

FIRST AID FOR YOUR OLD SET : : THE LOCH NESS HYDROPHONE

# Amateur Wireless

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Every  
Wednesday

and  
Radiovision

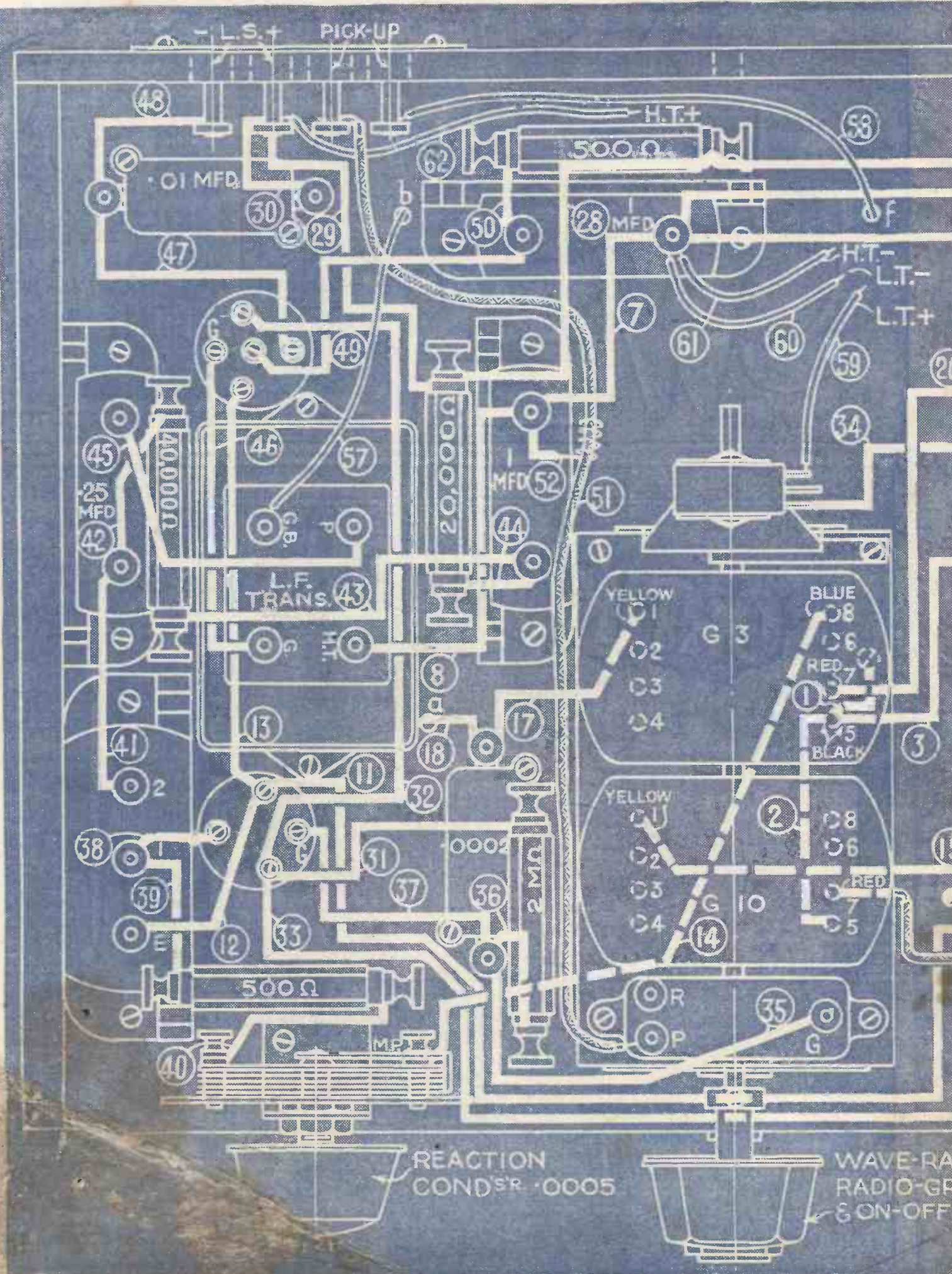
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OF 1934  
ETHER  
SEARCHER

## SORTING OUT the LUCERNE WAVELENGTHS

With Special Reference  
to the 1934 Ether Searcher

ALSO  
MAKING YOUR OWN  
HIGH-FREQUENCY CHOKES  
AMERICA WITHOUT A  
SHORT-WAVE SET





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## News and Gossip of the Week

### Television Moves

As we said some weeks ago, the B.B.C. is moving its television equipment from the present studio BB, in the basement of Broadcasting House, to a specially erected television studio at No. 16 Portland Place—a few doors away from the "marble halls."

When the changeover occurs some time in February, the London National transmissions will shut down for a few nights. The new equipment will then come into action, with improved projection facilities giving better pictures.

### Thirty-line Television

AFTER March 31, 1934, the B.B.C. assures us that the present 30-line transmissions from London National will continue. This is good news for the thousands who are building apparatus to receive such transmissions.

*We regret that there is every possibility of the transmissions being reduced from four nights a week to two. In view of the earlier talk of closing down these transmissions altogether, we suppose lookers must be thankful for even two nights.*

### Early-morning Broadcasts

NOT a hope, you early birds! The B.B.C. tells us that they haven't the faintest intention of coming on the air for breakfast—in spite of the recent inspired agitations. Well, they are merely putting off the inevitable, in our opinion.

### Dublin Wants New Wave

COME to think of it, Athlone has come out of the Lucerne Plan very well indeed, with its wavelength of 531.6 metres. But Dublin, which used to be on 217 metres, was given the international common wave of 222.6 metres—and listeners are kicking.

*So Dublin may take over the Yugo-Slav wavelength of 241.9 metres, as this is at present unoccupied.*

### Introducing Droitwich

BEFORE the Droitwich National takes over the Daventry service in the summer, it will transmit for a while on an experimental basis.

The B.B.C. does not expect trouble from listeners distant from Daventry, but engineers are preparing for complaints about the

difficulty in cutting out Droitwich in favour of foreigners.

The strength in most areas will, of course, be enormous, and users of unselective sets will find nearby-foreigners, such as Zeesen and Warsaw, utterly swamped.

### North Scottish Regional

OUR latest news about this new station is that the site is almost fixed somewhere in the Elgin district.

*As this is about 60 miles from the Aberdeen station, it is expected that the existing station will be kept on and not, as at first thought, closed down upon the opening of North Scottish Regional.*

lies some 20 miles west-north-west of Newcastle.

As soon as the mobile transmitting van has finished its job at Elgin, it will come south to search out the North-eastern site. Say, in two or three weeks' time.

### Pepping Up Regionals

WE have wondered how the power of the regionals would be pepped up from 50 to 70 kilowatts. Now we know. The power plant at present feeding the twin regional and national stations will remain when the medium-wave nationals are moved.

This extra power will be

programme at St. George's Hall.

Les Allen, popular B.B.C. vocal accompanist, will continue to please thousands of admirers with his delightful Canadian voice.

### Lapel Microphone

SOME time ago we noticed that the B.B.C. was tinkering with the lapel type of microphone developed by the Bell people for public-address speeches.

Now Al Bowly, who is vocalist in Lew Stone's dance band, has been using one of these microphones when appearing on the stage. Good idea, Al!

### Long-wave Chaos

WHAT are you making of the long waves just now? Tatfield has checked up the position and found which pairs of stations are causing all the bother.

Kootwijk and a Russian are fighting on 160 kc., Radio Paris and Lahti are messed up around 166 kc., and Warsaw, on 212 kc., is having the deuce of a time with Eiffel Tower, which has moved well away from Daventry to 215 kc.

### Daventry Now Clear

WE may breathe freely for a time, anyway, because our Daventry National is well clear of heterodynes, Eiffel Tower being 15 kc. away. But other people are still in trouble.

Motala and Luxembourg are in the middle of a battle royal over the frequency band from 222 to 228 kc., and the Russians are making things difficult all round.

### No "SOS" Records

ON January 3 you may have heard from Daventry a broadcast record called "Rocked in the Cradle of the Deep." You will never again hear that record, or any other like it, from a B.B.C. station.

For in that record was the repetition of the letters "SOS" in morse. Director of Entertainment Roger Eckersley has put his foot down, rightly, maintaining that such a broadcast might easily be mistaken for a real SOS.

### Ether Search on Test

YOU see, it must be the spot... part of the... J. Godchev... page 115. It shows... and...  
*(Note: This text is partially obscured and difficult to read.)*



Clapham and Dwyer, famous for their "spots of bother," are appearing in the new British Lion film, "On the Air"

### One-mast Aerials

AN umbrella type of aerial will be used at the new station, supported by a single mast—probably 500 feet high. The aerial will be designed to concentrate the field strength inland and thus save the energy that would otherwise be wasted over the sea.

We are intrigued to hear that a low-ground site may be chosen in preference to high ground, owing to the better conductivity.

### Scouting Near Newcastle

THEN there is the North-eastern Regional to be considered. Already a B.B.C. engineer is scouting around the district that

concentrated into the single transmitters instead of feeding the twin transmitters. All regionals, new and old, will come up to 70 kilowatts, except where the wavelength is below 272 metres, when 60 kilowatts maximum will be used to conform with Lucerne agreements.

### Against Crooning

STARTING on February 5, Henry Hall will show the world that he is tired of so much crooning. Four new manly and virile voices will accompany the B.B.C. dance orchestra—a different one every week for a month.

*At the end of the month all four will be heard together in a special*

# At Loch Ness with a Hydrophone!



So far the "monster" has simply laughed at all efforts to find his hide-out!

**T**HE hydrophone was largely developed during the war period for sound-signalling under water, particularly to and from submarines, though there are occasions, such as during fog, or if secrecy is required, when it provides a useful alternative channel for short-range communication between one floating ship and another.

More recently it has found a number of new and ingenious applications, particularly for locating sunken submarines, for "sounding" the depths of the sea, and for indicating the proximity of hidden reefs, icebergs, and similar dangers to navigation.

It is also used by trawlers and other deep-sea fishers to indicate the passage of a submerged shoal of fish so that the nets can be lowered to good effect. It is in this connection, no doubt, that its use as a means of locating the presence of the now-famous Loch Ness monster has been suggested.

### Signalling Across Space

In wireless, we signal across space by setting up ether waves and modulating them with speech frequencies. As we know, these waves travel at the enormous speed of 300 million metres (180,000 miles) a second.

Another way of signalling "across space" is the very ordinary one of talking or shouting. Here we create waves or disturbances in the air, instead of in the ether, and these, by comparison, crawl along at a mere 330 metres a second. Their effective range naturally depends upon the intensity of the initial disturbance, so that a steam syren will always out-distance the best the human throat can do.

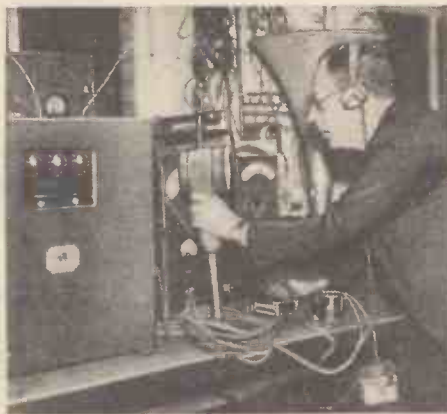
The hydrophone belongs to this class of signalling, except that the waves are created in water instead of in air, and that they travel

The hydrophone is an instrument which is used in conjunction with an amplifier for detecting under-water noises. There is one now in use at Loch Ness in an endeavour to track down the alleged "monster." It is a Marconiphone instrument used with a Marconiphone Special Products amplifier; it is of the under-water type used by the Admiralty during the war for the purpose of locating U-boats and any enemy craft. Here our contributor explains just how the hydrophone works

at the rate of approximately 1,450 metres—or a little less than a mile—a second.

Suppose, for instance, one man hammers at definite intervals against an under-water point on the hull of a ship. A second man can then hear the signal by placing his ear close against the hull of a second ship or of a submerged submarine.

Each blow of the hammer acts directly on the water, and the resulting disturbance travels as a compression wave through the fluid medium. In due course it reaches the second ship and sets the metal hull into vibration. The latter then acts as a diaphragm and passes the message on as a sound wave to the ear of the listener.



Testing a hydrophone in the Marconiphone laboratories

The modern hydrophone is a development of this principle. The place of the hammer is taken by an electromagnetic vibrator or oscillator set in the side of the hull of the ship, where it can act directly on the water. Morse messages are then sent by interrupting the current supply to the oscillator at definite intervals.

The receiver is a microphone which responds to the varying pressures of the incoming water wave in exactly the same way as it does to an ordinary air wave, and so makes the message audible.

The hydrophone oscillator is not, however, limited to the transmission of audible waves. Actually super-sonic vibrations are generated which may have a frequency of anything up to 200,000 cycles per second.

These very high "mechanical" frequencies are produced by using special piezo-electric or similar "resonators."

One advantage is that they can be used, in the same way as the carrier wave in radio, to carry superimposed voice frequencies, thus allowing direct communication by speech. Another is that like the short waves used in "beam" wireless, they can be concentrated along a clear-cut path. One can, of course, interrupt or modulate the "carrier" with morse signals, so as to transmit over larger distances.

### "Sounding" Operations

"Sounding" operations are carried out by measuring the "echo" interval, that is the time taken for the outgoing "beam" of waves to come back after reflection from the bottom of the sea. The oscillator or transmitter is arranged at one side of the hull, and the microphone receiver on the other side of the hull where it is "screened" from direct action by the outgoing wave, but can pick up the reflected wave.

A timing device measures the interval between the instant the outgoing wave starts, and the moment of impact of the returning or "reflected" wave. The gearing is so arranged that the actual sounding depth is automatically recorded on an indicator.

If the apparatus is kept steadily in action, at short intervals, the passage of any submerged body below the keel of the ship, such as a shoal of fish or "some vast denizen of the deep" would be indicated by a sudden change in the normal reading of the indicator.

M.B.

## By the Sad Sea Waves . . . . .

**M**URDOCH stared gloomily around the lounge. "Seaside hotels haven't changed since I was last here," he muttered, "the same hilarious gaiety to be seen everywhere."

"Rather not talk at all than just blather about the weather," Murdoch thought brutally. Spinsters, knitting-wool and contented middle-aged men reading newspapers formed a confused background in his mind.

There was a little excuse for his bad temper. He wasn't there of his own free will—and he had just been ordered to give up smoking. Apparently irrelevant, the two facts were in reality closely connected. "Severe laryngitis," the doctor had said. "You'd better take a week off and run down to the coast and get a little golf. And, I'm afraid, no smoking."

So here he was. The first day or two had

been pleasant enough, in spite of intense cold. He had persuaded a golfing pal from town to take a couple of days off and come down with him. Together they had manfully done the "round" twice a day and managed to infuse a tolerable amount of jollity into the evening's proceedings. Now his friend had gone home. It was early Sunday evening, no smokes, no theatres, nothing!

He opened his eyes as a voice from the loud-speaker filled the room. One of the more courageous of the guests had put it on. "Thought you might like to hear the news," he apologised to the unresponsive room.

Murdoch glared at him sourly. "A deep anti-cyclone centred off the Faroes is moving slowly eastward. Weather will continue cold with frost. . . ." Then, as the small boy put it,

"the wireless fainted!" The announcer's voice tailed off indistinctly. "C'est lui. C'est lui que j'adore. . . ." followed in a metallic soprano's voice. This galvanised the lounge and four men sprang towards the set.

"Let me have a look at it," interposed Murdoch. "The French lassie seems to be fading out too—must be the battery."

All four—suddenly animated—plunged into the deep waters of radio diagnosis.

Presently someone suggested that the cocktail bar round the corner was due to open. Having adjourned there, the four quondam "experts" found that their golf handicaps were also much of a muchness, and they all played bridge.

And yet they say that interest in wireless is declining!

S. J. H.

# AMERICA! Without a Shortwave Set



Members of an American circus troupe face the microphone for a broadcast!

ONE bright Saturday afternoon I succumbed to K. J.'s blandishments to look into his radio den at Letchworth. He wanted so much to show me his new short-wave gear. We had not been in the den long before I suggested he might scout around for some "DX" signals. Which he did, bringing in Boundbrook, New Jersey, and a good many other 15-20 metre American stations.

Early in the evening we tried on the 25-metre band, when we were quite lucky, bringing in several more Americans. Then we went down to the house for food and did not get back again to the den until just before midnight.

"Now do your stuff," I demanded, and K. J. switched up to the 50-metre band. Nothing doing at all, except Daventry. One very faint American was heard and identified as W3XAU, of Philadelphia (49.4 metres).

"Good gracious," I remarked, "I can't do

As the time was only 12.30 a.m., we thought we were doing quite well. We got used to the idea of hopping round from one to another, trying to catch the announcements every quarter of an hour. As we were going round we heard an announcement. We heard someone say "Boston," followed by an announcement that the programme would be taken up by the orchestra playing dinner music at White's Club.

We had to listen for a quarter of an hour to get the station. It was W. B. Zee, of Boston (302.8 metres). Note they pronounce the letter Z as Zee, and not Zed.

Recalling the old days of medium-wave American reception, we thought we would try for that old-timer, WGY, Schenectady (379.5 metres). We got it, but only very poorly. The amplification had to be pushed up to the mush limit and there was no real enjoyment in the signal.

We agreed that the best stations from America were those on wavelengths between 220 and 320 metres. Above this the signals were very poor and not worth trying to resolve.

Then came a real thrill. I was idly twiddling the tuning dial—still before I ack emma—and in came WIOD (230.6 metres), all the way from Miami Beach, Florida. The strength was nice and comfortable on the loud-speaker. Not enough to wake the neighbours, of course, but loud enough to give real entertainment.

We liked the precise way the American announcers told the world who they were. "Kay, Ess, Tee, Pee, St. Paul, Minneapolis" (312 metres) came the next announcement. Not too much advertising from any of them. Quite unlike the B.B.C.'s amusing burlesques of American broadcasting. We should say that not more than 3 minutes in 15 was devoted to advertising, 1½ minutes before and after the programme.

As time is booked up for the whole period of broadcasting, the programmes follow one another in quick succession; there is never a

break. So if you tune in a station on a silent carrier you can be quite sure you have not hit an American or Canadian station.

We were beginning to yawn when a snag awoke us. Three or four stations around 250 metres announced themselves as National Broadcasting Company, and all of them seemed to be doing exactly the same programme. The programme was emanating from WBZ and relayed over the chain to all the others. We could not very easily tell which station was which.

"Yes, this is all very well, but things ought to be good on an eight-valve, K. J. What about trying out a more average set—say, that four-valve super-het over there?"

### On a Small Set

No sooner suggested than done. In a few moments the small set was connected up to a separate aerial and earth and the tuning knob slowly rotated. We naturally checked up on stations already heard.

To our surprise, the volume was almost as good as on the big set, which should certainly encourage readers of AMATEUR WIRELESS to try their luck. The only difference was that the background noise was higher—quite naturally because the valves in the set were being run flat out.

WTIC, the Traveller Station, came in with a bang. Followed KDKA, WBZ, and then a stranger—WEAF, the well-known New Yorker.

Our experiences confirmed all this talk about medium-wave Americans. They really are coming over amazingly well, and can be picked up by anyone with a reasonably sensitive set after midnight. In fact, with a very selective set you may pick them up before midnight, where they sometimes add to the confusion of the European ether by butting in as early as 11.30 p.m.

During our evening with America we heard no less than twenty-five stations within a wave-band of 100 metres. This proves that even when the short waves are poor you can still keep in touch with America on the medium waves.

It is generally recognised now that when the conditions are poor on one waveband they are likely to be good on the other. So if you strike a bad patch with your short-waver, don't forget to try on the ordinary broadcast receiver. It will be well worth while

**It is the ambition of every listener to pick up America direct. In this feature ALAN HUNTER interviews KENNETH JOWERS in the latter's laboratory**

much better than that on the medium waves. Show me your broadcast set."

Out came a nice big straight eight set for me to play with. I twiddled around for a little while until the B.B.C. shut down at midnight. I then ran over the most lucrative band for Americans, which is between 220 and 320 metres. I stopped at a carrier that seemed much stronger than all the others. In a few moments the carrier resolved itself into an announcement—WCAU, Philadelphia (256.3 metres).

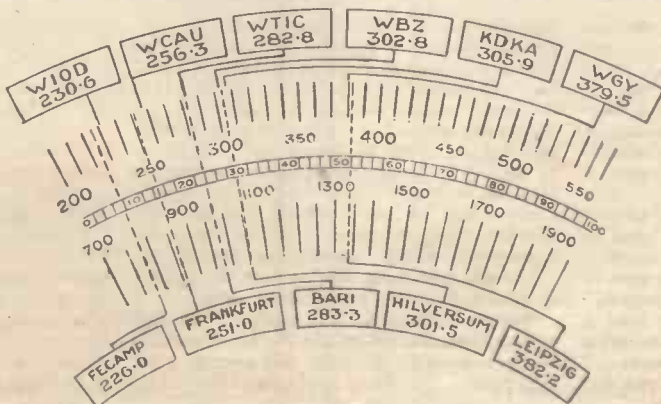
"This looks interesting," remarked K. J.; "let me try myself." He soon had KDKA (305.9 metres) on the loud-speaker, with quite good volume. Again we had got on to a parent station of a well-known shortwaver—W8XK. We were just in time for the tail end of Amos 'n Andy.

A bit more twiddling and we were listening to what seemed like a banjo solo. We were wrong. It was a marimba band from WTIC (282.8 metres), coming all the way from Hartford, Connecticut—well named the Travellers' Station.

### Free Samples!

Our sweet tooth was tickled by the announcement: "Write in to us for free samples of these delicious candies. Address your letter to WTIC, Hartford, Conn. Frank your envelope with a five-cent stamp." Then he spoilt the whole show by telling us that this offer did not apply outside the U.S.A. and Canada.

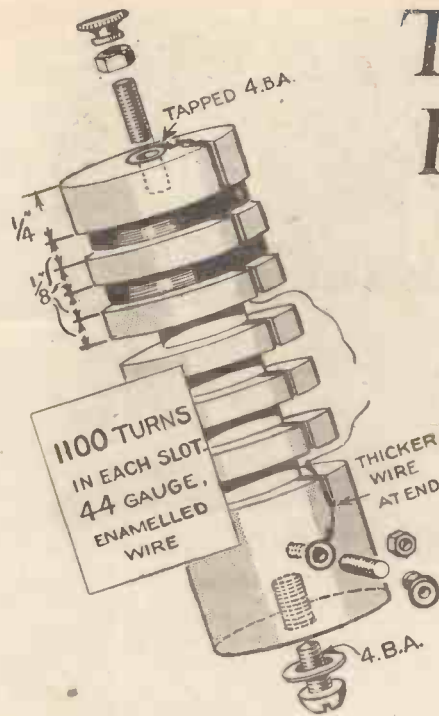
We thought that then we might as well go back to KDKA, but before I could get back to its setting I hit a gang of crooners. They seemed to be rhapsodising about their blue heaven, so we waited for the announcement: "W. J. Zee, Long Island, New Jersey!"



This diagram shows the relative dial positions of some of the more powerful American stations

# Try Making Your Own High-frequency Choke!

By *The Experimenters*



From this diagram you can obtain all the data needed to wind your own high-frequency choke

ARE you still keen on getting down to the practical way of learning all about wireless? Of course you are! By now you have probably made up those tuning coils we told you about last week. Even supposing you have not, we are giving you another chance this week—not coils, but something rather easier.

Don't imagine that because a high-frequency choke is easy to make you can just wind a few thousand turns of wire round a bobbin and call it a day. As a matter of fact, there is a good deal you can learn about choke design.

A really first-class high-frequency choke *must* be an expensive component, and we think its design is rather beyond the ability of the average amateur. We believe that when you want a one-hundred-per-cent choke you should buy one from a firm that specialises in its manufacture.

On the other hand, we don't need a first-class choke for every position in the modern set. The choke we are describing this week will do very well in, say, the anode circuit of the detector valve or in the grid circuit of the low-frequency valve to stop high-frequency current getting into the loud-speaker, or to help stop hand-capacity effects on short waves.

*By the way, we have used our own choke in the three-valve we shall describe in a week or so—but that can wait.*

## What a Choke Is

Now what is a high-frequency choke? It is a component that is inserted in any circuit where high-frequency current is to be diverted. It consists of a large number of turns of wire—really an inductance or coil.

The property of inductance offers a very great barrier to the passage of high-frequency currents, and so prevents them passing through. We usually use a fixed condenser to provide an easy alternative path for the current our choke has stopped.

If we are not very careful some of the high-frequency current will leak

through. Why? Simply because the turns of wire form between them a capacity and the total effect of all these little inter-turn capacities is really a condenser—through which some of the high-frequency current will pass.

So you see we want this special sort of coil to have, firstly, a high inductance, which we can get by a lot of turns, and, secondly, a very low what we call "self-capacity."

In practice the only way we can get sufficiently low self-capacity is to break up the number of turns into sections, keeping the capacity effect between each section of the windings as low as possible.

Some high-frequency choke formers are cone-shaped, fat at the bottom and thin at the top, so as to reduce the capacity effect between the sections. Other designs make use of a solenoid former with spaced grooves to take the sections of winding. This is what we are using for our choke.

You might at this point take a look at our very helpful drawing, which shows the dimensions of the choke former with its six slots. You will also note the fixing hole at the bottom, which is tapped to take a 4BA bolt for screwing to the baseboard.

You drill a little hole in the baseboard, push through the flat-headed bolt, put the choke over the bolt and screw it bodily in a clockwise direction.

Now you will want to know where you get the bits and pieces. We have arranged with Peto Scott Co., Ltd., and also Ohmic Products, of 8 Myron Place, Lewisham, S.E.13, to supply everything you need, including the choke former, the No. 44 gauge enamelled covered wire, the fixing bolt, the terminals and a little piece of lead-out wire. The inclusive price is only about 1s. 6d. or 2s.

Amongst the choke kit you will find 2 or 3 inches of thin stranded wire. Cut this in half, clean the ends so that the bare copper strands show brightly. Then clean the enamel from the end of the No. 44-gauge wire and



Winding the fine wire into the six slots of the ebonite former is quite simple if you adopt this system. Turn the choke former in a twist drill held in a vice and slowly unwind the reel of wire over a pencil or screwdriver

join the end of one piece of thick wire to the beginning of the thin wire, either by soldering—this is preferable—or by a good twist joint.

Clean the free end of the thick piece of wire and screw it under the nut of the terminal at the top. A word about this terminal. It consists of three bits, namely a shank, a nut and a knurled head.

Screw the shank into the tapped hole about eight threads. Then put the thicker wire round it, screw down the nut and then put the head on loosely, for subsequent connection to the rest of the set.

## The First Slot

Wind the thicker wire into the first slot, to take the strain off the thin wire. Fix the other end of the ebonite former into the maws of a twist drill. Then pop the reel of wire over a pencil or screwdriver and get someone to hold it firmly. Then let the thin wire run freely through the fingers of your left hand, so that you can guide it into the slot, at the same time keeping it at the right tension.

With the right hand you can be turning the twist drill, slowly but evenly—don't jerk it, otherwise there will be a break in the wire. Wind on about 1,100 turns into the first slot—no need to worry over a few turns, but get it as near as you can. Then take the thin wire very carefully through the cut slot.

Then you can put on the next 1,100, making sure all the windings are in the same direction. Fill up all the six slots in the same way. When you get to the other end make your join as before between thin and thick wire. A slot is provided to take this wire to its terminal from the last winding slot.

## Using Last Week's Coils

JUST a word or two on the coils described last week and regarded as part of a circuit. The aerial coil is out of the ordinary. The whole winding is tuned by a variable condenser, but instead of taking the grid to the top as is usually done, we take it to the centre tap. The aerial lead is taken to a still lower tap, which we have fixed at 10 turns from the earthy end, though that is a matter for experiment.

## Standard Switching

The switching is quite standard. A push-pull switch is connected between the terminal marked earth and the terminal marked switch. When pulled out the inner coil is shorted out and medium waves are in tune. When pushed in, the inner coil is brought into series with the outer and the long waves are in action.

You will find the grid coil for inter-valve coupling just the same in its circuit application. Instead of the aerial tap you have, of course, the lead from the coupling condenser connected to the plate or anode of the high-frequency valve. With this coil you can, of course, increase the selectivity by lowering the tap as before

## The Second Article of a Series

**I**N the issue of AMATEUR WIRELESS dated January 13 we considered what could be done in the case of an old set which seemed to have gone "off colour" but which, for some reason or other, we do not want to scrap at the present time.

I advised, if you will remember, a complete overhaul of the wiring as a start, and with this done we arranged to try the set out on the aerial to see what improvements had taken place. In a large number of cases the set will be brought back almost to its old state of efficiency by the treatment recommended, but in some cases there will still be poor performance, so we will now see what next steps to take.

The set, of course, is still out of its case, although connected to aerial and earth with batteries in position, so that it can be operated while sundry internal adjustments are made. We will assume that the set is still not working properly. Are you really sure it is the set that is giving the trouble?

by you a spare variable condenser (a spare reaction condenser will do), try substituting this for the compression type, and if the set works properly at one adjustment of the substituted condenser then obviously your trouble is in the compression condenser, which can easily be changed.

If, however, your adjustments bring about the variations you would expect and there is no difference between the results with the two kinds of condenser, then this component may be



... we arranged to try the set out on the aerial to see what improvements had taken place

# First Aid for Old Sets

By PERCY W. HARRIS,  
M. INST. RAD. E.

Inspect the aerial carefully, making certain that the lead-in wire is clean and bright where it is screwed beneath the terminal of the lead-in insulator; that a similar state of affairs exists with regard to the wire on the inner side of the lead-in and there are no breaks in the wire leading from the insulator to the set.

The earth connection, too, may be faulty, and this should be checked over for continuity between the set and the earth terminal which, of course, may be to a water-pipe or to a buried earth-plate. Earth connections to buried plates are not very easy to test out, and in such a case it is not a bad plan to take a temporary wire to a water pipe to see whether the results are different.

If the results on connecting to the water-pipe are very much better, then you may be sure there is something wrong with your buried plate connection. If you already have a water-pipe earth, make sure there is no dirt or corrosion at this point and that the contact is satisfactory.

If both aerial and earth connections are sound, the probability is that the trouble is in the set, and I again suggest that you should start systematically from the beginning.

In most sets the first component after the aerial terminal is some sort of variable condenser, usually of the compression type. Sometimes these stick so, with the set tuned to some station working, you should now try varying the adjustments of this condenser to see whether there is any difference in the signal strength. If the result is exactly the same with any adjustment then the chances are that this component is faulty.

If you happen to have

assumed to be in perfectly good condition.

Ganged sets, in which all the tuning condensers are worked off one knob, are a little difficult to check, but comparatively few home-built sets are of this kind—at least the older types which we are now discussing.

If your first condenser connected to the grid circuit of the first valve tunes very flatly compared with its original performance, then there is reason to think that the fault is in your first tuned circuit, although if the compression condenser has been altered or wrongly set, flattening of the tuning of this circuit can easily come about without any fault in the circuit itself due to the additional aerial damping.

This is why I advised you to test out the compression condenser *before* you do anything else and you will see the reason for the logical and systematic method of working through the receiver.

If the tuning is still flat, carefully examine the tuning coil. The connections, of course,

are bound to be correct, for you checked these before, but look inside to make sure there are no disconnected or corroded wires. Look particularly for corrosion.

If, by the way, this circuit does not tune at all, signals being received from the local station with equal strength at any setting, the chances are there is actually a definite break in the wire of this tuning circuit. This is not the only possibility, however, and a short-circuit or a disconnection in the condenser may give a similar effect, preventing the tuning taking place when the knob is moved. Even the knob itself may be loose.

### Chances of Faulty Grid Leak

If the first circuit is a detector and not a high-frequency circuit and, if the signal is momentarily good but trails off to practically nothing with an occasional "plop" after which the signal is temporarily restored, the chances are that your grid leak is faulty, preventing the charge on the grid from leaking off.

The substitution of a new grid leak or a spare one is naturally the remedy in this case. Extremely weak signals, which, however, tune properly (the quality being as satisfactory as ever), may come from a disconnection inside the .0003-microfarad fixed condenser or some disconnection in the wiring of this condenser or even a faulty contact, the effect being that the ordinary .0003-microfarad has been replaced by an extremely small condenser made between the broken connection and the condenser itself.

### Some Kind of a Signal

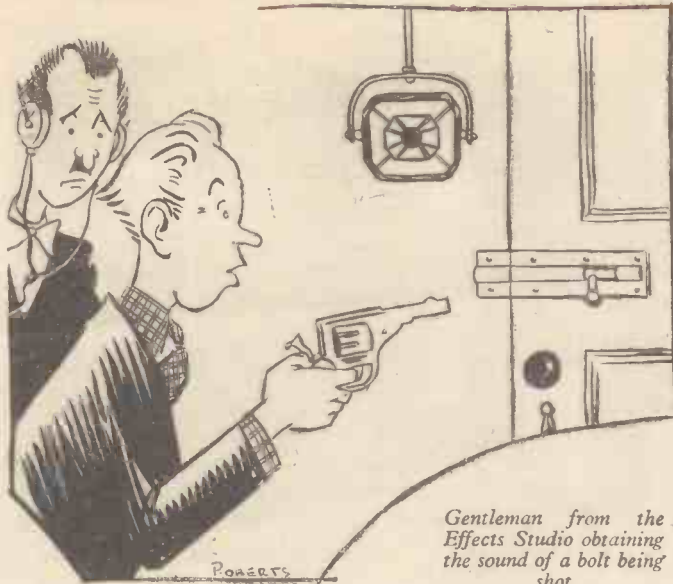
You would be surprised if you knew how minute the condenser can be and still give some kind of a signal in a set. If you have doubts about this condenser being disconnected, parallel with it another .0003-microfarad, and if signals are immediately restored to what they should be then you will know the trouble is here.

In a general article of this kind, endeavouring to cover the main faults in all sets which have gone off colour, it is impossible to deal with individual circuits, but considerable experience in examining faulty sets has shown me that one of the chief causes is the development of faults in anode and decoupling resistances.

If you have a valve which is resistance-coupled to another and if at the same time the set is properly decoupled, you will have two resistances in series, the main anode resistance and the decoupling resistance. Both of these are in the direct path from the high-tension battery to the valve, and if for any reason either increases its resistance very considerably, the voltage reaching the valve will be reduced and the set will not work efficiently.



Percy Harris trying out a set after some intensive experimental work. The hints he gives in this article will be appreciated by all owners of old sets



Gentleman from the Effects Studio obtaining the sound of a bolt being shot

Sometimes these resistances break down entirely, but more often through corrosion at soldered joints or from other causes the resistance goes up from, say, 100,000 ohms to several megohms. The older spaghetti type were particularly prone to develop troubles of this kind, which is one of the reasons why commercial set manufacturers now use almost exclusively the moulded type of resistor. These resistances are quite cheap and very satisfactory, and are obtainable in a number of makes which are completely reliable.

**Substitute One at a Time**

In any case, even if your resistors are not faulty, it would not be a bad plan to take this opportunity of replacing the old ones by new types. Substitute one at a time and this may enable you to find the fault. In this way the older type of resistor which you discard while still being good will serve as a spare.

Grid leaks do not often fail in these days, but the poor quality of many grid leaks was very apparent a few years ago, and it may be that one of yours is of a dubious type. The effect of faulty grid leaks is not always the same in different parts of the circuit.

I have mentioned the effect in the detector circuit of such a fault, and in the low-frequency circuit a good deal depends on the type of valve with which it is used.

If the valve is of a super-power type requiring a good deal of grid bias, a disconnected grid leak will prevent this being applied and at the same time a strong signal will easily choke up the valve. Sometimes with dust and dirt on the valve holder there may be sufficient leakage to prevent the valve blocking, but the overall effect will be bad and you will get a kind of "strangled" effect in the speech and music.

**Changing the Grid Leak**

It is very easy to test out whether the leak is bad or not by changing it. There are no soldered connections to undo and, naturally, when making the change you should make sure that the holder itself is not faulty. It sometimes happens that one of the clips has worked loose and is not making proper connection with its screw.

A similar effect so far as the sound is concerned is sometimes due to a defect in the power valve circuit, which has no grid leak but is connected to the previous valve by means of a low-frequency transformer. In this case there may be a disconnection at the grid bias end of the transformer, there being quite sufficient capacity effect between the windings to enable the set to give some kind of result.

The fault, of course, may be inside or outside the transformer, but when trouble occurs in the secondary it is nearly always due to

corrosion, for there is a negligible current in this winding—quite insufficient to give any possibility of a "burn-out."

With the primary, however, the passage of the high-tension current through the winding gives an additional possibility of trouble. Disconnections in the primary windings of transformers are not infrequent in old sets, particularly when the transformers are of poor quality.

It is generally stated that such transformers have "burnt out," but actually the trouble is due to corrosion accelerated by the passage of electric current. The wire used in the primary will stand far more current than is ever put through it without burning out.

Now, unless you have special instruments it is not easy to test the continuity in primary and secondary windings of a transformer. The resistance of both is so high that you cannot light a flash-lamp through them, and the trick sometimes recommended of using a pair of phones in series with the battery, tapping one phone lead on and off the terminal, will frequently give a click even when there is a direct break, due to the capacity effect.

An experienced man can detect the difference between this capacity click and the actual continuity click when there is no break in the

winding, but I do not recommend the method to the inexperienced. If you have a low reading milliammeter, a much more satisfactory method is to use about 20 volts of a high-tension battery joined in series with a 5,000-ohm fixed resistance (you can buy these quite cheaply), this being joined in series with the milliammeter.

The two end wires, if brought together so as to complete the circuit, will cause the current to flow through the whole circuit, including the milliammeter, but owing to the 5,000-ohm resistance being in the path, the total current flowing cannot exceed 4 milliamperes, so no harm can come to the meter even if the end wires are connected to a dead short.

If now you test the secondary by connecting the two wires to the terminals (naturally having

If any of your friends are in trouble over the Lucerne Plan, show them the special article on pages 140-141 of this Issue!

disconnected the other lead before doing so) there will be a reading on the milliammeter if the wire is unbroken. The actual reading does not matter, for this will depend on the resistance of the secondary—as long as there is any steady reading at all your secondary will be unbroken.

A similar test can be applied to the primary, and as the resistance of this is always lower than the secondary, the actual current reading will be higher. This little testing device, by the way, can be used for a continuity test throughout the set, and as the total current flowing can never exceed 4 milliamperes if 20 volts are used you can use it on valve filaments or whatever you like without the slightest risk of injury.

## Absent-minded Announcers

THE B.B.C. announcers generally keep up to such a consistently high standard of perfection in their work that one very rarely catches them making a slip of any kind.

Just occasionally, however, in those moments of absent-mindedness to which all of us fall victims now and then, an announcer unconsciously perpetrates an amusing "howler" before the microphone—and listening millions chuckle!

Some little time ago, for instance, I heard one of the London announcers solemnly assure listeners, in the course of the evening weatherforecast, that the "nights will be cool and slight. Ground frost may occur locally."

I was at a loss to fathom the meaning of the enigmatic first part of this prediction. Although I can claim to be as familiar as most other listeners with "Weatherese," a "slight night" was quite new to me!

But at that juncture the announcer realised there was something amiss, had another look at the typescript, and exclaimed, "I beg your pardon! The nights will be cool, and slight ground frost may occur locally."

More recently, another London announcer, in giving out details of a gramophone recital at midday, informed listeners that they were about to hear "Acts Four and Five of Gounod, by Faust!"

A few days later I heard one of his provincial colleagues (who, perhaps, had called in at the tailors' on his way to the studio) say that the programme would open with the orchestra "playing a waltz *suit* 'Three Fours,' by Coleridge-Taylor!"

W. O.



The police ask the B.B.C. to broadcast a special S O S



# On Your Wavelength!

By Thermion

## Plan Gets Into Its Stride

AT the end of the first week of its existence I confess I was beginning to wonder whether I had not been too optimistic about the results of the Lucerne Plan. Except for the long waves, it started off pretty well on January 15, but reception became worse and worse within a few days. At the end of the week there were comparatively few stations that could be received without jamming, jumbling, spluttering, burbling or heterodynes.

Now as I write there has been a very marked improvement and it does seem as if matters were straightening themselves out. There is no question that if only stations can and will adhere strictly to their allotted frequencies the Plan will work thoroughly well and will effect at least a fifty per cent. improvement in long-distance reception.

## Menaces to Ether Peace

A GREAT deal of the interference now experienced on the medium waveband is undoubtedly due to Russian stations, some of which are very much indeed off their wavelengths. I had considerable misgivings about these stations during the great dress rehearsal on the night of January 14-15.

A number of them did not submit themselves at all for measurement by the Brussels Laboratory and of those that were measured the average error was getting on for a whole couple of kilocycles.

It is reported—though I did not hear the announcement myself—that the Russians gave out from some of their stations that they would abandon the Plan if there was not less interference with their transmissions. The truth of the matter is that they have themselves to blame, for by wobbling and wavelength wandering they are causing the interference from which they and others suffer.

## France's Broadcasting Troubles

THE French Government seems to exercise a queer kind of control over its broadcasting stations. Some of them do what they are told, but others appear to put metaphorical fingers to their noses and to do precisely what they like.

Radio Toulouse, though its 100-kilowatt transmitter was ready down to the last terminal at St. Agnan, obeyed the order not to use more than 8 kilowatts in the aerial issued as long ago as last spring. But the Eiffel Tower, which, strangely enough, is a Government station, absolutely refused to close down when the Lucerne Plan started.

Fécamp, too, seems to have treated with scorn first of all the instructions to come down to 600 watts and, secondly, the order to use one of the French common-wave channels. The station is still working on about 220 metres, but reception of it is utterly impossible, for in that part of the waveband there is one of the most magnificent super-jams that I have ever heard. I suppose that in due course the pirate stations will settle down—for their own sakes as for other reasons.

## On the Long Waves

IT seemed for some days that on the long waves the position was to be one of stalemate. Stations had grabbed wavelengths and refused to budge as much as a millimetre from them. The result was that hardly a long-wave station was receivable without poisonous interference.

Now there are signs of better things and though I don't believe that the long waves will become entirely clear until there has been a further conference of some kind, I do feel that we shall soon be able to receive the best of the long-wave stations—and these, after all, are the only ones that really matter—as well as we used to receive them.

I cannot help thinking that Huizen has some reason for feeling slighted. If it had been allowed to retain the 1,875-metre wavelength half the trouble would have disappeared. What particular reason can there have been for giving this wavelength instead of a rather lower one to Roumania?

## Battery Psychology

WHY is it that many of those who use the cheapest high-tension batteries are convinced that they are wonderful performers, though the cold, hard facts of the laboratory test bench demonstrate in every case that they are not?

It has long been a puzzle to me and I think that I have now hit upon the solution. Everyone who invests in a cheap battery wants it to give a good account of itself. Deep down in his heart of hearts there is the knowledge that you cannot get anything for nothing in these days, but he refuses to hear the little voice that is trying to remind him of this fact.

So determined is he that his bargain shall prove indeed to have been a bargain that he is prone to exaggerate even to himself the number of hours that it is in use a day and the number of weeks that it lasts.

Further, when the battery is really on its last legs he refuses to admit the existence of distortion.



"Why is it that many of those who use the cheapest high-tension batteries are convinced they are wonderful performers, though the cold, hard facts of the laboratory test bench demonstrate that they are not?" asks Thermion. Above we show a view of the chemical laboratory of the Exide and Drydex battery works

## The Fading Question

MY recent remarks about the absence of fading this season have brought me numerous letters from readers. I mentioned some time ago that fading could be curiously local and these letters amply bear out my contention. In my own locality there has been no fading worth talking about on either home or foreign stations.

Some readers in different parts of the country report similar experiences, whilst one from Fakenham in Norfolk says that it is the worst season for fading that he has known for ten years, and another from Woking finds the foreigners steady, but some British stations, including the Midland Regional, much inclined to wavering.

## Soldering Wires to Stalloy

A FRIEND who happens to be a scientist of some eminence came to me the other day with a queer little problem. He wanted to solder an earthing wire to the laminations of a transformer in order to be sure of a thoroughly good contact. But for the life of him he couldn't find any way of doing it. His idea was that it might be possible if he deposited copper electrolytically on the stalloy, then tinned the copper and finally applied the solder.

Many people think, like him, that you cannot solder to stalloy or to iron or steel direct, but as a matter of fact you can, as any gunsmith will tell you, and I was soon able to demonstrate the fact to my friend. Provided that you use the right flux—"killed spirits" or sal ammoniac—the job is perfectly straightforward.

You must clean the metal thoroughly and have the point of your iron bright and hot. It took me just about two minutes to solder a copper wire to the specimen of stalloy that he produced from his pocket.

## Loud-speaker "Zizz"

QUITE a few readers write to me about one particular trouble with loud-speakers. This is that the instrument buzzes or zizzes in the most distressing way when reproducing loud passages or particularly on certain notes. They always blame the instrument, though actually it may be quite innocent. The trouble is not infrequently that there is a strong resonance in one or other of the low-frequency circuits of the set. When a certain note occurs it is unduly amplified and is thus passed on much too strongly to the loud-speaker.

On the other hand, if an old permanent-magnet loud-speaker takes to zizzing the odds are that it requires remagnetising. There are firms which undertake this work at very moderate charges.

## Valves Still Too Microphonic

THERE is no doubt that detector valves, and particularly those of the battery-operated type, are far too often microphonic

nowadays. I am not referring to any particular make but to valves taken at large.

Time and again I have had to try half a dozen different valves before I could find one that was reasonably free from "ponging." One would have thought that with modern methods of construction it should be possible to get over this difficulty and to produce definitely non-microphonic valves. There may be some. All that I say is that I have not so far come across them.

### Some Eliminator!

THERE was a good joke in the Christmas number of "A.W." about the chappie who thought that a pick-up was a device for picking up foreign stations. But I have come across something just about as good in a recent letter, not from a reader of "A.W."

"If," he asks, "I purchase an XYZ eliminator, will it enable me to eliminate the London National station and to hear Turin?"

### Germany Forbids Advertising

IT is good news that the German authorities have put their foot down on the use of broadcasting stations for advertising purposes. I know that there are those who are all for sponsored programmes and advertising, but personally I know of few things more irritating than to listen to the entreaties to buy these goods or those that are hurled at you at every interval.

My own reaction is that a resolve is begotten never on any account to purchase the things whose praises are sung in this way. I don't think that advertising means programmes of better quality; I know that it means unending spells of irritating ballyhoo.

### Wireless and the Deaf

LAST week I had one of the most interesting and at the same time one of the most pathetic experiences I can remember. I accompanied Mr. Poliakoff, the inventor of the Multitone Deaf-Aid set, to a London school for deaf children.

The set, as some readers may know, has a moving-coil loud-speaker which enables people of normal hearing to hear wireless programmes or gramophone records in the ordinary way. It is provided also with a special telephone receiver, having an independent volume control of its own, for a deaf person.

On turning over a switch the set ceases to be a wireless receiver. The loud-speaker then acts as a microphone and a deaf person can take part in the general conversation.

### Hearing Sounds for First Time

AT this school for the deaf I saw and heard some remarkable results. Perhaps the most interesting case of all was that of a boy of eight who had never previously used the apparatus and had never in the whole course of his life heard a sound of any kind, for he was born stone deaf. He had been taught to lip-read and to speak certain simple words.

The headmistress explained to him that she would first pronounce certain syllables for him to lip-read and that she would then utter them into the loud-speaker and that possibly he would actually hear them. The boy was a little puzzled at first but soon the fact that he was hearing dawned upon him. Within ten minutes he was

repeating, with his eyes shut so that he could not see the headmistress's lips, the syllables that she pronounced and was making no mistakes.

She then told him that she would see if he could hear music. The switch was turned over to the wireless position and a gay little orchestral piece of music tuned in. A grin of delight dawned slowly on the youngster's face. Presently he was nodding his head in time to the music; then he began to wave his hands to and fro.

At last he got off his chair and began to sway his body and shuffle his feet in an attempt to dance. It seems that at last wireless may do as much for the deaf as it has done for the blind.

### "Flu"

THIS is short, not for the prevailing epidemic, but for the curious kind of light or "fluorescence" used in cathode-ray television. Just now it is the subject of a good deal of research work, because—other things being equal—the tube with the most efficient

## NEXT WEEK!

W. James will contribute a special article on getting the best out of the high-frequency pentode, the new valve that is creating such interest.

Whitaker-Wilson will review the latest records for your guidance.

"The Experimenters" will explain how you can

make your own low-frequency transformer for a few shillings—a feature that no "builder" will want to miss.

"What are These Kilocycles?" is the title of a useful article explaining in simple terms the relationship between wavelengths and frequencies.

viewing-screen is going to sweep the board. And designers are naturally looking ahead.

Fluorescence and phosphorescence are often classed together as being much the same kind of thing, though this is by no means the case. From the point of view of television, the main difference is that fluorescence is only a transitory effect. It comes and goes with the impact of the ray, otherwise it could not reproduce a "moving" picture.

Phosphorescence, on the other hand, is definitely a more permanent effect. There are a number of other differences—one being that a fluorescent substance always gives off light of a lower wavelength than that by which it is excited—but they have this in common, that they are both forms of what is known as "cold" light.

### Tuning Practice

WHATEVER else is to be said about the Lucerne Plan—and I have heard some unkind remarks the last few days—it has certainly given all of us some useful practice in tuning.



"It seems that at last wireless may do as much for the deaf as it has done for the blind," says Thermion. Above you see a special theatre fitted up in Germany for the benefit of hard-hearing people

It is interesting to note how much closer one can bring the set to oscillation—without affecting the quality of reception—on the shorter waves than on the long. The reason is, of course, that on the long waves reaction begins to "cut" the side bands seriously, some time before one reaches the oscillation point.

By contrast, on the really short waves, there is no need to worry at all about side bands, the main difficulty being to "spot" and separate one carrier wave from another.

### Fact or Fancy?

QUITE a number of people have noticed the curious falling-off in power of some of the well-known stations. At first the programmes may come in at full and even overpowering volume, and then for no apparent reason they lose strength.

One suggested explanation is that there is a gradual decrease in the conductivity of the "earth" of the transmitting aerial, caused by the heavy currents passing through it. If true, this would no doubt tend to reduce the efficiency of radiation by some small percentage, though not, I should say, to any appreciable extent.

In some cases the effect may be accounted for by a loss of efficiency in the receiver—due, for instance, to a falling-off in valve emission. Another possible explanation is that the loss in strength is more apparent than real. In other words that it is due to a purely psychological effect created by the higher powers which are now in fashion. As each new high-powered station comes on to the ether, it sets a fresh standard which, by comparison, necessarily throws other stations into the shade.

### Against "Internal" Aerials

CALLING the other evening at a friend's flat in town, it was not very long before I noticed a large and imposing-looking table console set in the corner of the lounge.

Naturally I wanted to know how it worked. My friend obligingly switched on, remarking, as he did so, "It is quite a good set—so it ought to be with eight valves. But the background noise is rather bad, don't you think?"

I most certainly did think so. Then I discovered the reason. My friend was using as an aerial the foot or so of wire stuck on the inside of the back of the cabinet.

### Amplifying the Background

AS a result, the volume control had to be turned up considerably, involving the use of quite a lot of amplification, not only of the required signal but of all the background mush and crackling noises.

I suggested that even a short indoor aerial would materially cut down the background. Less amplification would be needed to give good strength on the locals and so the background would become less obtrusive. Later on my friend proved this point. And now he is going around warning listeners of the snare and delusion of "internal" aerials.

As a matter of fact the internal aerial of big sets is never intended as the normal aerial, but only as a stop-gap device to make the instrument transportable on occasion. A short outdoor aerial is still best no matter what type of set you use—especially if there is a lot of background.



Monday

THESE guessing competitions are destroying my morale. The second item I put down for a bit of the Aldershot Tattoo, until I remembered it wasn't on. So I altered it to gun practice at Bisley. It turned out to be swimming bath activities at a West End hotel. After that I amused myself by listening without presuming to guess. I think they ought to tell us the answers one by one right away. The suspense was awful.

Carroll Gibbons gave a good show. Likewise Johnny Green. I was called away in the middle, so I don't know whether he covered the waterfront or not.

Enid Szantho, singing Schubert, concluded my listening to-night. Had she been a soprano she would not have concluded it, but it is such a change to hear a nice contralto. Can't we have more? Failing that, let us have more of her!

Tuesday

I went *Away to the Hills* for half an hour to-night. I thought it would help me to stand up to Winston Churchill on *Whither Britain?* I liked Mark Lubbock's music—but I always do. Also Denis Freeman's production and book. A pleasing show.

What I did not like was that unpleasing whistle in my set.

Wednesday

Berlioz' *Faust* is rather too heavy for wireless—at least, in places. A fine performance, with the right man conducting—Oscar Fried.

Herman Klein gave a fascinating talk and recital of gramophone records called "Singers of Yesterday." He proved his point up to the hilt. There is no doubt voices in these days are not what they were, nor yet what they should be.

Singers cannot sustain notes with the even quality they once used. It is very sad.

I consider this recital one of the most illuminating transmissions for a long time. Every note of Patti's was an indictment and a piece of constructive criticism at the same time.

Ibsen's *Ghosts* made amazingly good broadcasting. Ibsen dared much in this play. At least, Norway thought so at the time. Never was a play of his hissed more fervently. It may have been that people went to Ibsen's first nights with the preconceived idea that they would be infuriated.

All that has passed and Ibsen's plays remain as perfect specimens of drama. Had you or I written that play there would have been hundreds of letters of protest and Mr. Gielgud would probably have got the sack. As it was a classic it was heard without a word.

Ibsen is so serious (and writes with such a single idea of driving home his points and satirising what he considers

social evils), that we stand up to his hard hitting, feeling he is right.

Before leaving the subject of what I found very attractive as a broadcast, I think it would be unfair not to congratulate the little cast of five: Leontine Sagan as Mrs. Alving, Margaretta Scott as Regina (her voice fascinated me), Donald Eccles as Oswald, Milton Rosmer as Parson Manders, and Percy Rhodes as Engstrand.

We can do with more Ibsen, but I do not think *Brand* should be one.

Friday

"Songs from the Shows" have begun again. The new series promises to be worth hearing. I liked the Shaftesbury Theatre songs immensely, but was surprised to find how few I had remembered were originally sung there.

Have you noticed the second performance of these transmissions is timed for a quarter past four on a Saturday afternoon? The B.B.C. has recognised that this is a good listening hour in the winter months.

Saturday

The variety show from St. George's Hall to-night contained one or two names new to me. I do not remember, for example, having heard Gladys Church before. She entitles herself a whistling songster. I thought her whistling tone unusually pleasing. Nothing shrill about it. Tone, whether it be in a piano,

a violin, or a 'cello—in fact, any solo instrument, is a very personal matter. No two pianists, for instance, strike a chord alike. So it may be with whistlers. Why not? At all events, I should like Miss Church to know that her whistling sounded very charming to-night.

The Geddes Brothers, in their Musical Cocktail, gave us something new in style. I gave up guessing what all their instruments were, but I thought their tone, also, quite pleasurable.

Donald Peers, again, was new to me. I can hardly judge him fairly, as somebody rang me up in the middle of his turn, but my impressions were by no means unfavourable.

Further down in the bill I came upon Ann Penn and Stainless Stephen, both of whom were up to form. The last two or three shows from St. George's have been worth hearing. There is some satisfaction in the thought, because it would be hard to find a time when more people are listening than at the hour of eight on a Saturday evening.

Did you chance to hear Mr. J. A. Spender in this "Seven Days Hard" series? I think the title none too good, but I enjoyed him. He was a wee bit prosy, though. Whatever speakers in talks of this sort may be, they may not be prosy.

Of all composers, I would rather hear Chopin than anyone else last thing at night. I think he could be my night-cap on most nights of the week, but not expecting him on a Saturday evening, I was not, perhaps, in the best romantic mood.

It is wholly in compliment to Elsa Karen that I listened throughout her recital. As I say, I wasn't in the mood for Chopin just then, but after hearing her begin the F Minor Fantasie I decided to hear at least half of it.

Thirty-five minutes later I was still listening to her. When pianists play without banging, and in a manner reflecting the thoughts of the composer rather than their own, they can have the satisfaction of knowing that there is one listener who will sit still in a chair and listen intently. That is what I did to-night, and I thank Miss Karen.

Sunday

Some good music to-day. I heard all I could. First, the Bach Cantata.

Best of all, a really fine symphony concert. The only use I have for fog is when I have to listen to wireless through it. The reception was amazing to-night. Albert Sammons, in the Max Bruch violin concerto, produced tone that almost might be said to make history.

Sir Landon Ronald was the conductor. I rather expected he would give us an exciting performance of Tchaikovsky's *Fifth*. He did.

Tchaikovsky is everybody's composer. If you didn't hear that symphony, don't you miss it the next time it is down. It contains the finest waltz ever written. You will find modern dance-band waltzes very poor stuff after that. You want the best tunes, don't you? *Tchaikovsky has them!*

New Lucerne Dial



This new Ekco device provides a complete answer to the Lucerne problem. The wavelength calibrations are a permanent fixture, but station-name scales can be supplied for attachment over the wavelength calibrations—and only two screws are needed.

Should there be any considerable alteration in the present wavelength arrangement a new station-name transparency can be obtained and the obsolete one detached in a few seconds to make way for the up-to-date scale. A great idea—and the Ekco people are applying it to all their model 74 receivers.

# Listeners' Letters

## SIGNPOST FOUR

To the Editor, "Amateur Wireless."

SIR—I want to thank you for the Signpost Four, which is a set I have just got going. I think the best reference I can give you is that everyone who has heard the Signpost Four set is now determined to build it. J. ALLEN.  
*Barrow-in-Furness.*

## THE 5s. BATTERY

SIR,—I have followed, with interest, Thermion's test of the 5s. high-tension battery which he stated gave a life of 130 hours and which test was commenced on a discharge rate of 10 milliamperes. He also states that if batteries of first-rate quality were used, high-

### LIST OF HIGH-TENSION BATTERIES USED OVER PERIOD OF TWELVE MONTHS.

Type	Life
120-volt ... ..	8 weeks
100-volt ... ..	9 weeks
100-volt ... ..	9 weeks
100-volt ... ..	8 weeks

#### AVERAGE USE

Six days per week. Three hours intermittent per day.

One day per week. One hour intermittent per day.

tension costs would be a good deal less than if the 5s. battery were used.

I have, for over twelve months, used a set of the detector and two low-frequency type, the consumption of which, carefully measured by a competent radio engineer with a dead-beat meter, does not exceed  $4\frac{1}{2}$  milliamperes. Yet I am unable to obtain a useful life of more than 170 hours from first-quality 100-volt batteries. This, if based on a consumption of 10 milliamperes, would equal a life of not more than 85 hours.

I have tried first-quality batteries of several makers whose advertisements in the radio papers claim lives of many months and in one case the makers state that a guaranteed life of 144,000 milliwatt hours can be obtained.

These claims are not substantiated in practice and, in view of this, can one wonder that the public uses the 5s. battery? I myself am now testing one of the 5s. variety and, for your information, attach details of the so-called first-quality batteries tested.

I may add that I am by profession a civil engineer intimately connected with the electrical supply industry, use of secondary batteries and not unused to testing batteries on a large scale.

"DISILLUSIONED."

*Neath, South Wales.*

## THE 50s. TELEVISION RECEIVER

SIR,—I have much pleasure in letting you know how I have got on with your 50s. Television Receiver. Living so far out of the service area of London National I have had some hesitation in trying television till you described this receiver, as I did not expect very great results. However, the results have amply justified the experiment. As I have not had the opportunity of seeing television before I cannot compare my results with others, but, especially with "close-ups," the figure is often quite recognisable, though fading is troublesome and distortion frequent—there is often heterodyning of this station.

Appropriately enough, the first recognisable figure I saw was someone in Highland dress dancing on St. Andrew's Eve! Some nights are, of course, much better than others for getting results; the worst always occur when someone has come in to "look in!"

It seems that the time has come for an extension of television to other transmitters, for this cheap and easily made set brings television within the reach of all, and I have no doubt that with local transmission there would be real entertainment value in the pictures received. At present, I have to use some reaction, which doesn't help the definition.

The only alteration I have made to the televisor as yet is to insert a 10,000-ohm variable resistance in the neon lamp circuit, which helps to get maximum definition with the maximum light. My set (home made) is S.G.-Det.-2 L.F., band-pass tuning, anode-bend rectification and the L.F. side is R.C., Trans.

At present I am on D.C., but A.C. is coming any day and I am anxiously waiting for it as my valves are all over four years old and their emission is not what it should be.

I am, naturally, very interested every week in your television section and hope in the future to make a better set when it is worth while here.

JOHN KINNEAR.

*Dundee.*

## INTERMEDIATE FREQUENCIES

SIR,—I was extremely interested to read your correspondent's letter re intermediate frequencies and must state that his remarks are entirely correct regarding the high intermediate frequency.

Whistles due to second-channel interference appear to be entirely absent, but selectivity, as judged by the standards of normal superhets, is very definitely down—in fact, I recently tried a receiver (in this district) which operated with a high intermediate frequency and could barely separate Radio Paris from the long-wave

National! Even on the medium band about three or four channels were lost on account of the Midland Regional.

It is therefore quite patent that the advantages of a high intermediate frequency are overbalanced by its disability to give even reasonable super-het selectivity.

Now coming to the point that really interests me. I myself have spent many hours experimenting with a two-stage high-frequency receiver with iron-cored coils, and I can definitely state from actual experience that equal selectivity to that of a small superhet can be extracted from a well-designed receiver of this type.

The best combination, having regard to reasonable cost of production and simplicity, appears to be that having three tuned circuits functioning as aerial coil, inter-valve coil and detector grid. I have found a very happy combination in Varley Nicore coils BP30, BP31, and BP30 (usual disclaimer, etc.); these coils are very accurately matched as regards inductance and deserve the best variable condenser obtainable.

Band-pass tuning is, of course, a refinement which, while not being strictly necessary, might be included if four tuned circuits would not make production costs too high. However, with the circuit detailed above separation of Berlin (Zeessen) from Daventry National (9 kilocycles) is easy, and on the medium waves Leipzig and Katowice part from the Midland Regional.

Now to come to the point—I have yet to try a four- or five-valve superhet, A.C., D.C., or battery operated, which will better this and give me the two channels immediately adjacent to the Midland Regional.

It would be interesting to hear readers' views on this arrangement from different parts of the country, including those unfortunate enough to live within 10 or 12 miles of a 50-kilowatt "regional."

J. CORBETT GRIFFITHS.

*Wylde Green, Warwickshire.*

## Potted Biographies—18

### John Tilley—Comedian

HIS real name is John Mounsey Thomson, but you mustn't call him that. To you he is John Tilley—and quite one of the funniest comedians on the wireless.

John joined the Royal Flying Corps in the early days of the War. He says he cost the country over two thousand pounds for airplanes he managed to smash before joining the Gordon Highlanders.

Soon after peace was declared he was fortunate enough to inherit the useful sum of seven thousand pounds. He thought he saw a better use for it than paying the Government back for the loss of their airplanes, so he invested it in an antique furniture business. Nobody seemed to want antique furniture—and that was that.

He had always wanted to be a doctor, but failed the examinations. His friends told him the questions were too hard for any except those who had given years to the study of medicine and surgery. John said he profoundly disagreed. The questions were easy enough; it was the answers that were so difficult.

John was connected with the Ministry of Food for some time. Then he tried Lloyd's Bank. He then cooled his ardour by working for a cold storage company; was introduced to a manufacturer of mothproof bags for whom he worked for a while before joining the staffs of two newspapers.

He then decided that it would be a funny thing if he could not be funny himself and took an engagement at the Windmill Theatre in a non-stop variety which, of course, really and truly summed up the whole of his career thus far.

And now he is the comedian who can say so much about nothing that he would have been invaluable to Shakespeare. Get John Tilley talking, and you lose count of time.

W.-W.



John Tilley

Tit-bits from Radio History

# The Mystery of Operator Szek

WHAT became of Wireless Operator Szek? In his absorbingly interesting book "Espionage" (published by Eveleigh Nash and Grayson, Ltd, and translated by Bernard Miall) Count Berndorff tells us that although large sums of money have been spent, to this day the fate of Alexander Szek remains a mystery.

The operator's mother was an English woman, his father a wealthy Austrian merchant. In August, 1914 the family lived in Brussels. On the German occupation, an officer of the command came and took up his quarters in the house. Alexander then dabbled in wireless as a hobby. At the earliest possible moment the lad acquainted the officer with this fact, adding that he possessed a set in working order.

## Very Ingenious Apparatus

So that he should not be suspected as a spy, Szek asked that the Brussels command should be immediately informed. An officer of the signalling corps called at the house, and during his inspection noted that the young man had constructed an apparatus which at that period was considered to be very ingenious.

The officer reported to the military authorities that he had discovered a man with an extraordinary knowledge of the technique of wireless, and suggested that his services might be used to advantage. Consequent upon very searching inquiries the Germans found that Alexander's father was highly respected in Viennese circles.

Well-known for his patriotism, his wife was no less reliable. Both were entirely above suspicion. The question was put as to whether young Szek could be employed in a sphere where military secrets would be available. The reply was that there was no question about it.

Thus it came about that the young experimenter found himself employed in a civilian capacity, at first as a wireless engineer in a German station. He was soon promoted, however, to a job in which he supervised the continuous reception of messages on different wavelengths, and eventually reached the highest post available.

Through this station messages of extreme importance to the German Government and Great General Staff were dealt with. Every message was condensed into a specially secret code. Naturally, this was jealously guarded, and used only in messages addressed to the Great General H.Q., the Governor-Generals, and the foreign embassies and legations of the Imperial Government.

Actually, the code book consisted of two volumes, and was so arranged that one was quite useless without the other. The few officials into whose hands the book came were the only persons allowed to touch it. It was and still is claimed that, so secret was this code, it could never be deciphered.

Imagine the utter consternation and violent heart-beats in German diplomatic and military circles then, when, at the end of February, 1917, Reuter's Agency published the text of a secret letter from the German Secretary of State, Zimmermann, to the German Minister in Mexico, von Eckhard! Reuter's recorded, moreover, that the contents of the letter were known in the United States, and all the Allied countries.

In the Reichstag, Zimmermann expressed himself at loss to understand how the Americans knew the text of the secret letter, being written, as it was, in absolutely secret cipher. He did not explain how the letter had been forwarded, but the suggestion that it had been posted or given to a courier was dis-



missed as absurd. The communication was not dispatched by either method.

As we have previously seen, the code books, or book, was accessible to only a few, and Alexander Szek was one of them. Night and day in the receiving room of the station, he dealt with, and deciphered, secret State telegrams, for this latter was one of his duties.

How they accomplished it is not yet known, but the English Secret Service managed to enlist the services of the young man. At first, he himself proposed to steal the code books, and escape with them over the Dutch frontier. It was recognised, of course, that this would mean the key of the cipher being changed upon discovery of the theft.

## Copied from Cover to Cover

So, alone in the instrument room, for a number of successive nights, Szek copied the whole of both books from cover to cover. He then fled for the Dutch frontier and, using a wooden apparatus, pushed aside the electrically charged guard wires, crossed into Holland, and from that very moment, although the British Secret Service received the code book (or rather a copy thereof) by which they were able to decipher all the State dispatches from Germany, Count Berndorff asserts that Szek has never been heard of since. W. T. L.

## A Chat with a Bus Driver

Another of Our Three-minute Interviews

HE only murmured sleepily to my opening remarks on the weather, but on mentioning radio he brightened considerably. In fact, he became quite warm. He was not a constructor; only a listener. I say "was" not a constructor, for I believe I convinced him that next time he thinks of changing his set he must build one himself.

"You're only interested in listening? Then what interests you most?" I asked.

"Well, of course I like vaudeville best of all, but I don't expect it every night."

"Are you at all interested in classical music?"

"No. I don't like it, but other members of the family do; so I have to stand down sometimes. I like the lighter music, like that played by the Commodore Grand Orchestra, the B.B.C. Military Band, and Tom Jones' Orchestra, and also some of the organ music—like that from the Regal."

"What time do you usually listen-in?" I asked, for it was nearly midnight.

"That depends on my turns. Some days I'm finished at four o'clock, other days—as to-day—I'm on till a quarter to twelve; so that really I have no set time for listening. But on the days I am at home in the morning I would like a little more music before twelve o'clock.

Days when the rain keeps me in, I look to my wireless to provide entertainment; but I am often disappointed. Surely the B.B.C. could find someone to play a few gramophone records?"

"You like records?"

"Oh, yes, and I like Christopher Stone. I think his programme compares very favourably with vaudeville, for he certainly gives variety."

"What about talks?" I asked.

"Generally I'm not interested, for I find them rather boring. After a day's work I prefer music, but sometimes I find somebody interesting. One person I particularly like is Commander King-Hall; the other members of the family don't like political talks, and it is at these times that they have to stand down. Oh, I must not forget the news bulletin and weather forecast. How we curse those forecasts, but we still wait for them. The news bulletin is useful, too, and the football results."

"Taking the programmes as a whole, then, you consider that they cater for all?"

"I do. With the millions of listeners as an audience, I think the people concerned fulfil their jobs very well. I don't envy them."

"What do you think of the Lucerne Plan?" I asked.

"Well, I don't get many foreign stations on my set. Radio Paris and Luxembourg are about the only ones I listen to. I have not had an opportunity to listen to them since this new plan came into operation. Well, I get off here; so I must say cheerio!"

And, jumping off the bus, he hurried off home to a warm supper (I hope!). J. A. P.

## Crime and Radio in New York

By Our Special Correspondent: LIONEL MERDLER

THAT the police departments in New York are fully alive to the advantages of radio communication is borne out by this advertisement of the police commissioner in the New York subways:

"If you see a crime call or dial operator, say 'Police,' give the street number and in two minutes RADIO POLICE are there. HELP FIGHT CRIME—James S. Bolan, Police Commissioner."

We are glad that the liquor laws have now been repealed so that false alarms will not be too frequent.

## Extensive System in Use

A very extensive system has now been fitted up at police headquarters in New York, and transmitters are located in various parts of the city. A careful analysis has been made of the advantages of this method of communication and results were so completely convincing that the system has been extended to all police cars.

A degree of efficiency has now been reached by this means that outrivals any system unequipped with radio. For a radio engineer it must almost be a pleasure to commit a crime with such a system in operation.

# Sorting Out the Lucerne Wave

with Special Reference to the 1934 Ether Searcher



L.N.A. photo

The multi-vibrator which checks the wavemeter used at the B.B.C.'s checking station at Tatsfield

IT is not given to every household to buy or construct a multi-valve superhet; in many cases a cheaper yet still perfectly efficient receiver is required. Again, it is not every listener who requires to make up a sixty- or seventy-station log merely for the sake of bragging that he has toured Europe.

Most of the five million odd—in fact nearly six million—holders of licences in the British Isles require a set which will give them the means of receiving three or four B.B.C. programmes and, say, another ten or twelve Continental wireless entertainments on any given evening; they must be easy to tune in, at good loud-speaker strength, and the reproduction of both music and speech must be pleasing.

These, I take it, are the requirements of the average listener who does not wish to spend much on his hobby, and in the 1934 Ether Searcher I am convinced he will find what he requires.

It possesses many advantages; it is inexpensive, easy to build, sufficiently selective to permit a clear reception of worth-while transmissions, makes the most of three valves and is consequently cheap to maintain. As regards power, it is endowed with all the necessary punch to permit the use of a good permanent-magnet moving-coil loud-speaker and the volume obtained on the more powerful broadcasts is sufficient to fill comfortably an average size room.

## Making a "Lucerne" Log

For a simple two-tuned circuit it is remarkably selective; it scores many points in this respect and for this sole reason proved very useful in helping me to draw up a new log of stations according to the Lucerne positions they occupy in the medium and long wavebands.

We have not yet recovered from the shock

of the general change-over and therefore, barring a definite number of broadcasts of which the channels appear to be relatively clear, it is still somewhat early to judge whether some of the

no lack of stations rated at from 50 to 100 kilowatts. These provide hefty signals which, with a three-valver such as the 1934 Ether Searcher, you cannot fail to pick up. Look at the log annexed; it was compiled in less than two hours, a period which permitted a check-over of several broadcasts, and it contains, as you will quickly observe, most of the

Although this article is chiefly concerned with the 1934 Ether Searcher, our contributor's explanation for making out a log of broadcasting stations applies equally well to any receiver that needs re-calibrating now that the Lucerne Plan has come into operation. The latest wavelengths of the medium-wavelength stations appear on page 142



Chassis version of the 1934 Ether Searcher. A full-size blueprint of the under side of the chassis appears on the covers of this issue

broadcasters are better received on their new wavelengths than when they were working on the Prague Plan.

Most of my time during the past week has been spent in a re-calibration of my wireless receivers; this has been necessary owing to the fact that all stations have not taken up their new allocations and consequently it has been my lot every night to make a search for the dissenters to the Lucerne Plan.

It is some time since some of the older hands have had the job of finding out where the

European stations you are likely to receive on any one evening.

The first, if only casual, twirl of the dial will bring you a few signals; settle down at once on the strongest and ascertain from which transmitter it emanates. It is more than likely that it is one of the National or Regional broadcasts. My method when dealing with a set which is quite new to me, and of which the dial is not marked otherwise than in wavelengths or kilocycles, is to follow a transmission right through.

It is a simple matter to take the London National or Regional programme, make a note of what it is, and carefully twirl the condenser dial to pick up the other stations in the particular network taking the same entertainment. Do the same with both Regional and National broadcasts and thus secure definite landmarks on the scale which you know accurately correspond with the published wavelengths or kilocycles of the B.B.C. stations.

I have purposely mentioned the B.B.C. inasmuch as they hold a reputation for accuracy; so much cannot be said of all our Continental friends.

Having jotted down the readings for the home transmitters—a proceeding which has narrowed down the search—look at the list to find some nearby foreigners! Gradually, by careful tuning, you will encounter no difficulty in establishing quickly and correctly a log which will assist you in finding a required station at any future time.

There are roughly in Europe to-day over two hundred and twenty stations operating daily, but it must be borne in mind that to all intents and purposes in the British Isles we can only rely on those which possess exclusive channels. Transmitters on shared wavelengths may be heard at times, inasmuch as one may close down before its partner and thus leave the channel free.

## A Special Article by J. Godchaux Abrahams

various transmissions are tuned in on the condenser dial. We had become so accustomed to the Prague Plan that this recent upheaval has landed us high and dry.

The most practical plan, barring the slightly more technical method of drawing a graph, is to take the list of wavelengths published in AMATEUR WIRELESS and, starting at some point in the scale, pick out, say, a portion of the band which contains a sprinkling of high-power transmitters on exclusive wavelengths.

If you glance at the list you will find there is

# Wavelengths—

## 1934 Ether Searcher

Do not worry about broadcasts on international or national common waves. Although in the latter case where synchronisation is good you will pick up the broadcast, it is, however, likely to be wobbly and except in such instances as, say, Frankfurt-am-Main, it is nearly always possible to hear the "mother" station on her own exclusive channel.

### On Exclusive Wavelengths

Now, the greater part of the 1934 Ether Searcher log consists of transmissions working on exclusive wavelengths, or if shared are those coupled with stations so very distant from the one heard that the broadcasts suffer little interference. But the list is far from being complete, and with care you should be able to enlarge it considerably.

So far as regards the medium waveband, the Lucerne Plan has worked well; generally speaking, British National and Regional, German, Italian, Belgian, the three Swiss transmitters, most of the Czech and some of the Swedes are clear.

You will undoubtedly encounter mush here and there, and frequently strike it between well-known stations; these you will find are shared channels which, although useless to us, are practicable in their local service areas.

As regards the long waves, we do not find the stations working in such friendly co-operation. Although, on this simple set, I was able to log fourteen transmissions, I do not pretend to affirm that all were clear; some on this particular evening possessed no programme value whatever as they were suffering from neighbourly—or rather unneighbourly!—interference.

Such was the case of Eiffel Tower which, although advertised on 1,446.7 metres, was actually operating on 1,392 metres, below Warsaw on 1,412 metres! Neither the Frenchman nor the Pole provided a clean reception.

Kootwijk, a powerful signal on 1,875 metres, was rudely shaken by the 100-kilowatt Moscow (RCZ) transmitter which accompanied the Dutchman's broadcast with a "jabberwocky" style of running commentary.

### Stations Received on the 1934 Ether Searcher

MEDIUM WAVES			Station		
Station	Metres	Condenser Reading	Station	Metres	Condenser Readings
Fécamp	225.6	22	Prague	470.2	140
Trieste	245.5	28	Brussels	483.9	143
London National	261.1	36	Vicnna	506.7	155
Bordeaux	278.6	46	Mühlacker	522.6	160
Bari (faint)	283.3	49	Athlone	531	164
Scottish National	285.7	50	Beromuenster	539.6	167
Heilsberg	291	52	Budapest	549.5	175
North National	296.2	57			
Hilversum	301.5	60	LONG WAVES		
West Regional	307.1	63	Croydon	900	38
Poste Parisien	312.8	65	Moscow	1,107	52
Breslau	315.8	66	Oslo	1,186	58
Hamburg	331.9	74	Leningrad	1,224	63
London Regional	342.1	80	Kalundborg	1,261	70
Strasbourg	349.2	85	Luxembourg	1,304	75
Berlin	356.7	90	Motala	1,350 (?)	85
Scottish Regional	373.1	96	Warsaw	1,411	88
Leipzig	382.2	102	Eiffel Tower	1,442 (?)	92
Midland Regional	391.1	110	Daventry	1,500	96
Rome	420.8	120	Zeesen	1,570	118
North Regional	449.1	132	Moscow	1,714	125
Langenberg	455.9	137	Radio Paris	1,796	140
			Kootwijk	1,875	155

Kalundborg was blanketed by Radio Luxembourg—an intruder in the waveband—which is keeping its position through sheer lung power. But even if we deduct these few stations we still have a fair number to fall back upon.

It is difficult to forecast when the tangle on the long waveband will be straightened out, seeing that there are only seventeen channels available and a greater number of applicants than can be accommodated.

The making of a log such as I have described brings with it—at least for the time being—many surprises, as on both bands during the periods I devoted to this work I came across broadcasters who, to use an Irishism, "officially were not there."

Cork's old wave) and also its high power.

In the same way, Reykjavik, which I could seldom hear formerly in London, is now a "possible" on 1,639 metres as it does not have to share the wavelength with Ankara and Kaunas, the latter having remained as the "final" broadcaster on 1,936 metres.

### Dance Music from Russia

The 500-kilowatt at Moscow now operating on 1,714 metres (which, by the way, has taken over the duties of the old T.U. station and also broadcasts on 50 metres) is a stentor; you cannot fail to pick it up as it is clear of both Radio Paris and the Deutschlandsender. A feature I noticed particularly on a few nights ago was that the studio was actually broadcasting dance music; although not of the conventional jazz pattern, it possessed a lively lilt, and from the applause, the audience found favour with it. RCZ of Moscow, which is the transmitter of which you hear broadcasts as a background to Kootwijk (Hilversum programme) on 1,875 metres, has departed from its policy of giving out speech only; I logged this station relaying a concert from Leningrad recently, the latter working on 1,224 metres.

Another point about the Moscow high-power station to be observed is that it has adopted a musical interval signal consisting of a species of carillon; I do not recognise the melody.

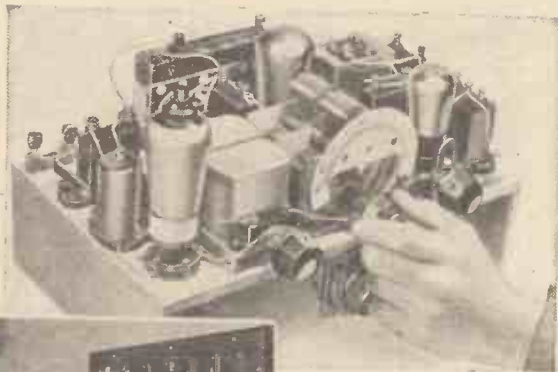
As regards programmes, except for those given by our local stations, I presume that in the excitement of the moment but few of us have been actually listening to foreign entertainments. By listening I imply holding a station for the period of a broadcast and not simply fitting from wavelength to wavelength.

### Chamber Music from Germany

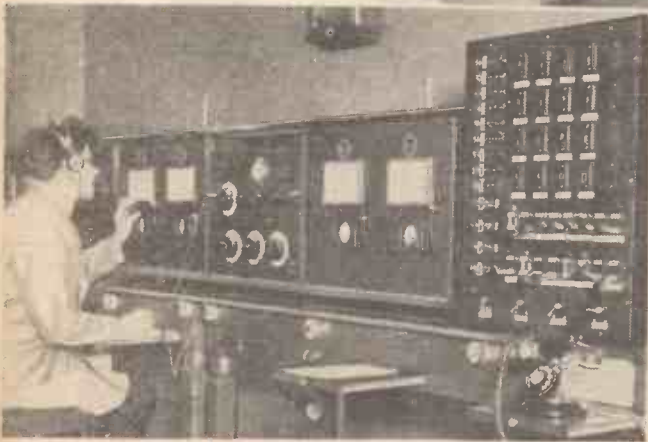
Most of the Germans, I notice, in the later hours have cut down their transmissions of dance music and in its stead are feeding their nationals with a full dose of Beethoven—chamber music in the afternoon and symphonies in the evening. Belgium, Holland, Poland and Czecho-Slovakia, however, are still on tap for the lighter fare, but for dance music *qua* dance music given me Denmark at any time.

The relays from the restaurants in the capital are carried out punctually in a businesslike manner and on most nights they are equal to the broadcasts we hear at home. No other

Continued on page 152



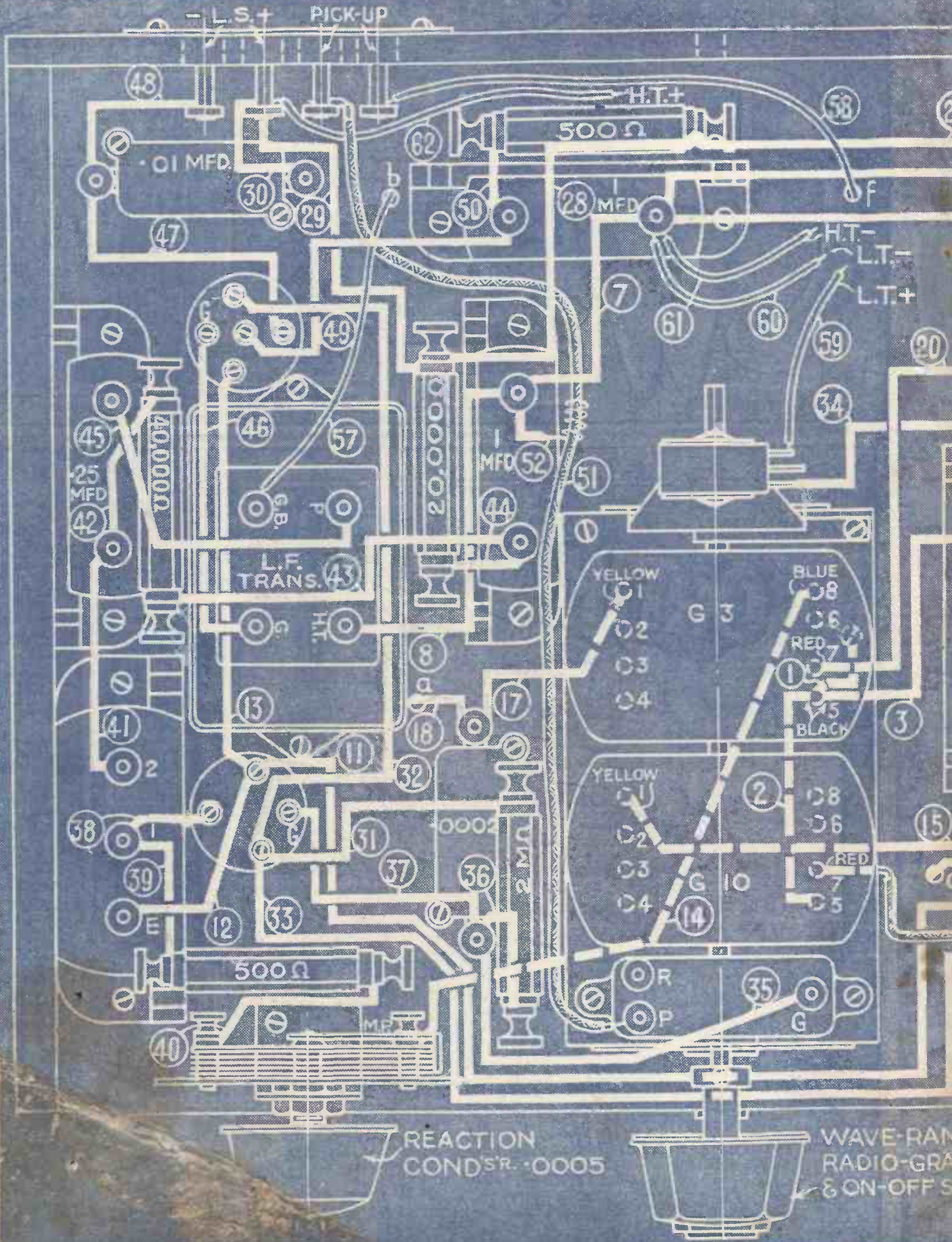
Construction of the base-board model of the 1934 Ether Searcher has already been described in these pages



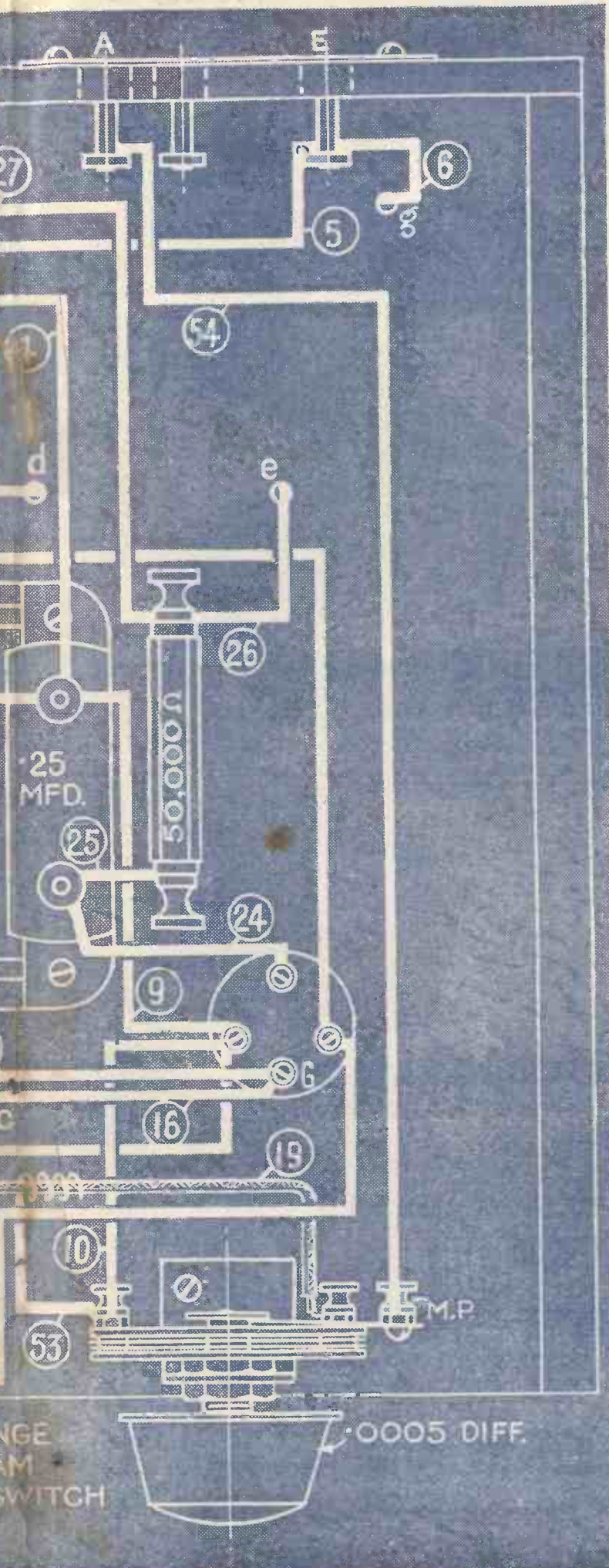
Actual photo

An engineer at work in the Brussels laboratory of the International Broadcasting Union

I found, for instance, Barcelona (EAJ1) merrily working on 377.1 metres, a position reserved for another Spanish station; and Riga and Madona have exchanged channels. Fécamp, which should be at the very bottom of the scale, has maintained both its wavelength of 225.6 metres (just above







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## MEET ALL THE STARS of the RADIO WORLD in this SPLENDID NEW WEEKLY!

"Radio Pictorial" vividly brings to life the unseen artists and personalities of the broadcasting world. Intimate stories by and about famous stars—exclusive articles and fascinating photographs. "Radio Pictorial" makes an instant appeal to every listener. The February 2 issue on sale next Friday, is wonderful value for twopence—Order your copy now to make sure of getting a copy.

Another splendid list of contributors in February 2 issue. Harry Roy, the popular Mayfair dance-band leader, gives a personal account of his life story. Captain H. B. T. Wakelam, the B.B.C. sports commentator, supplies an interesting article on the Scotland v. Wales rugby broadcast. There is also an intimate instalment of Henry Hall's life story, together with many other equally interesting and exclusive features.



# RADIO PICTORIAL

ON SALE EVERYWHERE - ORDER YOURS NOW

# Lucerne Wavelengths

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

Metres	Kilo-cycles	Station and Call Sign	Country	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Country	Power (Kw.)
201.1	1,492	Bordeaux-Sud-Ouest	France	3	304.3	986	Genoa	Italy	10
203.5	1,474	Plymouth	Great Britain	3	304.3	986	Cracow	Poland	1.7
203.5	1,474	Bournemouth	Great Britain	1	307.1	977	West Regional	Great Britain	50
209.9	1,429	Newcastle	Great Britain	1	309.9	968	Grenoble PTT	France	2
209.9	1,429	Beziers	France	1.5	309.9	968	Odessa	U.S.S.R.	10
209.9	1,429	Radio LL, Paris	France	1.2	312.8	959	Poste Parisien, Paris	France	60
215.4	1,393	Radio Lyon	France	7	315.8	950	Breslau	Germany	60
218.2	1,375	(Basle, Berne)	Switzerland	5	318.8	941	Algiers	North Africa	13
221.1	1,357	Turin (2)	Italy	2	318.8	941	Goteborg	Sweden	10
222.6	1,348	Vitus, Paris	France	1	321.9	932	Brussels (2)	Belgium	15
222.6	1,348	Nice-Juan-Les-Pins	France	5	325.4	922	Brno	Czechoslovakia	35
222.6	1,348	Dublin (2)	Irish Free State	1.2	328.6	913	Limoges PTT	France	7
222.6	1,348	Koenigsberg	Germany	5	328.6	913	Dniepropetrovsk	U.S.S.R.	15
222.6	1,348	Lodz	Poland	2	331.9	904	Hamburg	Germany	100
222.6	1,348	Milan Vigentino (2)	Italy	7	335.2	895	Radio Toulouse	France	8
224	1,339	Montpellier	France	8	335.2	895	Helsinki	Finland	10
225.6	1,330	Fecamp (R. Normandie)	France	10	338.6	886	Graz	Austria	7
225.6	1,330	Hanover	Germany	1.5	342.1	877	London Regional	Great Britain	50
225.6	1,330	Bremen	Germany	1.5	345.6	868	Poznan	Poland	1.9
225.6	1,330	Flensburg	Germany	5	349.2	859	Strasbourg	France	15
225.6	1,330	Stettin	Germany	5	352.9	850	Bergen	Norway	1
225.6	1,330	Magdeburg	Germany	5	352.9	850	Valencia	Spain	3.0
227.1	1,321	Budapest (2)	Hungary	3	356.7	841	Berlin	Germany	100
230.2	1,303	Danzig	Germany	5	360.6	832	Moscow (4)	U.S.S.R.	20
231.8	1,294	Linz	Austria	5	364.5	823	Bucharest	Roumania	12
231.8	1,294	Salzburg	Austria	5	368.6	814	Milan	Italy	50
231.8	1,294	Klagenfurt	Austria	5	373.1	804	Scottish Regional	Great Britain	50
231.8	1,294	Dornbirn	Austria	0.2	373.1	804	Salonika	Greece	1.5
233.5	1,285	Aberdeen	Great Britain	2	377.4	795	Lwow	Poland	21.5
236.8	1,267	Nurnberg	Germany	2	377.4	795	Barcelona (EAI1)	Spain	8
236.8	1,267	Dresden	Germany	0.5	382.2	785	Leipzig	Germany	120
238.5	1,258	Madona	Latvia	15	386.6	776	Toulouse PTT	France	7
238.5	1,258	San Sebastian (EAI8)	Spain	6.6	391.1	767	Midland Regional	Great Britain	25
241.9	1,240	Cork	Irish Free State	1	395.8	758	Katowice	Poland	16
243.7	1,231	Gielwitz	Germany	5	400.5	749	Marseilles PTT	France	2.5
245.5	1,222	Trieste	Italy	10	400.5	749	Vilpuuri	Finland	13.2
247.2	1,213	Lille PTT	France	1.4	405.4	740	Munich	Germany	100
249.2	1,204	Prague Stranice (2)	Czechoslovakia	3	410.4	731	Seville	Spain	1.5
251	1,195	Frankfurt-am-Main	Germany	17	410.4	731	Tallinn	Estonia	11
251	1,195	Trier	Germany	2	415.5	722	Dorpat	Estonia	0.5
251	1,195	Freiburg im Breisgau	Germany	5	420.8	713	Kiev	U.S.S.R.	36
251	1,195	Cassel	Germany	25	420.8	713	Rome	Italy	50
251	1,195	Kaiserlautern	Germany	1.5	426.1	704	Stockholm	Sweden	55
253.2	1,185	Kharkov (2)	U.S.S.R.	35	431.7	695	Paris PTT	France	7
255.1	1,176	Copenhagen	Denmark	75	437.3	686	Belgrade	Yugoslavia	2.8
257.1	1,167	Monte Ceneri	Switzerland	15	443.1	677	Sottens	Switzerland	25
259.1	1,158	Moravska-Ostrava	Czechoslovakia	11	449.1	668	North Regional	Great Britain	50
261.1	1,149	London National	Great Britain	50	455.9	658	Lansberg	Germany	60
261.1	1,149	West National	Great Britain	50	463	648	Lyons PTT	France	15
263.2	1,140	Turin (1)	Italy	7	470.2	638	Prague (1)	Czechoslovakia	120
265.3	1,131	Hoerby	Sweden	10	476.9	629	Trondheim	Norway	1.2
267.4	1,122	Belfast	N. Ireland	1	476.9	629	Lisbon	Portugal	20
269.5	1,113	Kosice	Czechoslovakia	2.5	483.9	620	Brussels (1)	Belgium	45
271.7	1,104	Naples	Italy	1.5	491.8	610	Florence	Italy	20
274	1,095	Barcelona (EAI5)	Spain	1.0	499.2	601	Sundsvall	Sweden	10
276.2	1,086	Falun	Sweden	5	499.2	601	Rabat	Morocco	6
276.2	1,086	Zagreb	Yugoslavia	75	506.7	592	Vienna	Austria	100
278.6	1,077	Bordeaux PTT	France	13	514.6	583	Riga	Latvia	15
280.9	1,068	Tiraspol	U.S.S.R.	10	522.9	574	Muhlacker	Germany	100
283.3	1,059	Bari	Italy	20	531	565	Athlone	Irish Free State	60
285.7	1,050	Scottish National	Great Britain	50	531	565	Palermo	Italy	3
288.6	1,040	Leningrad (2)	U.S.S.R.	100	539.6	556	Beromunster	Switzerland	60
288.6	1,040	Rennes PTT	France	1.3	549.5	546	Budapest	Hungary	120
291	1,031	Hellsberg	Germany	60	559.7	536	Wilno	Poland	16
293.5	1,022	Madrid EAJ7	Spain	3.0	559.7	536	Bolzano	Italy	1
296.2	1,013	North National	Great Britain	50	569.3	527	Tampere	Finland	1
298.8	1,004	Bratislava	Czechoslovakia	14	569.3	527	Ljubljana	Yugoslavia	7
301.5	995	Hilversum (Huizen prog.)	Holland	20	578	519	Innsbruck	Austria	5
					578	519	Hamar	Norway	7

NOTE:—The following wavelengths are common to several transmitters: 206 m. (1,456 kcs.); 207.3 m. (1,447 kcs.); 208.6 m. (1,438 kcs.); 211.3 m. (1,420 kcs.); 214 m. (1,402 kcs.); 218.2 m. (1,375 kcs.); 221.1 m. (1,357 kcs.); 225.6 m. (1,330 kcs.); 228.7 m. (1,312 kcs.); 235.1 m. (1,276 kcs.); 236.8 m. (1,267 kcs.); 251 m. (1,195 kcs.).

## Notes and Jottings

ANY readers who own the "Radio for the Million" Stationmaster 34 receiver can obtain new tuning scales marked according to the Lucerne Plan from their local dealers or direct from United Radio Manufacturers, Ltd., 63 Lincoln's Inn Fields, London, W.C.2. The price of the scale is 2s., post paid.

Do the knobs on your receiver look odd? Sets of matched knobs are made by Bulgín. A set of these will greatly enhance the appearance of your receiver. There are about twenty designs from which to choose; all are adaptable to 1/4-in., 3/16-in. and 5/32-in. spindles.

More wavelength conversion charts. These are by Ferranti for their superhet sets. One series is printed on blue card and the other on buff card. The blue one is for the original

superhet type A1 and the present Gloria types, and the buff card for the Arcadia models. Copies of these charts will be sent to all interested on request.

Esperantists will be competing for the Gueritte silver trophy, commencing at midnight, January 31, and ending midnight, February 28. This trophy is held for one year by the Esperantist who submits the best log of radio reception for the period mentioned. The test is held under the auspices of the British Esperanto Association, Inc., 142 High Holborn, W.C.1.

From February 1 all mains sets sent out from the Marconiphone factory will have their valves already in the appropriate sockets. The only protection found necessary is a small cardboard cap tied to the valve.

## Wireless for Diamond Mines

THE Consolidated Diamond Mines of South-west Africa, Ltd., have stations at Luderitzbucht (South-west Africa) and the mining camp at Oranjemund, 160 miles distant. The equipment is capable of operation on telegraphy or telephony and is regularly used for the exchange of messages on a wavelength of 1,100 metres.

Despite the severity of atmospheric disturbances prevalent in South-west Africa, communication during the past twelve months has always been possible in the morning and there have been only three days when reception at one of the stations during the afternoon has been impossible. Telegraphy is usually employed as most of the messages consist of figures.

At both stations the aerials are supported by light lattice-steel masts each 70 ft. in height. At Luderitzbucht a counterpoise earth is used as the site is on solid granite. The transmitters are Marconi type U having a power of 1.5 kilowatts and the power is obtained from paraffin-engine generator sets.

## Measuring Sound Volume

THE sound volume of musical performances can be measured by the pressure exerted by the sound waves. This measurement is carried out in so-called microbars—one microbar is the pressure exercised by a milligram weight upon a surface of one square centimetre of the microphone.

Some interesting figures of such sound pressure have lately been published in Prague by a keen fan who also enjoys a reputation as a scientist. The sound pressure of the subdued noise made by the audience in a concert hall during "complete silence" amounted still to one-thirtieth of a microbar. A concert at which five soloists, 110 instruments and 250 singers participated created a pressure of 150 microbars on the spot where the microphone was suspended—at a distance of about 18 metres.

The roar of a lion, says Mr. Wagner, the experimenter, amounts only to about 8 microbars.

## Lucerne "Specials"

FOR the new broadcasting conditions under Plan de Lucerne the Marconiphone Co., Ltd., has just produced two new instruments, one a five-valve super-het including mains rectifier, and the other the same chassis in radiogram form. They are aptly dubbed "Lucerne Specials."

Model 262 is the table console complete with moving-coil loud-speaker for A.C. mains, price 12 guineas—remarkable value. The radiogram is model 286, and at its very low price of 20 guineas it is certain of a great reception.

The D.C. mains user has not been forgotten. You can obtain the table console for 13 guineas and the radiogram for 21 guineas.

## New Coil Kit

CONSTRUCTORS of the Lucerne tuning coils described by "The Experimenters" in last week's issue will be interested to hear that Peto Scott, Ltd., can also supply the complete kit of materials, at the same price of 2s. 6d. Remarkable interest has been taken in this coil design, and hundreds of our readers are busily making them up.

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THE FANFARE OF TRUMPETS!**



**AS REPRODUCED  
BY THE  
POWER OF A  
LISSEN BATTERY**

*To Ensure Speedy Delivery, Mention "A.W." to Advertisers*



A delightful picture introducing the latest H.M.V. five-valve super-het chassis—here it is in the form of a table console set selling at the remarkably low price of 12 guineas

WE are among the first to take advantage of the latest H.M.V. development—the production of two new models, one a radio-gramophone and the other a table-console set with a similar chassis.

It has been our pleasure for the past two or three evenings to try out the radio-gramophone version—and very admirable its performance has proved.

When the model arrived at our laboratory we were pleased with the cabinet work. The wood is walnut inlaid with highly figured veneers. The whole job looks most attractive.

#### Gramophone Volume Control

With the lid closed there is only one knob to be seen—the volume control for the gramophone reproduction on the front, half way up from the top of the loud-speaker fret.

On lifting the lid you see all the controls of the set on the right and the gramophone accessories on the left. There are four main controls, consisting of a master switch, which does the wavelength changing, gramophone switching and mains on and off, a tuning knob, a tone-control knob, and lastly a radio volume control. These are conveniently grouped round the extremely clear tuning scale.

This scale, which is clearly marked in medium waves on the right and long waves on the left, is used in conjunction with a cardboard chart provided separately. This chart is marked with all the important foreign stations against their appropriate wavelength settings. It is the work of a second to find a station by comparing the figures on this chart with the actual wavelength markings on the scales of the set.

#### Lucerne Plan Policy

The makers have adopted this policy until the Lucerne Plan settles down, and then they will market their models with the main stations engraved as well as the wavelengths.

As the tuning knob is actuated the pointer moves up and down the scale, which is, of course, illuminated as soon as the set is switched on. Altogether an exceptionally good tuning arrangement.

So much for the controls. The gramophone motor and turntable on the left are fully equipped with all the latest gadgets, such as a speed regulator, an automatic brake to switch

developed type, as you can see from the brief specification panel.

A special claim made by the designers is that, thanks to the frequency-changing valve arrangement, there is no interference with other sets—no re-radiation, in other words.

Clear reception is claimed due to the inclusion of a duplex whistle suppressor of patented design. Similarly, the reception is claimed to be free from images caused by second-channel interference.

In brief, this super-het circuit is designed so that all the bugbears of the older types are eliminated, while leaving us with the unique advantages of the super-het in selectivity and range.

These are big claims, so it was with special interest that we put the radio gramophone into operation to test their validity. We first connected up to a 200-volt A.C. supply in a district some 20 miles south-west of Brookmans Park. An indoor aerial was used, with a moderately good earth.

We were gratified to find how easy it was to adjust the mains-voltage panel. Just one bolt to unscrew from its 230-volt hole and insert in the appropriate 200-volt hole. A small point, perhaps, but it pleased us.

So we switched on and awaited the heating up of the valves. Came a burst of sweet music. By accident we had hit right on a foreigner, which came through clearly and loudly and without any background noise.

We glanced at the clearly marked tuning scale and found we were on Munich's wavelength. By referring to the cardboard chart we quickly found our way about the new ether, and

off the turntable at the end of the record, and a hand brake.

Then there is the pick-up, made in a single bakelite case with its carrying arm, and spring loaded so that you lift it up bodily to change the needle—a very convenient design:

Inside the cabinet is the sort of chassis we have come to expect from the H.M.V. people. Solidly built to take the five valves; with facilities for the connection of an external loud-speaker, for a mains aerial, and for adjusting the mains voltage to suit your own supply.

A word or so on the circuit will interest our technically minded set buyers. It is for A.C. mains, this model, but please note that there is a D.C. model as well. The four chief valves are connected up in a super-het circuit of highly

meanwhile gathered a very good impression of the set's capabilities.

Selectivity is most decidedly of a very high order. We found that stations could be separated with ease and there was no "hang-over" from adjacent stations. This set does justice to the Lucerne Plan. If all sets were as good we should at this moment be hearing a chorus of praise for the new wavelength plan.

#### Clear of Background

An example of the selectivity. North Regional, Langenberg and a PTT station were all brought in clear of each other, though they are adjacent in the new wavelength line-up. All the British stations were clear of background. On the long waves, where conditions are bad at the moment, we got five good, clear programmes.

Sensitivity must be good because all the stations we listened to were at full strength with the volume control at half throttle. The mains aerial brings in such stations as Athlone and Budapest—still with the volume control down a bit.

#### BRIEF SPECIFICATION

Makers: The Gramophone Co., Ltd.

Model: 540AC.

Price: £21. D.C. Mains Model, £22 IS.

Valve Combination: Cathode-coupled screen-grid frequency-changer valve, type MS4B; intermediate-frequency variable-mu valve, type VMS4; power-grid detector, type MH4; power pentode output valve, type MPT4; and valve rectifier, type U12.

Power Supply: A.C. mains.

Remarks: Wonderful value for money. First-class quality on radio and gramophone. Very high selectivity.



View of the radiogram version of the new super-het chassis produced by H.M.V. Considering the price is only 20 guineas, the instrument is sure to be very popular. It is housed in a handsome walnut cabinet

Quality has a rich tone that most listeners will like. The top-note response is very realistic, especially with the tone control adjusted to give all the available top notes in the output.

As a radio-gramophone the instrument is a great success. Volume more than enough for dancing is available without blasting. With a little tone control the needle scratch is negligible, but the tone is still very well balanced. On test, the turntable, pick-up, auto-stop worked efficiently.

Speaking of the performance in a general way, we should say it is above the average for the type of circuit. The "clean" background is notable, mains hum being negligible and mush at a very low level.

We have not had an opportunity to try out the table-model set, but as it has the same chassis as the radiogram it ought to prove a best-seller. The price is only 12 guineas.



The Pilot Kit SERVICE was founded in 1919

# 1934 ETHER SEARCHER PILOT AUTHOR KIT EXACT TO SPECIFICATION

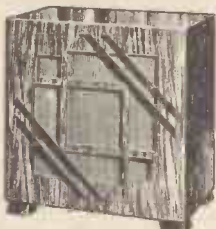


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PETO-SCOTT Permanent Magnet Moving-Coil 1934 EXTENSION SPEAKER

Suitable Output for 1001 Receivers. With inclined baffle, supported on felt cushions—Free from all resonance and boom—enhancing the already perfect tonal balance. Complete with Combined Volume Control and Switch. In Beautiful WALNUT CABINET. Suitable for any type of set or output valve. Direct only from PETO-SCOTT.



30 RATIOS



Balance in 7 monthly payments of 5/6 CASH or C.O.D. Carriage Paid, 39/6. Speaker only (less cabinet) Cash or C.O.D. Car. Pd. 29/6 or yours for 4/- down and 7 monthly payments of 4/-

## PETO-SCOTT PERMANENT-MAGNET MOVING-COIL SPEAKER



Power or Pentode Complete with input transformer. Send only 2/6, balance in 5 monthly payments of 4/-.

Cash or C.O.D. 19/6 Carriage Paid.

2/6 DOWN

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Assemble this amazing Unit yourself in less than half an hour. Gives seven times the volume with mains quality from your existing battery set. Complete Kit comprises B.V.A. Class "B" Valve, Peto-Scott Permanent Magnet Moving Coil Speaker, B.R.G. Driver Transformer and Input Choke, seven-pin Valveholder. Peto-Scott Baffle and Baseboard Assembly, all necessary Wires, Screws, and plug-in Valve Adapter, with full-size Diagrams and Assembly instructions.



Complete with Speaker Cash or C.O.D. 55/- Carriage Paid. 6/- Or Send Only 6/- Balance in 11 monthly payments of 5/-

SUITABLE FOR ANY BATTERY SET

## BARGAIN PHILCO 5 VALVE BALANCED SUPER-HETERODYNE

LOWBOY CONSOLE MODEL 5G. All Electric; seven tuned circuits with single dial control. Gives amazing performance with new economy in operating costs. Duo wavelengths; no leak between bands. Illuminated dial, no reaction; chassis and tuning condenser floating on rubber. Oversize, energized M.C. Speaker with large baffleboard gives exquisite, full tone. Beautiful cabinet in Walnut and Oriental woods with rich inlays. Height, 39" in.

LIST PRICE 22 GNS. OUR PRICE 12 GNS. Or 18 Monthly payments of 16/6.

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- 1 Peto-Scott baseboard, Metaplex, 14 in. by 9 in., with 4 s. d. runners 9 in. by 3 in. ... 3 0
- 1 British Radiogram screened H.F. choke, type 42 ... 3 6
- 1 Set Colvera iron-cored coils, G3 and G10, mounted on base with on-off and pick-up switches ... 1 6 6
- 1 J.E. two-gang .0003-mfd. Unitone variable condenser ... 12 6
- 1 Lissen H.F. by-pass unit, LN3493 ... 5 6
- 1 Telsen, type DR3, transformer ... 8 6

## LUCERNE COILS

As described in "A.W.", January 27th, 1934

Complete kit comprising 2 ready-drilled Formers, 2 Reels of enamelled Wire, 6 B.A. Terminals, Nuts and Screws. Exact to specification for Aerial or Grid Coil. Postage 6d. extra. 2 Complete Kits for both Aerial and Grid Coils, 5/- Postage 6d. extra.

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KIT "A" Author's Kit of first specified parts, including Metaplexed Baseboard, with all necessary wire, screws and flex, but less Valves, Cabinet and Speaker. CASH or C.O.D. Carriage Paid £2/2/0 Or 12 monthly payments of 4/-

KIT "B" As for Kit "A," but with Valves as specified. CASH or C.O.D. Carriage Paid, £3/3/3. Or send only 6/9. Balance in 11 monthly payments of 6/9.

KIT "C" As for Kit "A," but with Valves and specified Peto-Scott "Kontact" Cabinet and Speaker. CASH or C.O.D. Carriage Paid, £4/12/9. Or send only 8/6. Balance in 11 monthly payments of 8/6.

## 1934 WALNUT ADAPTAGRAM



38 in. high 22 in. wide 15 1/2 in. deep Speaker Compartment: 17 in. by 19 in. by 14 in.

YOURS FOR 8/3

CONVERT YOUR EXISTING SET INTO A MODERN RADIOGRAM.

As illustrated. Cash 63/- or C.O.D. Carriage 2/6 extra. Or 8/3 Deposit and 11 monthly payments of 5/9 (Carriage Paid). IN OAK OR MAHOGANY NO EXTRA.

Direct from Factor. No MIDDLEMAN'S PROFITS. Built by mastercraftsmen of the piano trade. Real inlaid walnut mortised, tenoned. French polished. With motor-board ready to take your set, speaker and special drillings or other power equipment. Plain front or varnished panels, 14 in. by 7 in., 3/- extra to cash price or 3d. 16 in. by 7 in. 18 in. by 8 in. to each monthly payment. Baffle-board, 3/6 extra.

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NEW W.B. P.M. 4A. MICROLODE PERMANENT MAGNET SPEAKER, complete with switch-controlled multi-ratio input transformer. Cash or C.O.D. Carriage Paid, £2/2/0. Balance in 7 monthly payments of 5/9.

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NEW LISSEN SKYSCRAPER FOUR ALL-WAVE CONSOLE CABINET MODEL, complete kit, comprising all components, including set of Lissen valves, cabinet and moving-coil speaker. Cash or C.O.D. Carriage Paid, £3/2/6. Balance in 11 monthly payments of 15/-.

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ATLAS C.A.25, for mains, class "B" and Q.P.P. Four tappings: 60/80, 50/90, 120, 150, 25 m/A. Cash or C.O.D. Carriage Paid, £2/19/6. Balance in 10 monthly payments of 6/-.

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SEND DIRECT to AVOID DELAY — CASH, C.O.D., or EASIWAY

# Operating the C.R. Tube from A.C. Mains

THE operation of the cathode-ray tube from A.C. mains is rendered a little difficult by reason of the extreme sensitivity of the beam to external magnetic fields. This means that it will be practically impossible to mount the mains unit close to the tube as would be done in a self-contained equipment, and in addition there is the possibility of direct coupling with the mains through the self-capacity of the transformer windings.

The possible sources of interference in the complete assembly are:—

A.C. magnetic field due to heating the cathode of the tube from raw A.C. Small as the cathode is in the standard tube, there is a possibility of this field producing a slight whirl in the electron beam, resulting in blurred focus.

A.C. ripple on the H.T. rectified supply to the anode of the tube, which will produce the same blurring effect. This will not be difficult to eradicate as the anode current of the tube is so small, and the smoothing equipment need not therefore be very elaborate.

If the linear time base is operated from A.C. the external field due to leads or transformer will produce a blurred or double line on the screen if the mains transformer is too near the tube. Ripple in the H.T. supply to the thyatron will cause the time-base to become non-linear due to the opposing effect of the ripple at certain points on the travel of the beam. This effect will be noticeable on the screen by the presence of light patches in the otherwise uniform line

on the screen. Where the A.C. is acting in opposition to the deflecting potential the beam will be slowed down in its movement and will thus produce a brighter line for that part of its travel.

Although it has nothing to do with the subject under discussion, it is interesting to note here that the principle of cathode-ray television by the "variable-density" method depends for its operation on the slowing down of the beam at different points on its travel by superimposing the

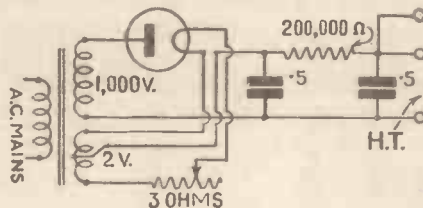


Fig. 1. The circuit diagram of the rectifier unit

picture signal on the impulse which causes the beam to traverse the screen. The beam thus moves at a different rate throughout its scanning and the momentary slowing down of the beam gives a brighter line.

### Preventing Interference

The effect can be studied by the possessors of battery-operated equipment by injecting a small A.C. voltage in series with one of the connections of the time-base to the plates.

However, for the purpose of the matter in

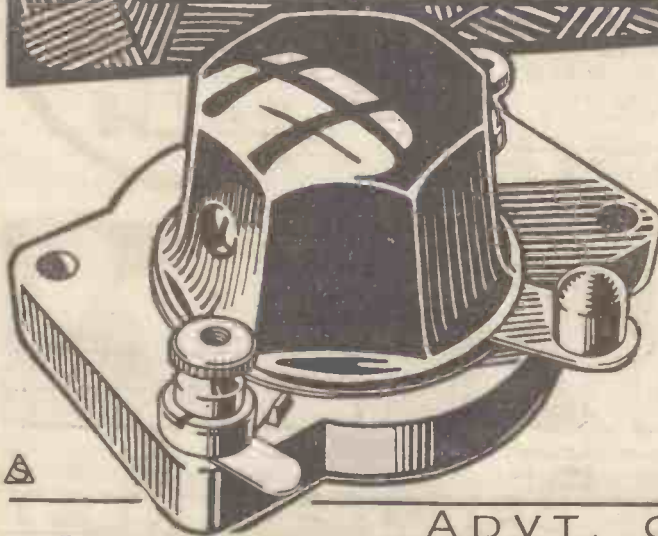
hand, this interference is a nuisance and can only be got rid of by very careful design of the H.T. rectifier unit supplying the time-base. If the thyatrons are indirectly heated (like the Ediswan MR/AC1) the cathode may be directly fed from A.C. without risk of interference unless the heater-cathode insulation of the tube is defective.

Finally, there is always the question of direct interference from the magnetic fields of the transformers, and to avoid this some experimenting should be done to find the best position of the H.T. unit. As a general rule three feet may be taken to be a safe distance between the transformer and the tube, although a great deal depends on their relative positions. Obviously, it is preferable to put the mains unit behind the tube, rather than near the deflector plates.

A steel shield surrounding the tube may be of use, but if it becomes magnetised it will be worse than useless, and accordingly it should be used with caution and suspected at the first sign of irregular movement of the beam.

The effect of a permanent field near the tube would be to cause the beam to swing in a path which would not be truly horizontal or vertical, and if a train of sine waves were examined they would be pushed over at the top, or otherwise distorted.

The foregoing list of troubles is not intended to scare the experimenter from attempting the operation of the tube from A.C., but rather to indicate where the source of interference may lie if trouble is



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TELEVISION SECTION

experienced in this direction. If the apparatus is designed and laid out, bearing the above precautions in mind, there is no reason why the tube should not be satisfactorily operated from the mains, with the corresponding advantages. The construction of the various units can be undertaken

intended to replace the H.T. battery at present in use and has been designed to be connected-on to the existing H.T. terminals of the exciter unit described in the issue of January 13.

The transformer used will have a 1,000 volt secondary winding as well as that for the rectifier filament. Messrs. Sound Sales, of Tremlett Grove, Highgate, have manufactured a special transformer for this purpose which is no larger than the ordinary mains receiver type and which will give the small current required by the anode of the tube without overheating. By the way, do not attempt to use small H.T. transformers for supplying large output valves—they are only rated to give a few milliamperes.

The H.T. rectifier for the unit needs to have special characteristics. It must safely withstand twice the voltage of the H.T. supply across the glass pinch without breakdown, and it should also be of the bright-emitter type to allow of controlling the rectified voltage. It is probable that the wireless amateur will have an old bright-emitter in stock which may serve the purpose, but a specially designed one has been produced by the Edison Swan Co. which has the further advantage that the filament only requires 2 volts for heating. This has already been used in the lineartime-base unit described previously and is known as type CR2.

The theoretical circuit diagram of the rectifier unit is given in Fig. 1 and it will immediately be noticed that the smoothing is unusual. Actually, it is adequate for the purpose since the load on the condenser is so small that there is little tendency for them to lose their charge. In the same way half-wave rectification will not be found to be a disadvantage.

If possible, a sheet-steel box should be obtained and the components fitted on a baseboard to rest inside it. This box, beside adding to the appearance of the unit, gives protection against touching the H.T. terminals and minimises the effect of the field of the transformer.

Varying the Dimensions

The dimensioned sketch of Fig. 2 suggests a suitable layout, but it is understood that this can be varied slightly to suit the dimensions of the box it is intended to use.

The rectifier filament has a 3-ohm rheostat in series which is used to control the impedance of the valve and hence the H.T. rectified voltage obtained at the terminals of the unit. The H.T. connection should be directly connected to the metal case and brought to a terminal on the outside, in order to conform to the arrangement previously adopted of connecting the H.T. of the tube to earth and leaving the cathode live.

For the time being it is better to assemble and try out the H.T. unit alone and add the L.T. circuit for the cathode supply at a later date when all is found satisfactory.

The wiring diagram of Fig. 2 is so straightforward that little detailed explanation is necessary. When wiring up, only the best quality Systoflex should be used and the leads carefully spaced out.

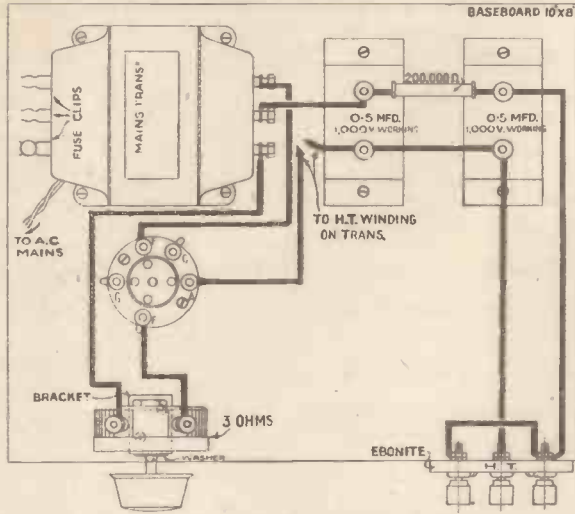


Fig. 2. The wiring diagram of the H.T. unit

gradually and each one tested as it is put into use to ensure that possible trouble is checked at its source.

The simplest circuit to be made up at the commencement is that of the H.T. rectifier supply for the anode of the tube. This is

# For the New Wavelengths

use

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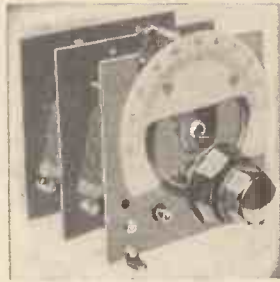
# 2!

EACH

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Conducted by J. H. Reyner, B.Sc., A.M.I.E.E.

# Our Tests of New Apparatus



Magnum two-gang condenser

## MAGNUM TWO-GANG CONDENSER

THIS is a strongly made two-gang condenser built into a heavy-gauge aluminium frame. Provision for earthing is supplied by a terminal fitted in the end plate. The trimmers are arranged separately, the back section trimmer being mounted on the top of the condenser and the front section trimmer, which takes the form of a small circular paper-dielectric condenser, is arranged to be operated from the front through a concentric knob.

A slow-motion disc drive is provided, giving smooth control with the minimum amount of backlash.

**Test Results.**—At 400 metres the measured high-frequency re-

sistance was found to be .8 ohm per section with the trimmers at minimum. This figure indicates an efficiency above the average.

The maximum capacity of the front trimmer was found to be approximately 123 picofarads, and that of the rear trimmer approximately 75 picofarads. The capacity range of the condenser was approximately 30.5 to 614 picofarads. This is a useful range and is obviously intended to cater for the extended wavelength band now in operation.

Makers: Burne-Jones & Co., Ltd.  
Price: 10s. 6d.

## MARGO AERIAL ELIMINATOR

SEVERAL aerial eliminators have recently been placed on the market, most of them based on the fact that a modern receiver will pick up quite good signals on the earth lead alone. This latest



Margo aerial eliminator

gadget is a variant of the same principle. It actually employs a tapped condenser, which is connected across the aerial and earth terminals of the set, while the tapping point is connected to earth.

The condenser is housed in a small bakelite moulding, about 1 in. diameter and 2 in. long, having two leads coming from one end which are connected to the aerial and earth terminals of the set, while a longer lead comes from the other end, this being taken to the earth connection.

**Test Results.**—We usually find with these aerial eliminators that the results obtained are no better than with the earth lead alone. In the present instance, however, this did not seem to be the case.

A simple two-valve set was connected up and the voltage across the detector produced by the local station was measured. The results obtained were about twice as good as those with the earth lead alone and were, in fact, slightly better than those obtainable with a simple indoor aerial.

The results were, of course, considerably less than those on an outdoor aerial.

Makers: C. E. Marquis.  
Price: 2s.

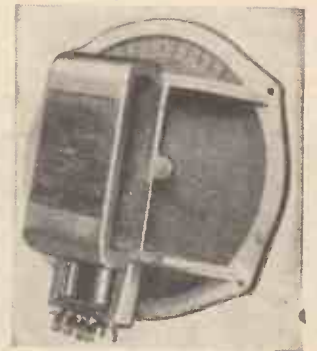
## SOUND SALES LOUD-SPEAKER

THIS is a permanent-magnet moving-coil loud-speaker having several novel features. The principal impression one gains is that of rigidity. The cone is housed on an aluminium casting, to which is bolted an E-shaped magnet.

The necessary flexibility at the edge of the cone is obtained by providing a number of radial slits instead of crimping the paper or fixing it to some other form of surround. This is said to minimise the bass resonance often obtained with moving-coil loud-speakers. A felt ring is provided over the front of the chassis, which will enable it to be bolted to a baffle with a good airtight fit.

An output transformer is provided having a tapped primary and a tapped secondary.

The primary taps are obtained by connecting across the appropriate terminal, while for tapping the secondary a flex lead is provided, which comes from the speech coil and this is connected to the terminal required.



Sound Sales loud-speaker

**Test Results.**—The loud-speaker was found to be of good sensitivity and was particularly pleasing on speech. The output is reasonably level from the upper frequency down to about 150 cycles per second. At this point a small resonance occurred, followed by a falling off in the sensitivity.

A very wide range of impedances can be obtained, as will be seen from the table attached giving a number of random figures measured at a frequency of 1,000 cycles per second.

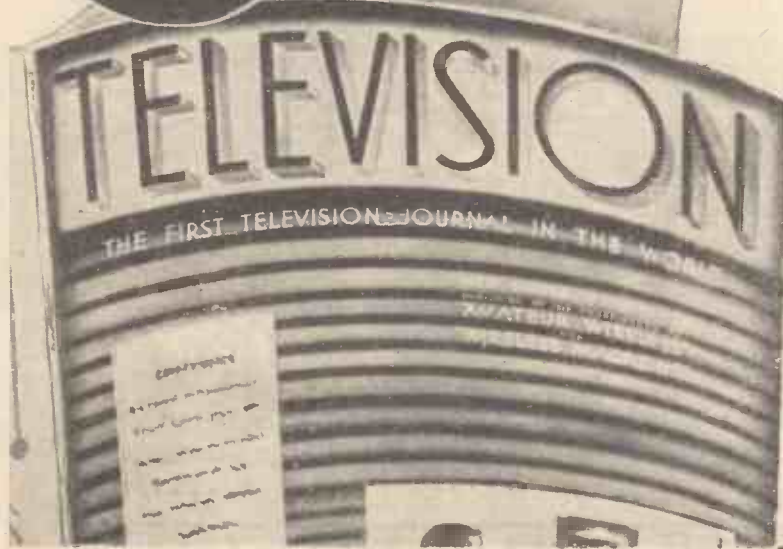
Primary	on terminal	Secondary	Impedance
I-3	...	4	4,400
I-3	...	6	7,400
I-4	...	7	8,500
I-4	...	6	12,400
I-4	...	5	16,500

It would be an improvement if the markings on the output transformer were made a little plainer and a leaflet giving the terminal connections for various impedances would be of assistance.

Makers: Sound Sales, Ltd.  
Price: £2.

# OUTSTANDING SUCCESS of the NEW TELEVISION

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The January issue of "Television," the first of the new series, was an instant success, and was sold out within three days of publication.

The demand for the February issue, which is on sale to-day, will be equally heavy.

"Television," in its new form, is considerably increased in size, many new features have been added, and better paper is used.

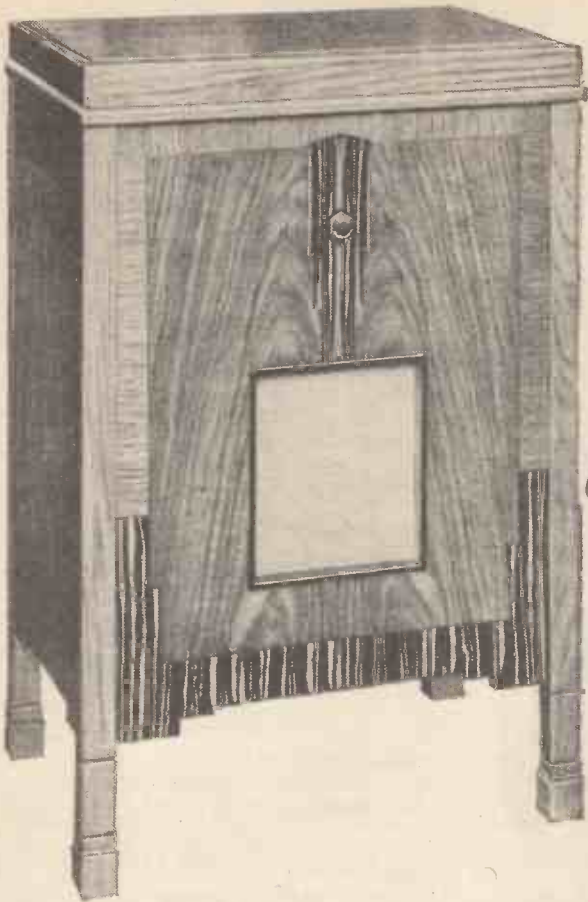
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## SOME OF THE CONTENTS OF THE FEBRUARY ISSUE

- The Standard Television Receiver
- All about Gas-discharge Lamps
- The Baird Kit for the Home-constructor
- Television at the Physical Society Exhibition
- Studio and Screen
- Foreign News, etc., etc.

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It is the victory of "His Master's Voice" that has made it possible for almost everyone to enjoy the luxury of the all-electric radiogramophone. The Superhet Five-Forty Radiogram can be bought from any "His Master's Voice" dealer for the astonishingly low price of 20 guineas, or a small deposit and £1 a month.

And it is magnificent! Have it demonstrated! Without any possible doubt you will be profoundly impressed by the perfection of this instrument in its very lovely walnut figured cabinet. Both from the radio and from the gramophone the tone that it gives you is the very cream of modern reproduction. A luxury indeed! But one that you can easily afford.

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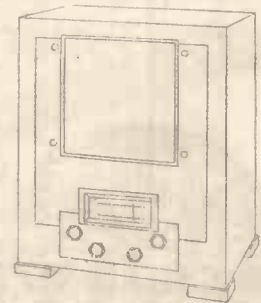
### LISTEN TO THE TONE!

Superb tone—tone that is true to life. Tone that only the older-than-radio experience of "His Master's Voice" sound-engineers could give you. Ask your dealer about the Five-Forty to-day! And remember—listen to the tone.

When you buy this instrument ask for the free gramophone record which is included with the equipment in order to demonstrate to you at home the beautiful reproduction of modern records possible with "His Master's Voice" radiogramophones.

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MODEL 440.—The Superhet Four-Forty is an achievement. It need only be compared with other sets to convince you of its superb Tone quality, its Sensitivity and its Selectivity—perfect ability to separate completely the station you want from any other. There is volume without distortion. There is ease of tuning. The energised moving coil speaker is of the latest type and mains can be used as an aerial. 5 valve (including rectifier) A.C. model 12 gns. D.C. model 13 gns.

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Send a postcard immediately for special illustrated leaflet, to

THE GRAMOPHONE COMPANY LTD., 108E CLERKENWELL ROAD, LONDON, E.C.1. (PRICES DO NOT APPLY IN I.F.S.)

## New Battery Economiser

**M**OST of you know something about the Westector battery economiser scheme. It is possible to use a super-pentode output valve, giving a large volume, and yet keep down the battery consumption.

The pentode is over-biased to give a very low anode current. Then a part of the anode current is rectified by the Westector and fed back through a resistance network so that a voltage is set up in opposition to the grid bias on the pentode.

When the signal is large the rectified current is also large, and so is the opposition voltage.



Underside view of the Graham Farish battery economiser unit, showing the resistance and clips for the Westector

This means that a large input signal reduces the grid bias to normal working conditions, because the overbiasing is counterbalanced by the opposition voltage.

It is a good scheme for keeping down the

anode current to a low value except when a large standing current is necessary—as when the signal is large.

Graham Farish, Ltd., of Masons Hill, Bromley, have seen the advantage of this scheme, and have just produced a neat little booster unit for use either with small power or pentode valves or for large pentodes. The price of the unit, which comprises all the condensers and resistances, is only 7s. 6d.

Two of the resistances and the two condensers are mounted in the top part of the bakelite moulding, with a neat metal can over them. Four terminals for external connections are also fitted here. Then underneath is the remaining resistance and clips for taking the type W4 Westector unit, bought separately.

The makers claim that you can effect a 60 per cent. saving of current with this unit.

For the man with a small pentode or power valve who is content with moderate volume the unit should certainly appeal on the score of battery economy. But for the man who wants really big volume with normal battery running cost the unit also has attractions.



Top view of the Graham Farish unit, showing the compact arrangement of the two condensers and two resistances.

## 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.

### Short-wave Specialists

**E**VERY short-wave fan should have a copy of the Eddystone catalogue of short-wave apparatus. It contains two-pin, four-pin and six-pin low-loss coils and coil units, tuning and reaction condensers, vernier disc drives, valve holders, and a host of useful accessories such as extension spindles, mounting brackets, formers for coils and high-frequency chokes, and mounting pieces for valve-holders and coil bases. **135**

### For Your Aerial

All standard components made by Ward and Goldstone, Ltd., are listed in the R/130 catalogue. Also there are numerous accessories such as aerial stand-off insulators, guide-arms for lead-in wires, and all components needed when constructing receivers and units. Of special interest is the Goltone shielded lead-in, a great help to listeners in districts where static interferes with reception. **136**

### Accumulators For All

Are you needing a new low-tension accumulator? You should certainly consider one of the Dagenite series. There is a type to suit you in their range. Also high-tension accumulators, providing an economical way of obtaining high-tension current. All these accumulators are guaranteed against faulty material and workmanship. **137**



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# WIRELESS MAGAZINE

February issue . . .

The complete operation of the Lucerne Plan, which has recently come into force, packs the broadcast stations all over Europe together in a wave-length spectrum.

The "Wireless Magazine" has therefore produced a set, described in the February issue, now on sale, to overcome the difficulties.

This four-valver—The Lucerne Straight Four—gives the best possible reception under the new plan.

Full constructional details together with a wiring plan, appear in the February issue. Get your copy to-day and start building this new receiver—The Lucerne Straight Four.

### SOME OTHER CONTENTS OF THE FEBRUARY ISSUE

- Plan de Lucerne.
- 70 m.p.h. Broadcasting.
- Broadcasting from the South Pole.
- Droitwich—Britain's New High-power Station.
- Radio and War.
- List of World Short-wavers.
- Designing Your Own D.C. Set.
- Quality from the Modern Loud-speaker.
- Wireless Jobs Made Easy for Mr. Everyman.
- Building the "Emigrator."
- Choosing Your Gramophone Records.
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## With the Amateurs on the Short Waves

By Kenneth Jowers

QUITE a number of people have written to me recently querying my remarks about the wavelengths used by trawlers.

A week or two ago, I said that their most popular wavelength was 164 metres, which was right in the middle of the 1.75-megacycle amateur band.

To clear up this point I am giving you here the approximate wavelengths allocated to British trawlers:—

From 200 down to 196.1 metres they are licensed to transmit C.W. and I.C.W. Between 186 and 184 metres they are licensed for C.W., I.C.W., and telephony, while the wavelengths between 184 and 179 metres are used as calling waves. Then we come down to the amateur band. The bulk of this is shared with trawlers.

### Unavoidable Interference

Actually, they are licensed to broadcast telephony between 174 and 155.8 metres, so all of you who are worrying over interference on this waveband will realise that it is quite unavoidable.

I came across an interesting point with an A.C. mains super-het converter. It had been in use for some time, very satisfactorily, until I changed the rectifying valve from the old full-wave directly heated type to one of the new full-wave indirectly heated type. The trouble I had was that at about ten positions on the tuning dial there was a very bad 1,000-cycle note, just like modulation hum.

Different values of modulation condensers had absolutely no effect, and this annoying hum could not be cut out. Then, quite by accident, I found a solution to the trouble. As you know, the cure for modulation hum is to connect two .01-microfarad condensers in series across the anodes of the rectifying valves and take the centre point to earth.

Now this is all very nice with a directly heated rectifying valve, but with the new indirectly heated type it simply does not work, at least, not on short waves. What you have to do is to use smaller-capacity condensers, round about .005-microfarad, and take the centre point directly to the cathode, instead of to earth.

There is usually a bias resistance in series with the cathode so connect it to the valve-holder side of this resistance.

Over the week-end I was listening to one or two amateur stations on the 80-metre band and was very struck with the bad quality. So I tuned in to one or two stations which I know are very reliable and, to my surprise, these were just as bad. I found out later in the week that this bad quality was prevalent during the whole week-end. All the stations that I heard were in the same locality so I got in touch with one of them to find out what was the trouble.

### Bad Conditions

He apparently knew all about it, although he did not know the exact cause of the trouble. He said conditions had been very bad over the week-end, what with frosts, fog, and so on, and all of his fellow transmitters had complained of the same trouble.

If anyone has any idea as to what causes this bad quality I should like to know. I haven't come across it before.

Conditions on the 60-metre band are improving a lot; for the first time for a long while, W8XK, W3XAL, and W2XE are quite reliable signals and can be picked up quite well and free from interference by GSA.

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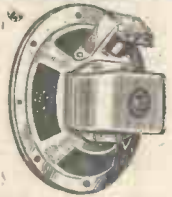


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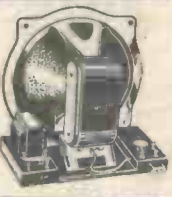


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ELIMINATORS.—D.C. 20 m/a., 8/6; 25 m/a., 14/0. A.C. Westinghouse Rectifier Incorporated, 25 m/a., 24/6. Britannia M.C. Speakers, P.M. Large Magnet, 13/9. New and guaranteed stock.—L. Harding, 6 Kings Road, Leytonstone, E.11.

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Please write concisely, giving essential particulars. A fee of one shilling postal order (not stamps), a stamped, addressed envelope and the coupon on the last page must accompany all queries.

Not more than two questions should be sent at any time.

The designing of apparatus or receivers cannot be undertaken.

Slight modifications of a straightforward nature only can be made to blueprints. For more serious alterations the minimum charge is 2/6.

Blueprints supplied by us will be charged for in addition, but of course, readers may send their own blueprints for alteration.

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We do not answer queries in cases where the fee is omitted.

Queries should be addressed to the Query Department, "Amateur Wireless," 58/61, Fetter Lane, London, E.C.4.

Sorting Out the Lucerne Wavelengths

Continued from page 141

Continental bands can compete with them.

Vienna also is a worthwhile transmitter inasmuch as it is largely featuring popular music of a light character and relays of tuneful musical comedies and operettas. It is always an easy matter to tune in this station which, with Athlone and Budapest, may be numbered amongst the stars on the upper part of the medium waveband.

Under the Lucerne Plan, Brussels No. 1, Beromuenster, Berlin, Strasbourg, Hamburg, Bari, Bordeaux and Trieste among the foreigners have greatly benefited by the change in their wavelengths; their broadcasts seem to have acquired more power and are consequently better received.

As to the B.B.C. stations, the slight alterations which they were required to make in their wavelengths have in no way affected their reception. Perhaps of the various countries which have adhered to the Lucerne Plan, we are the most favoured.

Conditions during the past few days have been exceptionally good for listening to distant broadcasts; it is an ideal period to work up an interesting log. The many hours I have spent on doing so since January 15 have been very pleasant ones, as it has revived my interest in radio. It also gave me the opportunity of trying out the 1934 Ether Searcher.

Personally, I consider that every listener should possess an emergency set as, if your ordinary instrument needs repair for any reason whatsoever, a substitute is called for. The 1934 Ether Searcher is exactly what is wanted to fulfil that duty and after trial I am sure that it would favourably replace—at small cost—that "old wireless."

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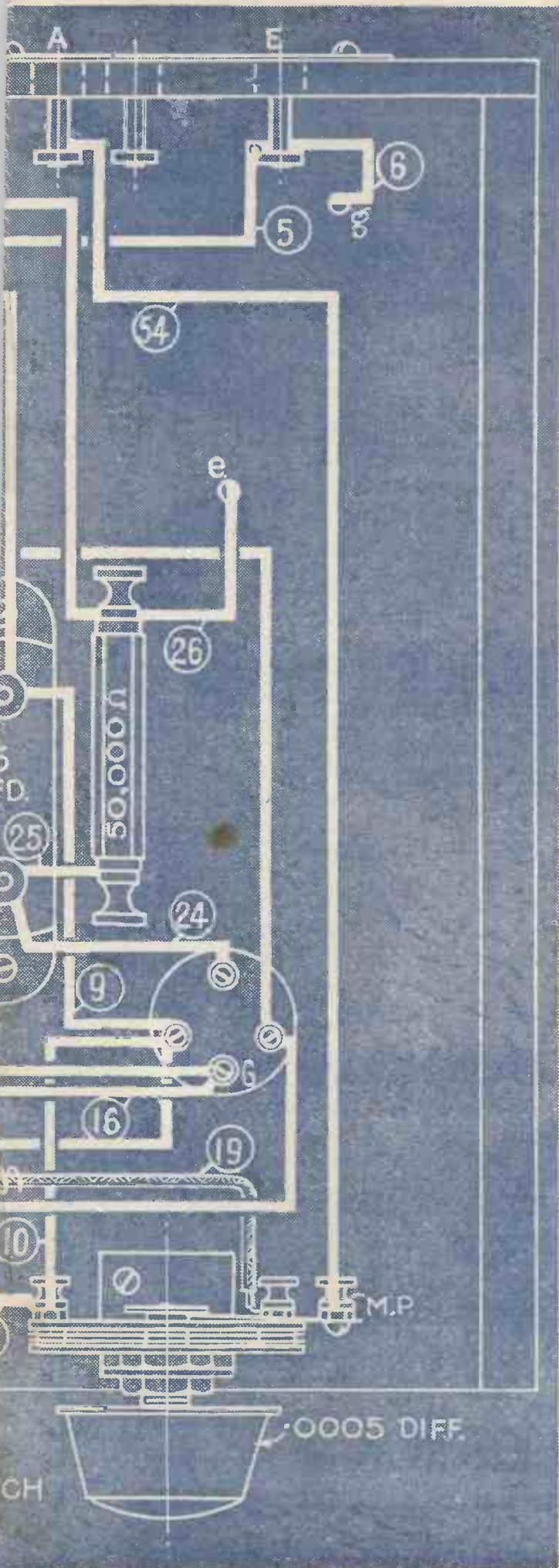
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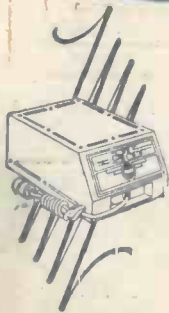
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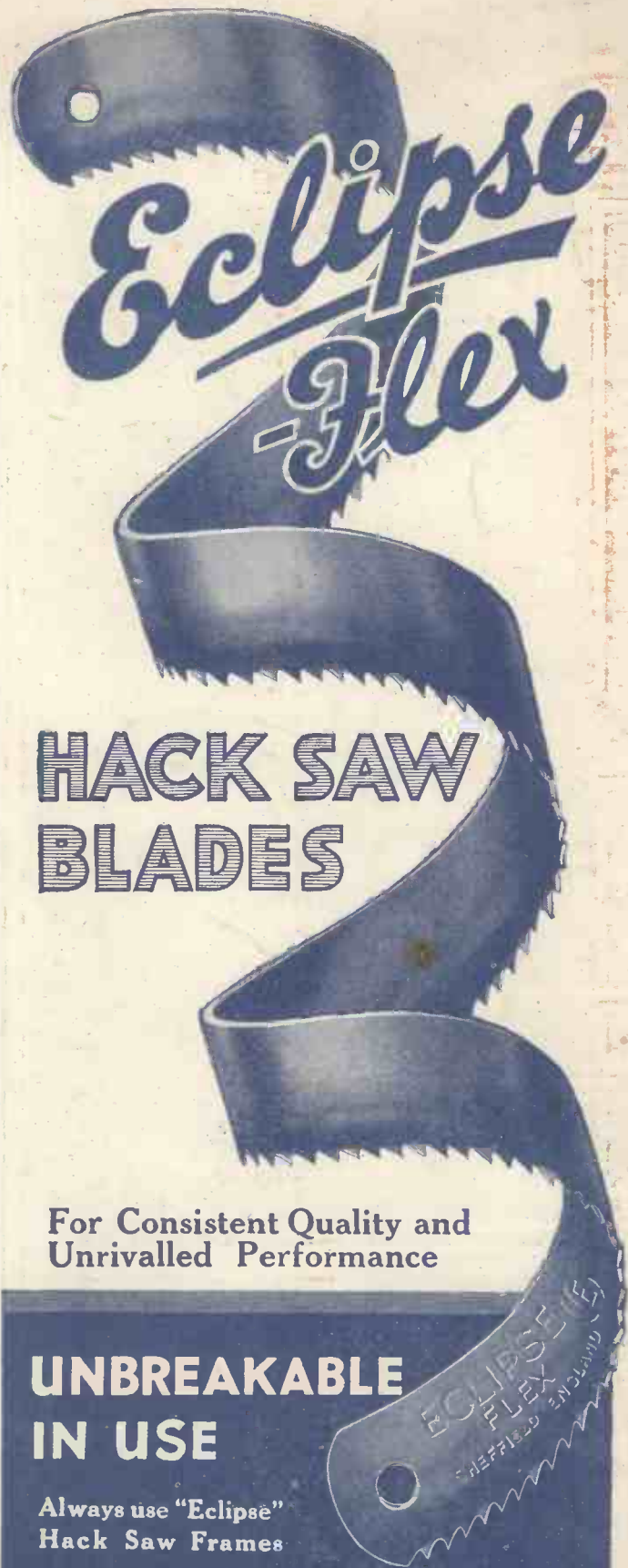
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