bulgin).

Twelve terminals, marked Aerial, Earth, L.S.+, L.S.—, L.T.+, L.T.—, H.T.—, H.T.+1, H.T.+2, G.B.+, G.B.—1, G.B.—2 (Belling & Lee).



The Circuit Diagram of t

Local, 5GB or 5XX

Sc. (Hons.), A.M.I.E.E.

Quantity of Glazite or Junit wire for wiring up.

Screws, etc.

Constructional Details

The actual construction of the receiver will occupy quite a short time. First of all, take the panel and mark out the positions for the three selector switches in the centre. Immediately under these switches a hole is drilled for the on-off switch. Holes are then drilled at each end of the panel to take the aerial, earth, and loud-speaker terminals respectively, while finally, the .0003 fixed condenser is mounted behind the panel in the position shown. This is done in order to simplify the wiring to some extent. If the presence of the two screws on the panel are considered undesirable, these can be countersunk a little more than usual and the top of the holes filled in with Chatterton's Compound or cobblers' wax, which will conceal the screws.

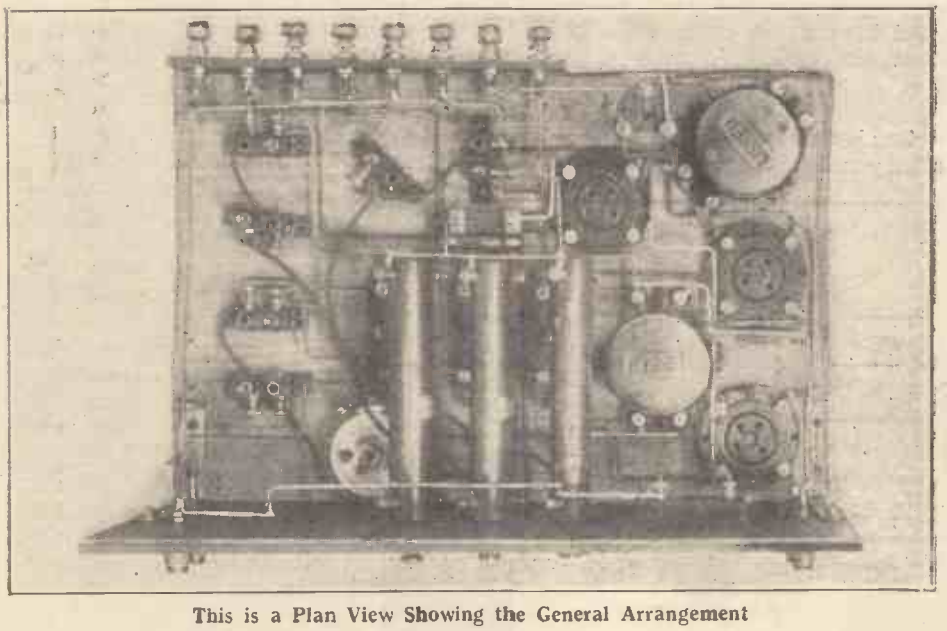
Next mount the panel in position relative to the baseboard and mark out the position for the holes for the two panel brackets. Drill these holes and fix the panel definitely to the baseboard. The baseboard components should then be laid out in the positions indicated on the diagram and photographs. The object of placing the panel in position is to ensure that there is adequate clearance for all components.

The actual space available is slightly limited, owing to the fact that there is a large amount of apparatus at the back of the panel. It was not considered desirable to increase the size of the panel, as the amount of apparatus on the panel is so small, that it would have spoilt the proportions. With a little care, however, there is plenty of room for all the apparatus on the baseboard without any difficulty. The two L.F. transformers are mounted on the extreme right-hand side of the baseboard, together with the two L.F. valve-holders. One particular point may be made here relating to the last valve-holder. This must not be placed too near the panel, as otherwise if a large valve, such as a DE5, is employed in the last stage, it will foul the terminals or the .0003 condenser. This point should be watched when actually laying out this portion of the apparatus.

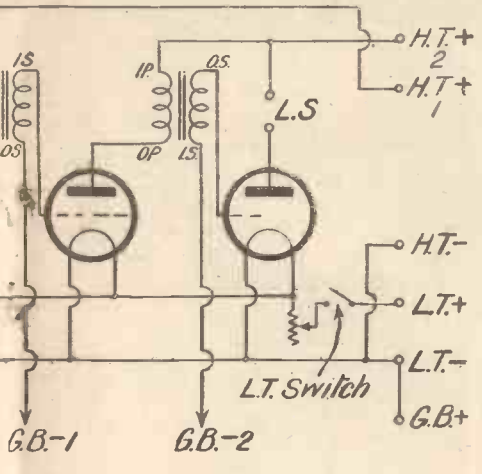
The three Formo Densors are mounted on the baseboard in such a position that they can be reached with a screwdriver placed in between the selector switches. This is quite a satisfactory proposition, as there is over an inch between the switches themselves, and if the condensers are laid out to coincide with these spaces they can be adjusted quite easily.

It will be seen that the left-hand side of the baseboard and the back up to the halfway line is left for the three tuning circuits. The two short-wave circuits are placed on the left-hand side of the baseboard, while the long-wave circuit is placed on the back. The detector valve is then placed in the remaining space at the back of the baseboard between the third tuning circuit and the first L.F. transformer.

An H.F. choke is included in the lead from the anode of the detector valve. The purpose of this choke is, of course, to prevent the high-frequency current from flowing through the L.F. stages where it is liable to cause trouble. It also serves to give a good and smooth reaction effect by by-passing the high-frequency current

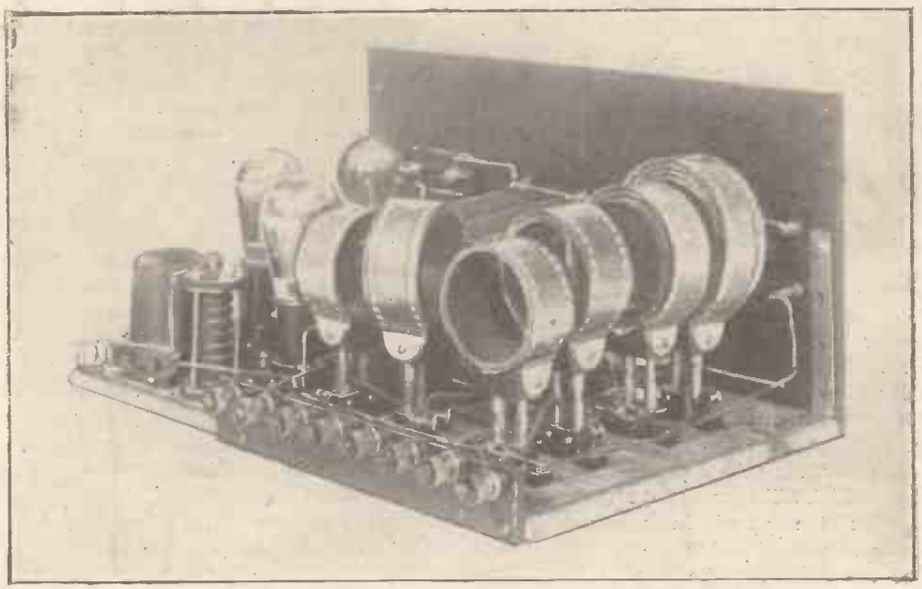


This is a Plan View Showing the General Arrangement



the Alternative-programme "3"

through the reaction circuit where it is required. The omission of the choke introduces a slight danger of uncontrollable oscillation, since the last circuit has a certain capacity effect to the aerial circuit, although this is not serious. No such difficulty was experienced on the actual receiver, but the presence of the choke is an additional safeguard.

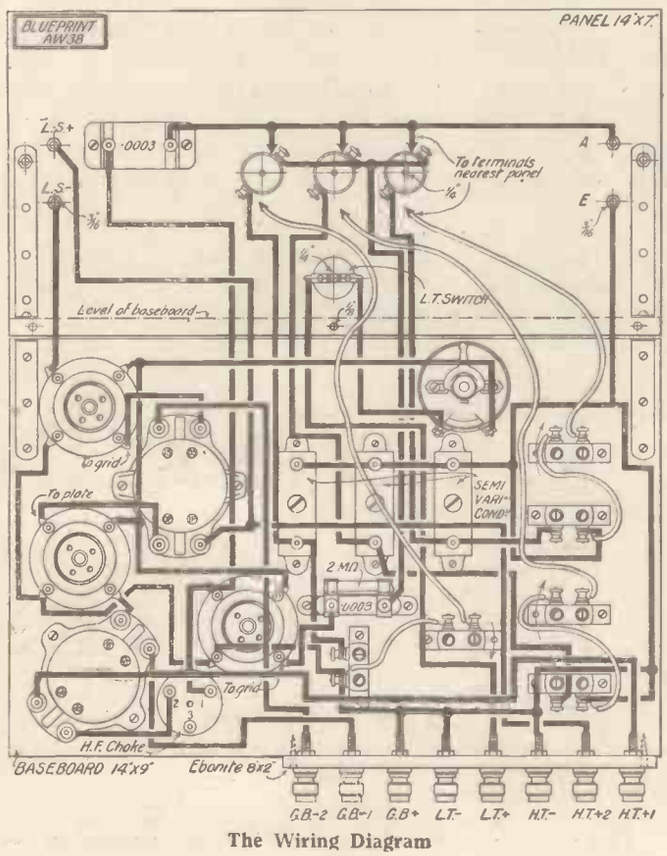


The Alternative-programme "3"—The Coils in Position

Wiring

The receiver is then ready for wiring up. The terminal panel containing the battery terminals should be placed at the back of the baseboard. Wiring is quite straightforward, although care must be taken, owing to the slightly limited space. It is desirable to remove the front panel when all the baseboard components have been mounted in position, and to wire up the main components as far as can be done. Thus all the L.F. side and the filament circuits, together with the connections to the battery terminals, may be completed before the panel is placed in position.

Connections are taken from each of the three Formo-Densers to the appropriate tuning circuits, while flexible connections are taken to the moving-coil holders. One of these connections comes from one of the terminals on the fixed coil-holder, while the other connections require fairly long lengths of flex, which are ultimately connected to the selector switches.



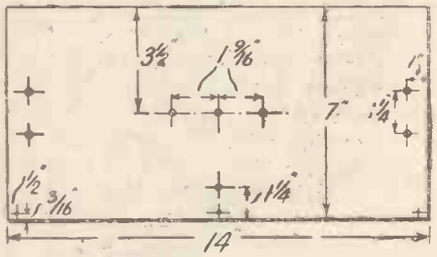
The Wiring Diagram

At this point the panel may be placed in position and the remainder of the wiring completed. The three flex leads from the reaction coil just mentioned are connected to the underneath terminals of the switches at the end next to the panel. The top three terminals next to the panel are all joined together and connected on one side to the aerial and on the other side to the fixed .0003 condenser mounted on the panel. The other end of this condenser is connected to the anode of the valve. The first three terminals at the back of the selector switches are then connected together and taken to the grid condenser of the rectifier valve. The bottom three contacts are then taken individually to the three Formo Densers immediately below. The earth terminal has to be connected to the negative L.T., while the two loud-speaker terminals have to be connected up. Finally, it is necessary to run two wires through the on-off switch from the L.T. positive terminal to the positive connections on the three valve-holders.

Testing

The actual coils to be inserted in the receiver will depend to some extent upon the stations to be received. Daventry Senior (5XX) will require a 200 coil in the fixed coil-holder and a 75 coil in the moving holder. The coils for Daventry Junior (5GB) are 50, with a 35 reaction coil. The coils for the local station will depend upon the wavelength of the particular station. In my particular case, where the local station is London, the coils required were a 30 or 35 for the tuning coil and a 25 coil for the reaction.

The choice of the reaction coil has something to do with the operation of the receiver since it also acts as an aerial coupling coil. Using a small coil serves to increase the selectivity of the receiver,



Drilling Diagram of Panel

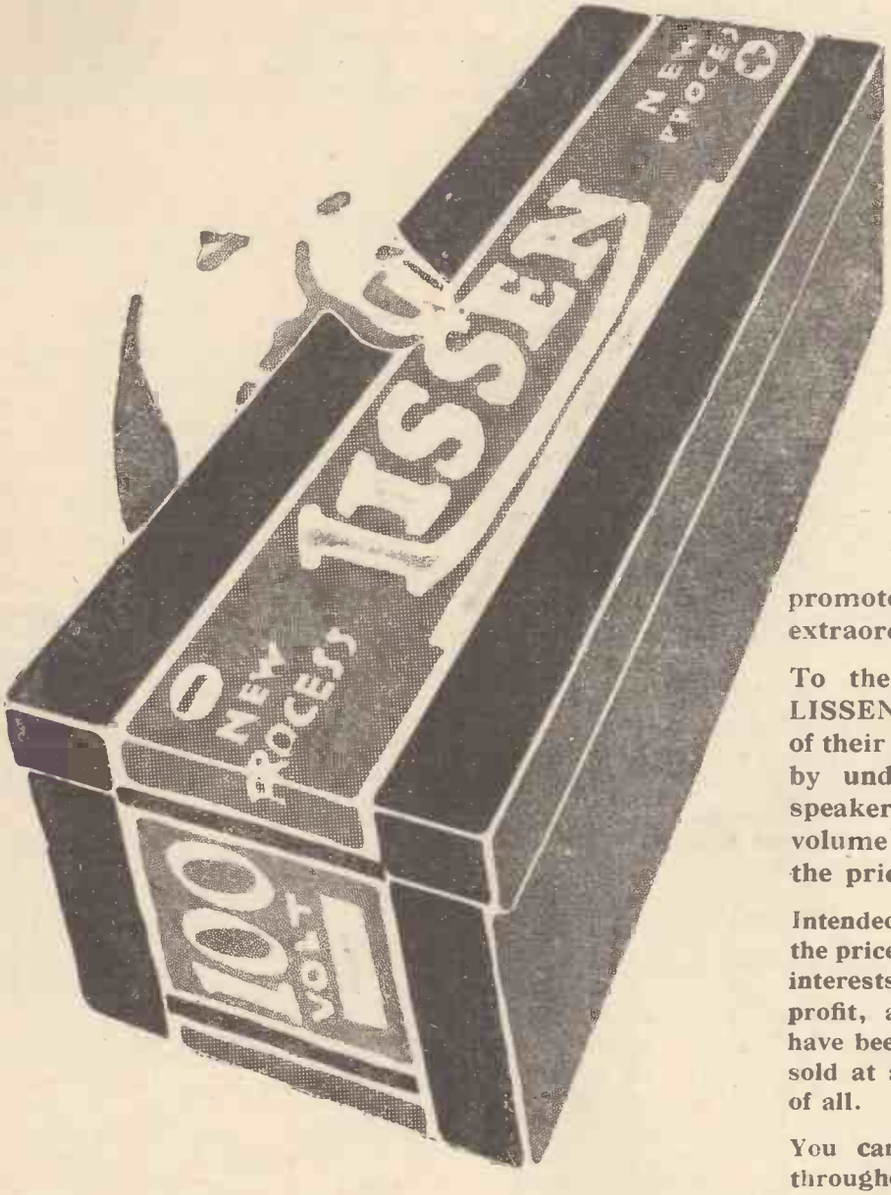
while conversely a larger coil will increase the strength slightly at the expense of selectivity. For any particular size of coil the reaction effect is controlled by the high-tension voltage applied to the detector. In general, a value of 40 to 60 volts should be used. For the L.F. stages, of course, any value up to 120 volts or so can be used.

The value of the grid bias employed on the L.F. stages actually depends upon the valves in use and the actual high-tension voltage on the L.F. stages. The L.F. high tension is connected to H.T.1, while the detector H.T. is taken to H.T.2.

The valves in use are of ordinary type. A medium-impedance detector valve should be employed for the rectifier, while suitable power valves should be used for the last stage. For example, with 6-volt valves, a Cossor H.F. valve was used for the detector, followed by an ES5 L.F. and a DE5 or DE5A. Similar valves in the 2-volt stages were also tried, with every satisfaction.

(*Concluded on page* 340)

CATALYSIS AND THE LISSEN BATTERY



Science has never successfully explained the phenomenon of catalysis—the mysterious way in which a chemical reaction is hastened by the addition of substances which do not themselves react.

Part of the secret formula of the LISSEN Secret Process Battery includes a catalytic agent which promotes a liberation of oxygen copious to an extraordinary degree.

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60 volts	(reads 66)	7/11
100 ,,	(reads 108)	12/11
9 ,,	(grid bias)	1/6

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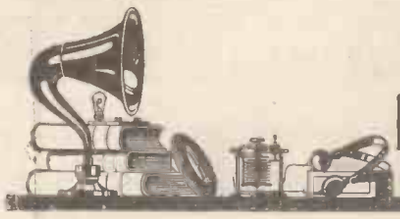
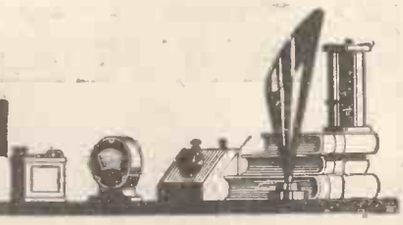


OUR INFORMATION BUREAU



RULES.—Please write distinctly and keep to the point. We reply promptly by post. Please give all necessary details: Ask one question at a time to ensure a prompt reply, and please put sketches, layouts, diagrams, etc. on separate sheets containing your name and address. See announcement below.

Frame Aerial Efficiency.

Q.—*I notice that there are two methods of winding frame aerials. In one the finished winding is a square solenoid, while in the other it forms what (for want of a better term) I might call a "square spiral." What I should like to know is which is the more efficient type of winding?—F. C. M. (Bristol).*

A.—From the point of view of signal strength and sensitivity the solenoid method is undoubtedly the better of the two. The efficiency (in the above sense) of a frame aerial increases with an increase in the *average* size of the turns. Now with the solenoid winding all the turns are of the same size, and therefore the average size of the turns corresponds to the outside dimensions of the frame. But in the case of the other method of winding all the frame turns have different sizes and consequently the average size of the turns is considerably less than that of the largest turn. So that *for a given size of frame* the solenoid method of winding is the more efficient.—N. F.

Inductance of Coils in Series.

Q.—*Will two 30-turn coils, when connected in series with each other, have the same inductance as a similar coil having 60 turns?—P. T. (Salford).*

A.—If the two coils are connected in series, but are not coupled together in any way, the total inductance of the whole arrangement will be twice that of each coil alone, but will be considerably less than that of a single coil having twice the number of turns on one of the smaller coils. If, however, the two small coils are tightly coupled together so that the field of each reinforces that of the other, then they will be equivalent to a single coil with twice the number of turns. If the two small coils, connected in series, are not coupled at all, there will be no mutual inductance. If they are coupled there will be mutual inductance, which will have to be added to, or subtracted from, the sum of their two separate inductances, in order to find the inductance of the whole arrangement. If the fields of the coils reinforce each other the mutual inductance is added; if they oppose each other, then it must be subtracted.—G. N.

When Asking Technical Queries

PLEASE write briefly and to the point

A Fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped, addressed envelope and the coupon which will be found on the last page.

Rough sketches and circuit diagrams can be provided, but it will be necessary to charge a special fee (which will be quoted upon request) for detail layouts and designs.

Variometers in Place of Condensers.

Q.—*I believe a one-valve set, with reaction, can be built without the use of variable condensers, but using two variometers. Is this so?—T. N. B. (Glossop).*

A.—A variometer may, of course, be used instead of a coil and condenser for tuning the aerial circuit. Reaction can be introduced (through the inter-electrode capacity of the valve) by tuning the plate circuit to the wavelength to which the aerial circuit is tuned. This may also be done by means of a variometer. The plate circuit variometer, however, must have considerably more turns on both its windings than has the aerial circuit variometer.—G.N.

The Alternative-programme "3"

(*Continued from page* 338)

Operation

The actual operation of the receiver is as follows:

Having completed the wiring and connected up the battery, switch on the receiver and pull out the left-hand selector switches. Place the two coils relative to this switch at about 45 degrees. With a screwdriver, adjust the condenser associated with this selector switch until the local station is heard. Adjust the reaction coil until the station is obtained at the required signal strength. It may be necessary to retune slightly.

Now push in this switch and pull out the next one and repeat the performance, tuning, in this case, to 5GB. Repeat the process for the third switch on 5XX, when the receiver is completely adjusted.

All that is necessary subsequently is to pull out the switch for the station required and to switch the receiver on or off as required. The fact that the circuits are left in a tuned condition will have no deleterious effect whatever. In fact, on the short waves there is a certain amount of advantage arising from this fact, for the circuit tuned to the local station acts to some extent as a wave-trap and reduces interference when receiving 5GB.

It will be seen that the operation of the receiver is simple in the extreme. The only tuning that has to be done is that which is carried out when the receiver is first constructed, and this is an operation taking about five minutes only. After this there is no further tuning, the various stations being selected simply by pulling out the knob appropriate to the station required.

"Operating the Tetrode Three"

(*Continued from page* 331)

This does not mean that we cannot avail ourselves of the properties of the valve on shorter wavelengths. I shall give further details of better coils from an electrical point of view which will enable greater amplification to be obtained. I wanted first of all to hook up the circuit in the simplest possible form so that anyone who has plug-in coils can try it out for himself. By suitable design of coils and condensers it is possible to increase the impedance of the tuned-anode circuit, and so increase the efficiency of the arrangement.

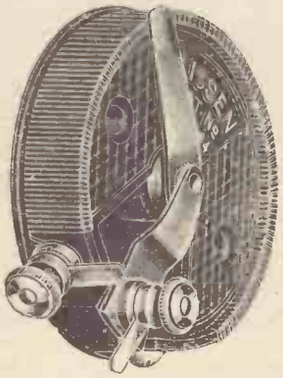
An interesting test on the properties of the valve can be carried out in the following manner. Tune in to the local station or to Daventry, whichever happens to come in stronger, and then turn off the high-frequency valve by means of the rheostat on the front panel. This will extinguish the filament, and so prevent the valve from exercising any amplifying properties. It will be found that the signals have now been practically eliminated. There is a very slight trace of signal which can be detected in most cases. This is due partly to a very small amount of stray magnetic coupling which exists between the coils, and also to a small amount of capacity coupling which is still present in the valve. Nevertheless, the signal has, to all intents and purposes, disappeared. This shows, therefore, that the high-frequency circuit is really completely isolated from the detector circuit, so that there is no coupling existing of a sufficient order to cause any oscillation.

Readers will remember that one of the methods of adjusting a neutralised circuit is to turn out the high-frequency valve and adjust the neutralising condenser until the signals are zero, indicating that the feed-back has been balanced out by the energy passing through the neutralising condenser. An exactly similar effect is being obtained here, except that there is no balancing. The feed-back has actually been reduced to zero by the special construction of the valve and the provision of the screen between the circuits, and it is quite an interesting test to note how very small the residual coupling is when the high-frequency valve is turned out.

WHOSE TURN?

WRITERS of constructional articles in the radio journals keep one eye on the advertisement columns. Advertisers naturally expect their products to be used and mentioned in turn by these writers. So when you see certain makes of components definitely specified, remember that they are not necessarily the best. Users now know that they can replace every part named in any published circuit with the corresponding part in the LISSEN range. You will use all the energy available if you build with LISSEN parts and get louder, clearer signals from near and far in consequence.

NOW ONLY 1/6



The baseboard type of LISSEN Resistor is now reduced from 2/6 to **1/6.** This type has, of course, no knob, dial or pointer, but is provided with two holes for screwing to baseboard. 7 and 35 ohms Rheostats; 400 ohms Potentiometer, each **1/6** (previously 2/6).

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LISSEN Panel Type Rheostats. The wires do not loosen, the arm keeps in perfect contact, nothing ever goes wrong with this LISSEN Rheostat.

	Now
Rheostats, 7 and 35 ohms ... (Previously 4/-)	2/6
Potentiometer, 400 ohms ... (Previously 4/6)	2/6
Dual Rheostat, 35 ohms ... (Previously 6/-)	4/6

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.002 to .006, **1/6** „ „ „

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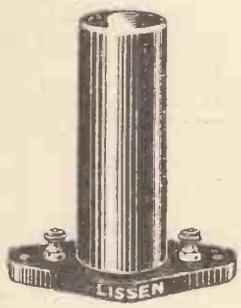

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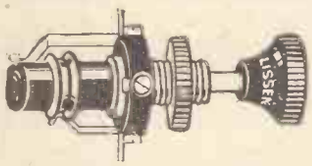

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Managing Director: THOMAS N. COLE

L.319

MAINS WORKING

The Third Article on Coupling the Receiver to the Mains

By H. J. BARTON CHAPPLE, Wh.Sc., B.Sc. (Hons.), A.C.G.I., D.I.C., A.M.I.E.E.

A Useful Experimental Choke Assembly

BEFORE proceeding further it will be useful to note an important precaution which must be taken with all receivers connected across the mains for power supply. As mentioned in the section dealing with the mains as an aerial, it will be found almost invariably that one side of the main is earthed at the generating station. Suppose, for the purpose of illustration, that a conventional two-valve receiver, consisting of a detector and low-frequency amplifier with magnetic reaction, has been converted so that it draws its high-tension supply from the mains as shown in Fig. 13. If the negative main is earthed, little difficulty will arise, but should the positive main be earthed then the negative is 240 volts above or below earth potential. But H.T. is earthed at the receiver so that a short circuit will occur through the set, and this will blow the fuses or cause damage. With the choke in position, as shown, the current flow will be considerably reduced, but the circuit is dangerous.

The difficulty can be overcome quite effectively by inserting in the earth lead, as shown dotted, a condenser of 1 to 2 microfarads capacity. This will isolate the set and not upset the tuning of the aerial. Since this condenser is in the aerial circuit, however, it should be of good quality with a low equivalent high-frequency resistance and to this end it is often preferable to employ one with a mica dielectric. It is found quite frequently that on test the earthed main is a few volts above or below earth potential, so that the provision of this condenser will prevent any leakage of current even when the negative main is earthed.

Another way in which the voltage of the mains may be broken down is to employ a neon lamp—the Osglim marketed by the G.E.C. Co. being a typical commercial pattern—in series with the smoothing unit

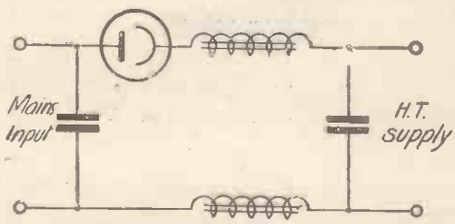

Fig. 14.—Smoothing Circuit with Osglim Lamp

(see Fig. 14). An arrangement such as this will be found very useful where a relatively small H.T. current is desired and the maximum current will flow when the larger element, such as the spiral bee-hive in one pattern, is joined to the negative main.

The resistances contained in the cups of these lamps can, with advantage, be removed, but the initial tests should be made before removal takes place to ascertain whether the unit will work satisfactorily as it stands. Although these neon lamp units will be found quite effective for certain specific purposes their application would appear somewhat limited owing to the insufficiency of the output current and the voltage difficulties. No doubt when attention has been turned to the lamp for the purpose of designing it specially to meet the demands for a mains unit instead of for illumination it will provide a cheap and effective means for working an H.T. supply unit.

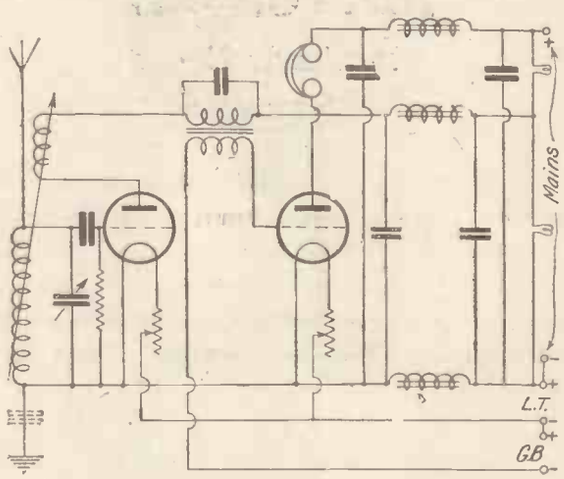

Fig. 13.—Typical 2-valve Circuit for Mains working

Before proceeding to discuss another very interesting method for smoothing out the mains ripple there are one or two points which call for further explanation in connection with the choke and condenser models. The frequency of the ripple is not only governed by factors situated at the individual source of supply but depends to a very great extent upon the *type* of power demand made in the particular locality. Thus a unit may be wholly free from hum at its output terminals when installed at one place, but produces a defined hum when operated in a different area fed from the same supply. This is most marked where a large number of motors may be working, such as in an industrial quarter of a city, the frequency and magnitude of the fluctuations varying from time to time depending upon peak loads, etc. On transferring the scene of activities to the residential districts, where the mains are primarily used for lighting and heating, the unit will be found silent in operation.

The best way to meet this problem would be to provide a variable impedance; but, of course, this increases manufacturing costs. A tapped choke would be one solution, but a better and more efficient arrangement consists of a variable-cored choke. Mechanical means can be provided for altering the relative position of the iron core with reference to the coil, or alternatively the iron circuit could be nearly closed and the resulting air gap adjusted.

With the simple smoothing arrangements the output is really unlimited providing the chokes can pass the current demanded by the modern multi-valve receiver without over-heating. Unfortunately the system is progressive, that is, the greater the current, the larger the section of the wire to give adequate carrying capacity; consequently for a given inductance the dimensions of the choke are liable to become unwieldy. This coupled with the fact that I have known of cases where chokes of 200 henries inductance were necessary to smooth out pronounced ripples, serves to substantiate my earlier remarks that a standard smoothing arrangement is not possible.

The problems must be settled according to local conditions so that a flexible piece of apparatus is desirable, which will enable the chokes and condensers to be altered at will.

(To be continued)

RADIOGRAMS

ON a wavelength of 33 metres an Italian amateur wireless station transmits a short programme every Saturday and Sunday, at 7 p.m. The call sign announced is IRJ.

For the last week or so the Berlin (Witzleben) broadcasting station has suffered considerable interference owing to the fact that Lyons PTT has been transmitting on a slightly higher wavelength than that allotted to it. Apparently the trouble will only be a temporary one as it has been mainly due to the fact that the plant of the official French broadcasting station at Lyons has been undergoing reconstruction.

When the British National Opera Company performs Rossini's opera, *The Barber of Seville* at the Theatre Royal, Newcastle-on-Tyne, on September 19, the entertainment will be broadcast *in its entirety* from Daventry (5GB).

Miss Ada Reeve, the famous music hall artist will make her second appearance before the microphone at the London station on September 15.

In the near future the Queen's Hall Promenade concerts will be broadcast from the following stations: September 22, Bournemouth, Cardiff, Glasgow and other Scotch stations; September 23, 5GB only; September 24, London, Bournemouth, Manchester, Belfast and the usual relays taking the 2LO programme.

The first of Henry Arthur Jones plays to be heard by listeners will be *The Liars*, to be broadcast from 5GB on September 20, and from 2LO and 5XX on the following evening. It was first produced at the Criterion Theatre by Sir Charles Wyndham, in October, 1897. It is expected that other plays by this well-known dramatist will be revived by the B.B.C. Dramatic Department.

The new station, 2YA, at Wellington, New Zealand, has recently been officially opened. The station is situated on the crest of Mount Victoria. It is reported to be ten times the strength of the stations at Auckland and Christchurch.

XNA, Canton, China, is the newest Chinese broadcasting station. It is operated on 2,600, 3,090 and 4,385 metres, and was constructed at a cost of £15,000.

By the completion of a radio station at Brazzaville, a French possession in equatorial Africa, France is now in communication with all its territories.

Following the successful re-broadcast from Australia recently, the B.B.C. is now planning to build ten receiving-stations in a circle around London, by which means it is hoped to overcome the phenomenon of "fading" which has hitherto prevented long-distance programmes from being received in this country, especially from America and Canada. This is the first of the steps by which, as was exclusively announced in "A.W.", the B.B.C. hope to attain Empire broadcasting.

DO YOU KNOW?

1. How many watts there are in one electrical horse-power?
2. For what purpose is Wood's metal used in a crystal receiver?
3. Which station has the call letters JOAK?
4. How many licensed listeners there are in the Irish Free State?

Puzzle your friends with these queries: the answers will be given in next week's issue of "A.W."

Last Week's Queries: (1) KDKA. (2) Polskie Radio, the Warsaw Broadcasting Co. (3) 830 kilocycles. (4) Patent 7,777.

A NEW COVER FOR "A.W."

Above is a reproduction of the cover which will take the place of the present cover of "A.W." from next week onwards.

In connection with the engagement of Sir Henry Wood by the B.B.C., it is understood that the famous conductor will visit several of the provincial stations. He is to conduct a public concert in the St. Andrew's Hall, Glasgow, on October 5, which will, of course, be relayed.

Radio transmission is to be tried from the bottom of the Grand Canyon, Arizona. Early in September five boats will set out from Lee's Ferry, Utah. A transmitting set, capable of sending both telephone and telegraph messages, will be part of the equipment. An army radio car, located at Navajo Mountain, Arizona, will attempt to pick up the transmissions. The party will risk death, for the next opening of the canyon after leaving Lee's Ferry is 400 miles down the Colorado.

Work on the new Kattowitz (Silesia) relay station is proceeding apace, the station buildings in the Kosciusko Park being already erected. The transmitter, will be somewhat similar in type to the one installed at Posen and will be in operation towards the middle of September. At Vilna, the station will also be ready by the autumn. Both relays will be valuable adjuncts to the Polish broadcasting system inasmuch, as their power will be greater than that of Posen and Cracow. Both the Warsaw and Cracow studios specialise in celebrations of important historical and patriotic events. On a recent occasion these stations relayed the ceremony of the transfer of the remains of the great Polish poet Stowacki, who died in France, to the Royal Mausoleum at Vaval; another interesting transmission made was a religious festival in connection with the miracle picture of the Virgin Mary at Vienna.

It will not be long now before the Australia-Canada beam service will be inaugurated. Local engineers are looking forward with interest to this event, as the striking difference in behaviour of the Australia and South African services with Great Britain, makes the working results of the new service a matter of conjecture.

The Manchester station, will be very busy if the proposal to have a Lakeland Week commencing on August 14, goes through. A number of events and programmes of interest direct from Westmorland and Cumberland, including a special service from Grasmere Church, a concert by Keswick's male voice choir from the banks of the River Greta and the Rydal Sheepdog Trials and the Grasmere Sports would be relayed. The last-named two events will be broadcast through London and Daventry.

The Federal Radio Commission of America, has issued a public proclamation against broadcasting mechanically reproduced music, unless it is so announced to the listeners. Since few broadcasters would reveal this fact, listeners may be assured of little of such music.

"Perfecting Simpler Wireless"

(*Continued from page 322*)

Even in the case of the coupling condenser used in a resistance-capacity or choke-capacity coupling the impedance may be reduced to a negligible valve for all ordinary frequencies by making the capacity of the condenser sufficiently large. But in this case the signals have actually to pass *through* the condenser, and the larger the capacity of this, the less the voltage to which it will be charged by signals of a given amplitude.

But the object of the choke is to *prevent* the passage of the signal impulses, and the larger its inductance, the better will it do this. If its inductance is sufficiently large it will, to all intents and purposes, effectively block the way to signals of all frequencies. Desirable features to look for in a choke for this purpose are high inductance, small self-capacity, and low D.C. resistance. Several L.F. chokes already on the market have been found to answer well.

In the "Simpler Wireless" circuits already published means of obtaining a reaction effect have not been shown. Many people who are interested in the circuit chiefly from the point of view of obtaining the best possible quality of reproduction will not wish to use reaction.

On the other hand, a great body of amateurs will be attracted to the new system principally on account of the simplicity with which all its current requirements may be obtained from the lighting mains. Such people will not ask more than a reasonable freedom from distortion and will not mind the slight amount inevitably introduced by the moderate use of reaction, counting this as of little importance in comparison with the increase in sensitivity obtained.

NEXT WEEK:

"How We Invented Constant Coupling"

A signed article by

EDWARD H. LOFTIN

There is no difficulty whatever with regard to the use of reaction in the "Simpler Wireless" circuits. This may be applied in various ways, one of the best of which is shown in Fig. 4. A tapped coil is used, the portion between one end of the coil and the tapping being connected between the grid of the detector valve and the slider of the first potentiometer. The free end of the coil is then connected to the plate of the detector valve through a suitable variable condenser.

If the L.F. choke coil has a reasonably low self-capacity there will be no need for an H.F. choke as well, and in practice very good results have been obtained by the use of the circuit shown in Fig. 4. The reaction control is smooth and, as might be expected, the increase in sensitivity is considerable.

"The Shielded Four-electrode Valve"

The above is the title of a book published jointly by Cassell and Co., Ltd., and Bernard Jones Publications, Ltd. It gives full details of the remarkable shielded 4-electrode valves. Written by the well-known authority, Capt. H. J. Round, the book was available as from Sept. 15. A full review will appear in AMATEUR WIRELESS in due course.

Madame Raymonde Amy.—We regret to find that a mistake was made concerning the photograph published in a recent issue of the famous prima donna Raymonde Amy. A member of the well-known quartet, the Celtic Singers, her name was wrongly linked to her fellow-artiste Alan Johnstone. We offer apologies to all concerned.

Transformer Saturation

SIR,—With reference to the letter by "Incredulous" in your issue No. 272, there seems to be some confusion. Whilst the current required actually to magnetically saturate the iron core of a good audio-frequency transformer may be considerable and more than the windings can carry without damage, there is no doubt that the effective inductance of any transformer or choke is greatly reduced long before the saturation point is reached, and it is this consideration which causes the makers of the best transformers to specify a limiting plate current, for example, 3½ milliamps in the case of the AF3. The effective inductance of a transformer primary or choke is proportional to the square of the alternating flux produced by the applied signal, and it will be obvious that if the core is already magnetised to any extent, the superimposed alternating current cannot cause as great an increase in flux as it can if applied to a non-polarised core, and consequently the inductance is reduced. This applies especially in the case of transformers or chokes having inductances of the order of 80 henries, and experimenters should view with suspicion any choke of high inductance value unless the current at which the claimed inductance applies is furnished. One is sometimes recommended to use chokes having inductances of 300 or 400 henries, and it is seldom realised that if such chokes have to carry say, 10 milliamps, they must weigh about 30 lb. or more each, quite apart from the question of cost.

J. B. (Manchester).

SIR,—Your correspondent, "Incredulous" (London), says he would like to know of a valve which will pass 25 milliamps without positive bias. Has he ever heard of such valves as the LS5, LS5A, DE5A, and similar power amplifying valves? These are all receiving valves. An LS5 valve, with 250 volts anode and as much as 15 volts *negative* grid bias, will pass about 25 milliamps.

With regard to saturation of the transformer cores, it must be remembered that there are, on a good transformer, a very great number of primary turns, and so the current to saturate the core must be corresponding small, since the magnetic flux depends on current times number of turns. To ensure good quality, the magnetic flux density in the iron must be kept low, so that the magnetic field in the iron core will be able to follow the current changes in the primary of the transformer.

This is the reason why transformer manufacturers usually give the value of maximum primary current permissible, so as to ensure that the iron will be well away from saturation and so ensure good reproduction. L. E. N. (Portsmouth).

2LO's Piano Transmissions

SIR,—Your correspondent T. B. (Croydon), is not by any means the first to record his disapproval of the quality of some of 2LO's piano transmissions.

It is true that to reproduce the piano faithfully on a loud-speaker is about the most difficult problem which faces the enthusiastic amateur, but at the same time I think there is no doubt that the consistently faithful transmission of the piano is one of the B.B.C's unsolved problems. Quite frequently all is well, but often when the piano is played as a solo there is no doubt that some acoustical problem remains unsolved.

Personally I believe that the acoustics of a studio affect piano music more than any other.

High plate and grid voltages on the power valve are, of course, necessary to cope with the deeply modulated low notes.

F. G. S. (Birmingham).

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CHIEF EVENTS OF THE WEEK

LONDON AND DAVENTRY (5XX)

Sept. 18 Vocal Concert. Religious service from the studio.
" 19 A garden programme.
" 20 Italian programme.
" 21 *The Liars*, an original comedy in four acts.
" 22 Concert of new works.
" 24 B.B.C. Promenade Concert, relayed from the Queen's Hall, London.

DAVENTRY (5GB)

Sept. 18 Religious service from Birmingham. Military band concert.
" 19 *The Barber of Seville*, as played by the British National Opera Co., relayed from Newcastle.
" 20 *The Liars*, an original comedy in four acts, by Henry Arthur Jones.
" 21 Symphony concert.
" 22 From the musical comedies and comic operas.
" 23 B.C.B. Promenade Concert, relayed from the Queen's Hall, London.
" 24 Popular concert.

BOURNEMOUTH

Sept. 21 *Old Danube Days*, a programme of music from pre-war Vienna.
" 22 "Prom," relay from the Queen's Hall.

CARDIFF

Sept. 22 "Prom." relay from the Queen's Hall.
" 23 *The King's Highway*, an orchestral and vocal programme.
" 24 *No Class*, a comedy in one act.

MANCHESTER

Sept. 23 *On with the Show of 1927*.

NEWCASTLE

Sept. 23. Richard Cuthbert in impersonations and impressions of famous actors.

GLASGOW

Sept. 22 "Prom." relay from the Queen's Hall.
" 23 *The Reed in the Wood*, a romance by Edwin Lewis.
" 24 *The Dweller in Darkness*, a play of the unknown in one act, by Reginald Berkeley.

ABERDEEN

Sept. 22 "Prom." relay from the Queen's Hall.

BELFAST

Sept. 22 *The Lone Man*, a comedy in two acts, by Ch. Ayre.

A trans-Pacific radio service is now in operation in the Philippines. It is controlled by the Government and United States Army.

A patent has just been granted by the United States Government to Elmer Sperry of Brooklyn, N.Y., for an invention for broadcasting the course, speed and name of vessels at sea. The inspection division of the Department of Commerce are investigating the device to see how useful it could be made as another safeguard for ships at sea.

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General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets.

Contributions are always welcome, will be promptly considered, and if used will be paid for.

Queries should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed.

Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58/61, Fetter Lane, London, E.C.4.

BROADCAST TELEPHONY

NOTE.—In the following list of transmissions these abbreviations are observed: con. for concert; lec. for lecture; orch. for orchestral concert; irr. for irregular; m. for metres; Kc. for kilocycles and sig. for signal. Unless otherwise stated all times are p.m. (B.S.T.).

GREAT BRITAIN

London (2LO, 361.4 m. (830 Kc.). 1-2, con.; 3.15-4.0, transmission to schools; 3.30-5.45, con. (Sun.); 4.15, con.; 5.15-5.35, children; 6, dance music; 6.30, time sig., news, music, talk; 8.10, music; 9.0, time sig., news, talk, con. Dance music daily (exc. Sundays) from 10.30 until midnight.

Aberdeen (2BD), 500 m. (600 Kc.) **Belfast** (2BE), 306.1 m. (980 Kc). **Bournemouth** (6BM), 326.1 m. (920 Kc). **Cardiff** (5WA), 353 m. (850 Kc). **Glasgow** (5SC), 405-4 m. (740 Kc). **Manchester** (2ZY), 384.6 m. (780 Kc). **Newcastle** (5NO), 312.5 m. (960 Kc). Much the same as London times.

Bradford (2LS), 252.1 m. (1.190 Kc). **Dundee** (2DE), 294.1 m. (1,020 Kc). **Edinburgh** (2EH), 288.5 m. (1.040 Kc). **Hull** (6KH), 294.1 m. (1,020 Kc). **Leeds** (2LS), 277.8 m. (1,080 Kc), **Liverpool** (6LV), 297 m. (1,010 Kc). **Nottingham** (5NG), 275.2 m. (1090 Kc)., **Plymouth** (5PY) 400 m. (750 Kc). **Sheffield** (6FL), 272.7 m. (1,100 Kc). **Stoke-on-Trent** (6ST), 294 m. (1,020 Kc). **Swansea** (5SX), 294 m. (1.020 Kc). **Daventry** (25 kw.), high-power station, 1,604 m. (187 Kc). Special weather report 10.30 a.m. and 10.25 p.m. (weekdays), 9.10 (Sun.); relays 2LO from midday onwards. Time sig.: 10.30 a.m., 4.0 and 10.0 p.m. (5GB). **Daventry Experimental,** 491,8 m. (610 Kc), 30 kw., from 3.0 onwards.

IRISH FREE STATE

Dublin (2RN), 319.1 m. (940 Kc). Daily 7.25 Sundays, 8.30 until 10.30 p.m. Relays Cork.

Cork (6CK), 400 m. (1 kw.). (750 Kc). Relays Dublin (exc. Sundays).

CONTINENT

AUSTRIA

Vienna (Radio Wien), 517.2 m. (5 kw.) and 577 m. 7.30, con.

Relays: **Graz**. 357.1 m. (750 w.); **Klagenfurt**, (750 w.) 272.7 m.; **Innsbruck**, 294.1 m. **Linz** (under construction).

BELGIUM

Brussels, 508.5 m. (1.5 kw.). 5.0 orch. (not daily), 8.30, talk, 9.0 con., news.

FRANCE

Eiffel Tower, 2,650 m. (8 kw.). 6.30 a.m., markets (exc. Sun. and Mon.); 10.15 a.m., time sig., weather; 6.0 talk; 7.0 weather, con.; 8.15 lec. Relay PTT, Paris, Sat., 9.10-11.0, and weekday afternoons.

Radio-Paris (CFR), 1,750 m. (about 5 kw). Sundays; 12.0 sacred service; 12.45, con.; news; con.; 8.15, news, dance, Weekdays; 10.30 a.m., news, con., 12.30, con., markets, weather, news; 4.30, markets, con.; 8.0 time sig., news, con.

L'Ecole Sup. des Postes et Telegraphes (PTT), Paris, 450 m. (5 kw.). 1.15-3.0)relay of Sorbonne University); 9.0 con. (daily).

Le Petit Parisien, 340.9 m. (500 w.). 9.15, con. (Tues., Thurs., Sat., Sun.).

GERMANY

Berlin, on 483. 9 and 566 m. Throughout day. Relayed by Stettin (236.2 m.).

Konigswusterhausen (LP), 1,250 m. (8 kw.) 11.30-12.50 a.m., con. (Sun.); 3.0, lec. (daily). 8.30, relay of Berlin (Vox haus) con., or from other German Stations (daily).

Breslau, 322.6 m. (4 kw.). 7.0 lec.; 8.30 con. Relay, Gleiwitz, 250 m.

Dortmund, 283 m. (1½ kw.). See Langenberg.

Frankfort-on-Main, 428.6 m. (4kw.). 6.0 to 6.15 a.m. (exc. Sun.), physical exercises; 8.30 a.m., sacred con. (Sun.); 4.30, con.; 8.0, lec., con., weather. Relay: Cassel, 272.7 m.

Hamburg, 394.7 m. (4 kw.). Relayed by Bremen 252.1 m., Hanover (297 m.). Kiel (254.2 m.). Sundays: 6.50, relays Berlin; 9.15 a.m., sacred con.; 6.0 con.; 7.0 con., Weekdays: 5.45 a.m., then from 9.0 a.m. throughout day.

Konigsberg, 329.7 m. (4 kw.). 8.0, con. Relay: Danzig, 272.7 m.

Langenberg, (Rhineland), 468.8 m. (25 kw.). Relays Muenster, Dortmund, Cologne or Dusseldorf (daily). Throughout day.

Leipzig, 365.8 m. (4 kw.). Relayed by Dresden (275.2 m.). 8.15 con. or opera; weather, news, dance music.

Munich, 535.7 m. (4 kw.). Relayed by Nuremberg, 303 m. (4 kw.) and Augsburg 535.7 m. 11.30 a.m., lec., con. (Sun.); 6.30 con, (weekdays).

Muenster, 241.9 m. (1.5 kw.). See Langenberg.

Norddeich (KAV), 1,100 m. 11.15 a.m., 10.30.

Stuttgart, 379.7 m. (4 kw.). 11.30 a.m., con. (Sun.); 6.30, time sig., news, lec., con. (daily); Relay: Freiburg, 577 m. (1½ kw.).

(Continued on next page)

BROADCAST TELEPHONY

(Continued from preceeding page)

GRAND DUCHY OF LUXEMBURG

Radio Luxemburg, 217.4 (250 w.). Con. 2.0 (Sun.), 9.0 (Tues.). (Irr.).

HOLLAND

Hilversum (ANRO) 1.060 m. (5 kw.). Sundays: 9.40 a.m., sacred service; 12.40 and 2.10, con.; 6.25, church service; 7.40, weather, news, con. Weekdays: 4.40, con.; 7.50, con.

Scheveningen-Haven, 1,950 m. (2½ kw.). Throughout day. Markets, Stock Ex.

Eindhoven (PCJJ), 30.2 m. (Tues., Thur.) 6 p.m.—midnight.

Hu'zen, about 1,800 m. (5 kw.): Testing.

HUNGARY

Budapest, 556 m. (3 kw.). 8.0 con.

ITALY

Rome, (IRO), 450 m. (3 kw.). 8.30, news, weather, con.; 10.15, late news.

Milan, 315.8 m. (1 kw.). 8.15-11.0, con.

Naples, 333.3 m. (1½ kw.). 8.30-11.0, con.

Como, 500 m. (5 kw.) 8.0-11.0 (temp.).

SPAIN

Madrid (EAJ7), 375 m. (1.5 kw.). Con., daily. 8 or 10 con.,

Madrid (Radio Espana) 400 m. (2 kw.). irr.

Barcelona (EAJ1), 344.8 m. (1½ kw.). 6.0-11.0 (daily).

Barcelona (Radio-Catalana) (EAJ13), 462 m. (1kw.). 7.0-11.0, con., weather, news.

Bilbao (EAJ9), 434.8 m. (500 w.). 7.0 con.

Bilbao (Radio-Vizcaya) (EaJ11). 420 m. (500 w.), 8.0-12.0, con. (daily).

Cadiz (EAJ3), 344.8 m. (550 w.). 7.0-9.0, con., news. Tests daily (exc. Sun.), midnight.

Seville (EAJ5), 357 m. (500 w.). 9.0, con., news, weather. Close down 11.0.

Seville (EAJ17), 400 m. (500 w.). 7.0-10.0 con. (daily).

San Sebastian (EAJ8), 297 m. (1.5 kw.). Relays Madrid (EAJ7).

SWITZERLAND

Lausanne, (HB2), 680 m. (600 w.). 8.0

Zurich, 588 m. (600 w.). 11.0 a.m., con. (Sun.); 6.15, lec., con., dance (Fri.).

Geneva (HB1), 760 m. (750 w.). 8.15, con.

Berne, (411 m. (1.5 kw.). 8.30, con.

Basle, 1,100 m. (250 w.). Relays Berne.

TURKEY

Constantinople (Radio Stamboul), 12.30 m. (7 kw.). Con., 8.0 p.m.

Angora (15 kw.), testing shortly.

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Advertisements under this head are charged THREEPENCE PER WORD, minimum charge THREE SHILLINGS.

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As the Publishers cannot accept responsibility for the bona fides of advertisers in this publication they have introduced a system of deposit which it is recommended should be adopted by readers when dealing with persons with whom they are unacquainted. It is here explained.

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