

THE THREE THAT WILL SET ALL BRITAIN TALKING!

Amateur Wireless

3d
Every
Wednesday

and
Radiovision

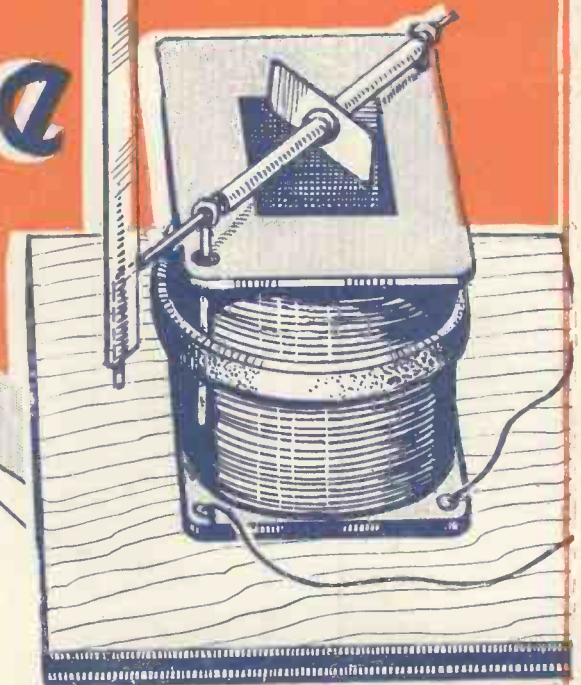
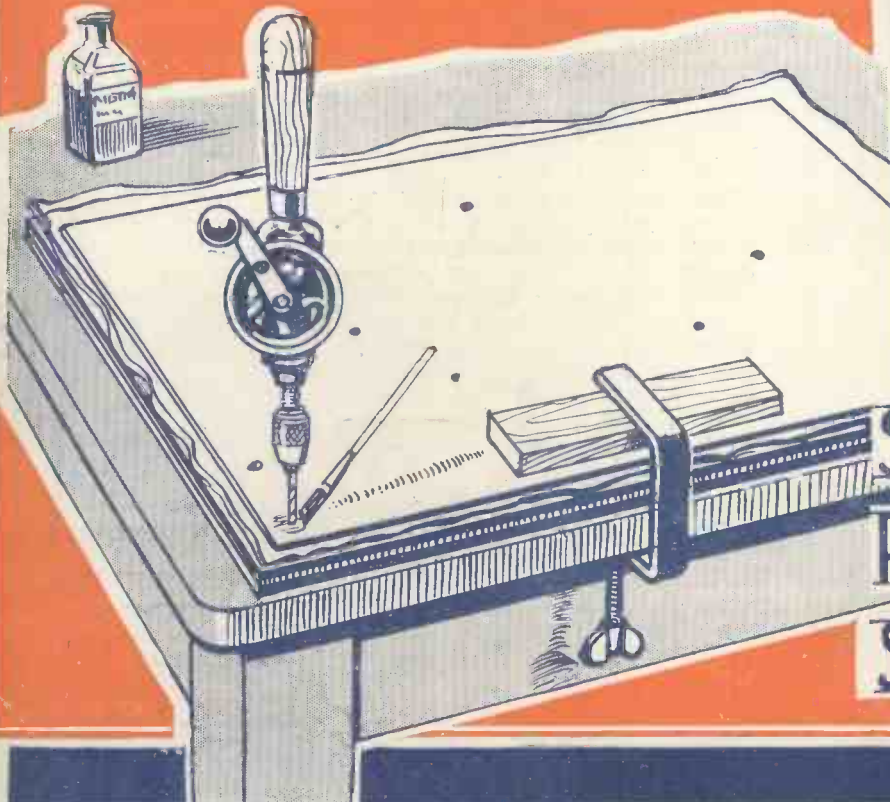
**FREE BLUEPRINTS
FOR CRUSADERS**

**SHOULD YOU
USE "SQUELCH" ?**

**THIS VALVE HAS
NO FILAMENT!**

**WHAT'S THE BEST
SHORT-WAVER?**

TEST GALVO for a Few Pence



**SHIELDING
PANELS for
SHORT-WAVERS**

THIS SEAL



...AND WHAT IT MEANS TO YOU!

Look for the red seal on your next component carton—it is your safeguard against faulty manufacture and ultimate breakdown of the component when in use.

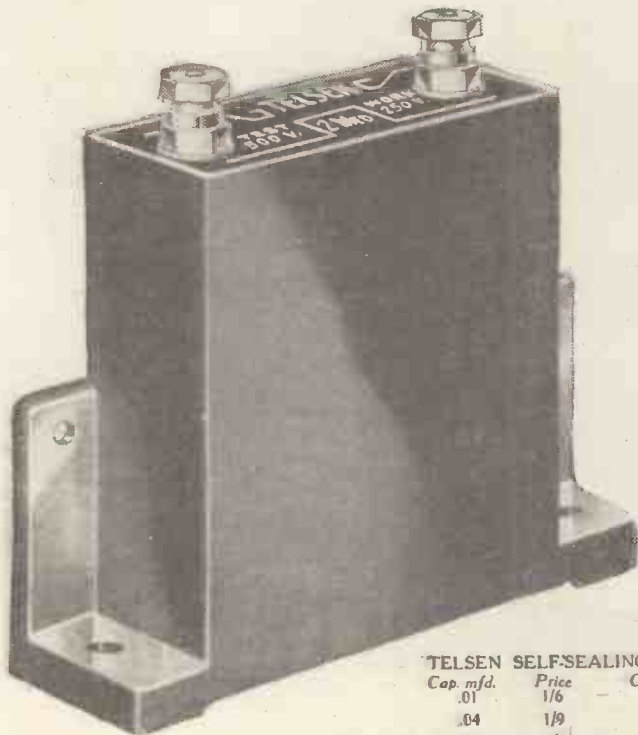
The TELSEN seal guarantees that the component has passed all its exhaustive tests in the processes of manufacture and assures you of lasting efficiency throughout its long life.

THEREFORE ALWAYS INSIST ON

TELSEN
Triple Tested
GUARANTEED COMPONENTS



Permanent efficiency



with matched performance is obtained in the case of Telsen Self-Sealing Condensers by a process of manufacture which represents a definite advance in current condenser practice.

Instead of metallised paper, rolled foil is used with dielectric consisting of pure linen tissue. Impregnation with a special compound takes place in an extremely high vacuum and the rapid cooling process ensures the condensers being hermetically sealed. Factory tests show an insulation resistance of more than 8,000 megohm microfarads, and an electrification of 30%.

These condensers are tested by the Reflecting Galvanometer, which is one of the most sensitive electrical instruments known, as it will record a current of less than one millionth part of an ampere! Capacity bridges in conjunction with this type of instrument are used throughout our Laboratories for testing purposes.

TELSEN SELF-SEALING CONDENSERS

Cap. mfd.	Price	Cap. mfd.	Price
.01	1/6	.25	2/-
.04	1/9	.5	2/3
.1	1/9	1	2/3
		2	3/-



ANNOUNCEMENT OF THE TELSEN ELECTRIC CO. LTD., ASTON, BIRMINGHAM

Editor-in-Chief:
BERNARD E. JONES

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

Radiovision Editor:
H. CORBISHLEY

Amateur Wireless and Radiovision

Editor:
D. SISSON RELPH
Research Consultants:
W. JAMES and
PERCY W. HARRIS
M.Instr. Rad.E.
Assistant Editor:
ALAN HUNTER

Published by BERNARD JONES PUBLICATIONS, LTD., 58/61 Fetter Lane, London, E.C.4. Telephone: Central 4341 (four lines). Telegrams: "Beejapee, Fleet, London." Subscription post paid to any part of the world: 3 months, 4s. 6d.; 6 months, 8s. 9d.; 12 months, 17s. 6d. Published on Wednesdays and dated for the following Saturday.

News and Gossip of the Week

Night and Day . . .

Now that Droitwich has been transmitting regularly night and day for a fortnight, B.B.C. engineers are taking stock of the position.

Listeners' letters have produced no shocks for Mr. Ashbridge. Of the first hundred letters three have complained of interference with foreign stations, four have reported that Droitwich is no stronger than Daventry and two have complained that it is weaker!

About Little Nationals

FOURTEEN listeners have inquired about the future of London National, seven about North National and one about Watchet. Two correspondents have asked about long-wave coils and two have been worried about their crystal sets!

No Fading!

No one has written to complain of fading within 150 miles, or beyond 350 miles of the transmitter.

One letter on this subject comes from a listener within the 150-250-mile range and the other from the 250-350-mile radius.

Thirteen writers complain that the station overloads their receivers.

Quality Achievement

IT is too early to pass a final judgement but there is nothing in these first reports to keep the engineers awake at nights. In quality Droitwich is the equal of a Regional station—which is an achievement for a long-wave transmitter. Long-wave listeners hearing overtones for the first time may think that it sounds rather odd.

Droitwich gives far better quality than any long-wave station in Europe but new designs are quickly reproduced and it is only a matter of time before other transmitters are re-equipped.

Dismantling 5XX

THE work of dismantling 5XX will start as soon as Droitwich takes over the full service next month. A good deal of the gear is obsolete and will have to be scrapped, but some valuable components will be retained for research.

The two 500-ft. masts will be placed in the "pool" with the two new 350-ft. masts for the Empire aerial systems.

Television Wavelengths

THE new timings have now been fixed for the television programmes which will be broadcast on Wednesday evenings and Saturday afternoons, as we announced last week.

From the second week in October, 30-line pictures by the Baird process will be transmitted on Wednesdays from 11 to 11.45 p.m. and on Saturdays from 4.30 to 5.15 p.m.

The wavelengths used will not be changed.

Static v. America!

A LOT of static marred the reception at Tatsfield of the American commentaries on the early yacht races. Engineers at the B.B.C. listening post followed the broadcasts from start to finish, ringing the changes between W3XAL, W2XAD and W8XK.

Hundreds of yards of metal tape were used at Broadcasting House to record the commentaries and afterwards a few snappy sections were cut and laid aside for the big race programme devised by Gerald Cock.

Air-race Relays

THE London-Melbourne air race is the next big sporting event that will shake the ether all over

the world. The B.B.C. is getting ready to broadcast the start at Mildenhall aerodrome near Newmarket on October 20 and the Empire transmitters at Daventry will relay the commentary.

Short-wave fans in the States, please note!

Seven Years!

WHEN Christopher Stone says goodbye to B.B.C. listeners on Saturday he will have completed seven years' broadcasting. Though the *maestro* is leaving, the recitals which he made popular will go on.

New records will be broadcast on Thursdays from 1 to 2 p.m. and there will be the usual evening session. The man who succeeds a popular figure undertakes a difficult job and we do not envy the fellow who handles these records.

Announcers are going to have a cut at it.

Prince George

PRINCE GEORGE is much in the news. His voice is not as well known as his brothers', though he has already broadcast.

With any luck, His Royal Highness will be heard again soon when he opens Swansea Civic Centre.



H.M.V. Photo
Well-known stars record one of the concerted items of the latest C. B. Cochran revue, "Streamline." From left to right you see Joe Batten, the Columbia Recording Manager; Charles Prentice, conductor; Esmond Knight, Meg Lemonnier, Florence Desmond and "C. B. C."

New Pip Times

"SIX dot seconds" is the B.B.C.'s official description of the Greenwich pips. From the second week in October the time signal at 4.45 will be suppressed because no break occurs in the programme at this time.

The signal now given at 1 o'clock will be broadcast at 2 instead and in the evenings the pips will be heard before the news at 9.30 on the National and at 10 on the Regional. Whenever possible Big Ben will still be used to start programmes from London.

They Listen Wrong

BY comparing Empire transmissions not strictly intended for their zone with foreign short-wavers, some overseas readers are jumping to the conclusion that the B.B.C.'s short-wave signals are "duff."

It often happens that when such listeners are tuned-in to an Empire signal not intended for them they can hear a foreign programme that is directed to their area.

Hence the odious comparison!

Plymouth's Successor

DOWN in the West Country they are betting that Newton Ferrers will be the site of the bigger relay transmitter which will eventually take over the service from Plymouth station.

A spot on high ground outside the town is certain to be chosen, so maybe they are right.

Postponed Play

D. G. BRIDSON, the Northern playwright, was unlucky to have two broadcast plays postponed by North Regional within a few weeks.

Jannock will be given in November, and its performance was only delayed because the author was away on holiday and so could not attend to alterations.

A. J. Alan Again

THE London Children's Hour has bagged A. J. Alan for a broadcast to the children on October 6, and the man of mystery is writing a special story for the occasion.

It will *not* be the one which he told to the microphone at the opening of the London School of Broadcasting. Its studios in Bond Street are replicas of those at Broadcasting House.

As a Crusader You will Have

Constructor Crusaders' Corner

A Free Blueprint on Your Breakfast Table!

When our second Crusaders' set—the All-Britain Three—is fully produced next week all Crusaders will be presented free with the full-size blueprint of the set normally sold for 1s. You will come down to breakfast on Wednesday, October 3, to find this Crusader gift on your table—we shall have posted all Crusader blueprints on the preceding Tuesday.

INSTEAD of that "Dear sir, Unless . . ." buff envelope on your table in the morning—enough to put any man off his ham and eggs!—think of the delight of an envelope containing a full-size blueprint for our latest set.

Not a bad thought, is it? As a Crusader, that is what will happen to you on the Wednesday morning of October 3—the morning, in fact, of the publication of our next issue of AMATEUR WIRELESS.

Good Thing in Threes

Your free gift—always assuming you are a Crusader—will coincide with the full inside dope on what we consider is a good thing in three's.

We are simply *not* going to invoke superlatives to describe the set—you will soon see next week that it is something a bit out of the ordinary run.

What we should like to point out, though, is something to do with the construction. After all our airing of views on the relative merits of chassis and baseboard we have hit on a compromise that ought to please practically all of you—no matter how strongly you favour the one or the other method of assembly.

As a matter of fact, credit for the new form of layout is due to a youthful member of our Technical Staff. Like all of us, he has been obsessed with the need for cleaning up the appearance of the panel and baseboard type of set—with the need, that is, for emulating the super neatness of the commercial chassis set.

But we are nothing if not realistic on this staff and we have for a long time realised that

to go bang over to metal-chassis sets is not really a solution—not when we think in terms of blueprint construction, with wires going from upper to lower sections.

So we put to you something that seems to us to meet both sides of the case—a metal baseplate. Not a metal chassis, note. There are no components below this plate, and only two or three wires. Even these are shown on the blueprint as though they were above, because we have carefully engineered the layout so that they do not cross wires above.

The metal baseplate takes the place of the wooden baseboard—that's all. There is the usual panel for the controls, and, in fact, you can say that in general form the layout is as old as the hills. But the detailed construction and wiring certainly are not old—in fact, right up to the minute, with short, straight connections for high-frequency, other connections being earthed to nearest baseplate point.

No need to say more about the set here—there will be more than enough dope for you to masticate next week. But don't

A. B. Curran, the correspondent with the "down" on "The Experimenters," is full of bright ideas for making sets as distinct from assembly. We are noting all you say, A. B. C.—and maybe we shall be able to act on some of your suggestions.

His Funny Way

We like your digs at Crusader No. 1—especially the bit about him being a woman hater! He isn't really, you know—just his funny way of putting things. If you think kilocycles are more tangible than wavelengths, by all means stick to your admittedly more scientifically accurate mode of reference.

But there's no doubt about it—the majority of ordinary mortals do find it easier to think about wavelength than about frequency. Granted neither is really tangible—but length is at least a homely conception—like a yard of tripe!

"I seem to have given CC No. 1 a bit of a slating but I agree with 80 per cent of his views," goes on A. B. C. And so say all of us!

"As a matter of fact, I think that for ordinary use it is hard to beat a good S.G., detector and pentode . . . no need for you to show us how to build these, since every Constructor Crusader should be able to design one for himself."

Now, that's where we *don't* agree, A. B. C. We are catering not only for the seasoned amateur such as yourself—who obviously can sit down and design a set—but for the many newcomers to this radio game who don't seem to be getting a fair deal through ordinary channels.

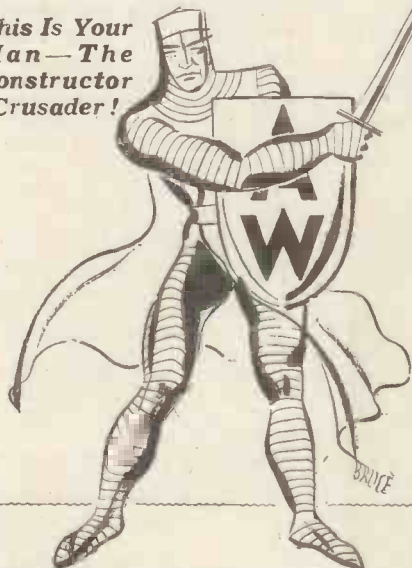
That is why our second Crusader set is vitally simple in its design—but it has the screen-grid, detector and pentode circuit A. B. C. rightly hits on as the most workaday for ordinary listening. True, there is an optional high-frequency pentode for the first stage—but no one will grumble at that evidence of keeping abreast of the times. Thanks for a fine letter, A. B. C.—and write again sometime!

Against All-wavers

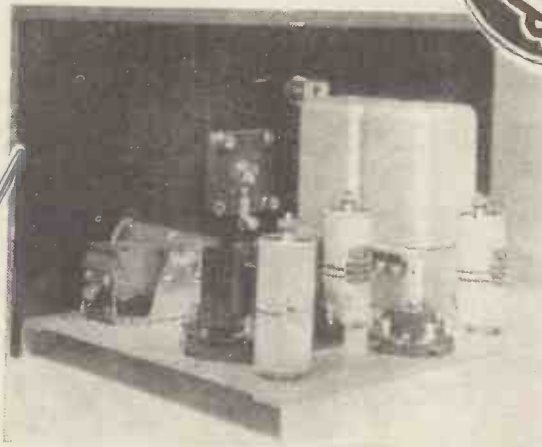
The scales are weighting against the all-wave set, judging by recent letters. One bright Crusader, who has sent another very readable "serial"—you boys surely can write!—wants a short-waver next, with self-adjusting volume control. We must ask "K. J." about that. As you say, CC1178, the gang condenser is quite a good thing now that concentric panel trimming has been adopted.

We proved how a two- or three-gang condenser is preferable to single condensers—as in the A.V.C.4. But the single condensers also have a place as we show in the All-Britain Three.

This Is Your Man—The Constructor Crusader!



Are YOU a Crusader yet? Thousands of AMATEUR WIRELESS readers have joined up by signing the enrolment form, a copy of which you will find on cover iii of this issue. One shilling entitles you to many privileges, including free blueprints and free technical advice on all sets produced by the Crusaders. Sign up now!



Meet the All-Britain Three! Second of the great Crusaders' sets, this straight screen-grid, detector and pentode set is built up on a new principle—the metal baseplate. You gain all the advantages of a metal chassis but retain all the simplicity of a baseboard—you get it both ways!

forget, Crusaders all, there is a blueprint coming to you of a pukka three that ought to gladden your hearts.

And, if you aren't a Crusader, well, nothing is stopping you from filling up the form on the inside back cover, is it?

"Why not a real constructor's set?" asks an intending Crusader. "What I should like to see is a set for which I could make the coils—but not, please, the weird and wonderful affairs designed by your pals, 'The Experimenters.'"

Well, now, that's not very kind to "our pals." Why not look back to page 297 of "A.W." for September 15, where CC1537 tells us how he got American stations on the Lucerne Ranger—the set designed to use the coils in question?



MAKING A SIMPLE TEST GALVO

Here's a Gadget That Finds Faults

BY THE AMATEUR WIRELESS TECHNICAL STAFF

NOT long ago we had a little article called "Now What's Gone Wrong?" It was all about faults. In the August 4 issue, to be exact. This week's effort is the sequel to many requests for a simple continuity tester. To test whether a winding—such as a coil or a choke—has broken down, you have to test whether current is really flowing round a complete circuit of which the suspected component is a link.

Circuit for Suspected Choke

For example, such a circuit might consist of a choke (suspected!), a battery, and some sort of current indicator—such as a milliammeter or other meter.

But a standard meter, though the usual form of tester, is by no means the only form. There is the old but ever-useful galvanometer to fall back on—not a bad idea, considering that all you want to establish is the flow of current, without the least desire to know how much of it there is—or rather what its rate of flow is in terms of amperes.

So we made up what seemed to us the simplest possible meter—a galvanometer, or just "galvo" for short. For an inkling of what this all means you should carefully study Fig. 1 as we go along.

Tester Gadget Called Galvo

In this picture our draughtsman has included all the relevant facts about the tester gadget called galvo.

Mainly, it is an old transformer bobbin— which most amateurs have lying in the junk box. On this convenient former you wind in a couple of ounces of fine wire—say No. 30 gauge D.C.C. A small piece of tape can be bound round the winding to keep it intact.

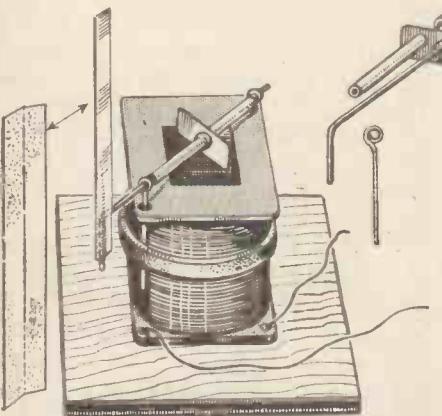


Fig. 2.—Artist's impression of the completed tester, showing delicately poised armature inside the bobbin. Note suggested paper pointer for the end of the bearing

In the top flange of the bobbin we want you to drill two holes, one at each of two diagonally opposite corners as shown by Fig. 1. These little holes are to take the "bearings" for supporting the armature.

Small shaped lengths of No. 20-gauge tinned-copper wire are dropped down these holes and held in position with an elastic band. Again as clearly shown by Fig. 1.

Just a point. Take a very good look at the shape of the loop in the bearings. You see

that it is curled under itself rather more completely than for, say, a terminal connection. Know why? To make the bearing really smooth—really like a bearing!

Between these two loops is supported the most important little bit of all—the steel armature. The spindle is just another length of the No. 20 gauge tinned-copper

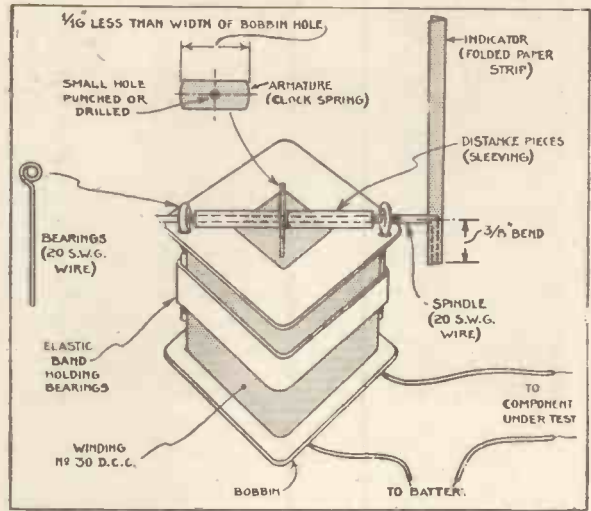


Fig. 1.—From this detailed drawing you can see almost at a glance how the tester is made up. Its main parts comprise an old bobbin, some fairly fine wire and one or two odds and ends from your junk box

Drill or punch a hole through the centre so that it will just slip over the spindle. Trim the two ends nicely as indicated by Fig. 1.

Then heat the fast-developing armature to red heat—and this time plunge into cold water. This process will harden it again.

But you are not done with it yet. Stroke it half a dozen times with a permanent magnet, such as a horse-shoe or bar type. The armature will then itself be magnetised.

Now you can slip through the spindle. One end, you will see, is bent down. This is to take a 2-in. length of stiff paper, which will act as an indicator. (See Fig. 2 for another good drawing.)

When You Assemble the Armature

See, when you assemble the armature on the spindle, that it will move freely in its bearings. On no account allow any stiffness of action, or the whole gadget will be quite useless.

Now for action. When a current flows through the bobbin winding, the coil of wire becomes an electro-magnet, and as such it will influence the little freely-moving armature. It will, in fact, turn the armature and so move the paper indicator.

Thus you have a ready means of noting current flow. If, therefore, you connect this tester in a circuit such as you see at Fig. 3, the indicator will move when that circuit is completed. At least, it will move if the choke is a continuous winding, and therefore passing current. If it is a "dud" and the winding is burnt out or broken the indicator will not move.

So with a condenser. If the condenser's insulation is broken, and there is a "short" between the plates, a current will flow round the complete circuit of Fig. 4—and your indicator will tell the tale accordingly.

Use Your Grid-bias Battery

It is best to use your grid-bias battery for these tests—not less than 9 volts. For higher resistance components you may have to use a high-tension battery to get a current flow through a perfectly sound winding.

If you care to read back to the article on fault finding in the August 4 issue, you will see that there are many possible uses for a continuity tester where a somewhat expensive meter is normally used.

This little galvo has the merit of being assembled for a few pence, and of giving a definite and decisive flick when current flows through the circuit containing the suspected component. Now we ask you—what more could the efficient fault-finder wish for?

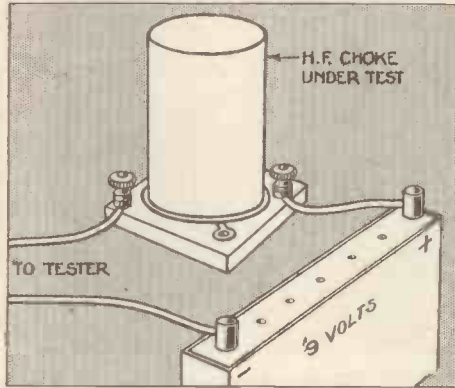


Fig. 3.—One of the many simple ways of using the tester—here we show connections to test the continuity of a high-frequency choke

wire, covered with two short lengths of distance pieces—insulated sleeving, as a matter of fact.

The armature itself we made out of an old clock spring. Most of you have one somewhere knocking about or can very easily get hold of one. Only a very small piece of the spring is needed—a piece just $\frac{1}{8}$ in. less in width than the width of the bobbin hole.

Before the bit of clock spring can earn the name of armature, it has to pass through some pretty trying times. First you must heat it in a gas flame until red-hot.

Then allow it to cool off slowly. It will then be found quite soft—malleable, as we say. While in this workable state you can cut off the wanted bit from the main length. What you do with the rest is your affair!

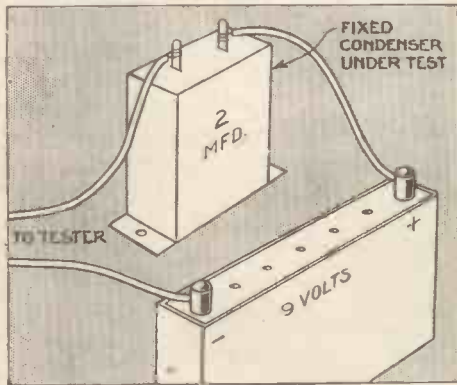


Fig. 4.—You can quite easily test a condenser for faulty insulation if you connect up the tester as shown here. Movement of the pointer denotes a breakdown



Messrs. M. Child and E. Handsley picking up signals from the Ivinghoe station two and a quarter miles away

LET me tell you, my hearties, all about the successful 5-metre field day of the Golders Green and Hendon Scientific Radio Society.

On Sunday, September 16, the natives of Ivinghoe Beacon, in Bucks, were startled to see a caravanserai of motor-cars apparently armed bonnet-a-hood with fishing rods and lines and mysterious poles and cases draw on to the downs. Even the painted lion on the Whipsnade slope sat up and took notice.

In the Teeth of A Gale!

Under "remote control" by President W. A. Hudson, members, oblivious to the curious gaze of hikers, cyclists and stray dogs, unloaded equipment and toiled up the hill with aerials, batteries and transmitter. A vertical aerial was soon erected in the teeth of a gale, and all was ready.

After an appreciated "refresher course," members studied field maps and President Hudson outlined the campaign. The society had held its first 5-metre field day some months ago, when elementary experimental work with a vertical aerial was done.

This time both vertical and horizontal aerials would be utilised to permit research into directional effects, and observation parties would work in an ever-widening circle to study both screening and distance effects.

The parties were Messrs. A. Black and P. Marks, using a super-regenerative receiver with a vertical aerial; Messrs. H. B. Dent and Bremner, jun., adopting a superheterodyne set; Messrs. Hubbard and Hudson, who had a di-pole aerial and a standard circuit; Messrs. M. Child and E. Handsley; and Messrs. J. C. Emerson and A. G. Griffiths.

Assisting Guerilla Tactics

Others present, either stationed at "G.H.Q." or assisting the guerilla tactics, were J. E. Hull, A. J. Bremner, D. N. Corfield, operator, and A. R. Gardiner, operator.

Mr. Corfield, of 5CD fame, brought along his trusty transmitter of familiar push-pull circuit with half-wave aerial modulated by choke control. Mr. Gardiner (5RD) was transmitting as well from his station at Abbots Langley. The power was about 10 watts.

The day was a triumph of organisation, and all was carried out to clockwork. The *modus operandi* was to send out morse and speech signals of 5 minutes' duration at 15-minute intervals, the afternoon being divided equally between vertical and horizontal aerial transmission.

Leaving Mr. Corfield glued to his keyboard like an operator on a

At A Five-metre Field Day

Once again the Golders Green and Hendon Scientific Radio Society has shown its mettle by organising a highly successful field day. In this article our special representative, CECIL W. LUSTY, recounts his experiences "on the field" while five-metre transmission and reception technique were being studied by these exceptionally well-equipped amateurs



Mr. Corfield in charge of the transmissions from the five-metre horizontal aerial—note the set up the pole!

sinking ship, I set out by car into the enemy country to find our scouting parties. Positions had been taken precisely with the indicated points on the map, and I was impressed with the complete absence of any confusion or error.

I first visited Mr. Childs, who was situated in a field in which cattle meditatively chewed the cud and ruminated on the strange actions of wireless "fiends"—about $2\frac{1}{4}$ miles distant. The location was in optical range with "G.H.Q." and through Mr. Child's "spy-glass"—which, incidentally, was used by General Picton at the Battle of Waterloo—I could watch Mr. Corfield tapping his code signal. The receiver comprised but two valves, but reception strength was unexpectedly strong. The morse came through distinctly, but speech was difficult to understand.

I thence inspected all the other pickets in



Studying directional effects on a "hot" ultra-short-wave super-het receiver during the tests.

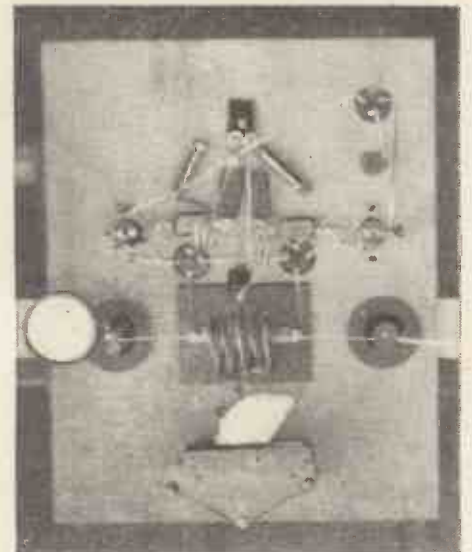
turn, making a round circuit of some 20 miles. Morse reception continued well; at $7\frac{1}{2}$ miles out it was R7, and was well audible at 10 miles—the best performance of the day. Speech for the most part was indifferent, but we heard Mr. Corfield announce that he was picking up 5-metre messages from a glider near Dunstable.

Handkerchief Waving

Presumably the "glideradio" experimenters had no two-way communication, as the "sky operator" was asking "ground" to indicate his signal strength by handkerchief waving and yard pacing. Our G.H.Q. was unable to establish contact with the glider operator who, I subsequently learned, was Mr. G. E. Collins, the holder of the British distance-gliding record.

We all later invaded a cosy farm when all records—for tea drinking and cake eating—were broken, and members compared reports. Opinions seemed about equally divided on the merits of vertical or horizontal transmission but the discussion yielded much valuable information as to reception conditions. For instance, we found that the Whipsnade hills made an appreciable difference.

All were agreed that the experiments had been highly successful and augured well for future tests. The Ivinghoe Beacon parties had not received Mr. Gardiner's Abbots Langley transmissions, but these were designed also for members in other counties. Directional effects, as a rule, were not pronounced. Among interesting directional observations, however,



This is the little set specially designed for ultra-short-wave transmission during the five-metre field day

was the slight-but noticeable reflection due to proximity of human bodies, and it was found advisable for the observers to stand well back from the receivers.

A full discussion on the results and lessons of the day's experiments will take place at the next meeting of the society.

Wellings W. Whiffin-Asks:

Should You Squelch?

"But before we start a learned treatise on how squelch works, we may as well know what it is and why it is wanted. Squelch is sometimes called low-frequency automatic volume control and the valve itself the suppressor. Its object is to cut out all extraneous noises and even weak distant stations of little programme value."

I PUT this question to a friend a short time ago and received the amazing reply that, although he would like to squelch, he didn't because he was afraid to. This sounded interesting to me and I put him in the mood for confidences.

"Listen," he said, "have you ever seen a circuit diagram of a receiver employing squelch? It is nearly always a super-het, fitted with A.V.C. as well. The number of resistances and condensers is as the sand on the sea-shore. No sooner do I follow along one lead than it branches off into the inevitable condenser and resistance with another pair on each lead on the other side until I am hopelessly lost."

Does Not Appear Complicated

There is something to be said for this argument. Squelch does appear complicated in a circuit diagram with self-adjusting volume control because of the number of decoupling resistances and condensers. Very often all the valves, except, perhaps, the output valve, are inter-connected electrically for the purpose of grid bias.

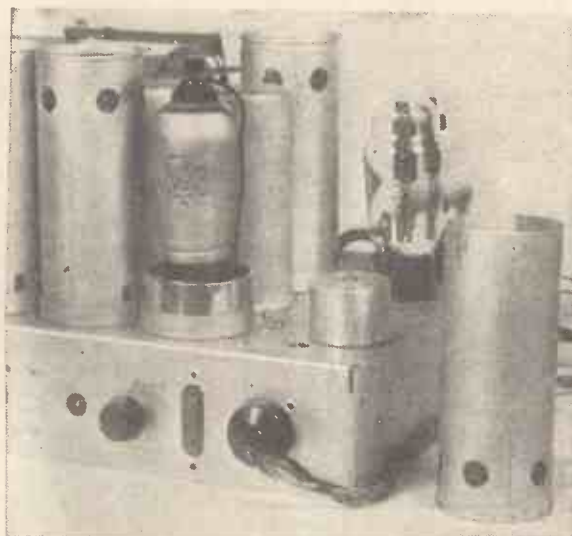
If the decoupling process with a resistance

To the person learning to drive a car the controls seem legion, but the experienced driver handles them automatically without giving them a thought. So it is with the study of circuit diagrams, with particular reference to those parts connected with squelch.

When the various decoupling systems are at once recognised and their objects understood, they need no longer exist as regards the puzzling out of the operation of squelch.

Look at the circuit shown at Fig. 1. It represents a variable- μ high-frequency valve, whose variable bias is obtained from an automatic volume control (A.V.C.) arranged on a detector valve shown in the next section. In the normal way the lower end of the tuned-grid circuit of this valve would join straight to earth.

In any case, if this wire is removed, an easy path to earth for high-frequency currents must be provided, or the grid circuit would not tune properly. Hence the need for condenser



For this mysterious process of squelching, a Mullard SD4 single-diode valve can be used—as in this typically modern all-metal chassis

In a circuit where squelch is found, A.V.C. is almost certain to be used as well. The two are related and their operation is sometimes effected in the same valve, usually the double-diode-triode. Some mention of A.V.C. will be given as it crops up because it will simplify the proper understanding of the squelch circuit.

Let us pass on to the second section, Fig. 2, of the circuit diagram. The high-frequency voltage induced into the secondary winding of the high-frequency transformer is rectified by the double-diode valve. Full-wave detection is shown. Condenser c_3 works in the same way as c_1 to form a low resistance path to earth.

When Signal is Rectified

When the signal is rectified a current flows along the two resistances R_3 and R_4 and applies a negative voltage to the A.V.C. control lead. The effect of this is to increase the negative bias on the high-frequency valve through R_1 and thus to limit the strength of the signal. So much for the A.V.C.

There is also an audio-frequency current flowing through R_3 and R_4 , the voltage developed across these being handed on to the low-frequency valve in Fig. 4. Note the condenser c_4 , which stops the flow of steady current. Resistance R_3 may be variable to form a manual volume control.

At Fig. 3 the squelch valve is shown as an ordinary triode for the sake of simplicity. It might well be incorporated in a double-diode-triode or a high-frequency pentode. Some manufacturers use a single-diode valve for this purpose as shown at Fig. 2. Squelch may take several forms, but the basic principle is the same in each case.

The action of the detector valve in controlling the volume of the high-frequency stage through its grid bias has been explained. Well now, the suppressor valve controls the low-frequency grid in somewhat the same way. Before the station is tuned-in, the squelch valve makes the grid of the low-frequency valve so negative that the set may be said to be out of action.

Squelch Changes the Bias

On a station, however, the squelch changes the bias to the amount normally required so that the low-frequency side operates in the usual manner. When off the station again, the extra negative bias puts the extinguisher over the valve.

It is natural to ask how the valve accomplishes this task. Refer again to Fig. 2, and note the lead which runs from the resistance R_4 . Yet

Continued on page 346

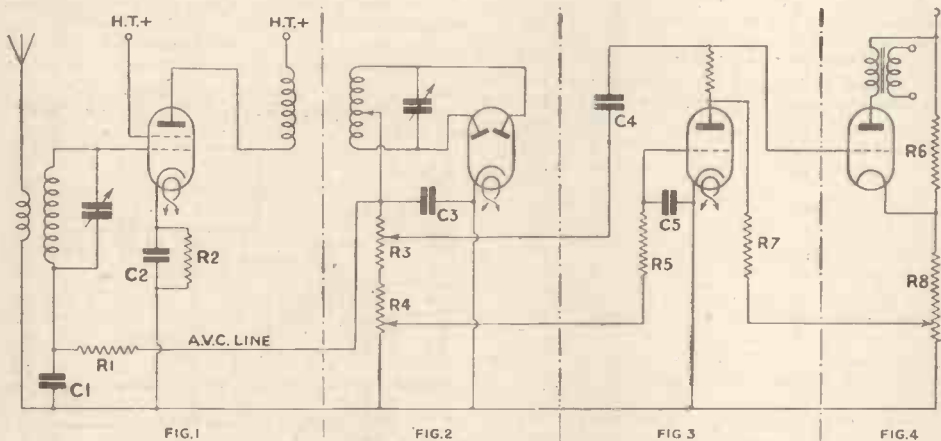


Fig. 1.—Variable- μ high-frequency valve, with bias obtained from the detector section. Fig. 2.—Full-wave detection with self-adjusting volume control. Fig. 3.—For the sake of simplicity the squelch valve is shown here as an ordinary triode. Fig. 4.—This is the low-frequency-amplifying valve, with associated manual volume control

and condenser was not carried out in each stage the result would be hopeless oscillation.

But before we start a learned treatise on how squelch works, we may as well know what it is and why it is wanted. Squelch is sometimes called low-frequency automatic volume control and the valve itself the suppressor. Its object is to cut out all extraneous noises and even weak distant stations of little programme value.

Briefly, the squelch valve controls the bias of the low-frequency stage so that it is out of action until a fairly powerful station is tuned-in. Then the low-frequency bias is automatically restored to its proper value in order that the station may be heard.

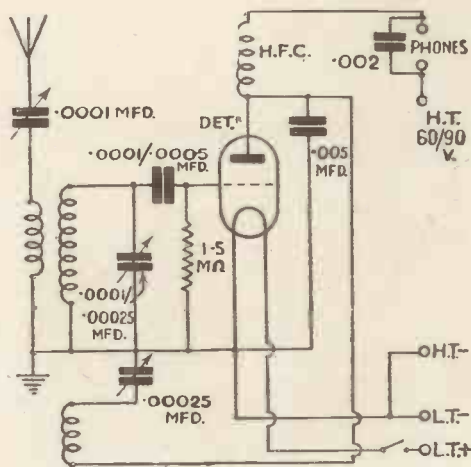
c_1 . Condensers will not pass direct current so that the variable bias along the A.V.C. line will not be short-circuited to earth.

The resistance R_1 is usually of a high order, say .25 megohm, so that high-frequency currents will not trouble to take the journey through it when the passage through the condenser is so much less fatiguing. Even electrons know how to avoid undue strain to their systems. This explains the decoupling principle, which holds good in any position in the circuit.

The resistance and condenser, R_2 and c_2 , supply the fixed part of the negative bias to the valve. So far there has been nothing much to frighten the reader off squelch.

What's the Best Short-wave Circuit?

Asks KENNETH JOWERS



Simple one-valver for short-wave reception. You can make the tuning coil yourself very cheaply and easily

LAST week-end a friend dropped in to inquire about what sort of short-wave set he should build himself. He had two ideas in his mind; one was that I was going to tell him quite definitely what set he wanted; secondly, he thought that to get any results at all the set would have to be a very expensive and complicated affair.

He was wrong with both of his ideas—as it took me a long time to explain. Never mind, in the end I got a new short-wave listener! I am going to tell you just exactly what I told him, so that those who are contemplating making a set will know what is what.

He Was Amazed!

Originally I got him interested by letting him play about with my own twelve-valve short-waver, and he was amazed at the way in which stations four and five thousand miles away could be tuned-in. No hand-capacity or tricky tuning, while volume was sufficient at times to overload the loud-speaker.

I rather damped his enthusiasm when I told him how many valves there were, and it took me the best part of an evening to convince him that a two- or three-valve set will really bring in American stations on the loud-speaker.

He was rather sceptical, for he had apparently owned a converter for many years, with which he had not heard very much. Fortunately, I had several sets rigged up—all small fellows—which I use when the atmospheric conditions make the large set rather too noisy.

First of all, I put on a little one-valve set with a pair of earphones. Perhaps I was a trifle optimistic, but anyway we pulled in W3XAL just before tea, although admittedly it was only just audible.

Several other stations were tuned-in, including Rome, Zeesen, and Moscow. So you see that even with a one-valve set, costing a few shillings, it is possible to get going on short waves.

There aren't any blue-prints of this circuit, but take a look at Fig. 1, which is very simple; for details of the tuning coil, which you can make yourself, write to us for the back number of AMATEUR WIRELESS, for July 7, 1934.

Anyway, to get back to the subject again, the one-valver really wasn't very much good for reliable American reception, so I let him handle a detector-pentode circuit on which I get very good results. Immediately he remarked on how very lively the set was, and promptly tuned-in W8XX on 19 metres. More by luck than judgment, perhaps, but

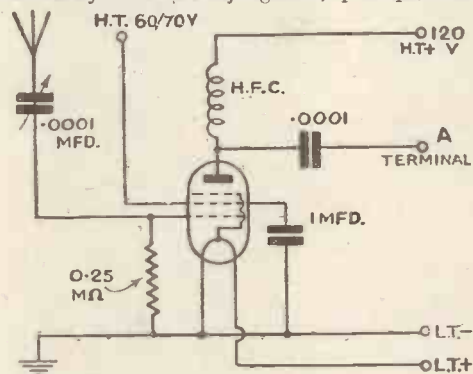


Fig. 3.—Untuned high-frequency stage in front of the detector and low-frequency type of circuit makes a combination that is easier to operate than a two valver

anyway he did tune-in Americans which he wanted.

My two-valver is fundamentally similar to the circuit Fig. 1, with the addition of a low-frequency-amplifying stage with a pentode output valve. This little set is really one of the best of its kind for the novice who does not know very much about short waves.

Untuned High-frequency Stage

The only real trouble with a set of this kind is that small variations in the capacity of the aerial pre-set alter the dial readings by two or three degrees. The only way to overcome this is to add an untuned high-frequency stage in front of it.

If you do not want to start off with a three-valve set, make the two-valver in Fig. 2. Then, when you feel like it, put in front of the untuned-high-frequency stage shown in Fig. 3. This will not mean any additional tuning condensers, and if you leave three or four

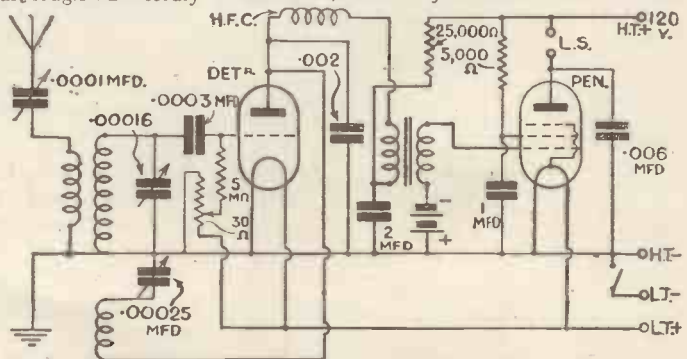


Fig. 2.—A two-valver with a stage of low-frequency amplification. "Really one of the best of its kind for the novice," says Kenneth Jowers in his article this week

inches to spare on your baseboard it can be added without upsetting the layout of the two-valver.

Short-wave Converter Unit

A point that rather upset my friend was that having a perfectly good two high-frequency set, why couldn't he modify that in some way so as to tune in short-wave stations? That meant that I had to show him a short-wave converter unit. As I had not got one, it meant knocking up one in a hurry.

The circuit in Fig. 4 was used—quite a straight-forward arrangement—and it was simply hooked up on a breadboard with rather untidy wiring. This rough unit was taken round to his house and connected in front of the two high-frequency-stage receiver.

It did not take very long to find out what the unit would do. First of all you must realise that it converted a straight set into a five-valve short-wave super-het. We had no trouble in bringing in quite a lot of the powerful Continental short-wavers.

Americans on Loud-speaker

After we had got used to handling it, the American stations on 19 metres came in at good loud-speaker strength. This was during the latter part of the afternoon. You see, there is really no need to go to a lot of expense if you want to find out just what happens on short-waves. A one-valver is quite amusing, but it is really not powerful enough for reliable results. If you do not want to spend a lot of money, the two-valver will do for the time being, and you can add the high-frequency stage later.

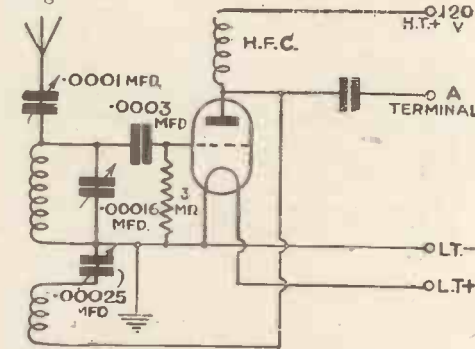


Fig. 4.—With this short-wave converter unit you can turn an ordinary broadcast set into a short-wave super-het, which will bring in Americans on the loud-speaker

Do not forget that if you have a good family set such as the A.V.C.4, or the Lucerne Ranger, you can add in front of it a super-het converter which will cost only a matter of a pound or so.

Generally speaking, the best set for the novice to build, if he is exploring the short-waves for the first time, is a two-valver.

Conditions at the moment are a lot better than they were last week. American amateurs are coming in quite well on the 20-metre band after 11 o'clock. If you can wait up until 11 a.m. then you will be assured of a good bag on both 20 and 40 metres.

On Your Wavelength

The Week's Radio Gossip :: By THERMION

A.C. That Wasn't!

DURING a recent holiday in a small town on the East Coast I had a really amazing instance of the quaint confusion which prevails in our electric current supplies.

Before starting I turned up the aforesaid townlet in a work of reference, discovered that it was blessed with 230 volts A.C. at 50 cycles, and selected an appropriate receiving set to take with me.

When we arrived, one of my young hopefuls unpacked the set and connected it to a wall socket in our sitting-room. He switched on—luckily the plug had its own switch—but nothing happened. "Something must have shaken loose during the journey by car," thought I.

Investigation disclosed that all the valves were in perfect order and that there was no loose connection anywhere.

We tried again with no result, and when the wall switch was turned off I noticed a blue arc. "Heavens!" I cried. "This must be D.C."

A Mixture of Currents

ON inquiring at the hotel office, I learnt that the whole building had been re-wired quite recently and that the supply was now unquestionably 230 volts A.C. from the grid system. This was a bit of a poser, but I decided to do some investigating on my own.

On looking round, I discovered a D.C. meter tucked away in a corner of the entrance of the wing in which my family's rooms were situated, and a little tracing out showed that, beyond all doubt, it was serving our sitting-room and two of the bedrooms.

A visit to the electric-light people disclosed the fact that part of the town was still on D.C., and an examination of the wiring plan of the hotel showed that when the change-over to A.C. was made just one or two rooms had been overlooked!

Can you beat it? Luckily, my set was not damaged.

Look Before You Connect!

THE moral, I suppose, is that in this queer country of ours you can take nothing for granted in the way of electricity supplies. If you go to a strange place, taking a mains set with you, you should certainly have a good look round before you hazard connecting it up to lamp holder or wall socket.

Next time I think I shall take a universal set with me, and then there won't be any trouble—unless, of course, the supply turns out to be of an antediluvian nature, such as 60 volts D.C. or something of that kind.

Separate Loud-speakers

A WEEK or two ago I said that I couldn't remember having seen a single set at Olympia which had not a built-in loud-speaker. A kind correspondent writing from Brockenhurst reminds me that the Eldeco Stenode is made for an external loud-speaker. Of course, I saw the set at Radiolympia, but it had slipped my memory when I wrote that paragraph.

I cannot help thinking that it's a great pity that there aren't more sets made in this way, for there must be heaps of people who would prefer to go in for large separate loud-speakers

instead of the smallish ones built into many cabinets.

One way out of the difficulty is to disconnect the built-in instrument and to work an external speaker from the terminals usually provided. There are many, though, who don't quite see why they should have to pay for a built-in loud-speaker that they don't want.

New Kind of Interference

SOME extraordinarily interesting facts have come to light at the meetings of the International Scientific Radio Union which is now conferring in London. One of the most important is the explanation of a type of interference that has been a puzzle to many of us for a long time.

Possibly you have noticed that when listening to Beromünster or Vienna you sometimes get interference from a station which you eventually identify as Luxembourg. Now, Luxembourg works on 1,304 metres and no harmonic of his could cause interference with either of these stations. Yet the interference is unquestionably there. What, then, is the explanation?

Dr. van de Pol told the conference that any station with a wavelength greater than about 470 metres can cause interference with another on a shorter wavelength, provided that the two are practically in a straight line with the receiving aerial. He had actually prophesied some time ago that Droitwich would interfere with the reception of Athlone in Holland when it came into action, and, sure enough, the interference was observed.

"Ghost" Transmissions

THE name "ghost" has been given to these queer interfering signals. It is

believed that they take place because the reflecting powers of the Heaviside-Kenelly layer are limited and that the layer can in some strange way be overloaded by a high-powered transmission.

It is a pity that Dr. Kenelly, who should have presided at the conference, was prevented by illness from doing so, for he might have had some interesting light to throw upon the behaviour of his own particular layer.

In any case, there is no doubt that high-powered stations are the worst offenders, and the fact that they cause "ghost" interference is likely to mean that there is a very definite limit to the power that can be permitted, particularly on the higher wavelengths.

Coloured Cabinets

RECENTLY I asked in these notes why manufacturers—and particularly those who go in for bakelite cabinets—had not exhibited more colourful housings for their wireless sets at Olympia.

I now hear that Ekco's will shortly be able to supply their sets in cabinets of various colours, though I believe that they have to be specially ordered—for the present, at any rate.

This is a good move, and I predict that, once people realise the possibilities of the coloured cabinet for fitting in with the furniture and so on of their rooms, there will be a big demand for brighter wireless sets.

Hiring Wireless

FOR some time, now, Londoners have been able to hire wireless sets, of one make, at any rate, on very favourable terms. Now I learn that a similar service is being started in the North of England as an experiment.

In this case only one set is offered at present,

Extra Special Features for You Next Week

LAST WEEK WE promised you preliminary details of the second Constructor Crusader set; you will find them on pages 336-337 of this issue. Next week's issue of "Amateur Wireless" will contain full constructional details of "the three that will set all Britain talking."

IN ADDITION TO details of this remarkable set there will be a number of features of more than ordinary interest.

IN THE FIRST place those inimitable contributors of ours, "The Experimenters," will return to our pages with more intriguing suggestions than ever after their long summer vacation.

THEN, FOR THE benefit of the newcomer to radio—we all know

that listening begins in real earnest with the end of Summer Time—we shall start a new series of helpful explanatory articles under the happy title, "Learn with a Smile."

THAT DOES NOT exhaust our programme by any means and two other features are worthy of particular mention. The first is a short series of articles explaining television and analysing the methods by which a service could be put over in this country.

AND AS A fourth special feature we shall introduce next week the first of a series of reference panels that every keen amateur will want to file for future reference.

AS YOU CAN see, next week's "Amateur Wireless" is an issue you must on no account miss!

Make Certain of Your "A.W." Next Wednesday



In its circular bakelite cabinet, the Ekco universal mains set has attracted many listeners who have been searching for "something different"

the Philco model 264. This can be hired for 1rs. a month during the first year and 7s. a month during the second. A deposit of £1 is also required.

The rental includes complete free service, including the replacement of worn-out or defective valves.

These hiring schemes with complete free maintenance strike me as a very good idea. No capital sum has to be put down and one is always sure of keeping up to date, for the set can be replaced at the end of two years at the option of the hirer.

Wireless in France

FROM one who visited the French Wireless Exhibition, I have received an interesting account of wireless developments on the other side of the Straits of Dover.

The French have always been from the very first superhet-minded and there are now very few sets of any other kind to be seen except for a few of the smaller "straights." Like our own country, France suffers from a multiplicity of lighting-current variations, and for this reason the A.C./D.C. set is very popular over there this year.

The French have paid us the compliment of adopting many devices which were first widely developed in our country. Amongst these are visual-tuning indicators and frequency-changing valves on the electron-coupling principle.

Like our own manufacturers, the French are producing large numbers of sets at prices round about the £12 mark, but they are also paying greater attention to the high-class set with every possible refinement which sells at from £20 to £30.

Droitwich Supreme!

YOU have all now had a chance of hearing Droitwich, and I am sure that your verdict of it will be unanimous. It is by far the best station in Europe now as regards the quality of its transmissions and the volume in practically every part of these islands must be admirable.

So successful is Droitwich proving and so big is its genuine service area that it won't, I think, be long before the London National station is closed down.

It is probable, when Droitwich has got thoroughly into its stride, that the West and North National stations will also follow suit. One of these wavelengths will be wanted for the North of Scotland Regional transmitter, work on which is to be started before long.

The coming of Droitwich is sure to produce a big increase in the number of listeners, for it provides a fine service in all sorts of out-of-the-way corners of the country where previously reception was poor.

'Ware Radio Bargains

AT the present time numbers of sets are being offered by cheap-jack firms as the world's finest bargains. Often they are in their original cartons, still sealed up. In one way, therefore, they are brand new; but in another they are sometimes very, very old.

The truth is that in many cases these are ancient sets, representing the surplus production of one, two or even more seasons ago. Many of them are utterly unsuited to present-day requirements. Their selectivity is not good enough for the high-power stations which now crowd the medium waveband under the Lucerne scheme and their reproduction leaves much to be desired.

Don't forget, too, that in many cases, if old sets of this kind go wrong, it is the dickens of a job to get them put right, since spare parts are no longer available.

If you do buy an old set at a bargain price make sure, first of all, that it is of a type not earlier than 1933-34 and, secondly, that it is covered by a reasonable guarantee. Lastly, don't omit to insist upon a demonstration in your own home and satisfy yourself that it is selective enough for modern conditions.

Queer "Short"

A FRIEND was very puzzled the other day by a breakdown in his set. All the symptoms showed that there was a short somewhere, but, for the life of him, he could not locate it.

Eventually the trouble was tracked down to a small piece of "silver paper" that had somehow worked itself in beneath the chassis; this set has a cabinet of the open-backed type.

The tinfoil was nestling gently against two very live points and the result was complete silence.

How the silver paper got there is a mystery. He blames his chocolate-loving better half, but she points out that silver paper is also used for wrapping the gaspers that he consumes in such quantities.

Anyhow, wherever it came from, it must have been whisked into the set during dusting operations. 'Ware silver paper on the wireless table.

The Lightning Bogey

A READER who has fixed up a "birdcage" aerial on a short pole over his roof wants to know if it stands any greater danger of being struck by lightning than the ordinary garden wire.

In my opinion, the risk is just about the same as any chimney stands of being struck—neither more nor less.

In the early days of broadcasting most listeners felt nervous about an outside aerial, particularly during a thunderstorm, but time and statistics have, by now, pretty well disposed of their fears.

Mind you, I still think it prudent to earth the aerial when thunder is about—just as I prefer to leave the telephone alone under the same circumstances.

Lightning is something like the wind, which "bloweth where it listeth," and there's no sense in going out of the way to look for trouble. But, by and large, neither a garden wire nor a small birdcage aerial is going to "attract" lightning to a place where it wouldn't strike anyhow.

It is true that a pointed object will sometimes prove dangerous, but only when it stands well above the surrounding objects—like an isolated tree or group of trees.

How Does It Work?

ALL of which, perhaps, goes to show how little we really know about the true "innardness" of lightning—and, for the matter of that, about lots of more ordinary things, too. For instance, the other day I read a mighty learned article on the way in which the ordinary crystal detector works, only to find in the end that, whilst there are any number of complicated theories on the subject, none of them seem to completely fill the bill.

And it's just the same with the oxide-coated filament of a valve. Some authorities say that the extra emission is due to the oxides in the coating, whilst others—of apparently equal learning—hold that it all arises from the action of free barium which is liberated from the oxide by the heat.

Luckily we know for a fact that such filaments do deliver the goods in actual practice.

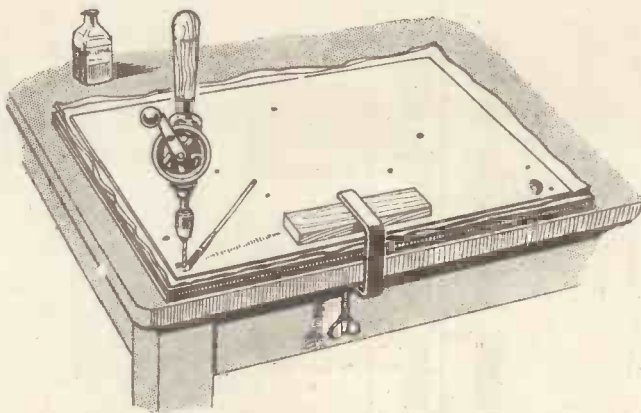


To help sort out traffic tangles, Scotland Yard now has an auto-giro plane. Above you see how the radio equipment for transmitting and receiving messages is fitted up—the morse key being strapped to the observer's knee. On the left is the auto-giro before taking off at the Croydon airport



Shielding Panels for Short-Wavers

By F. W. CAWLEY (G5FC)



When you are drilling that aluminium panel apply a little methylated spirit to the drill point—it will make the work very much easier. See that you put a nice sheet of paper between the panel face and the bench when you clamp down the panel—otherwise you will bruise the face

"It is surprising," remarked my young friend, Frank, as we lunched together in town the other day, "how the slightest little bit of hand-capacity in your short-wave receiver can cause havoc with the tuning."

I nodded. Hand-capacity must be one of the oldest of the short-wave bugbears. However, I did not remember experiencing much of it whilst I was last operating my friend's receiver, and I said so.

"Oh, well," he scoffed, "you were probably listening to morse signals all the time, and it is not so noticeable then."

World-wide Broadcasting

I had to admit that he was right. And although Frank was moderately good at copying the morse code, it was quite clear that he had not yet lost the thrill of receiving world-wide broadcasting.

"Let's see," I went on, "your set is a two-valver, isn't it?"

"Yes—just an ordinary affair."

"I suppose you've tried most of the usual cures for hand-capacity, such as direct earthing of all low-potential points, and chokes in the phone leads?"

"I've tried all those, but there is still a trace of hand-capacity left," he replied.

"Have you got a metal panel?"

"No, it's just an ordinary ebonite one."

This was a bit of good news. It gave me a line along which to work with a view to curing yet another of my friend's troubles.

"Well, a metal panel seems to be indicated," I declared, with an air of finality.

"I'm afraid it's out of the question," he sighed, "for the present, at any rate. I simply can't afford one."

"Oh, I don't mean buy one—ready cut and drilled," I hastened to point out. "I mean make one, out of sheet aluminium."

Frank still looked doubtful.

"It's as cheap as anything," I went on, "and you don't need much. It is sold by weight, and at the most a good-sized piece of No. 16 gauge should not cost you more than a bob, to give it the highest estimate."

"That sounds all right," my friend remarked, brightening considerably. "But isn't it very difficult—cutting and drilling it?"

"Not a bit," I replied. "It's the easiest stuff in the world to work—when you know how. Look here, you get a piece this afternoon from the biggest ironmonger's you can find, and I'll come along this evening to give you a hand with it."

"Righto!" Frank was very cheerful now. "What size shall I get?"

Aluminium is Cheap Enough

"Oh, about the size of your present panel." Then as an afterthought, I added: "No, get a piece a little bigger all round; the aluminium is cheap enough and the bits come in extremely useful at times."

"Fine! I'll slip along and get it now," Frank declared, looking at his watch. "I've just got time before I'm due back."

"Half a minute," I interrupted, suddenly. "While you're there, get a penny sheet of fine emery paper, and call at a cyclist's shop for a small tin of transparent lacquer and a small soft brush."

"What are all those for?"
"I'll tell you to-night! Better nip off now, or you'll be late back."

That evening I made my way to Frank's home, taking with me an assortment of drills of various sizes; a small, cheap plane; a hack-saw; a scriber; and a good solid clamp.

"Oh, here you are!" Frank greeted me, and added, in a

stage whisper: "The folks are just off—I told them what a good picture it was at the Palladium!"

I laughed.

"That's fine! But did you get the aluminium?"

It was No. 16 gauge

"Yes—here it is."

Frank handed the piece of metal to me. It was No. 16 gauge all right—about a couple of millimetres thick—and it shone with the brightness of a mirror.

"It's splendid," I said, as I looked along each edge to see if it was perfectly straight. "Yes, this will do fine. Now, have you decided about the specification?"

"Yes, I'm going to keep the set exactly as it is now."

"Well, take the knobs off and let's do a little measuring."

Frank did so, and before long we had put down all the distances, and compiled a full-size diagram on a piece of brown paper to show just where each hole had to be.

"This is the point at which you appreciate a blueprint when you are building a set," I remarked, as I estimated with infinite care the positions of what were, perhaps, the most important of all the holes in the panel—those to be used in the mounting of the angle-brackets which were to hold it firmly in place.

When It Looks "Amateurish"

The slightest divergence in one of these holes means either that the panel is not firm, or that it looks "amateurish," so it is as well to be careful.

When we had finished making the "blue-print" I clamped the aluminium to the table, using a wooden block between the head of the clamp and the metal to avoid disfiguring it, and, putting the diagram flat on the aluminium, marked the centre of each hole with Frank's centre-punch, not forgetting a punch for each corner of the new panel to indicate the size to which the metal had to be cut.

"How are you going to cut it?" Frank wanted to know.

"With this saw," I replied.

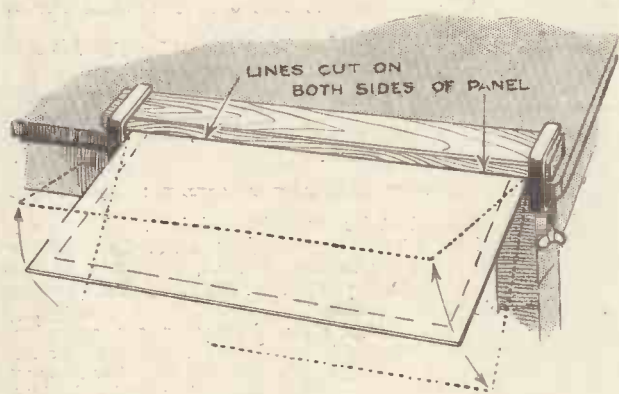
Frank was bewildered.

"Can you use an ordinary saw?"

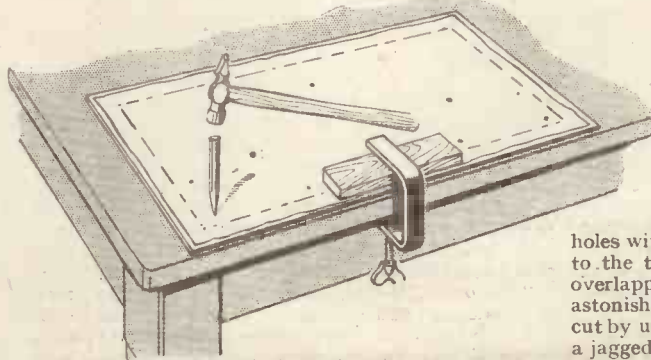
"Watch!" I smiled.

I drew lines between the corner holes with the scriber, and then fixed the metal to the table with the clamp so that one side overlapped the edge of the table. Frank was astonished to discover that aluminium could be cut by using an ordinary hacksaw. "But what a jagged edge it leaves," he said. "How do you

Continued at foot of next page



(Above) Here's a simple way of cutting a metal panel to any required size. Simply mark deeply lines on both sides of the panel and then—when clamped as shown by our diagram—bend up and down until it breaks off. (Right) This shows how to punch the drill centres for holes in the panel by means of an easily made paper pattern



Your Loud-speaker In the Garden

A One-wire Extension

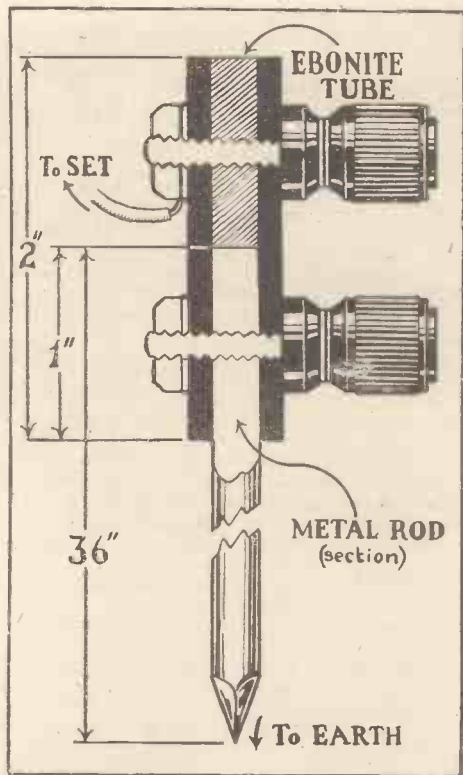


Fig. 2.—Handy little gadget you can make for easy loud-speaker extension using only a single wire

WHILE there is still a chance of an "Indian summer," the garden is certainly an ideal spot in which to lounge in a comfortable chair and enjoy the radio programmes.

Unless, however, your set is of the portable variety you will need to rig up an outdoor loud-speaker extension in order to do this.

With the type of output circuit shown at Fig. 1, you can extend the loud-speaker wiring into the garden easily and cheaply, as a single lead will suffice for connection to the outdoor speaker, provided that a "return" can be effected by means of a separate earth connection at or near the spot where the loud-speaker is placed.

The novel device shown at Fig. 2 affords a very simple but efficient and convenient means of providing the necessary earth return. You

can make this handy gadget in a few minutes out of odds and ends—at little or no cost.

The only materials needed are a rod of suitable metal, an ebonite tube and a couple of loud-speaker terminals. The metal rod can be, say, 3 ft. long and 1/4 in. diameter, and a suitable ebonite tube for use with this would be 2 in. long, 1/4 in. diameter inside and, say, 1/2 in. diameter outside.

These diameters are suitable for 4B.A. terminals; if 2B.A. terminals are used a rod and tube of slightly larger diameter would be preferable.

The construction is simplicity itself. Push one end of the rod half-way into the tube; then drill and tap a hole right through the tube and rod, as shown at Fig. 2, to take the stem of one of the terminals.

Insert the terminal, screwing it home and securing it with a nut. Then drill a second hole through the ebonite about an inch higher up

the tube to take the remaining terminal. Insert the latter and connect to its stem the output lead from the set.

Loud-speaker Leads

The leads from the loud-speaker should, of course, be connected to the two terminals. The upper terminal, which, as you can see from a glance at Fig. 2, is insulated by the ebonite tubing, provides the connection through the extension lead to the set; and the

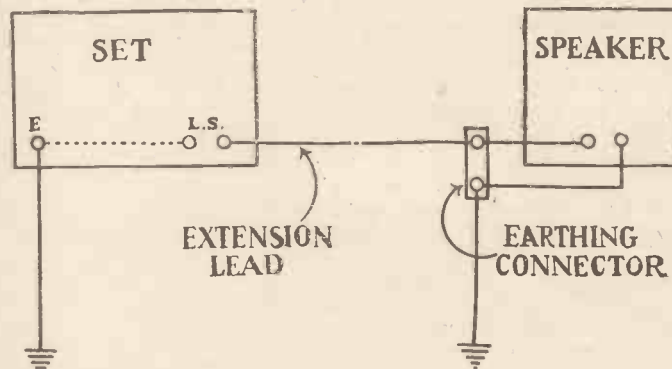


Fig. 3.—This shows how the single wire connects the distant loud-speaker to the set, the return being through earth

lower terminal, which makes contact with the metal rod, provides a satisfactory earth return connection if the rod is thrust into reasonably moist soil in any part of the garden.

To avoid any risk of disturbing neighbours when you are using your loud-speaker in the garden, it is very necessary to keep the volume down to a modest level. As some kinds of music give much greater overall volume than others, it is an advantage to have an external volume control across the loud-speaker, if possible, so that you can adjust the volume in the garden to suit each individual item or programme.

The wire or cable used for the extension lead between the set and the outdoor speaker, as at Fig. 3, should, of course, be adequately insulated to prevent the "speech" currents leaking away to earth before reaching the loud-speaker.

W. O.

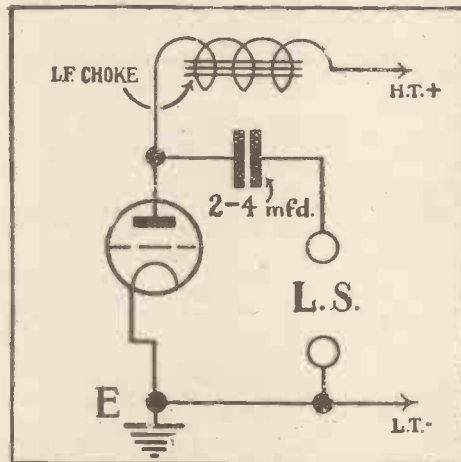


Fig. 1.—Typical output circuit with choke-capacity loud-speaker coupling

Shielding Panels for Short-wavers

Continued from preceding page

get rid of that—with a file?" "You can use a file if you wish, but it is hard work, and it generally leaves nasty marks on the aluminium. The best way is to use a plane and shave the rough edge off as though it were made of wood.

"The best way of all, though," I went on, when the edge was no longer rough, "is simply to use the scriber, making a deep cut along the line on each side of the panel. Then bend the metal backwards and forwards until it breaks."

"Now we'll see about drilling the holes," I said, when the panel was eventually the correct size. "I've brought along some of my drills, just in case you haven't got just the very drill we want."

Frank smiled. We had been caught that way before.

"Oh, by the way," I continued, "we want some methylated spirits. Not very much—a drop or so for each hole."

Soon Frank came back with the methylated spirits. I decided to let him drill the holes,

not only because I could see he was absolutely itching to get to work, but also because I wanted him to see for himself what a difference a drop of meth. makes on the drill.

"Phew!" he exclaimed. "It takes a bit of getting through!"

"Now try again," I smiled, applying a little methylated spirits to the drill with the brush.

It was evidently Frank's evening for surprises. But anyone would be surprised to find how soft the metal seems to become.

When all the holes had been carefully drilled, I turned the panel over, and clamped it on to the table again. On the other side there were the usual protruding edges round each hole. I took a hammer and a screwdriver, and showed Frank how to chip these off. The first time all the edge sank back into the hole.

"Hold the screwdriver more parallel to the panel," I said, "and give sharper little taps."

At last all the holes were drilled, and the panel was finished; at least, so Frank thought.

"Not quite," I said, flicking off the little bits of aluminium and sawdust. "The panel will not keep shiny like this for more than a month or so if you do not take any precautions

against its becoming oxidised. That is what the transparent lacquer is for. But first we'll give it a burnished effect, to make it look like the stuff you see on the dashboards of smart sporting cars."

I took a strip of emery paper, and placed it over my thumb, which I then turned a little way round and back again for a few moments. The result was a small shiny circle. I did the same again, at distances of about half an inch. Frank liked it very much.

Monotonous Task—but Worth It!

And so we got over rather a monotonous task, but it was well worth while.

"Now for the lacquer," I said. "First of all we had better find a spot where the panel can remain undisturbed for a few days until it is absolutely dry. It must be where there is not much dust, and the lacquer dries more evenly if the panel is flat all the time."

We settled this little point, and then I started to apply the lacquer, putting it on as quickly and as evenly as I could, so that there would be no need to go over any part a second time, for this results in brush marks.

PERCY W. HARRIS EXPLAINS HOW

The Theory Seemed Wrong — But It Worked!

SEE a very great danger of radio progress being held up because existing theories are supposed to prove the uselessness of attempting progress—in certain directions, any way. It is rarely realised, particularly by those who, of all people, should know, that a theory is merely a logical deduction from the known facts of a case, and that only by taking into account *all* of the facts can we have a secure foundation for it.

An Experimental "Error"?

What so often happens is that, basing their conclusions on relatively few facts, research workers formulate a theory which for some time proves a very practicable working proposition. Now and again, however, something is found which does not quite fit and the variation is put down as an experimental error.

More and more of these variations occur, and whenever there is any doubt as to what the reading should be it is consciously or unconsciously made to fit as near as possible to the theory. And then, one day comes somebody who, taking into account a larger number of facts than hitherto, produces a new theory and from this often we get new inventions.

This "experimental error" supposition is, in my opinion, probably covering up the seeds of any new inventions. Take, for example, valve curves, which show, say, the relationship between grid volts and anode current. You see these published curves, always smooth, and sometimes straight lines over a good deal of their length, but have you ever tried to plot one yourself? Or better still, have you ever seen the set of readings made by the experts before the curves are drawn?

These curves, as you know, are drawn by first of all taking a large number of readings and then plotting their positions on a sheet of squared paper. The curve is then drawn by connecting the various points of the readings by means of a line—or, at least, this is the idea!

Dots That Stagger

The trouble is that in a considerable number of cases the dots do not fall on a smooth line, and the curve is really a kind of average throughout a series of dots which actually stagger here and there from one end of the sheet to the other.

But then, you see, the line *ought* to run smoothly from one end to the other, and so it is made to do so. To avoid this awkwardness in the way of variations of dots, comparatively few readings are generally taken.

If you were to take, say, one hundred and fifty readings so that the dots came very close together, and joined every dot to the next dot, you would get, in many cases, rather a bad shock. In most cases, too, these variations of position are *not* due to experimental errors—the apparatus and the users are much more accurate than the variations would suggest.

Several years ago the sideband theory—or more accurately its protagonists—made it perfectly clear to

all and sundry that no further progress in selectivity was possible without sacrifice of quality. If you further sharpened the tuning to get rid of interference you lost the high frequencies, and if you used audio-frequency correction in the amplifier to raise the attenuation of the high frequencies due to this sharpening of tuning, you brought back the interference which had been reduced by the sharpness of tuning, and so you were just precisely where you were before. Logical, isn't it? Perfectly, in accordance with the theory as held. *But it just isn't true!*

From theoretical considerations, Doctor James Robinson came to the conclusion that there was a flaw in this argument, and that sharpening the tuning *should* be carried to the very limit to obtain selectivity and that the necessary audio-frequency correction to bring the quality back to normal would *not* bring back the interference.

The invention embodying this idea was called the Stenode and I happen to know more about the early history of this invention than most people, because the first working Stenode embodying this idea was made in my laboratory by me.

I have a most interesting collection of statements in print from some of the greatest authorities in radio at the time, not only pouring scorn on the idea, saying that such a set would work, but proving conclusively (in their own minds at any rate) that such a scheme could not possibly work because of the sideband theory.

The sideband theory, they proved, was mathematically perfect, and therefore anybody who claimed that such a scheme could work

Our Research Consultant makes the very interesting suggestion that under cover of what are thought to be experimental errors are actually the seeds of many new inventions. His point is that these are not errors at all—but new facts that are trying hard to show that the existing theory is incorrect. There is the danger, as Percy Harris rightly asserts, that we should make facts fit pre-conceived theories, even when over and over again the facts will not really fit in at all

was attacking the basis of mathematics. That was about five years ago.

The fact that telephonic reception can be had on the sharpest of resonance curves and the tone, which is thoroughly distorted by this sharpness, brought back again to normal by means of audio-frequency correction circuit *without* bringing back the interference to anything like the same extent, is now admitted by these scientists. Indeed it can be shown by them that it is in perfect accordance with the sideband theory!

Lots of Progress to be Made

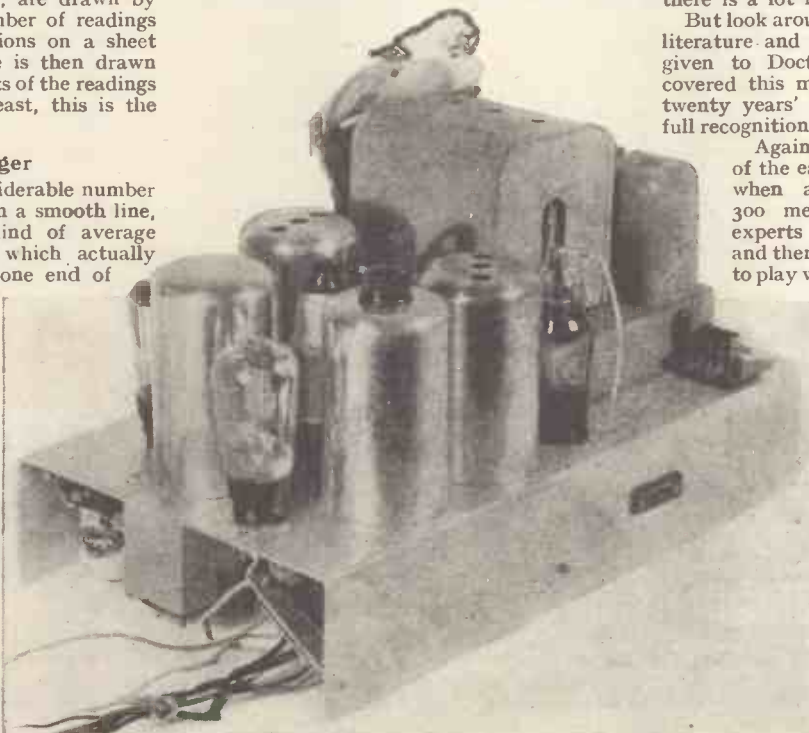
Some of the earlier claims for the invention have not yet been substantiated and owing to sideband splash (so-called) there are still some practical difficulties to be overcome, but my own experiments and those of a number of other people have shown that the "sideband splash" is in many cases far less than the sideband theory would indicate, even now, so there is a lot more progress to be made yet!

But look around in the "highbrow" technical literature and see if you can find any credit given to Doctor Robinson for having discovered this most important fact. In about twenty years' time you will probably find a full recognition of his contribution, but not yet!

Again, I still have vivid recollections of the early days of short-wave wireless when all wavelengths below about 300 metres were considered by the experts useless for practical purposes, and therefore were given to the amateurs to play with. When these same amateurs

succeeded in effecting trans-Atlantic communication on about 100 metres with a power far less than that fitted to the smallest ship installation, their results were put down as "freaks."

When a regular service by amateurs was obtained, the commercial experts began to take notice, and this band was removed from them and much shorter waves (*quite* useless, they thought, for long-distance work) were given to them to carry on. But for the practical work of the amateurs who got on with the job without worrying their brains as to whether or not theory would permit them to work across the Atlantic, the present beam systems and long-distance communications on "micro-waves" would not have been heard of.



Meet the first practicable battery Stenode for the amateur—its construction is fully described in the October issue of our contemporary "Wireless Magazine," now on sale. The principle of the Stenode was developed in practice by Dr. James Robinson in face of immense opposition from a large number of "theorists" who with elaborate mathematics "proved" they knew better!

The Three That Will S

ALL EUROPE BROUGHT to ALL BRITAIN

Results of Test by Constructor Crusaders' Registrar

AS Registrar to the Constructor Crusaders it was fitting that I should be the first to make an independent test on the All-Britain Three. Not so much to check up the efficiency of the circuit, but to see that the receiver was what the Crusaders wanted.

You will read elsewhere of the technical details of the set and all that I need do is to assure Crusaders that the All-Britain Three embodies a very big percentage of the suggestions you have been made in your letters.

I am in a good position for reception and, providing the receiver is highly selective, I can always receive twenty or thirty stations on a three-valve set. Actually, being about 30 miles from London and about the same distance from Daventry, the selectivity has to be good on both wavebands if I am to have interference-free reception.

Aerial and Earth

With the All-Britain Three I used a 40 ft. aerial about 25 ft. to 30 ft. high with an earth connection to an earth tube and the usual batteries supplied with the receiver. Under these conditions the receiver worked perfectly from the time that I first switched on.

I spent half an hour on the long waves and with a preliminary twiddle brought in fifteen stations without any trouble, the only one that was jammed being Königswusterhausen. You couldn't expect much else with Daventry blaring away two or three degrees below.

Stations I Definitely Identified

Amongst those definitely identified were Huizen, Lahti, Radio Paris, Königswusterhausen, Daventry, Motala, Warsaw, Luxembourg, Kalundborg, Oslo and Moscow No. 2, which left me with four stations of which I did not know the origin. As these were all between 800 and 1,000 metres they were probably Russian stations. The minimum

wavelength on the long waves was approximately 770 metres, with a maximum wavelength of 1,980 metres.

When Droitwich came on there was a noticeable improvement in quality, but Königswusterhausen was completely wiped out. However, Motala on one side and Radio Paris on the other were received at good loud-speaker strength without any background of Droitwich.

Twelve of the fifteen long wave stations came in according to plan on the tuning dials—that is the calibrations were accurate—but two of the long wavelength stations and

when were about six or seven degrees out. As the tuning dials are calibrated in degrees as well as in wavelengths, this does not matter very much.

Ideal for Average Home

An hour on the medium waves more than convinced me that this type of receiver is the ideal one for the average home constructor. There is no ganging to do, it didn't matter if the coils matched or if they didn't—actually they did.

It is sufficient for me to tell you that I received fifty-two stations, all loud enough to be of entertainment value, with several others that could be brought in if the reaction were pushed to its limit. It would take far too much space for me to tell you of all the stations that were tuned in, so instead I

will give you some idea of what the receiver did.

Below the London National station there were a dozen or so other stations all very close together. The only ones that I actually identified were Fécamp, Warsaw No. 2, Dublin, Trieste and Copenhagen. Then the London National station came along and wiped out two channels on either side, so the next powerful station heard was Naples.

Hearing Foreigners Without Interference

The West Regional programme was very loud indeed, but I was able to hear North National, Hilversum and Poste Parisien without interference. Between West Regional and London Regional there were seven stations at good strength and amongst these were Hambourg, Toulouse, Breslau and Brussels No. 2. Strasbourg was almost wiped out by London Regional, but Berlin came in at great strength, followed by Moscow No. 4, Milan, Scottish Regional, Leipzig, Toulouse and then Midland Regional.

Marseilles, Munich, Rome, Stockholm and Sottens were identified before I came to North Regional.

Prague Was A Colossal Signal!

Although the North Regional station was at good loud-speaker strength the programme from Cologne—just above—was free from interference. Prague was a colossal signal—in fact, most of the stations above 460 metres came in exceptionally well. I heard racing commentary from Athlone, a gipsy band from Budapest and several other programmes round about this wavelength.

Just as a matter of experiment I then tried the receiver on a standard 25-milliampere mains unit and put in a large pentode valve. There was a big increase in volume, while the quality, probably due to the combination of Ferranti low-frequency transformer, loud-speaker and plenty of high tension, was very good indeed.

This is assuredly the set for Constructor Crusaders!



Fitting the ebonite panel to the metal baseplate in an experimental model of the All-Britain Three. Note the use of single tuning condensers, which persist in the final model to be described next week

A 1935 SET FOR EVERYBODY MEETS UNIVERSAL REQUIREMENTS

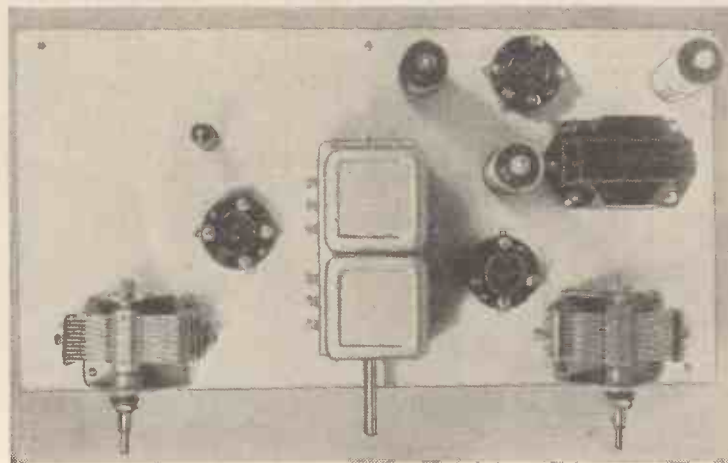
HERE are preliminary details of a new three-valve set that will meet the needs of all Britain. It has been designed by "Amateur Wireless" from ideas and suggestions made by Constructor Crusaders all over the country. Every feature has been given the closest deliberation and the result is a design that will become accepted by thousands as a standard for the new radio season.

One of the great points about this new set—which we have called the All-Britain Three—is that it lends itself in a remarkable way to individual adaptation by the constructor. There are few special "exclusive" parts in the circuit and it will be found that most standard gear can be used with complete success. Substitution of other parts for those actually recommended may, however, in some cases, add to the number of connecting leads and thus complicate the construction to some extent.

That it meets every need of the three-valve public is what we claim for the set, of which we shall publish full constructional details next week. It uses the minimum of parts—actually there are only twelve components to be fixed to the panel and baseplate—needed for satisfactory results; the layout is adaptable for the use of components of almost any type and make provided that they are of the correct electrical characteristics; and, within reasonable limits, almost any battery valves can be employed.

All Constructor Crusaders will get a full-size photographic blueprint of the set by first post on the morning of October 3; in addition to this we shall publish in "Amateur Wireless" complete details and many additional illustrations.

The collective efforts of Constructor Crusaders and the "Amateur Wireless" Technical Staff have resulted in a three-valve set with a universal appeal that should satisfy everybody's requirements for the 1934-5 radio season.



Looking down on the spartan simplicity of the metal baseplate layout of an experimental model of the All-Britain Three. A two-coil unit is tuned by separate tuning condensers, you see

Look Out Next Week for Full Constructional Details of the All-Britain Three—Built by

Set All Britain Talking!

SOME OF THE HIGH SPOTS

Design of Great Interest

● ● ● In the All-Britain Three you have all of the advantages of modern chassis construction with practically none of the disadvantages. A pleasing and efficient layout has been attained, but there is practically no sub-chassis wiring. The design will appeal alike to the old hand and to the beginner in radio.

● ● ● Two of the latest iron-core coils give adequate selectivity and sensitivity under almost all receiving conditions. Moreover, these coils are of the high-frequency transformer type, which saves high-frequency chokes and coupling condensers; this means extra efficiency and lower cost. It is no exaggeration to say that a set with two iron-core coils has the same order of selectivity as one with three old-type air-core tuners.

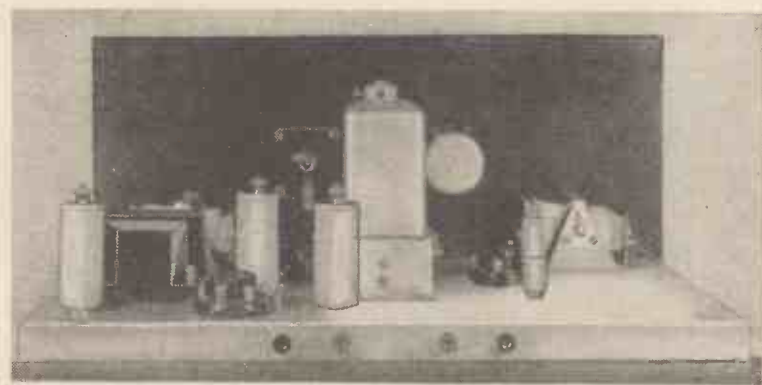
● ● ● The maximum efficiency is obtained from both tuned circuits by tuning them with separate condensers—a point that has been insisted on by nearly every Constructor Crusader who has written to us. Many amateurs will already have suitable condensers on hand, although they have no wavelength calibrations like those used in our original design.

● ● ● As the aerial coil is of the transformer type there is no need for a fiddling preset condenser in the aerial circuit to boost up selectivity at the expense of signal strength. Maximum amplification is obtained at every stage of the circuit.

● ● ● The high-frequency valve can be one of the new pentodes—but, without any alteration



Close-up of one end of an early model, showing how, even at that stage, wiring was kept ultra-short and eminently simple. It is no more complicated in the final model, we can assure you



How the experimental All-Britain Three looked from behind—until we made the final changes that have produced the set you will find described in detail next week. It's not very different from this!

to the circuit, you can use up an old standard screen-grid valve if you so desire and still get remarkable efficiency.

● ● ● Detection is by means of a standard triode valve; you need not buy a special new type for use in this set. A screen-grid or pentode detector would be slightly more efficient but the results are not sufficiently improved to justify the great extra cost.

● ● ● Transformer coupling is used between the detector and the output valve. The transformer can be of almost any type and almost any ratio; and if it is of good make the quality of reproduction will leave nothing to be desired.

● ● ● With the Readichex wiring system nobody will have any chance of omitting a connecting lead when wiring up the set. And on later occasions, when it is desired to make some alteration to the set, there will be no trouble about picking out the right wires if these useful little tags are used. And note that it is something of an achievement to produce a modern three-valver with as few as 43 connections, which is what we have accomplished with the All-Britain Three.

● ● ● Using the types of valves employed during our tests of the original AMATEUR WIRELESS design the anode current is of the order of 9 milliamperes for an output of 450 milliwatts.

● ● ● Pentodes are the most popular output valves and one is recommended for this receiver. But if you prefer the quality of a triode you can plug in a valve of the latter type without any alteration to the circuit at all.

● ● ● One of the most interesting features is the inclusion of automatic grid bias. There is no grid-bias battery and the bias automatically adjusts itself as the high-tension battery begins to run down; quality is thus always retained at a high level. This feature also reduces the number of battery leads and makes the whole set tidier and simpler.

● ● ● The metal chassis can be made at home for a shilling or two; in fact, a local ironmonger charged us only 2s. 3d. for the pieces which made our original.

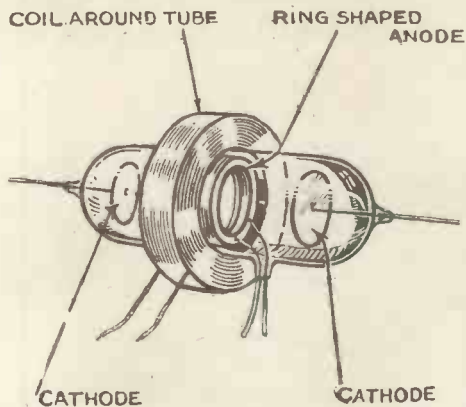
“Amateur Wireless” from Constructor Crusader Designs

This Valve has No Filament!

J. H. REYNER DESCRIBES A NEW COLD-CATHODE VALVE

THERE have been so many new valves during the past year or so that the introduction of a further new type may not seem anything remarkable. The fact is that development has been proceeding along more or less stereotyped lines and the new types introduced have been mainly improvements in technique or the assembly of two or more valves in the same bulb—not a very startling technical improvement, you will admit.

Sooner or later a really radical change is



Here is the tube without a filament—its place being taken by the two discs you see mounted at each end of the bulb. The anode is a flat ring-shaped piece of metal between these two cathode electrodes. Outside the whole tube must be fitted a high-frequency coil as indicated

bound to occur. A type of valve will be evolved essentially different from usual in structure, operation and performance.

The electron multiplier invented by Philo T. Farnsworth, of San Francisco, may well be this new departure. At any rate, it contains neither filament nor heater, and the anode is used merely to keep things going and does not enter into the amplifying circuits at all.

What is more, the tube has two cathodes. These are in the form of flat or slightly convex discs, and the anode is a ring-shaped electrode situated in between the two.

Around the outside is a coil which is supplied with current from a battery and produces a magnetic field inside the tube.

How the Valve Operates

The operation is as follows:

Assume that a few isolated electrons are emitted by one of the cathodes by photoelectric or other means. These electrons will be attracted to the anode and will proceed to shoot down the centre of the tube.

When they get near the anode they are unable to go on, because of the magnetic field produced by the coil around the tube. This prevents them from turning and keeps them moving in a straight line.

The electrons therefore have to continue down the centre of the tube, and they carry on until they reach the other cathode. They strike this with sufficient force to produce secondary emission, liberating four or five times as many electrons.

These new electrons start back down the tube in the opposite direction and exactly the same thing happens. They shoot through the anode and strike the other cathode, liberating still more electrons.

So the process goes on. The tube, in fact, generates an oscillation of rapidly increasing intensity, and it is necessary to insert protective resistances in the circuit to prevent the current from reaching too high a value.

Indeed, in some of the early tubes the current rose to such a high figure that the cathodes themselves melted!

The actual circuit used is shown herewith. With the simple theory just outlined the operation is somewhat uncertain because the electrons, having shot through the anode, are then subject to a retarding force.

The high-tension on the anode tries to pull them back again, and they may not reach the other cathode with sufficient velocity to produce any secondary emission.

To allow for this the two cathodes are connected across the terminals of a tuned circuit. The voltages developed across this circuit assist the action and ensure that the electrons strike the cathode with considerable force.

Now obviously the anode voltage will determine the speed at which the electrons shoot down the tube, so that for any given setting the electrons will take a certain definite time to travel from one cathode to the other.

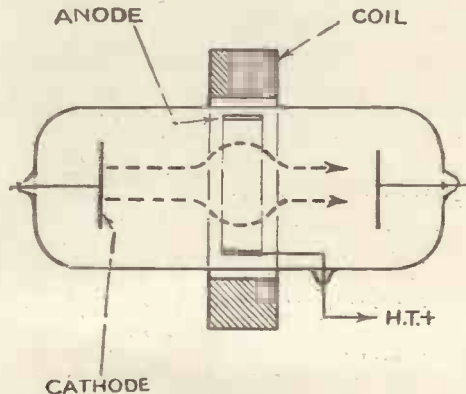
If we tune this time to the frequency of the tuned circuit the current obtained will be a maximum, and this is what is done in practice.

With the tubes at present constructed this frequency is rather high, being about 50 megacycles, although good operation is still possible if the tuned circuit is adjusted to a frequency which is some small sub-multiple of the tube frequency. Good results have been obtained, for example, at a frequency of 10 megacycles (30 metres).

Developed for Television

The tube was originally developed for television, where its applications seem very promising. A very feeble light focussed on to one of the cathodes (which has been suitably treated to produce photoelectric properties) will liberate enough electrons to start the train of oscillations, and in a minute fraction of a second the current will have built up to a value many thousand times greater.

If we assume only ten oscillations and suppose that each bombardment liberates five times as many electrons, the total magnification is nearly ten million!



When the electrons liberated by one of the cathodes tries to deviate to the central anode they are prevented from doing so by the magnetic field set up by the surrounding coil—and so they have to keep straight on to the other cathode disc

The application of the tube to ordinary radio telephony is not so clear as yet. It is significant, however, that the tube develops its maximum amplification at a particular frequency, so that it acts as tuner and amplifier combined. The falling off in the amplification is quite sharp as the frequency is varied and one can conceive an intermediate-frequency amplifier for a super-het consisting simply of one of these tubes.

Frequencies of 10 to 50 megacycles are, of course, much higher than the usual intermediate frequencies employed to-day, but with the general landslide towards shorter and shorter wavelengths it is quite impossible to say that such a frequency will not be usual in a few years' time.

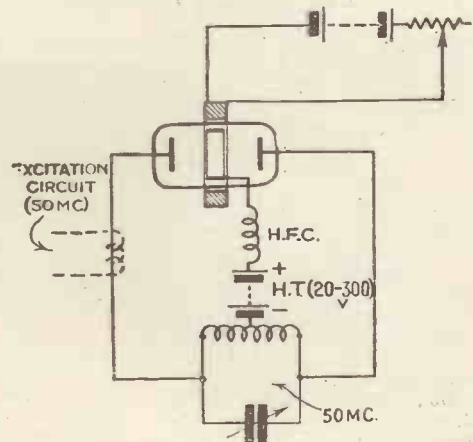
Much practical development remains to be accomplished. For one thing, the cathodes have to be made of a material which is susceptible to secondary emission. We don't know much about this—as yet.

All the efforts of the valve engineers hitherto have been directed to avoiding secondary emission like the plague.

Problem of Uniformity

A further problem is that of uniformity. As far as can be gathered there are three types of tube at the moment. In the first type the action will only take place if a small voltage, oscillating at 50 megacycles, is applied to the circuit the whole time as shown dotted in the circuit diagram.

With the second type a voltage of this type is necessary to start the action after which the tube carries on by itself quite happily.



Circuit arrangement for making use of the "cold-cathode" valve, which at the moment is only experimental. As our Technical Editor suggests, though, it may well be the beginning of a revolution in our valve technique in a few years' time

The third type needs no such external aid. If any electrons are liberated at all they build up into an oscillation of their own accord. All that is necessary is the tuned circuit across the cathodes.

This is the type on which Farnsworth and his assistants are concentrating, and although it may be some time before they attain sufficient success to commercialise the idea, there can be little doubt that widespread developments will result from this new discovery.

More Details of Our

Family Portable

Detailed constructional hints this week augment the article given on pages 303 to 305 of last week's issue. If you want a good straight four in portable form turn up the full specification. It is a battery set we can confidently recommend, being entirely self-contained and needing no outside aerial or earth.

NOW that you have had the opportunity of meeting the Family Portable and casting your eye over the main features a few more details about the constructional side will not be amiss.

No Chassis Snags

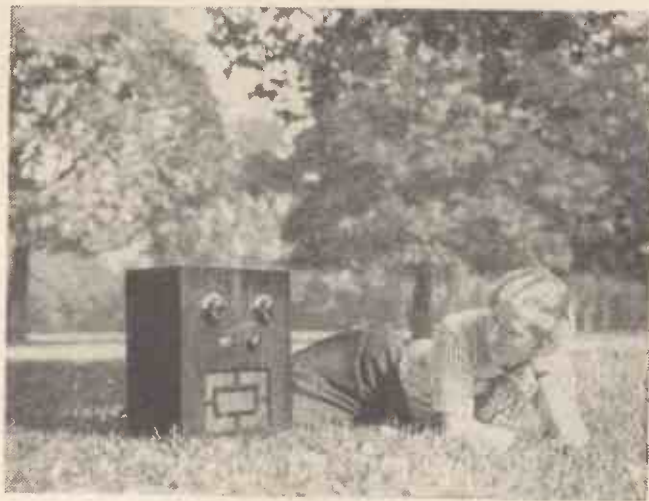
The chassis does not present any snags as the formation of this is quite straightforward and can be followed quite clearly from the instructions given on the blueprint. You will notice how robust this part is, the angle pieces making it rigid and free from those irritating wobbles during the wiring period.

There is one point in connection with the valve holders which may not be too clear,

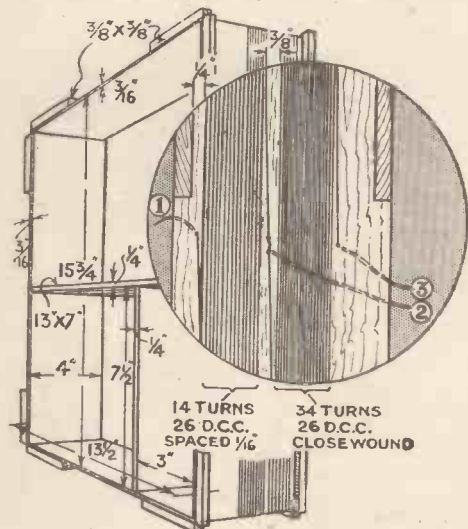
To make a nice circle when the serrations have been cut it is a good idea to bend the strip round something round such as a broom stick. When completed the screen simply fits into the hole already cut and it will be found that the valve will keep it firmly in position.

While on the top deck of the chassis, the small strip holding the frame aerial terminals calls for mention. Be sure and wire it as shown on the blueprint, as the leads from the frame are numbered to correspond.

Don't overlook the fact that it is essential that the heads of the shanks of these terminals must be properly countersunk, or else you will get some weird results through them shorting.



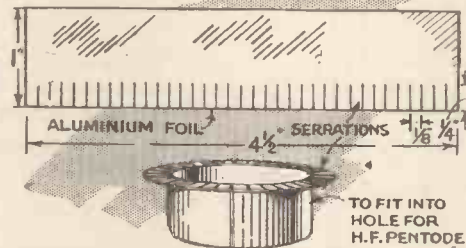
Still lazy days—even though it is the end of September. A fair member of our staff tests the Family Portable in halcyon surroundings—and looks as though she likes it!



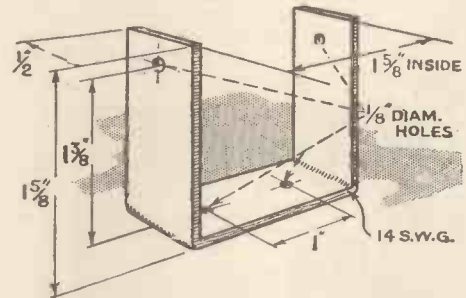
All the details you need to know about the windings for the medium and long-wave frame aerials are given in this drawing. Consult it when you connect up

and that is the extra screening for the high-frequency pentode. This is actually made from a small strip of aluminium foil 4 1/2 by 1 in. long.

One tip about this—don't use aluminium sheet, as you will no doubt find that it is too thick and will prevent the valve from fitting properly. The way to mark and measure out the foil is shown by the illustration.



This is the surround made of thin aluminium foil to give extra screening to the high-frequency pentode



This is the little bracket on which you have to mount the changeover switch for wave-band and on-off adjustments

Again, where a wire is shown as being connected to the baseboard do see that a good tight connection is made because a poor one will affect the efficiency.

Some of you may wonder how the switch is actually fixed as the bracket does not stand out too clearly in the photograph shown last week. It is quite easy and need not cause any worry.

Examine Switch Frame

If you examine the switch frame you will find on each side of the metal frame a small tapped hole. These will take a 6BA bolt, and it will be found that the bracket shown on this page will hold it quite firmly when the two are bolted together.

Now don't go and fix the bracket to the switch and then try to screw the bracket on the baseboard. You will only be annoyed, so please screw the bracket down first.

Now let us have a look at the frame aerial. The first tip here is, if you are going to make the frame and its parts spend a little extra time over it and make it a good sound job.

In the first place see that the wood you use is worthy of the job and that it is seasoned and dry. The actual winding is very straightforward as there are only two sections to think about.

No Worry With Reaction

The one which usually causes the trouble when winding these things, namely the reaction winding, is not needed as this is applied to the high-frequency coupling coil. Every detail is given in the illustration while the enlarged portion shows the method and positions of the two sections.

It is only the medium-wave winding which is spaced 1/16 of an inch between each turn, the long-wave part being wound turn to turn.

COMPONENTS AND ACCESSORIES NEEDED FOR THE FAMILY PORTABLE

CHASSIS

1—Peto Scott Metaplex 13 in. by 7 in. by 3 1/2 in.

CHOKE, HIGH FREQUENCY

1—Graham Farish, screened, type LMS.

COIL

1—Telsen, screened type W340.

CONDENSERS, FIXED

4—Dubilier type 670, values: .0001-, .0005-, .002-, .005-microfarad.

3—Dubilier type BB, values: 2-microfarad.

CONDENSERS, VARIABLE

2—J. B. .0005-microfarad type Popular Log with slow motion drive.

1—Graham Farish .0005-microfarad reaction.

HOLDER FUSE

1—Bulgin, type F5.

HOLDERS, VALVE

4—Clix type chassis mounting, 4-pin (2), 5-pin, 7-pin.

PLUGS, TERMINALS, ETC.

3—Clix wander plugs, marked HT-, H.T. +1, H.T. 2.

2—Clix spade terminals marked L.T.-, L.T. +.

RESISTANCES, FIXED

7—Graham Farish, type 1 1/2-watt values 100, 350, 15,000-, 25,000- (2), 50,000-, 500,000-ohm.

1—Graham Farish, 1-megohm grid leak.

SUNDRIES

1—ebonite strip 2 1/2 in. by 1/2 in. by 3/8 in. with three metal terminals.

3—British Radiogram 2 in. metal mounting brackets.

3 yd. thin flex.

Sleeving and wire for connecting.

6 in. screened sleeving.

5 oz. 26 D.C.C. wire for frame aerial.

2—1/2 in. 6 B.A. bolts and nuts.

2—2 1/2 in. 6 B.A. screwed rod and 8 nuts.

Aluminium foil, 4 1/2 in. by 1 in.
Aluminium strip, 14 gauge, 5 in. by 1/2 in.
1—Three-ply strip, 13 in. by 3 1/2 in.

SWITCH

1—Wearite 3-way, double throw, type 12.

TRANSFORMER, LOW FREQUENCY

1—Varley Niclet. Ratio 3 1/2-1

ACCESSORIES

BATTERIES

1—Lissen 120-volt high tension, type H3031.

1—Exide 2-volt accumulator type, WP0/7.

CABINET

1—Kebtex type BWD.

LOUD-SPEAKER

1—Grampion GC1.

VALVES

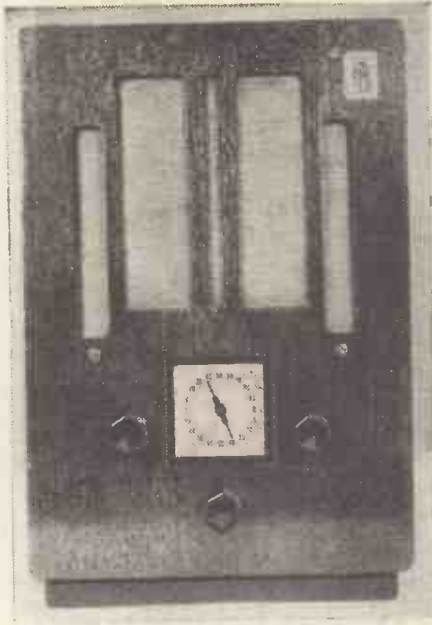
1—Hivac HP215.

2—Hivac D210.

1—Hivac Y220.

Kolster Brandes

New Battery PUP



A form of clock-face tuning is a feature of the new Pup, which is a great improvement on the set of the same name introduced two or three years ago

ALTHOUGH the name Pup is familiar, do not confuse the latest Kolster-Brandes receiver with the little set of the same name brought out two or three years ago. That set—a two-valver—was self-contained in a moulded cabinet with a balanced-armature loud-speaker.

Very Superior Instrument

The new Pup is a very superior instrument in a large oak upright table cabinet, with a new form of clock-face tuning. A moving-coil loud-speaker is fitted internally above the receiver chassis.

Three receiving valves are used, but there is not a high-frequency stage. The first valve is a leaky-grid triode detector, resistance-capacity coupled to another valve of a similar type. A second resistance-coupled stage links the first low-frequency amplifier to a small output pentode giving 200 milliwatts.

It may sound unusual to have a pentode in a straight three-valve set, but in this case as the pentode used handles a fairly large input, and the amplifier has been arranged to provide an output that will not overload the valve, then, of course, everything is satisfactory.

Four Aerial Tappings

The only trouble with sets of this kind—where there is no high-frequency stage to give selectivity—is that long aeriels make it rather a problem to cut out powerful transmitters. To overcome this difficulty as much as possible, four different aerial tappings have been provided. The receiver will be suitable, therefore, for use in all localities.

Tapping No. 1 should be used when the aerial is a long one, or you are close to the local station. A2 is for more general use with the average type of aerial, while A3 is better when an indoor aerial is used. In extreme cases where the receiver is at a distance from the station, or with a very poor aerial, the fourth tapping should be used, for this gives maximum volume but without a very good degree of selectivity.

You can see the tuning coil at the extreme right of the receiver when you are looking at the chassis from the back. Due to the way it has been designed, medium-wave break-

through on long waves has been overcome—a great step forward for a set of this type.

There are only three controls to worry about, and these are simple to operate. Even if you have not had any experience with tuning a radio set, it should not take more than a few minutes to grasp the proper way to obtain maximum volume and quality. In the centre beneath the tuning dial is the master switch. With this control the set can be turned on or off, or connected to medium or long waves as required.

On the right-hand side is the tuner, which causes a knife edge to travel around the clock-face dial. This dial is calibrated with figures between 0 and 90, as well as with station names. To the left of the dial is the reaction-cum-volume control. With it weak stations can be increased in strength, or the local powerful stations kept down to proper room strength.

The receiver is supplied complete with 120-volt combined high-tension and grid-bias battery and a 2-volt accumulator. These batteries can all be accommodated within the cabinet, and are inter-connected by means of multi-way cable, also supplied.

One does not expect super-quality from a small battery set, but with the new Pup reproduction is very clear and realistic. The frequency response is not exactly straight line, but when the anode current of the last valve is only $6\frac{1}{2}$ milliamperes you cannot expect that.

The loud-speaker is as large as those supplied with many of the more expensive receivers, so that Kolster-Brandes have done all they can to

keep quality up to a high standard without increasing either initial or the running costs.

As we have mentioned, the receiver has four aerial tappings in addition to the aerial being loosely coupled to the grid coil, so we expected a good degree of selectivity in spite of the fact that we were using an 80-ft. aerial only 20 miles from the local Regional.

Without Any Knob Twiddling

If the second tapping is used, the tuning is a trifle flat, but nine or ten stations can be tuned in at good loud-speaker strength without any knob twiddling. As this was not good enough we altered the aerial tapping to increase the selectivity. This decreased the volume slightly, but with a little more care between twenty or thirty stations were tuned in.

By adjusting the reaction and tuning and using the correct aerial tapping we could separate the local stations—the London Regional—and tuned in Brussels or the Midland Regional without any trace of interference.

The North Regional was brought in on the loud-speaker after dark, but during daylight the third tapping had to be used to bring the strength up to room level. The minimum wavelength was 200 metres, with a maximum

of 560 metres on medium waves, so Fécamp and the lower English relays are covered. On long waves it just goes down to 800 metres—Heston comes in with 3 or 4 degrees to spare, while the maximum wavelength is 2,000 metres.

With Droitwich in action, Radio Paris could be logged without interference, while with careful adjustment of the reaction, Eiffel Tower was also heard. Luxembourg and several other long-wave stations were received at good

strength, while on one evening Moscow was held for over half an hour.

If you are close to the local station you have to be careful as to the type of aerial you erect. Normally this receiver will bring in most of the alternative programmes that the majority of people are likely to want.

Daylight Range

The daylight range cannot be compared with a receiver having a high-frequency stage, but as seven or eight foreign stations are usually on tap, this is quite sufficient. The main feature is that the batteries will last a long while, and are cheap to replace when they do eventually run down. For £5 15s. the Pup receiver represents good value for money, and can be thoroughly recommended for those who depend on battery receivers.

It can be installed in a matter of a few minutes, for the receiver is supplied with a very complete handbook. This gives all the information you are ever likely to require about putting up an aerial and fixing the best earth

IN A NUTSHELL

Makers: Kolster Brandes, Ltd.

Model: K.B.362.

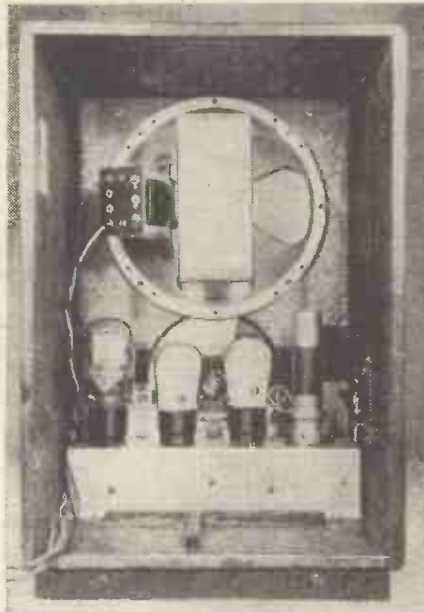
Price: £5 15s.

Valve Specification: Triode detector—leaky grid—(Cossor 210HF) which is resistance-coupled to a triode amplifier (Cossor 210HF). A second resistance stage couples this valve to a small output pentode (Cossor 220HPT).

Power Supply: Internal dry batteries and low-tension accumulator.

Type: Upright table model with internal loud-speaker — a moving-coil.

Remarks: This is an entirely new version of the popular Pup receiver—and can be thoroughly recommended.



Up-to-date chassis construction has been adopted for the new Pup, which is a straight three with pentode output

The
 "W.M."
 BATTERY
 STENODE

*The most selective
 battery set ever
 designed for the
 Home Constructor*

See full details in the
 OCTOBER

WIRELESS
 MAGAZINE

Now on Sale—Price 1/-

UNIQUE



Prices do not apply in I.F.S.

ONLY "ATLAS"

HAS THESE 6 OUTPUTS

THIS wonderful new "ATLAS" T10/30 is quite unique. It has no less than 6 TAPPED OUTPUTS. This ensures correct H.T. supply to any and every battery set—straight, super-het, class "B," and "Q.P.P." Not only is it the ideal mains unit for your present set, but it is also the ideal unit for every set you may buy or construct in the future. In addition to H.T. supply, it embodies a trickle-charger to keep your accumulator always fully charged.

FOR A.C. MAINS

H.T. Tappings: 60/80 v. (min. and max.), 50/90 v. (min., med., and max.), 120 v., and 150 v. Tapped Outputs: 10, 20, or 30 m/A at 120 or 150 v. Trickle Charger: 2 v. at 0.5 amps. Westinghouse Rectifiers.

Guaranteed 12 months.

H.P. Terms.—10/- deposit and 8 monthly payments of 8/6 each.

Ask your dealer to-day for a demonstration.

Other models from 39/6 cash or 10/- deposit.



H. CLARKE & CO. (M/CR), LTD., Patricroft, Manchester.
 London: Bush House, W.C.2. Glasgow: G.E.S. Co., Ltd., 38 Oswald Street.
 I.F.S. Distributors: R. Marks, Ltd., 27 Upper Liffey Street, Dublin.

© 17

POST THIS COUPON NOW

Messrs. H. CLARKE & CO. (M/CR), LTD., Patricroft, Manchester.
 Please send me FREE copy of Folder 95 telling me how to run my battery set from the mains.

NAME

ADDRESS

29/17

Erect this Efficient Indoor Aerial

By L. O. SPARKS

In so many houses where it is impossible to erect an outside aerial very little care seems to be taken to make the indoor arrangement neat and yet efficient. An idea which is prevalent is that if a length of wire, the longer the better, is hung around the house from the easiest points of suspension, all will be well.

Admittedly we live in the days of super-sensitive receivers, efficient portables and mains aerials. But that is no reason why we should not provide a reasonable input to our set if its design calls for the use of an aerial. Especially if we are interested in the quality of reproduction and the selection of our stations.

To prevent any wire being seen, quite a number of people tuck the alleged aerial well down in the picture rail. The only good point about this method is that it is neat. But the owner should not blame his set if the remote stations seem very weak.

Through jamming the wire so close to the wall a pronounced damping effect is set up, which decreases the efficiency of the aerial circuit. On a weak signal this will necessitate the reaction or volume control being turned up, with consequent increase in background noises.

If Load is Too Small

A sensitive receiver requires a certain load across its aerial circuit. If this is too small it is quite possible that the circuit will become unstable and very touchy to handle.

The advantages of the arrangement shown herewith are (a) it is very simple to fix, (b) it is practically invisible, and (c) its efficiency is high. The only material required is sufficient No. 28 S.W.G. double-cotton covered wire to reach round three sides of the room in which the aerial is to be fitted; plus two or three yards for the lead down to the receiver and one yard of fine white silk elastic cord and four stout drawing pins.

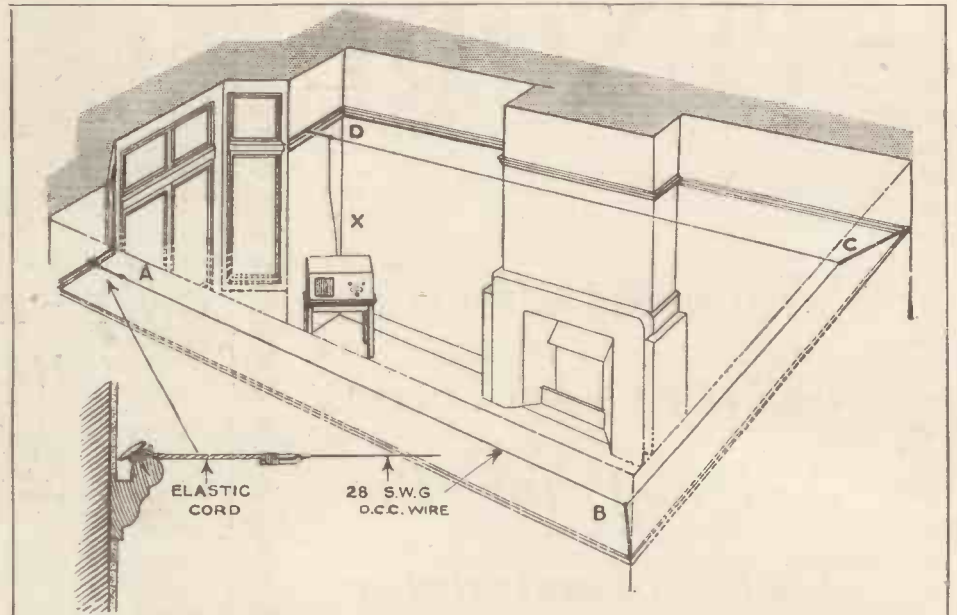
The elastic should be cut into four equal pieces, a small knot being tied in the ends of each length. One piece is fastened by means of a simple knot, through which a drawing pin is passed to the inner edge of the picture rail about 12 in. from the corner position, A.

repeat these operations at c and d. Now go over the aerial again, this time adjusting the length of wire in each section so that it is kept taut by the elastic and forms the shape shown A, B, C, and D being the elastic cords.

The points c and d will have to be adjusted to allow the wire to clear the flue projection.

When the wire is securely anchored at D, don't make the mistake of cutting the end off. It has to come down to the set.

The advantage of this method will be lost if care is not paid to keeping the aerial really tight and all joints neatly made. The writer has often noticed his friends gazing round the room trying to locate the aerial—as the thin white wire renders it practically invisible against the freeze and ceiling.



How you can put up an almost invisible indoor aerial wire is fully shown by this diagram of a typical arrangement, using No. 28 gauge wire. Your friends will wonder where the aerial is!

Broadcast Wavelengths

This week we give details of the principal short-wavers and the European long-wave stations. Next week we shall publish a list of medium-wave transmitters

Principal Short-wavers

Metres	Kilo-cycles	Station and call sign	Country
11.67	25,700	New Brunswick, N.J. (W2XBC)	United States
13.93	21,540	Pittsburgh (W8XX)	United States
13.97	21,470	Davenport (GSH)	Great Britain
14.00	21,420	Deal, N.J. (W2XDJ)	United States
14.19	21,160	Buenos Aires (LSL)	Argent. Republic
14.28	21,000	Podybrady (OKO)	Czechoslovakia
14.47	20,730	Buenos Aires (LSY)	Argent. Republic
14.72	20,380	Rugby (GAA)	Great Britain
15.25	19,540	Rome (IRW)	Italy
15.78	18,900	Prangins (HBF)	Switzerland
16.86	17,790	Davenport (GSG)	Great Britain
16.87	17,780	Bound Brook (W3XAL)	United States
16.88	17,770	Eindhoven (PHI)	Holland
16.89	17,760	Zeesen (DJE)	Germany
19.47	15,410	Riobamba (PRADO)	Ecuador
19.56	15,340	Schenectady (W2XAD)	United States
19.64	15,270	Wayne (N.J.) (W2 & E)	United States
19.67	15,250	Boston (W1XAL)	United States
19.68	15,243	Paris (Colonial) (FYA)	France
19.72	15,210	East Pittsburgh (W8XX)	United States
19.73	15,200	Zeesen (DJB)	Germany
19.82	15,140	Davenport (GSF)	Great Britain
19.84	15,122	Vatican (HVJ)	Italy
23.39	12,825	Rabat (CNR)	Morocco

Metres	Kilo-cycles	Station and Call Sign	Country
24.83	12,082	Lisbon (CTICT)	Portugal
25.00	12,000	Moscow (RNE)	U.S.S.R.
25.25	11,880	Paris (FYA)	France
25.27	11,870	E. Pittsburgh (W8XX)	United States
25.29	11,850	Davenport (GSE)	Great Britain
25.40	11,810	Rome (RO)	Italy
25.45	11,790	Boston (W1XAL)	United States
25.51	11,740	Zeesen (DJD)	Germany
25.53	11,750	Davenport (GSD)	Great Britain
25.63	11,705	Paris (Colonial)	France
28.98	10,350	Monte Grande (LSX)	Argent. Republic
29.04	10,330	Ruyssedele (ORK)	Belgium
30.43	9,860	Madrid (EAO)	Spain
31.25	9,600	Lisbon (CTIAA)	Portugal
31.28	9,590	Philadelphia (W3XAU)	United States
31.28	9,590	Sydney (VK2ME)	New South Wales
31.3	9,585	Davenport (GSC)	Great Britain
31.35	9,570	Boston (W1XAZ)	United States
31.36	9,565	Bombay (VJB)	India
31.38	9,560	Zeesen (DJA)	Germany
31.45	9,540	Jeloy (LKJ)	Norway
31.48	9,530	Schenectady (W2XAF)	United States
31.51	9,520	Rabat (CNR)	Denmark
31.55	9,510	Davenport (GSB)	Great Britain
36.65	8,186	Caracas (YV3BC)	Venezuela
37.33	8,035	Rio de Janeiro (PRA3)	Brazil
38.48	7,797	Rabat (CNR)	Morocco
43.86	6,840	Radio Nations (HBP)	Switzerland
45.38	6,610	Budapest (HAT2)	Hungary
46.53	6,447	Moscow (W72)	U.S.S.R.
46.69	6,425	Barranquilla (HJABB)	Colombia
48.86	6,140	Bound Brook (W3XL)	United States
49.02	6,120	Pittsburgh (W8XX)	United States
49.08	6,112	Wayne (W2XE)	United States
49.18	6,110	Caracas (YVIB)	Venezuela
49.18	6,110	Chicago (W9XF)	United States
49.22	6,095	Bound Brook (W3XAL)	United States
49.25	6,065	Bowmanville (VE9GW)	Canada
49.48	6,060	Nairobi (VO7LO)	Kenya Colony
		Byberry (W3XAU)	United States

Metres	Kilo-cycles	Station and Call Sign	Country
49.48	6,060	Mason (W8XAL)	United States
49.5	6,060	Skamlebaek (OXY)	Denmark
49.59	6,050	Davenport (GSA)	Great Britain
49.67	6,040	Boston (W1XAL)	United States
49.83	6,020	Zeesen (DJC)	Germany
49.92	6,010	Havana (COC)	Cuba
49.96	6,005	Montreal (VE9DR)	Canada
50.0	6,000	Moscow (RNE)	U.S.S.R.
50.26	5,969	Vatican (HVJ)	Italy

Long-wave Stations

Metres	Kilo-cycles	Station and Call Sign	Country	Power (K.w.)
1,107	271	Moscow (RCZ)	U.S.S.R.	100
1,144.2	262.2	Madona	Latvia	20
1,181	254	Oslo	Norway	60
1,209.6	248	Scheveningen Haven	Holland	5
1,224	245	Leningrad	U.S.S.R.	100
1,250	240	Vienna (Exp)	Austria	3
1,263	237.5	Kalundborg	Denmark	63
1,293	232	Kharkov	U.S.S.R.	35
1,304	230	Radio Luxembourg	Grand Duchy	100
1,312.9	229	Ankara	Turkey	7
1,339	224	Warsaw	Poland	120
1,388.9	216	Motala	Sweden	30
1,395	215	Eiffel Tower (Paris)	France	8
1,442	208	Reykjavik	Iceland	14
1,442	208	Minsk	U.S.S.R.	35
1,500	200	Davenport National	Great Britain	30
1,500	200	National-Droitwich	Great Britain	150
1,571	191	Deutschlandsender	Germany	60
1,612	186	Istanbul	Turkey	5
1,648.3	182	Radio Paris	France	80
1,724.1	174	Moscow (I)	U.S.S.R.	500
1,807.2	166	Lahti	Finland	40
1,875	160	Hilversum	Holland	50
1,875	160	Brasov	Roumania	20
1,935	155	Kaunas	Lithuania	7

Leaves from a Short-wave Log

By J. Godchaux Abrahams

CONDITIONS might have been worse this last week, although, as you no doubt observed, atmospherics on nights preceding storms were pretty hefty and badly swamped the 40-50 metre band. On other days, listening was more encouraging and most of the Europeans provided good signals.

There seems to be some mystery in connection with the Rio de Janeiro transmissions. So far, PRA₃ broadcasts by the Radio Club of Brazil have been carried out through PSK, Marapicu, but recently this call has been picked up, not on 36.65 metres as hitherto, but on 48.95 metres.

Only a Test?

There is a possibility that the broadcast on the higher wave-length is only a test. A correspondent informs me that he has also heard Rio on 31.35 metres; I suggest this was PRBA, Sao Paulo, through PSA on 31.58 metres.

From late advices other South Americans are also effecting changes in their frequencies. El Prado, Riobamba, in addition to its transmissions on 45.31 metres, also intends to put out a programme on Sundays between B.S.T. 2200 and 2330 on 19.45 metre. HCJB, Quito, usually logged on 73 metres, proposes to work on 365 metres. With the exception of Tuesday, which is a day of rest, it will be on the air on weekdays between B.S.T. 0030 and 0400, and on Sundays between 0030 and 0330 (Mon.). HC₂RL, Guayaquil, on 45.02 metres now broadcasts on Sundays from B.S.T. 2345 to 0145, and on Fridays between 0315 and 0515.

Hilversum Wavelength Change

I am informed that from October 7, PHI, Hilversum, will revert to the 25.57 metre channel. Until November 18 the broadcasts will start at G.M.T. 1330; after that date thirty minutes earlier.

You may recall that in the lists of broadcasting stations published in the early days we always found OAX, Lima, Peru, although I cannot recall anybody hearing even its call.

Possibly now we may meet with more luck, as a new short-wave transmitter, OA₄AC, on 38.36 metres (7,820 kcs.), has now come on the air and relays the OAX medium-wave station. The time to tune in is towards B.S.T. 0215.

English and Spanish Announcements

All announcements are made in both Spanish and English as some of the programmes are destined to the U.S.A. As a closing signal, the studio gives out its call sign in morse.

OER₂, Vienna, although advertising 49.4 metres, would appear to be operating on a lower frequency, as the broadcasts come in somewhat above those of Skamleback.

If you can pick up HVJ, Vatican, Rome, it might be worth your while to keep in touch with this station on October 14, when Pope Pius XI will give an address to the Eucharistic Congress, then sitting in Buenos Aires. Successful tests have already been made.

Some months ago we were told that Iceland contemplated erecting a short-wave station; apparently its construction is well on the way,



To the Seer the Crystal is all-revealing!

With the aid of a Pifco A.C. and D.C. RADIOMETER you now have the power of tracing faults in any radio, A.C. or D.C.—power akin to the magic of a crystal-gazer.

What does this "magical" power cost? You will agree, surely, that it would be cheap at five times 12/6d.—yet that is the amazingly low price of this solidly constructed Pifco "All-in-One" RADIOMETER. It is made, adjusted and tested by highly skilled British instrument makers and neatly finished in a bakelite case.

Néver before has such value been obtainable anywhere. Organized production on a large scale has enabled Pifco to provide you with this wonder instrument at such a low price.

Ask your dealer to show you one now or write for fuller details to PIFCO, LTD., SHUDEHILL, MANCHESTER, or 150 Charing Cross Road, London, W.C.2.

12/6

AVOID and REFUSE SUBSTITUTES



THE "ALL-IN-ONE" RADIOMETER FOR A.C. OR D.C.

For testing electric or battery radio sets. Anybody, however inexperienced, can trace faults with this wonder instrument. Size of dial, 1 1/2 in. by 3/4 in. Complete with leads.

PIFCO
'All-in-One' RADIOMETER A.C. AND D.C.
PIFCO ON THE SPOT WILL TRACE YOUR TROUBLES LIKE A SHOT

as it is expected that the first official transmission will be made towards the end of next month. Through this channel we may be given a better opportunity of hearing the Reykjavik programmes.

North-African Station

A North African station which is seldom mentioned nowadays, but which is still going strong, is CNR, Rabat, which relays Radio Maroc every Sunday on 23.38 metres from B.S.T. 1300 to 1400 and on 37.33 metres from 2030 to 2300.

A paragraph recently published in a wireless journal led us to believe that the small radio transmitter on the Monte Rosa (Switzerland) was the highest installation of that kind in the world. This, however, is not a fact.

CP₄ and CP₅, La Paz (Bolivia), hold the record as, although erected at the foot of the Andes, they are 4,089 metres (roughly 14,000 feet) above sea level.

International Short-wave Club

To the Editor, AMATEUR WIRELESS.

THANK you for your letter of August 31 and for printing that note about the "Q-code cards" we were issuing. The demand for these was very great and it just shows what interest is taken in your publication.

We welcome any of your readers to join this world-wide organisation. Membership costs 4s. 6d. per year, and begins from the month of joining and includes the club's monthly publication, "International Short-Wave Radio."

The London Chapter of the I.S.W.C. meets every Friday, except the second Friday of the month, at the R.A.S.C. Hall, Cavendish Grove, Wandsworth Road, S.W.8, at 8 p.m.

A. E. BEAR.

10, St. Mary's Place, Rotherhithe, S.E.16.

Criticisms by WHITAKER-WILSON

My Broadcasting Diary

WE shall all suffer from the *orchestrococcus* germ if we are given so much orchestral music. The Proms are for those who like orchestras. The alternative programme is for those who do not. When the alternative programmes are full of orchestras, how do we do then?

one of the feeblest items I have ever heard. Merely silly.

I felt disinclined to be "not amused" and switched into the Brahms Prom to hear Isolde Menges and May Mukle play the concerto for violin, cello, and orchestra. Never having liked the concerto one little bit, I did this out of duty to them. Beautiful playing of what is, to me, a dull work.

Altogether I was feeling rather depressed when I went back to the other programme for Charles Brewer's *On the Dotted Line*. I looked at all the signatures in the cast and felt I could have cheerfully signed the death warrant of anybody that had anything to do with broadcasting.

They were all so good that I had a hope after all. I have noticed before that Charles Brewer does not permit people who have nothing to say to come and say it in his shows. There is no doubt about it, a producer must be ruthless where comedians are concerned.

Davy Burnaby made an excellent compère. He is suited to that sort of thing and has the advantage of being popular with his fellow artists.

Sunday



Martyn Webster

THELMA TUSON is a singer eminently suited to broadcasting. I have often thought so. I thought again to-night. I don't know who accompanied her—she sang in a Sandler programme from Park Lane—but the accompaniments were poor in the sense that there was no unity, but otherwise quite admirable.

Ben Davies—that youngster of seventy-six—sang extraordinarily well to-night. He made his debut in 1881, which is looking back a bit. I liked him better in songs than in the Handel aria. Latter too strenuous for him now.

Thursday

AN hour for Eddie Pola's "America Calling" seemed to me to be too long. On the other hand, like the "Café Colette" shows, it was the sort of thing one could switch on for five or ten minutes. It certainly required no listening.

The only question in my mind with these shows is their inclination to become rackets. Everybody shouts so much. And shouting is the worst thing you can do before a microphone. Therefore it is not good in the broadcasting sense.

Friday



Walford ("Café Colette") Hayden

ONE of the orchestral nights. From seven to eight the Northern Studio Orchestra followed by the Beethoven Prom. Rather hard on the studio orchestra, but perhaps we are not supposed to compare one orchestra with another.

I should like to say, though, that the Northern Studio Orchestra is amongst the best of the routine bands.

Solomon played beautifully. They gave him a better piano. I know which it is without being there to see. Not fair to Moiseivitsch by comparison.

In the middle of the Prom the other wavelength produced a concert by the C Orchestra which went on until 10.30. On the same side as the Prom, and after it, was the third of the "Our Bill" broadcasts by Frederick Grisewood which I am sorry to say I accidentally missed. There is to be a fourth which I shall certainly hear.



Charles Brewer

GRETA KELLER a success. I liked her songs, but suggest she never broadcasts without singing one song in German. There must be some lovely light German songs and they will be new to us.

Monday

CAFÉ COLETTE in Continental dance music turned out to be rather rackets. The compère was not always funny. When he wasn't, it seemed as though he had interfered with something he might have left alone.

There is danger with this sort of show—always the danger that somebody will be silly instead of funny. The show is otherwise so good that I make these remarks hoping the standard will be jealously guarded.

The Omar Khayyam broadcast was certainly imaginative. I felt I wanted more poetry and less talk. I admired the production and the cast.

So many good voices: Robert Speaight, Leon Quartermaine, Clinton Baddeley, Abraham Sofaer, Lillian Harrison, Percy Rhodes, and Patric Curwen. A cast with such voices provides an entertainment whatever they may do.

Tuesday

MOISEIVITSCH excited the Promsters into a roar with the Tchaikovsky piano concerto. His rendering is a sort of standard. I wish the B.B.C. would take more care which piano they use. The pianos at Queen's Hall are a disgrace. That particular one would spoil any broadcast.

Wednesday

TWO shows to-night—one very bad and the other very good. Martyn Webster's Radioptimists ought to have been called the Radiopessimists. At all events they made me so pessimistic that I felt nobody would ever say anything funny again. How they reconciled their title with the sordid melodrama they gave in the middle of the show beats me.

The bridge scene had possibilities about it. In fact real opportunities, but unfortunately they were all missed. The Post Office scene, where the young ladies were all refanned, was

"Eclipse" 4S TOOL
for
SLOTING SAWING SCRAPING SLITTING FILING ETC.

Invaluable for 101 JOBS IN ENGINEERING ELECTRICAL GARAGE and GENERAL MAINTENANCE WORK

Complete Outfit 16 Tools with Patented Holder in 6" x 1 1/2" x 1 1/2" Metal Case **5/-**

Obtainable from all Tool Dealers
Made by the Manufacturers of
ECLIPSE HACK SAW BLADES & FRAMES
JAMES NEILL & CO. (Sheffield) LTD., SHEFFIELD 11
E456

ENGINEERS! LOOK WHAT YOU HAVE AT YOUR FINGER TIPS!

Do not let a first-class post slip through your fingers for the sake of a few letters after your name. Whatever your experience, age, or education, you should send to-day for "ENGINEERING OPPORTUNITIES." This free 256-page Handbook shows the easiest way of preparing for the A.M.I.C.E., A.M.I.Mech.E., A.M.I.E.E., A.M.I.A.E., Matric, G.P.O., etc., exams. The book also gives details of all branches of Civil, Mech., Elec., Motor, Aero., Wireless, and "Talkie" Engineering, and explains the unique advantages of our Appointments Department. Send for the valuable Handbook to-day—FREE, and post free. **BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY, 409 Shakespeare House, 29/31 Oxford Street, London, W.1.**

H.T. THAT SAVES POUNDS

Why not end H.T. problems for good with a Standard Wet Battery? Smooth, abundant H.T. year in, year out at half cost of dry H.T. Cheap, annual replenishment. Saves pounds. 120v. 12,500 m.a. £2, carr. paid. All Standard H.T. Spares supplied. Lists Free.

WET H.T. BATTERY CO. 28 LISLE STREET LONDON, W.C.2

Postcard Radio Literature

Here "Observer" reviews the latest booklets and folders issued by well-known manufacturers. If you want copies of any or all of them FREE OF CHARGE, just send a postcard giving the index numbers of the catalogues required (shown at the end of each paragraph) to "Postcard Radio Literature," AMATEUR WIRELESS, 58/61 Fetter Lane, E.C.4. "Observer" will see that you get all the literature you desire. Please write your name and address in block letters.

A Matter of Connection

TO those who value good connections the latest folder issued by Clix should prove most useful. It contains full details of their numerous products, which when used not only give "finish" to a receiver but prevent many snags from cropping up through faulty contacts. **188**

Cossor Wireless Book

A FORTY-PAGE booklet simply packed with useful information for the home constructor. All their valves are described in great detail, so no one should experience any difficulty in selecting the right one for any part of a circuit. On page 9 a very neat table of resistance values for decoupling and voltage dropping is given. This alone will save many minutes of calculations and remove all doubt regarding the type of resistance required. Several methods of high-frequency coupling are shown and explained, while A.V.C., the superheterodyne, radio definitions and a tuning chart for all wavelengths help to form interesting reading in this most useful little booklet. **189**

Lissen Components

THE latest Lissen folder is now to hand and contains details of all their components and accessories from gramophone needles to valves, high- and low-tension batteries, moving-coil and balanced-armature speakers, numerous types of coils, chokes and pick-ups are included in this comprehensive list. **190**

Dubilier Condensers

ANTI-INTERFERENCE devices are included and explained in the new Dubilier catalogue together with their motor radio suppressors. The major portion is, of course, devoted to their fixed condenser products, of which there is a wide selection both in price and type. The metallised resistances are dealt with and a handy little colour code is provided. This applies to all resistances coloured according to the international standard colour code. It is interesting to note that wire-wound power resistances are also mentioned. These are capable of standing a continuous dissipation of 10 watts and are available in a range of values from 200 to 50,000. **191**

Ever Ready Batteries

FOUR new leaflets have just been issued by the makers of the Ever Ready batteries and accumulators. These deal with all types of high-tension, low-tension and grid-bias batteries and a point worthy of note is that all details are given. Size, weight, number of cells, tappings and, in many cases, the current discharge capacity. One list shows the right type and size of battery to suit the various makes of receivers. **192**

Sound Sales, Ltd.

FOR those interested in mains equipment the Sound Sales leaflet provides full details

Exclusively Specified for the AC/DC Straight AVC4 for its sensitivity and superb quality



Stentorian Senior (PMS1), 42/-.
100 per cent. dust protection oversize cone.
Stentorian Standard (PMS2), 32/6.
Stentorian Baby (PMS6), 22/6.
Write for the new W.B. Stentorian leaflet.

"We are making a big song about the quality of reproduction from this set," says "Amateur Wireless." It is significant that a W.B. "Stentorian" speaker is exclusively specified.

Previously, Mr. A. K. Jowers, "Amateur Wireless" technician, had said about the "Stentorian," "A definite advance. These units are considerably better than the average loud-speaker."

You must hear the difference a W.B. "Stentorian" will make to your set. Its revolutionary magnet (of an exclusive new alloy) will bring greatly increased volume and a wider frequency response. Its new "Whiteley" speech coil will bring crisper attack and a new vivid realism which will astound you.

Ask your dealer for a demonstration to-day.

STENTORIAN

Whiteley Electrical Radio Co., Ltd. (Dept. A), Radio Works, Mansfield, Notts.

Sole Agents in Scotland: Radiovision, Ltd., 233 St. Vincent Street, Glasgow, C.2.
Sole Agents in I.F.S.: Kelly & Shiel, Ltd., 47 Fleet Street, Dublin.

of all their products, namely mains transformers, smoothing chokes and fixed condensers. Their permanent-magnet and energised moving-coil speakers are mentioned together with the special output transformers which they are now producing. Another leaflet is issued dealing with all matters relating to class-B amplification. **193**

Celestion Loud-speakers

WHEN big men fiddled... is the title of an interesting booklet which contains a résumé on the development of the loud-speaker since the days of cat-whiskers. This is issued by the makers of Celestion Speakers with the folder which gives full details of all their latest products. Models ranging in price from 17s. 6d., for the energised "Midgets" to £18 18s. for the large and powerful "Audiatorium" are now available. All the speakers are finished in cellulose in an attractive shade

of brown and fitted with a universal input transformer. **194**

Brown "A" Headphones

FOR those who wish to get hold of a highly efficient pair of headphones, Messrs. National Radio Services can supply the famous Brown "A" Type. These not only have adjustable headbands but the magnetic system can be varied to obtain the most satisfactory response and render them highly sensitive. The construction of the units leaves nothing to be desired—in fact one thinks of a miniature loud-speaker when the details are examined and the powerful reproduction heard. These headphones are used extensively, we understand, by H.M. Forces, which speaks well for their efficiency and reliability. For short-wave fans they are ideal owing to their sensitivity to weak signals. The price is 52s. 6d. a pair and they are well worth it. **195**

With the Continental Stations

New CLIX

AERIAL EARTH MASTER PLUG



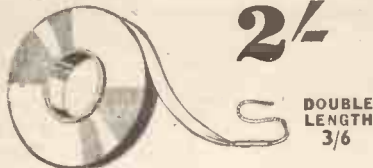
With this New Clix "A.E." Master Plug—the only really universal plug—you can carry the heavy lead-in wires straight to your set, without breaks or joins. The Clix plug takes any wire up to three-sixteenths inch overall, and the Clix method of wiring ensures perfect contact. Price 3d. each.

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

PIX

INVISIBLE AERIAL

AN INSIDE AERIAL THAT'S AS GOOD AS AN OUTSIDE AERIAL—



PRESS IT AND IT STICKS ANYWHERE

A highly efficient self-adhesive strip Aerial that gives a wonderful pick-up clear of interference. Fixed in a jiffy without tools. Press it anywhere you want to run it and it sticks. Lightning proof, neat, efficient, just the thing for a modern home.

Obtainable anywhere:

BRITISH PIX CO., LTD., LONDON, S.E.1
THE BEST AERIAL FOR FLATS

Heterodynes Are Increasing Above 1,000 Metres

SAYS JAY COOTE

ALTHOUGH improvement may be observed in the reception of medium-wave transmissions, I am sorry to say that listening to broadcasts on channels above 1,000 metres has been not an unmixed blessing.

You will find in this portion of the band a number of heterodynes which appear to be increasing nightly. Tune-in Kootwijk and Brasov—the latter can be heard during intervals in the Dutch programme—Radio Luxembourg and Warsaw, Eiffel Tower and Motala, and note now in almost every instance the transmissions are spoilt. There is no doubt that until Eiffel Tower is relegated to the lower band we cannot look forward to any amelioration.

Poland On 500 Kilowatts?

The trouble on the band is likely to increase if a report from Poland is to be believed—the authorities intend to increase the power of Warsaw to 500 kilowatts to counteract the effect of the Moscow No. 1 broadcasts.

As a matter of fact, we may see considerable changes in the Polish network which may pass over to the Ministry of Posts and Telegraphs. If this takes place, Cracow will be given a 120-kilowatt transmitter.

Bulgaria, I learn, also has ambitions and is contemplating the installation of a powerful station at Sofia with smaller relays at Varna and Plovdiv (in pre-War days Philippopolis).

In view of the Macedonian question, Greece is anxious that all broadcasts from her neighbour should be directed towards the East, but, as the Lucerne Plan was not accepted by Bulgaria, this condition is not likely to be fulfilled. It may prove an added impetus to Greece to hurry on the building of a broadcasting system.

Should You Squelch?

Continued from page 329

another resistance and condenser! The former (R_3) is obviously necessary. Without it, the current would flow along this wire through the condenser C_3 , which we have already shown offers but little resistance, and short-circuit R_4 straight to earth. So that R_3 must be of high resistance.

As the squelch grid connects to the same resistance line as the A.V.C. line, it will become increasingly negative as the signal becomes stronger.

When this happens its anode current through R_7 is reduced practically to nothing, causing a negligible voltage drop across this resistance. Then the normal low-frequency bias is resumed and the signal passes through to the loud-speaker.

Let Us Follow a Signal!

Just to make the matter quite clear, let us follow a signal in from the aerial. After high-frequency amplification, the signal comes to the diode detector and by flowing down the resistances R_3 and R_4 increases the high-frequency bias so that a certain strength shall not be exceeded.

It travels now as a low-frequency signal through C_4 to the grid of the low-frequency valve. This valve is badly over-biased in a negative direction so that the signal cannot pass through at the moment. At the same

The withdrawal of Madonna (Latvia) from the upper band and its removal to 271.7 metres (the Naples channel) appears to have escaped notice. But the position had been allotted to Kuldiga, a new Latvian station which will be working shortly.

P.T.T. Grenoble has closed down temporarily as alterations are to be made to its aerial; by the time you read these notes it may again be on the air, but on a different wavelength, as it is dissatisfied with 309.9 metres.

Beromünster, which has been out of action pending its reconstruction to make it a 100-kilowatt, will resume operations within about a fortnight. In the meantime the Basle, Zurich, and Berne studio broadcasts are being transmitted through Söttens, in addition to its relays of Geneva, Lausanne, and Lugano.

Tax On Dutch Listeners

Up to the present, listeners in Holland have not been asked to pay any listening tax; the transmitters were financed by voluntary contributions paid to associations and clubs operating the two stations. The matter however, is now being discussed in the Dutch Parliament, and there is every likelihood that owners of wireless sets in that country may be taxed in the near future. Possibly, possessors of crystal sets may get off scot-free.

Bear in mind that the countries which have adopted Summer Time—namely, Great Britain, Irish Free State, Belgium, France, Portugal, and Holland—will all revert to Winter Time on October 7. Make a note also that on September 30 the Dutch studios exchange wavelengths for the next three months.

time, however, the squelch grid bias has also become more negative in the same way as the high-frequency grid.

This means that the current flowing through the squelch anode circuit is cut off so that the excessive negative bias to the low-frequency valve is removed.

This allows the signal coming through via C_4 to be amplified in the approved manner. Care must be taken that the values of the resistances are chosen so that the squelch action is not too heavy or all stations except the most powerful ones will be lost.

As a rule the squelch tapping is made variable so that the extent of squelching is left to the operator's discretion.

Some Loud-speaker!

AMONGST the exhibits at the recent Berlin Radio Show it is stated that the inventor of a 150-watt low-frequency amplifier of a new design claimed that speech or music by this means could be broadcast over a radius of several kilometers.

According to calculations made to attain the same degree of volume, it would be necessary to employ *fifteen million human voices!*

What a useful gadget to have handy when desiring to drown your neighbour's gramophone or his distorted version of Henry Hall's dance transmissions!

J. G. A.

Special "A.W." Visit to Station G5FC

An Active Amateur

DESCRIPTION OF TRANSMITTER AND RECEIVER

AMATEUR station G5FC, owned and operated by F. D. Cawley, of Reddish, Stockport, was licensed in 1929 for transmission at input powers up to 10 watts. Two years later the permit was increased to 50 watts, and the present transmitter is designed to make full use of this higher power.

The framework is made of angle-iron, giving great stability, and, taking also into consideration the weight of the five mains transformers and two chokes on the lower storey, making the whole transmitter a compact mass which is beyond the power of one man to move after it has been manoeuvred into position!

Power from House Mains

Actually, the transmitter stands about 6 ft. high and is about 2½ ft. wide and deep. All power is taken from the 230-volt house mains with the exception of grid bias, which is obtained from two 60-volt dry batteries. The mains equipment is all on the lower platform, and comprises separate filament transformers for each valve, and two distinct valve

Another switch selects the LS5B valve which is to be used as the crystal oscillator. To put it simply, when it is desired to work on 80 metres, the right-hand valve is used, and the power amplifier is also tuned to 80 metres. The other LS5B is not used.

To operate on 40 metres, the left-hand valve is used as crystal oscillator on 80 metres, the other LS5B being tuned to 40 metres. The power amplifier is then tuned to 40 metres.

It is also possible to work on 20 metres by tuning the power amplifier to that band, in



"The receiver is a modest two-valve Reinartz affair which gives ample volume from most morse signals"

which case the SW50 valve works also as a frequency doubler.

All controls are brought from the transmitter to the operating table, by means of a multi-cable, to a bank of switches, which are easily controlled whilst the gear is being used.

Modest Two-valve Receiver

The receiver is a modest two-valve Reinartz affair which gives ample volume from most morse signals. The extremely simple design gives an exceedingly high signal to noise ratio which is all-important in code reception.

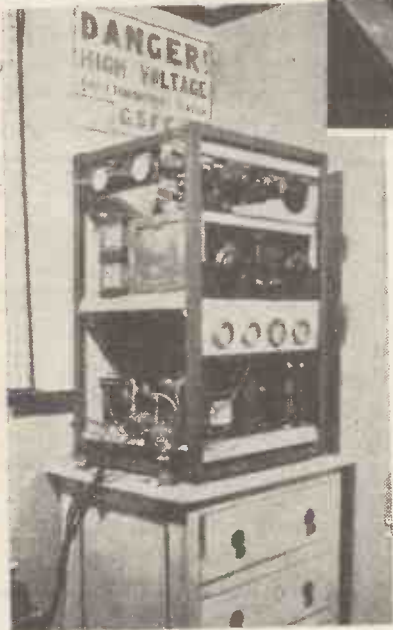
To the right of the receiver are the transmitting key, and the filter which has been designed to eliminate the clicks produced whilst keying.

All continents have been worked, including forty-five countries. About 1,500 QSL cards, for which there is no longer room on the walls, are stacked away in a corner of the shack. A few of the more interesting ones, together with one or two photographs, collected from all over the world, surround the two large maps.

What the Neon Lamp Is For

Visitors often ask what is the purpose of the neon lamp, which can be seen mounted to the side of the transmitter in the photograph. Firstly, it is arranged so that immediately the first power switch is turned on, the lamp glows brightly, giving a constant warning to the operator of the danger of making adjustments without switching off and discharging the filter condensers, some of which hold their charge for long periods.

The second reason is that it is invaluable for tuning purposes. The lamp is simply held close to one of the tank coils, the gas inside it becoming most brightly ignited when the circuit is perfectly in tune.



"The transmitter stands about 6 ft. high and is about 2½ ft. wide and deep. All power is taken from the house mains"

rectifiers, each of which has its own smoothing filter. The first of these supplies 500 volts from a U8 valve, and the second 1,000 volts from two GU1 mercury vapour half-wave rectifier valves, both these values being R.M.S. There is thus a voltage of about 1,400 volts D.C. on the plate of the last valve, which is a Mullard SW50.

The circuit is quite straightforward. Two valves of the LS5B class are mounted directly on the upper shelf, and their associated circuits are shielded from the rest of the transmitter by means of copper gauze.

By means of a switch, either of two crystals can be brought into the grid circuit of one of these valves: one crystal oscillates in the amateur 3.5 megacycle band, while the other is ground to the special frequency used by the Royal Naval Wireless Auxiliary Reserve.

S. G. Brown



HEADPHONES

Invented in 1910 still the Most Modern in 1934 Headphones in use to-day are required for special purposes and only Brown's 'Phones in one of their various forms are sufficiently sensitive.

These are made to-day by the same staff, tools, quality material as in years past at Brown's at Acton.

Write for latest particulars to the sole manufacturers:

NATIONAL RADIO SERVICE CO.
15-16 ALFRED PLACE, LONDON, W.C.1

DOUBLE YOUR VALVE OUTPUT WITHOUT COST

"TWINIL," a clever Valve-doubling Device makes this possible. Highly praised by Wireless Press as "something new with very great possibilities." Post free with full instructions to make a 2-Valve Receiver equalling 3-4 Valves, 2/6. Details stamp.

Eastern Radio Co., 35D, Waterloo Street, King's Lynn



There was a young lady named Det

Owened a marvellous radio-set

But reception was bad—

It made her quite sad—

NOW it's soldered with

FLUXITE—you bet!

See that FLUXITE is always by you—in the house—garage—workshop—anywhere where simple speedy soldering is needed. Of all Ironmongers—in tins, 4½, 8d., 1/4 and 2/3. Ask to see the Fluxite Pocket Soldering Set complete with full instructions—7/6. Ask also for Leaflet on CASE HARDENING and HARDENING TOOLS with FLUXITE.

THE FLUXITE GUN

is a handy and economical tool that enables you to put the Fluxite exactly where you want it on the soldering job.

Also used to project grease into bearings, etc.—like a miniature grease gun. Just fill the nozzle portion—half fill the cap—put together and press as required.

PRICE 1/6

ALL MECHANICS WILL HAVE

FLUXITE

IT SIMPLIFIES ALL SOLDERING

Fluxite Ltd., (Dept. 326), Dragon Works, Bermondsey Street, S.E.1.

Constructor Crusaders

Get the Best Out of Radio!

THE PRIVILEGES OF MEMBERSHIP

- 1.—Every Constructor Crusader will receive a full-size blueprint, immediately on publication, of each of the four star sets to be described in "Amateur Wireless" during the 1934-35 season. The first is the Crusaders' A.V.C.A., presented on August 18; other sets will be released on October 3 (1934), and January 23 and March 13 (1935).
- 2.—Every member will also be entitled to free technical advice in connection with any or all of the four special Crusader sets mentioned above (each query must be accompanied by a stamped and addressed envelope for the reply). In the case of queries regarding any other "Amateur Wireless" sets the usual rules of the Information Bureau must be observed.
- 3.—All Constructor Crusaders are invited to contribute ideas and suggestions to the Constructor Crusaders' Corner. Constructive suggestions will be specially helpful and will be interpreted by the "Amateur Wireless" Technical Staff as far as possible to the advantage of all set builders.
- 4.—Immediately his application for membership has been approved every Constructor Crusader will receive a certificate of membership. Note that the membership number must be quoted in all future correspondence.
- 5.—Constructor Crusaders will be authorised to wear the badge of membership. Badges for buttonhole wear can be obtained for 1s. extra each, post paid.

To Constructor Crusaders, "Amateur Wireless,"
58-61 Fetter Lane, London, E.C.4.
(Enclose in envelope bearing 1d. stamp)

Please enrol me as a member of the Constructor Crusaders. I enclose postal order for 1s. to cover postage on four free blueprints and office expenses (and also an extra 1s. for buttonhole badge).* It is understood that I shall be entitled to free technical advice on any matters concerning the four free blueprint sets. My name and address are:

September 29, 1934

Value of Postal Order Enclosed	For office use only.			
	No.	C	B	L
*Delete if not required				

LISTEN TO THESE RADIO PICTORIAL CELEBRITY CONCERTS

Every week RADIO PICTORIAL contains six or more pages of the English programmes from the Continent.

For the entertainment of all radio listeners RADIO PICTORIAL is now providing a series of Celebrity Concerts from various Continental Stations.

Here are the details of this and next week's RADIO PICTORIAL Concerts:

RADIO NORMANDY (206 metres)

Friday, Sept. 28 at 11.35 p.m. Sunday, Sept. 30 at 9.30 p.m.

PARIS (Poste Parisien, 312 metres)

Thursday, Sept. 27 at 10.45 p.m.

Don't forget to get a copy of RADIO PICTORIAL this and every Friday—besides finding the foreign programmes invaluable you will enjoy the rest of its 40 pages—price 3d.

RADIO PICTORIAL

EVERY FRIDAY from all Newsagents PRICE 3d.

AN ELEMENTARY WIRELESS COURSE for the BEGINNER

This is a book that has been written particularly for the listener who wants to know how his wireless set works. The Course takes the reader in easy stages right through all the processes of wireless reception. It successfully avoids textbook style, yet every line in the book is technically accurate.

131 ILLUSTRATIONS

The unique illustrations, of which there are 131 in all, are a remarkable feature and constitute the finest series of explanatory diagrams ever included in any volume on the subject.

AND OVER 270 PAGES!

The 32 chapters of this book cover nearly 300 pages and, at the remarkably low cost of 3s. 6d., is the simplest, quickest, and easiest way of understanding the science of wireless.

Send for your copy to-day, together with remittance for 3s. 10d., to the publishers:

BERNARD JONES PUBLICATIONS LTD.
58-61 Fetter Lane, London, E.C.4

OCTOBER Issue of TELEVISION ON SALE TODAY

Of all Newsagents, price 1/-

**THOUSANDS OF
KIT SETS NEED THE**



**OSRAM
S23**

as well as thousands
of portable sets.

OSRAM S 23

A 2-volt Battery Screen-Grid Valve especially designed to give *stable amplification with increased sensitivity, better selectivity, and Lower H.T. Consumption.*

Filament current 0.1 amp.
Mutual conductance 1.1
ma/volt.

PRICE 12/6

Metallized or plain bulb.

**IMPROVES
ALL KIT SETS
& PORTABLES
USING
SCREEN-GRID
VALVES**

To-day there are immense numbers of kit sets and portables existing which are employing one or more screen-grid valves.

Every one of these sets will be improved by fitting an OSRAM S23 valve.

Give your set the tonic it needs to restore its original purity, volume and tone. Fit the OSRAM S23 VALVE NOW!

Osram
2 VOLT BATTERY
Valves

WRITE for
the OSRAM
VALVE GUIDE
(1934 Edition)
sent post
free.

MADE IN ENGLAND
SOLD BY ALL RADIO DEALERS

Advt. of The General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.