

# FITTING A NEW DIAPHRAGM :: DO WE WANT ALL-WAVE COILS ?

# Amateur Wireless

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Every  
Wednesday

and  
Radiovision

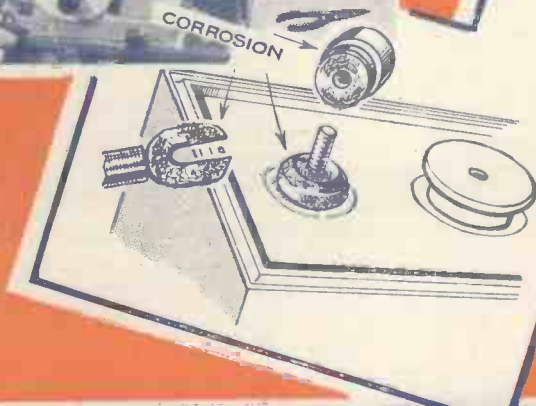
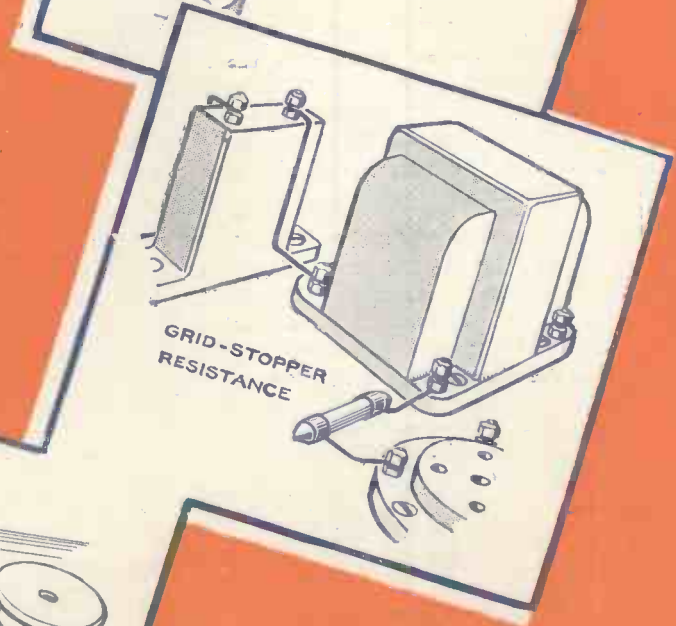
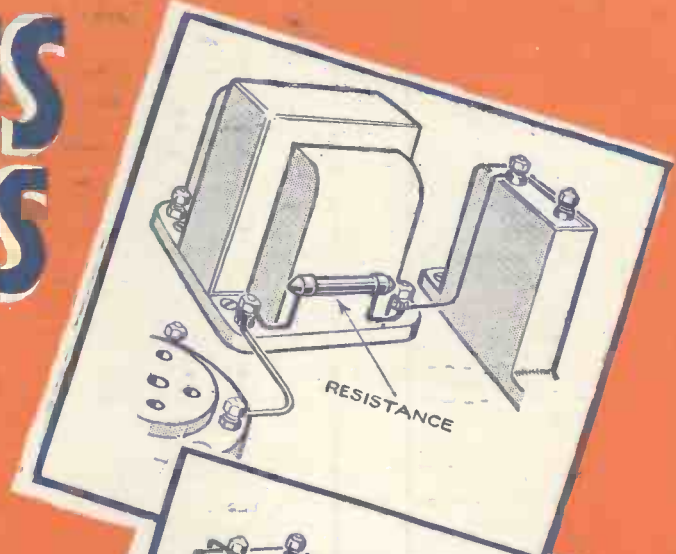
DIALS THAT ALMOST  
TUNE THEMSELVES

USING A PORTABLE  
for CAR RADIO

GERMAN RADIO and  
TELEVISION

LATEST NEWS for  
STATION-HUNTERS

## SIMPLE CURES for NOISY SETS



THIS SEAL... AND WHAT IT MEANS



TO YOU!



THE production of Telsens Radio Components calls for an elaborate technique and a high degree of mechanical and electrical precision. Material is controlled at all stages for quality and accuracy of dimension. The inspection reference gauges themselves are correct to the hundred-thousandth part of an inch.

Some indication of the electrical accuracy required is shown by the fact that one type of instrument alone, which is used in actual Telsens workshop tests, records current changes of less than one hundredth of one millionth part of an ampere. It is only by the exercise of such exacting tests that Telsens components give such high efficiency and lasting performance.

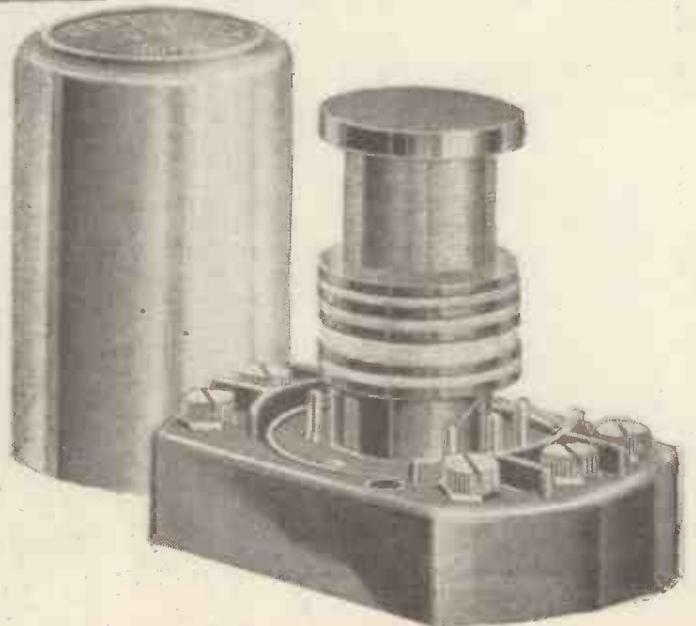
THEREFORE ALWAYS INSIST ON:

**TELSEN**  
*Triple Tested*  
GUARANTEED COMPONENTS

*Permanent efficiency*

with Matched Performance is assured with all Telsens Components—for example, in the case of Dual Range Coils, these after winding are first tested for "Insulation" and "Continuity." The coils are then fitted with "Iron" Cores, these having been previously tested for "Permeability"; the completed coils are then measured for "Inductance."

They are then graded into "Standard," "plus 1/2%" and "minus 1/2%." Coils from these three grades are made up into twin or triple matched units providing "Inductances" which have been matched to within 1/2%, thus ensuring absolute accuracy for ganging purposes when Telsens coils are built into a modern receiver.



TELSEN "349" IRON CORED SCREENED COILS

The result of extensive research, these coils employ an iron dust core which has enabled their size to be greatly reduced without sacrifice of efficiency. Consequently they take the fullest advantage of all the benefits that the "Iron Cored" principle provides.

Single Screened Iron Cored Coil, 8/6. Twin Matched, 17/-. Triple Matched, 25/6.

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## News and Gossip of the Week

### Your Dial !

Don't miss the well-illustrated centre page article this week. It deals with the many ingenious designs for dials seen at Radiolympia.

Our artist, gently lead around the Show by the Technical Staff, has cleverly exposed many really snappy ideas.

### Late(r) News

Bigger scope for the programme compilers will result from the B.B.C.'s decision to alter the timing of the second news bulletin.

It will be given at 9.30 p.m. instead of 9 p.m. From the second week in October, so we hear.

### Dance-band Changes

After Henry Hall and his boys return from their well-earned holiday, the B.B.C. Dance Band's personnel will come under review.

Idea is to introduce still more versatility into the combination. At the moment we are not allowed to say what changes are going to be made.

### Quality Droitwich

Music lovers are delighted with what they have already heard of Droitwich during its nocturnal tests.

It ought to sound pretty good. "Sensibly straight up to 9,000 cycles," is the frequency response boast of its designers.

Even with the landlines between London and Droitwich the top-note response is still well up at 7,000 cycles.

They are saying that series modulation has proved itself a fine aid to quality — beating perhaps the medium-wave Regionals.

### Fading and Distortion

Up to a radius of 200 miles, tests reveal, the Droitwich signals neither fade nor do they distort.

Over the whole country, taking an average, it seems that the new giant provides a ratio of

strength compared with Daventry of just over 2 to 1.

### Note This!

ALTHOUGH the Press visit to Droitwich occurs on September 6—when a short programme will be broadcast to inaugurate the station—you must remember that the official taking-over of the full-time Daventry programmes is scheduled for October 7.

Meanwhile Droitwich will give us morning transmissions from 10.30 to 12 midday, and from 10.30 to midnight for the late dance music.

### Crystals Still Used

EVEN now in Germany no less than 7 per cent. of the listening population still uses the humble crystal set for reception.

Most people over there seem to favour sets with from one to three valves—74.8 per cent. do. The remaining 18.2 per cent. are fortunate enough to use sets with more than three valves.

In two years, we see, the percentage of crystal users has dropped by half. But the crystal is not dead yet!

### Irish Regional

JUST another sign of the great autumn programme drive is the decision to radiate from Northern Ireland a full regional

programme. This will go out at present from the Belfast low-power station—but the Lisburn 50-kilowatt is coming along.

The change starts, with so many others, on Sunday, October 7.

### They Want London

PLYMOUTH and Bournemouth listeners seem to like the London brand of programme. Anyway, in the near future both these relay stations will radiate the London Regional programme.

Sometimes, though, they may take items from the West Regional.

### Pleasing Everyone

WHICH reminds us that West Regional has ceased to exist—at least officially.

The twin stations at Washford Cross—so soon to be deprived of one of their halves!—are now known to the B.B.C. as the Welsh

So the Midland nonette will shortly blossom forth as the Midland orchestra — also with thirty-five players or thereabouts.

### Nearly a Fire

NOT since the famous incident of the burning waste-paper basket at Savoy Hill has the B.B.C. been so near a fire as during a recent incident at St. George's.

As the curtain swished across it touched the very hot bulb of a red signal light. The next moment the curtain was alight—fortunately it was seen in good time.

### Expanding B.B.C.

SOMETHING like a secret corridor is being constructed to connect Broadcasting House with a satellite building.

This corridor will enable staff to walk from the third floor of "B.H." to the third floor of No. 12 Portland Place, which was recently acquired, you remember, for office extensions.

### No. 10 Revisited

WE were too pessimistic about the wharf studio known the world over as No. 10. It is true that for the most part the noise of the demolition gang effectively prevents any broadcasts, but of course "Alf" and his friends do knock off Sundays.

Apparently the B.B.C. has obtained permission to use the wharf for months and months ahead—so that even if the Maida Vale place is not quite ready at the end of the Proms season the big orchestra will not be entirely without shelter.

Good news for those who like the real stuff!

### Without Comment

"I CANNOT understand why all these stations should be allowed to use the same wavelength, when there are so many other numbers on the dial."—B.B.C. correspondent.

### DROITWICH AHOY !

Although Droitwich is still only testing, the warning lights are already burning merrily on the masts. Red lights are fixed at the top and at the half-way mark of the 700-ft. masts—but even that is not considered enough. Aircraft flies so low these days it has been thought necessary to fix white lights at the base of the masts. Altogether, then, wanderers of the sky should have no difficulty in locating the new broadcaster. It may even come to be known as a landmark of the air, just as it will very soon be an outstanding landmark of the ether.

and Western Regional.

Clumsy? Perhaps. But then so is the idea of trying to make one station site serve two countries, isn't it?

### Orchestral Enlargement

WE might have known it. When the studio nonette at Manchester increased to thirty-five members Midland Regional could not rest happy with its meagre nine players.



Ever Ready photo  
Rosalind Wade's little girls—you saw them, perhaps?—help to bring into Radiolympia a giant model battery built up in the shape of Broadcasting House



Monster valves are inseparable from Radiolympia, aren't they? Here is a giant on the Osram stand where girls showed visitors how valves are assembled

**B**Y all accounts we ought to. Judging, that is, by the extraordinary amount of interest that hard-boiled broadcast listeners are now taking in short waves.

It seems as though these listeners are toying with the idea of going down to short waves—but don't want to abandon their status as ordinary broadcast listeners.

There is no need to be self-conscious about being a short-wave fan, of course. But there it is. Many a broadcast listener who has consistently decried the value of the short waves is now beginning to have vague leanings towards them.

#### Remarkable Interest

Hence, as we say, the remarkable interest in all-wave sets. And, from that, we come to a very pertinent Crusader question: "Do we want all-wave coils?"

If we do we shall have to put on our thinking caps. The dearth of all-wave coils leads us to conclude we may have to get down to the design of a suitable all-waver for constructors.

First let us thrash out this question in the Corner. Already we have put the question to you in a slightly different form. We asked you, in one of five leading points a few weeks ago, whether you preferred sets for all-wave tuning or sets for broadcast and short-wave tuning as separate entities.

Some very contradictory letters came in about that. Some plumped for all-in sets because of the convenience, but most of you said in no uncertain terms that the all-wave set was a nuisance because the family would want it for broadcast reception just when you wanted it for short waves.

We think that slightly clouded the issue. That census of opinion proved you need, as a keen Crusader, a set of your own. At least, that is what we are inclined to think it proved. Perhaps we are wrong. You

## Do We Want All-wave Coils?

must disillusion us if we are—and quickly.

Granted that many of you, because you are by nature inclined to want to "mess about" with the set, desire a set of your own—what then? Is there not a very great urgency to build a really good all-waver? For is it not a fact that in these days the short waves are almost an essential part of keen reception activities?

From the point of view of convenience—and after all the average constructor does sometimes think about that—the all-wave set is an obvious boon. But can the knowing fan overcome his natural suspicion about the compromise in design necessitated by the all-wave nature of the windings?

That brings us to the question of whether an all-wave coil is possible. Assuredly it would seem to be from the all-wave sets at the Show.

When we come to look into the design of these super all-wave affairs what do we find? We find that the all-wave aspect has been achieved by employing entirely separate tuning circuits for the usual broadcasting wavelengths and for the extra short-wave facility. This is not really a solution of the all-wave problem from the hard-up amateur's point of view—though doubtless very effective in terms of commercial apparatus.

So we repeat: Is a good all-wave coil wanted—and if wanted can it be designed for amateur use?

What a surprise it was to us to discover your "down" on gang condensers! We quite thought that the average constructor had resigned himself to the necessity for a gang condenser in a modern set.

There are many reasons why amateurs prefer to stick to the single type of condenser. Not least of these is the fact, we presume, that the really keen fan does not mind a lot of fiddling about when tuning-in stations—does not mind, in fact relishes, the patient care needed to get each separate tuning circuit dead into resonance, with the frequency or wavelength of the incoming signal.



They are wireless fans, too! Some of the Australian team "looking-in" at the big Philips factory down at Mitcham

For Constructor Crusaders the single tuning condenser is, of course, admittedly a much-desired boon if extensive experiments are to be carried out. On the other hand there is no doubt at all that for combined amateur and family use an array of single tuning condensers is apt to cause a riot. Non-fan listeners simply won't be bothered.

But, in defence of the gang, we really think it necessary to point out that the better models are now always fitted with a concentric trimmer control in addition to the main gang control. There is no need, with modern coils and a careful initial adjustment of the side trimmers, to worry about lack of efficiency with a gang condenser for tuning.

#### Value of Concentric Trimmers

Where the aerial tuning tends to come out of gang with the rest of the tuning it is always possible with the front trimmer—that is the little knob mounted concentrically with the main control—to adjust matters so that there is perfect ganging again.

Is this fully appreciated by everyone who sticks to single condensers? Then again, is it realised that the latest coils of many makes are wound to a fixed inductance standard; so accurately matched one with another that a gang condenser is the obvious thing to use with them?

"... what a fine thing I think your movement is," says Lt.-Col. Pack-Beresford, "in bringing amateurs and their ideas together.

"After all," continues this keen Crusader, "the amateur is the backbone of wireless."

And so say all of us!



An enormous number of Constructor Crusaders took the opportunity at Radiolympia to look us up at Stand No. 10. They were all most enthusiastic about the Crusade, and many wanted to

know why it was not started years ago.

To which there is no reply—save to assure you that we now intend to make up for lost time!

Looking through the correspondence files for this week we see that the baseboard brigade is gaining very rapidly in strength, running away from the few who want chassis for their sets.

#### Screened Components

Once again it is obvious that what is good for the set makers in a commercial way is not necessarily good for the home constructor. The baseboard, especially when it is of the metallised-wood variety, seems perfectly adequate for most home builders. Bearing in mind the fact that modern coil units are fully screened as are many other small components, we fully sympathise with the viewpoint of the majority.

# New Diaphragms

## and How to Fit Them to Old Moving-coil Loud-speakers

By the AMATEUR WIRELESS Technical Staff

**D**ON'T let a broken loud-speaker diaphragm get you down too badly. Because if you follow out our instructions you can quite easily make yourself a new one.

First thing is to take a few measurements of the old cone. You must know the overall diameter of the cone—as shown by the base line BC of the triangle at Fig. 1. The rest of it is drawn when you know the diameter of the moving-coil former—which of course you can easily measure.

From the centre of line BC draw a vertical line. Then measure the overall depth of the



Another case for great care—arranging the cone surround so that the moving-coil does not foul the magnet

diaphragm. Mark off this dimension up the vertical from BC. Then draw a short line parallel with the line BC, marking off on this line the diameter of the moving-coil former already measured.

You can then complete your triangle, running a line up from B to D and from C to the corresponding point on the other side. You can then continue these lines until they intersect at point A.

It is important to carry out this part of the work very carefully. Upon your accuracy here depends the final snug fit of the cone diaphragm. With the triangle completed from the measurements obtained from the old cone and moving-coil former, you can begin to mark out your new diaphragm.

### Laying Out the Cone

If you look for a moment at Fig. 2 you will see the way the cone is laid out on the sheet of cone paper. This shaped figure is obtained from the triangle already drawn on another sheet of paper.

For example, the line AB in Fig. 2, representing the radius of the circle, is taken from Fig. 1 and is actually the measurement AB of that triangle.

Similarly, the little cut-out circle at Fig. 2 has its radius determined by the line AD of



Fixing the moving-coil to the centre of the new cone—a job that needs some care

Fig. 1. You simply measure AD in the triangle and transfer this dimension to the Fig. 2 layout.

Next you have to find out how much of the paper is to be cut away—what, in other words, is the actual length round the periphery represented by BE. This again is taken from the information available in the triangle.

The required circumference dimension is actually  $3\frac{2}{3}$  times the length of BC in Fig. 1. The easiest way to take this is to cut a  $\frac{1}{2}$ -in. wide length of thick paper the exact length of BC. Then you can bend this round the circle of Fig. 2, starting at B up to the point marked 1, then again from 1 to 2 and then a third time from 2 to 3. This will leave you with one seventh of BC to finish.

Just divide your strip into seven and continue the marking to the point E. After this you can easily see where to cut away the circle, so that there is a space from E to B.

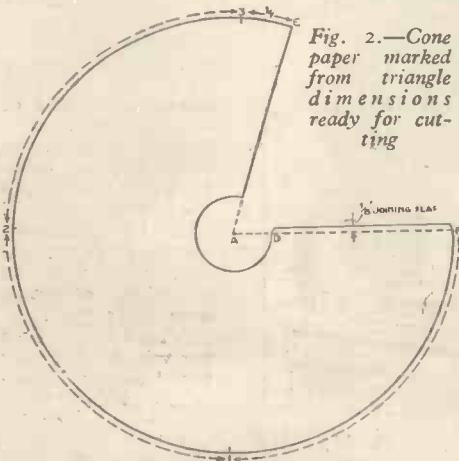


Fig. 2.—Cone paper marked from triangle dimensions ready for cutting

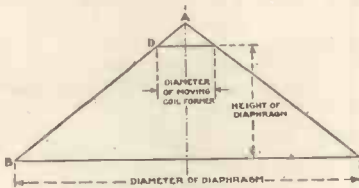


Fig. 1.—This is the triangle drawn from the dimensions of the old cone—and from these you can draw the new diaphragm



Cutting out the cone diaphragm from the specially marked paper

Leave, though, about  $\frac{1}{4}$  in. at BD for subsequent fixing. If you have done the work carefully you now have a pattern from which you can cut out a shaped piece of cone paper that will afterwards bend into the same-shaped and same-sized diaphragm as the broken one you want to replace.

With Secotine or Durofix you must firmly join up AB to AE, leaving the centre with its cut away hole for the subsequent fixing of the moving coil. This coil is easily fixed to the formed cone with the adhesive already mentioned.

### Three Simple Stages

Our three photographs show how the whole job is carried out in three simple successive stages. The first picture shows the cone paper being cut from the figure drawn on it by reference to the triangle of Fig. 1.

Then, in the second picture, you see the constructor carefully gluing the moving-coil from the old diaphragm on to the new. See that this joint is very soundly made, otherwise in use there may be a rattle.

The third stage is the fixing of the cone to the oiled-silk or wash-leather surround—again a job for the adhesive. Then you must very carefully mount the surround on the moving-coil loud-speaker chassis itself so that the little moving coil at the centre of the diaphragm is dead central—not touching the magnet at any point.

For the diaphragm construction you can use one or several papers. Most wireless dealers stock standard cone paper, or you can at a pinch use ordinary cartridge paper. Then again, good results can be obtained with what draughtsmen know as Watman HP paper.

The instructions for measuring out the cone may seem a little complicated, but the actual job is simple indeed. It is the only way you can be sure of getting an accurate copy of the original cone short of resorting to mathematics.

### Fixing the Diaphragm

As for the fixing of the diaphragm to the cone, that is just a matter for careful adjustment. Not difficult but perhaps a little fiddling until you get used to it.

But still, you will agree that it is worth while taking a little trouble to put a loud-speaker back into action.

The pity is that so few amateurs realize how easy it is to make a diaphragm at home. We hope this little article will put you on the right track.



As soon as a set becomes noisy have it right out of the cabinet and get down to the trouble without delay. This article tells you how

# Simple Cures for Noisy Sets

Cutting Out Crackles Bangs and Fizzes!

By W. OLIVER

**Q**UANTITY, volume and a silent "background"—those are three things that every listener wants. Good quality can be attained fairly easily nowadays, and as for volume—well! Modern valves give you plenty of that.

But neither volume nor quality is of any real value if accompanied by a high level of extraneous noise in the background. Every kind of unwanted noise must be eliminated before you can enjoy radio reproduction as it should be.

### Many Kinds—and Many Causes

Now, background noises are of many different kinds (as you probably know only too well!) and they come from a variety of causes. The first step in getting rid of them is to identify them definitely; the second, to locate the exact source of the trouble; and the third, obviously, to remedy it.

The sundry kinds of noises that may mar your reception can be roughly classified into three groups: (1) humming or buzzing noises; (2) crackling, grating or sizzling noises; and (3) howling or whistling noises.

Resolving a noisy background into its component parts, so to speak, is not always so easy as one might suppose. It may consist of, perhaps, four or five different noises, due to quite separate causes, but so intermingled that very careful listening is needed to distinguish which is which.

### Many Causes

A really bad background, for instance, might be composed of a low-pitched mains hum, a high-pitched heterodyne whistle, a slight humming or hissing of a rather indeterminate nature caused by the incoming carrier wave, crackling noises due to atmospherics, and similar crackles due to run-down batteries or defects in the set itself.

When all these noises happen to occur simultaneously, they take a deal of sorting out!

times be heard even on a crystal set if you use long extension leads, connected to the phone terminals, and happen to run these leads parallel to the electric-supply wiring in the house.

This fact, incidentally, points to a cure for mains hum induced in a "non-mains" set; arrange all lengthy radio leads as far away from the mains wiring as you can, and avoid running leads parallel to the latter for any considerable length.

If you have reason to think that hum is entering a mains-driven set direct from the supply leads, there are various possible remedies.

You can try connecting two fixed condensers (of a sufficiently high working voltage rating, of course) in series across the mains,

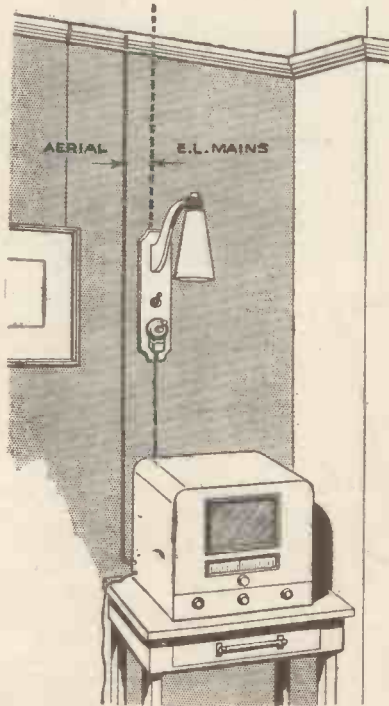


Fig. 1.—Radio leads should not run close or parallel to electric supply wiring

Hum from mains occurs chiefly, of course, in a mains-driven set, or one using mains unit high tension. But it is sometimes picked up nearly as strongly by a battery-operated circuit, owing to an induction effect.

Indeed, hum can sometimes be heard even on a crystal set if you use long extension leads, connected to the phone terminals, and happen to run these leads parallel to the electric-supply wiring in the house.

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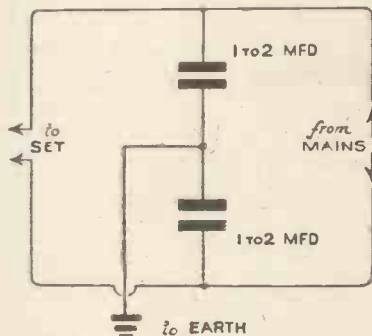


Fig. 2.—Arrangement of fixed condensers to reduce mains hum, ripple, etc.

and earthing the centre point. Another tip worth trying is connecting a pair of air-core chokes of a suitable type in the mains leads. Additional iron-core smoothing chokes, bridged to earth with suitable fixed condensers, may also be needed to ensure a noise-free supply.

A hum which does not vary in intensity as the tuning is altered is very likely to be due to faulty or insufficient smoothing. Perhaps, for instance, one of the fixed

condensers has "broken adrift" from the circuit, or has developed some other fault.

A faulty rectifier valve, too, may be suspected when hum becomes excessive.

Interaction of some sort between the mains apparatus and the receiving circuit proper is a likely source of hum. Earthed screening in the right places may help to reduce this, but if the trouble is chiefly due to interaction between the fields of chokes or transformers (as, for instance, between an intervalve transformer and a mains one), you will probably find there is only one effective remedy. That is to juggle about with the relative positions and orientation of these components until you find which arrangement produces least hum.

### Care with Mains Apparatus

Of course, in handling mains apparatus you should take all necessary precautions against risk of shock.

Apart from actual mains hum, a similar noise is sometimes produced by a fault in a valve grid circuit. The grid circuits are, in fact, apt to be "danger zones" where hum is concerned. Any unduly long leads here, or gramophone pick-up leads not properly shielded with earthed metal braiding, are very liable to give rise to this trouble. That is one of several good reasons for keeping all grid-circuit connections as short and direct as you can make them!

Crackling, grating, sizzling or other such extraneous noises may be due to natural and external causes, or to faults in the set itself.

To settle this point of doubt, try disconnecting the aerial and earth leads. If, thereupon, the noises cease, or almost cease, they are presumably due to one of three causes: atmospherics; electrical interference picked up by the aerial or earth; or a fault in the aerial-earth system itself.

If you suspect the last-named cause, replacing either of the leads separately may help you to discover which is at fault.

### Background of Atmospherics

A background of atmospherics is more or less unavoidable in certain weather conditions. But, although you cannot eliminate this kind of background noise, you may be able to achieve a more favourable ratio of signal-strength to atmospherics.

The effect of atmospherics can be reduced, as a rule, only by cutting down the sensitivity of the set, and this naturally entails some loss of signal strength. This is worth while, however, if there is a fair margin of volume in the first case, as the reduction in the strength of the interference is (or at least

Almost every radio set at some time or other becomes noisy—most annoying crackles, bangs and fizzes are heard from the loud-speaker! In some cases the noise comes from inside the set and in others it is caused by an external source of interference.

In this article our contributor explains how many of these noises are caused and simple cures are suggested. One or other of these will usually put matters right. Better keep this article on file—you never know when you may need its help!

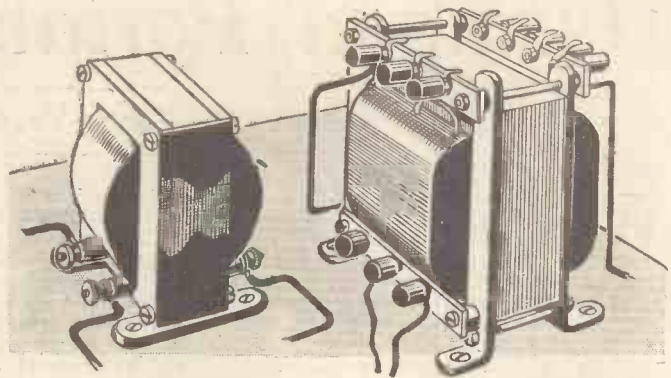


Fig. 3.—Hum may be due to interaction between intervalve and mains transformers

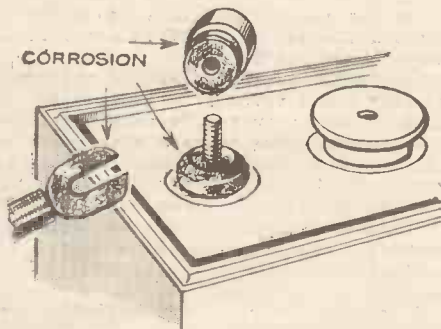


Fig. 4.—Faulty contacts in low-tension circuits may cause background noises

produced by a run-down high-tension battery, but they are usually less staccato and much less noticeable, hence the cause may remain longer unsuspected.

Heterodyning is, of course, one possible cause of background whistles. As this occurs only on certain stations at any given time it is easily identified. The effect of a heterodyne whistle is more noticeable with some circuits than with others; but if it is fairly high-pitched, tone control or some sort of "whistle-filter" may help considerably to minimise the effect (though at a certain sacrifice of high-note response).

Background noise in the form of a continuous untunable whistle may be due to high- or low-frequency instability, or to unintentional interaction between different parts of the circuit. Better screening, choking, decoupling or by-passing arrangements, such as changing over the connections to one winding of a low-frequency intervalve transformer, or connecting a fixed resistance of high value across the intervalve transformer secondary, or adding a grid-stopper resistance, may "do the trick."

A high-pitched whistle sometimes occurs with a low-frequency transformer of the parallel-fed type. Altering the values of the anode-fed resistance and coupling condenser, or changing over the

connections to the transformer terminals to get a different step-up ratio by means of an auto-transformer effect, will usually remedy matters.

Background noises of various kinds can often be reduced very considerably by a little skilful "juggling" with the sensitivity of the high- and low-frequency stages respectively. Careful adjustment of volume controls may help a good deal in this connection.

**Restoring Strength with Reaction**

One often finds, for instance, that adjusting a volume control associated with a screen-grid valve, so as to reduce the sensitivity of the high-frequency stage, cuts down background noise to a great extent. Of course, it reduces signal strength, too, but this can be restored (usually without bringing back much of the extraneous noise) by careful use of reaction.

The only snag here is that the latter may detract somewhat from the quality of reproduction.

appears to be) very much greater, proportionately, than the reduction in signal strength.

Tips worth trying in "atmosphericky" weather include the following: (1) Using a small indoor aerial; (2) connecting a high resistance across the aerial and earth terminals; and (3) reducing the sensitivity of the high-frequency stage or stages and increasing reaction a little.

Extraneous noises picked up by the aerial, such as those caused by certain electrical appliances or machinery, can, of course, be minimised by using a special shielded type of aerial cable for the downlead. But most kinds of local electrical interference can best be suppressed at source. If the source happens to be on your own premises, the trouble is easily remedied. If not—well, it may be a matter for gentle persuasion!

**"Frying" Noises from a Valve**

Just occasionally, a noisy background of rustling or "frying" sound is due to an internal fault in a valve. This trouble occurred with the detector valve in a short-wave set that I was trying out some time ago, and on substituting a spare valve for the faulty one the noises disappeared.

If the voltage of the low-tension accumulator or grid-bias battery is below its correct value, or if there is a fault in the associated leads, connections, etc. (as, for instance, poor contact with an accumulator terminal due to a corroded spade-tag), "sizzling" noises may occur. These may be similar to the crackles

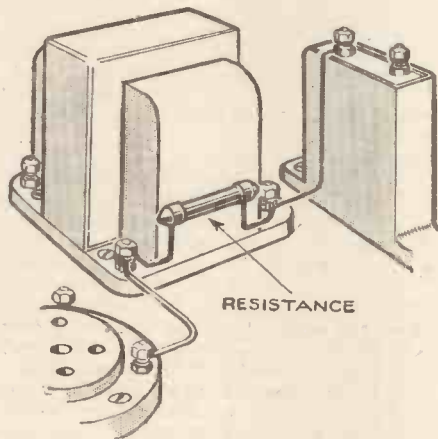


Fig. 5a.—A high resistance across a transformer secondary may stop noises

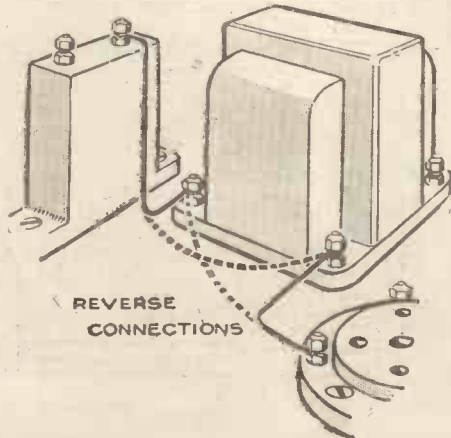


Fig. 5b.—Howls can sometimes be stopped by changing over transformer connections

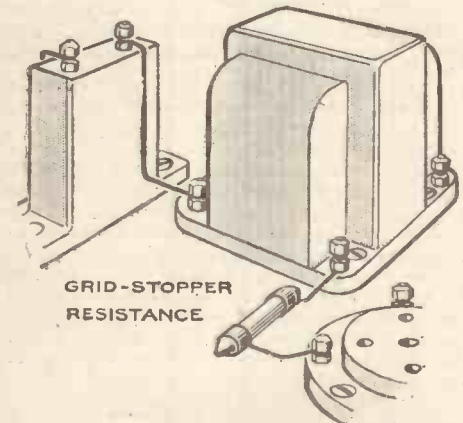


Fig. 5c.—A grid stopper resistance often prevents parasitic oscillation

new giant transmitter at Droitwich, which is well equipped to make its presence felt against any European competitor.

Curiously enough, there is a drift in the opposite direction on the receiving side, where the "midget" set seems to be steadily gaining in favour. This applies not only to the portable models where there is an obvious advantage in cutting down size and weight, but also to "mantelpiece" and bedroom sets. R.W.H.

# Using a Portable for Car Radio

By Percy W. Harris, M.INST.RAD.E.

**W**HENEVER anything new comes along you can judge fairly well whether or not it is likely to "take on" by the amount of argument to which it gives rise. Generally speaking, the more heated people get about a subject the more interested they really are in it! If, on the other hand, nobody troubles to discuss the matter you can be sure it will be forgotten in a very short time.

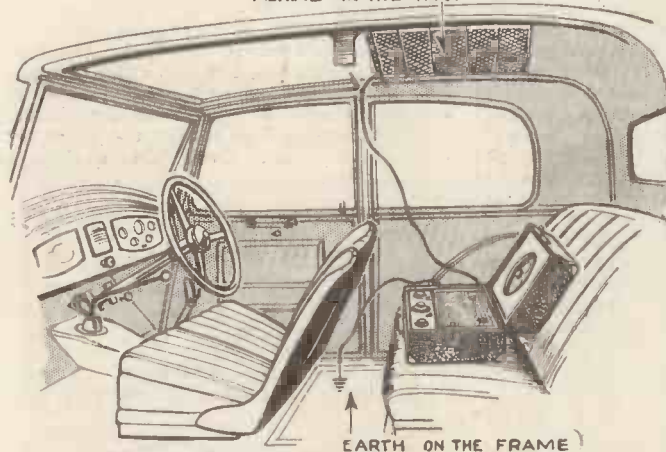
## Between Two Extremes

These thoughts arise in my mind because I have heard so much lately about car radio from people who have not tried it on their own cars or even heard it in other people's. Opinions vary through every shade between two extremes.

At the one end of the scale you get the man who becomes almost apoplectic at the mention of it, calling it a menace to the roads and apparently holding the opinion that the installation of a car radio is about as dangerous as painting the windscreen black.

At the other extreme there is the man who considers it a cure for all traffic evils because

AERIAL IN THE ROOF



When a portable set is used in a car it is desirable to arrange an aerial in the roof and to earth to the chassis

people will trundle along at about five miles an hour, alert to every likely happening because their nerves are comfortably soothed by the sweet music.

As I have indicated in a previous article, in my opinion the truth lies between these extremes, and car radio neither adds to, nor greatly detracts from, the risks of driving, the balance of argument being in its favour.

The purpose of this article is to point out to you how you can have a great deal of fun with the minimum of expense by adopting a few of the specialised ideas of car radio, without going to the trouble or expense of having a properly built-in set.

## Essentials of Car Radio

The main differences between a car radio set and an ordinary receiver are that the car set is used in conjunction with noise suppressors which eliminate the sparking noises which otherwise upset a receiver; a built-in aerial in the car is used, remote control for the tuning, the power supply comes from the car battery, and the loud-speaker is fixed permanently to some point on the car, usually underneath the instrument panel, or on the bulkhead.

A good modern car radio set, of course, is specially designed to stand vibration, to be very compact, to have automatic volume

control and so on, but essentially a car radio set is the same as any other. Why not, then, utilise some of these specialised ideas in conjunction with an ordinary portable?

Perhaps you have a portable receiver handy which you have discarded either because you have now a mains set or else because you have adopted another type of receiver. Get it out and let us see what can be done in the car.

First of all you want to fit noise suppressors to the distributor and plugs. Sets of these suppressors are obtainable at reasonable prices from a number of firms.

Next there is the question of an aerial. No doubt in future all closed cars will have a built-in aerial ready for the installation of a radio set and most American cars are now so fitted, but at the present time the majority of cars have no such aerials and therefore one should be provided.

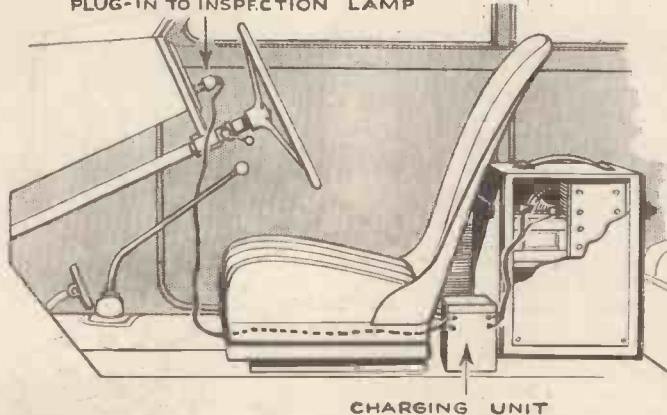
I suggest this as it is preferable to the built-in frame used by most portables. You cannot be bothered with a directional set in a car, and some form of non-directional pick-up is a great help. If you have a closed car, open the lining at some convenient point and slide in between the lining and the roof a sheet of copper gauze to one corner of which you have soldered a flexible lead.

Be careful that this does not come in contact with any metalwork of the car, and to provide against such a risk it is not a bad plan to slip the gauze into a protective cloth covering before you insert it through the slit in the lining.

An "earth" can be made by connecting a wire to any bolt on the chassis, and if these two connections (from aerial and earth) are joined to the aerial and earth terminals of the portable, or in the case of a portable with a built-in frame to the grid and filament of the first valve in parallel with the frame, then you will get an excellent pick-up. An alternative is to run a sheet of insulated gauze under each running board, using one as aerial and the other as earth.

So far I have said nothing about running the

PLUG-IN TO INSPECTION LAMP



CHARGING UNIT

It is not a difficult matter to arrange to charge the accumulator of the portable set from the car dynamo

valves and the high tension from the car, and you might think that it should be simple to arrange this with the existing valves, but unfortunately the voltage across the terminals of the accumulator will rise considerably above the nominal voltage of the battery when it is being charged, due to the heavy charging rate frequently given to accumulators in these days.

## Voltage Fluctuations

On the other hand, when the engine is stopped the voltage will drop to either 6 or 12 volts, depending on the type of battery, and it is not practical to have an adjustable filament rheostat to keep the voltage on the valves where you want it.

This is the reason why I do not recommend running 2-volt valves in series from the car accumulator in three-valve portables, unless you are only going to use the set when the engine is not running. In many sets, too, it can be very inconvenient to change the wiring from the usual parallel to series.

But there is no reason why you should not make a little arrangement to charge the portable-set accumulator from the car dynamo while the car is running.

I cannot give very precise details here because it will depend on the car, the voltage of the dynamo, the capacity of the portable-set accumulator and a number of other matters, but the handy man can very easily rig up an arrangement with a variable resistance and an ammeter so that the charging rate given to the accumulator is not greater than desirable. Once the value of this resistance has been found it can be set and a simple change-over switch can disconnect the dynamo and connect up the set.

## Inspection-light Socket

There is no need for any special wiring for this purpose provided you have a socket for an inspection light, as the charging feed will obviously be straight across the car accumulator and therefore in the same position as the wires to the inspection light plug.

In the United States it is now possible to buy at very low prices high-tension units to run off a car battery. Two kinds are available, the vibrator type and the motor generator type. The one I have in mind has a 60-watt A.C. output the bulk of which, of course, is transformed down for running the heaters of A.C. valves, the remainder being stepped up for high tension. It sells complete for twenty dollars! Similar types are available here.

There is one important point to remember when experimenting with built-in car radio. The type of receiver used in America for such work is fairly heavy in its absorption of power from the car accumulator. Many of the sets take as much current as all the lights of the car switched full on, and therefore the custom is to fit larger accumulators with cars so equipped.

In this country, where our accumulators are by no means so big, it is very easy to run a battery down by using the car radio set when the car is stationary and the engine stopped.



# On Your Wavelength

## Record Crowds at Olympia

NOT long after I got to Olympia on the opening day I felt pretty sure that the 1934 Exhibition was going to smash all records for attendance. In the morning there was a big queue outside waiting for the doors to open and by four o'clock there seemed to be as many people in the building as one usually sees during the evening rush hours.

Every day the attendance showed figures better than those of previous years and all exhibitors who had something good to offer reported satisfactory business.

## Radiogram "Whoppers"

LIKE most of you, I expect, I spent quite a bit of time at Radiolympia in examining the giant radiograms on view at several of the stands. The most expensive, so far as I could make out, was one shown by C.A.C. This was housed in a cabinet by whose beauties I, as a woodworker, was held spellbound. Its price was a mere £200.

Then I was fascinated by the Autotrope, which, besides being a first-rate performer on wireless, can be filled with about a barrow-load of records at one time and left all by itself to play both sides of each of them.

The record-changing mechanism of this instrument is a thing of wonderful ingenuity and efficiency. One of its very big advantages is that each record is placed in direct contact with the fabric surface of the turntable; hence there is none of that slip that one does sometimes find when records are piled one on top of another. Weren't you thrilled by the almost too human way in which the thing turned records over so as to play the other side?

## Other Giants

ANOTHER wonderful instrument was the Dynatron, the radio portion of which is, strangely enough, a straight and not a super-het. This radiogram has seventeen valves, of which eight are used in the low-frequency department. The Radio Gramophone Development Company had some fine instruments of the *de luxe* order.

The H.M.V. High Fidelity 15-valve Auto-radiogram is a marvellous instrument. I have seen statements that it receives 350 stations. Of course, it couldn't do anything of the kind in any one locality, because there aren't nearly so many to be received. But it has been tried out in different parts of Europe, and the total bag for all localities is about 350.

It's an all-waver, with a range from 13.5 to 2,000 metres, and the quality of its reproduction has to be heard to be believed.

## Hot Air at Olympia

IT is the genuine article, I mean; I real honest-to-goodness (or dishonest-to-badness) frowst or fug. I had to spend quite a bit of time at Olympia during the run of the Exhibition, and I found myself wishing continually that the ventilating arrangements could have been better.

I am sure that those who were on duty for hours on end, day in and day out, must have found conditions trying. One of the lay papers informed us that the air was con-

## By Thermion

ditioned and maintained at an even temperature of 65 degrees. I wish that the writer of that note could have been made to spend an hour or two in the gallery on the first Saturday afternoon!

May I suggest humbly to the authorities that they can make the next Exhibition even more popular than the last one, and vastly increase the comfort of both visitors and exhibitors, if they will do something about the ventilation?

## Olympia's Side-shows

ONE of the best side-shows that I have ever seen at Olympia was Radio Weather House, organised by the Radio Research Board. The purpose of the demonstration was to show the man-in-the-street something of the wonderful work that is being carried on at Slough. Talking films were used, and those of you who saw them will agree with me that they were jolly good.

Anyone, for instance, who spent ten minutes watching the first film couldn't have helped gaining a pretty good idea of the working of the cathode-ray oscillograph—and to explain a thing with a forbidding name like that in ten minutes is no mean feat!

The G.P.O. also put up a first-rate show. The part which was particularly interesting to the wireless man was that dealing with the causes and the cures of various kinds of man-made interference.

As for the B.B.C.'s variety show, I hadn't time to visit it myself, but the fact that as many as five hundred were content to stand at many performances, whilst more were turned away from the doors, is proof that it went pretty well.

## Crystals Sets Again

THERE is a big demand for crystal sets—in India.

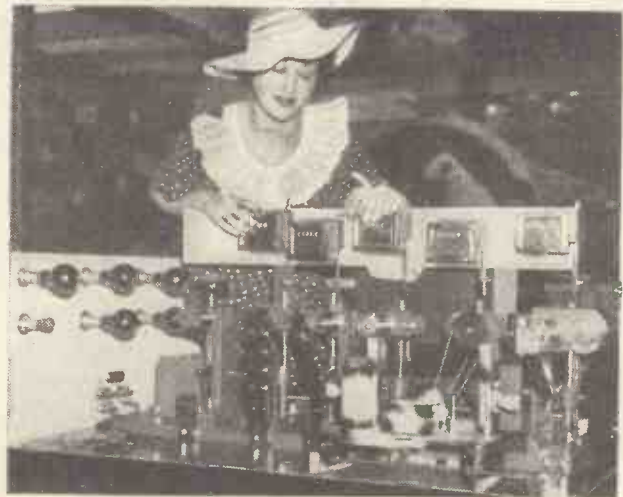
Until recently broadcasting in India has rather hung fire, but now it seems to be going ahead pretty well. In some of the big towns where there are broadcasting stations, Indians have suddenly become radio-minded, and they want something cheap which will enable them to listen to the programmes.

Thousands of crystal detectors have been exported recently to India, and one or two enterprising firms are seriously considering the manufacture of special crystal sets, simple to use and selling at very low prices.

I believe that there is a big market in India if our makers will wake up and collar it quickly.

And it is not only for crystal sets. India—as most people forget, if they ever knew it—is nearly as big as the whole of Europe, and it has very few medium-wave broadcasting stations. But it does contain large numbers of people living in out-of-the-way places who would give a lot to be able to receive the Empire programmes.

A set that would go well is a simple short



These switches live through six years' use experience in four days! All made possible by the ingenious life-testing apparatus, as shown on the H.M.V. stand during Radiolympia



Miss Radio misses nothing! So, of course, she had to have the latest Mullard set explained to her!

waver—or, better still, one taking in both the medium and the short waves. If some enterprising maker will try a two-valver on these lines for headphone reception I think he may receive a very pleasant surprise.

## Opening of Droitwich

THE new great long-wave station at Droitwich will take over full programme services on Sunday, October 7, our old friend 5XX being completely closed down at midnight on October 6.

The station known as 5XX has had a long and honourable career. It started, if you remember, as a more or less experimental transmitter at Chelmsford in July, 1924, the power used being 15 kilowatts.

The use of long-wave transmissions was found so satisfactory that



First broadcasting announcer? That is the claim of Mrs. H. de A. Donisthorpe, who broadcast a regular weekly programme from Worcester in 1917. Here she is during a visit to the Osram stand during the show

a permanent station was built at Daventry and came into operation just a year later. The power of the new 5XX was 25 kilowatts and, except for slight alterations and an increase to 30 kilowatts, the transmitter has remained very much in its original state for nine years.

Droitwich will use an output of 150 kilowatts, and I expect that it will provide good reception in every part of the country.

**Have You Heard Him ?**

MEANTIME, the new Droitwich station is conducting tests outside programme hours, and I expect that a good many of you have heard him. Daventry is just forty-two miles from my abode as the wave waggles and Droitwich seventy-five. The test transmissions that I have heard from the new giant (which was probably not using full power) came in with enormous strength and the beautiful quality was particularly noticeable.

Droitwich is a good deal farther than Daventry from London, but I expect that reception of the new station will be considerably better than from the old 'un.

**A.C./D.C. Sets**

ONE of the outstanding features of this year's Radiolympia was the astonishing number of A.C./D.C. sets to be seen. Almost every manufacturing firm seems to be turning them out, and I am just wondering whether it is not just another of these little madneses from which set makers suffer occasionally.

The A.C./D.C. set is a thoroughly good thing for the fellow who is at present on D.C. mains; but the number of D.C. users is limited and there cannot possibly be anything like a gigantic demand for these sets.

The wise D.C. user will certainly invest in a set of this kind, for he can then cease to worry about the change-over to A.C. which must come along sooner or later. But if you are on A.C. mains already,

there is no change in prospect, and the best course is certainly to buy an A.C. set.

**Are "Universals" Safe ?**

LAST year, I confess, I didn't very much care about the A.C./D.C. set, or "universal" set as it is sometimes called. The I.E.E. regulations state definitely that for A.C. working a double-wound mains transformer must be used, and there is no such transformer in these sets. This regulation, though, was made a good many years ago, and it will undoubtedly have to be revised pretty soon.

So long as an A.C./D.C. set is properly designed and made, there is no question that it is entirely safe to use. My only fear is that we may have a crop of cheap-jack horrors which will be anything but safe.

You can purchase the good quality universal with an easy mind, but I would counsel you to avoid the cheap affair as you would the plague.

**This Year's High Spots**

WHAT do you consider the biggest improvements in receiving sets this year, now that you have been to the Exhibition yourself or read accounts of it? I would say that one of the most important is the suppression of second channels in super-hets. A year or two ago there were few super-hets that didn't give you a pretty big crop of second-channel whistles as you rotated their dials, and some of them brought in the local station at as many as four different settings!

In the best of this year's, second channels just don't exist. That's one big advance. Another is to be found in the successful attempts of most good designers to make their sets give far better reproduction.

Then there's S.A.V.C. Last year there weren't many sets below the 15-guinea limit that had satisfactory S.A.V.C.; this year, there is hardly a super-het without it.

But we have got to realise that there's S.A.V.C. and S.A.V.C. Unless it is well designed so as to have full control with just the right amount of delay, it can be a cuss rather than a blessing.

The general adoption of visual tuning control is probably the third most important improvement. But, here again, let me mention that V.T.C. is pretty well useless unless it is really sensitive.

And when shall we see battery sets with this useful addition?

**Unmasked Hearing**

THE other day I heard a demonstration of the Multitone new system of "unmasked hearing." At present this has been applied to headphones only, but I am told that the loud-speaker equivalent will be coming along presently.

The essence of the system is that it prevents the high frequencies from being overshadowed, or "masked" by the low when the volume is considerable.

Here's an instance. I heard an orchestra playing from the London Regional, first of all, on a good moving-coil loud-speaker. Then the set was switched over to the special phones, and the difference was really astonishing.

With the loud-speaker in use, the high notes of the violin were hardly audible during loud passages. The phones brought them out in a wonderful way and made reproduction sound completely natural.

**Semi-conductors**

SOME of the new composite resistances behave rather curiously in action, owing, no doubt, to their rather unusual make-up.

Thyrite, for instance, consists of finely divided particles of metallic oxide thoroughly mixed and embedded in a mass of insulating material such as baked clay.

As might be expected, a mixture of this sort does not rigidly obey Ohm's law, but offers considerably less resistance to a high than to a low E.M.F.—so much so that a double voltage produces approximately a twelve-fold increase in current. Luckily, this is just the kind of resistance that is wanted to provide a perfect safety valve for lightning. For small signal voltages, thyrite acts as an insulator to prevent leakage, but directly the voltage in the aerial reaches a dangerous level the resistance breaks down and opens a "safety" short-circuit to earth.



He wanted to keep in touch with our civilisation, so he ordered a G.E.C. Overseas seven-valve super-het! An incident when Nani Sir Ofori Atta, K.B.E., of the Gold Coast Colony, visited the G.E.C. stand at Radiolympia



H.M.V. photo  
Their skeleton—but not in the cupboard! A visitor to the Radio Show looks at the uncovered mechanism of one of the latest types of automatic record-changer

Even your non-technical friends will be able to understand the article on "Simple Cures for Noisy Sets" that appears on page 228. Tell them about it!

# German Radio-1934

A Special Report of the Berlin Radio Exhibition by our German Correspondent, A. A. GULLILAND

THE German Exhibition is "different"—in fact the radio industry has limited itself to three halls, another three being occupied by the Broadcasting Company, the Post Office and by a joint manufacturer's

universal types. In spite of the restrictions, eight new types of valves are available from the range of twenty-five new types which the German valve manufacturers have introduced for export. These eight new valve types include the octode, a D.C. power pentode, two new battery valves for use in the battery model Volksempfänger, and a new frequency-changer, together with a double-diode.

Most manufacturers already make use of these new types, one firm even using two octodes in one of its sets. Low-loss insulating materials have been introduced wherever possible, and this results in greater selectivity. Absorption circuits prevent unwanted interference with the intermediate frequencies of super-hets. Iron-powder coil cores have become nearly universal. Various firms make these and they are to be found in all shapes.

Cabinet design is conventional. Loewe have introduced a leather-covered set and some firms place the loud-speaker under the tuning indicator to obtain an oblong form, but otherwise nobody seems to have had any great ideas.

Tuning indicators, on the other hand, are most interesting and some really novel developments have been achieved. There is one firm with a "film" indicator.

This consists of small window above the tuning scale containing a ground-glass screen on to which the name of the station just tuned is projected from inside the set.

Another firm has resorted to a fly-wheel and geared drive for its tuning indicator. The gear-

ing is 1:100; a sharp turn of the tuner and the needle moves right over the whole scale. A touch and the fly-wheel action is stopped and extremely fine tuning can be indulged in. This is undoubtedly an advantage for short-wave stations—and most German sets are provided with the three wavebands, short, medium and long.

### Tuning-in by Country

The most interesting new tuning indicator was shown by Seibt. After turning it to a given country the set will only receive those stations actually situated in the country selected; all others are blocked by an ingenious mechanical device. The listener can turn to Italy and he will only hear the Italian stations.

Readers may be interested to know the manner in which the new three-valve reflex super-het operates. Most of these sets make use of an octode as first valve (in some cases a "fading frequency-changer hexode" is employed); the second stage is fitted with a high-frequency pentode or an ordinary hexode; and a power pentode is used in the last stage. Those sets using a high-frequency pentode in the second stage make use of this valve three times, in the case of the other valve only twice.

Quality in these three-valve reflex super-hets is not, and cannot be, too good in view of the high selectivity required. The frequency cut-off is somewhere in the neighbourhood of 3,500 cycles.

The German Post Office exhibit again devotes much space to the various means of suppressing man-made interference and Siemens, who



Gulliland photo

A special reporter's microphone made by Philips, shown at the Berlin Exhibition

exhibit showing a complete receiver-set factory.

Receiver design in Germany is much the same as it was in 1933. The stringent conventions governing the manufacture and trade in radio receivers, loud-speakers and valves, seems to be responsible for this. Minimum prices for receivers must have been one of the main reasons for the re-introduction of reflex circuits and the subsequent saving of valves.

The People's Set still goes strong; another 200,000 will shortly be manufactured, bringing the total up to 900,000—of which 600,000 had been sold by the end of July! Other last year's models, of which there is said to be a large stock, have been reduced in price as much as 25 per cent. in some cases. This year's models are all slightly more expensive.

### Typical Circuit Combinations

The popularity of the three-valve super-het has led to the further development of this type of set. All in all Germany has a one-circuit two-valve class; a two-circuit two-valve reflex class; a three-valve reflex super-het type; a four-valve super-het; one or two five-valve super-hets; and I think just one six-valve super-het, the Volksempfänger.

Universal and midget valves may not be introduced before August 1, 1935. This is to give manufacturers a breathing space. Loewe with its multiple valves, however, has produced



Gulliland photo

A new type of tuning scale made by Sachsenwerk



Gulliland photo

Part of the German Radio Exhibition was devoted to a complete factory producing the Volksempfänger (People's Set)



Wide World photo

A huge display of Volksempfänger sets attracted every visitor to the German Radio Exhibition



*Gullstrand photo*  
Telefunken's smallest set—the two-valve Kurier with single-circuit tuning

seem to have become specialists for this kind of work (they did the Baden-Baden campaign), have further completed their series of suppressor condensers, etc. They also have on view a set for use in connection with their well-known portable interference "detector," by means of which it is possible to actually measure the intensity of the "static."

**German Post Office Activities**

The Post Office have interesting models giving even the casual observer an impression of the way in which anti-fading aerials, which have been fitted to all German transmitters, increase the service area of the stations. A model of the short-wave beam broadcasting stations is on view, together with statistical tables and models showing the effects of the short-wave station work.

A hall is devoted to the reconstruction in symbolical form of the manner in which the May Day celebrations were broadcast to all parts of the German Reich. This is a most

impressive arrangement and is immediately followed by another special hall where visitors are supposed to pause a moment for reflection.

A large painting, a group of figures and busts of those composers and famous Germans who have been specially stressed in recent programmes are also to be found here.

A special "television theatre" is provided, where all the firms interested in television development have their latest apparatus on view. The name "theatre" is justified by the presence of a large screen, 3 by 4 metres



*Gullstrand photo*  
Novel type of receiving aerial shown at the Berlin Radio Exhibition. It is used in conjunction with a screened download

in size, on to which television reception images of the new standard 180 lines are projected.

Von Ardenne was showing actual wireless reception of the combined sight-and-sound picture being broadcast on ultra-short waves

from the two new Funkturm transmitters. The German Post Office laboratories did the same, whereas other firms contented themselves with special transmissions laid on to the receivers by landline.

On the whole, one must say that picture quality has further improved, the size of the pictures being anything from half to full-plate, but the greatest improvements are not so obvious: these have to do with the transmission and wireless reception of a steady picture on ultra-short waves and it is largely due to the careful work of the Post Office engineers under Dr. Banneitz that this has been achieved.

**New 500,000-cycle Cable**

A cross-section of the new cable capable of taking the 500,000-cycle frequency of the new standard television image was also shown, in a special glass case. Some people may have overlooked it as it was in rather a dark corner.

The most exciting of all television exhibits was the R.R.G.'s television "reporter car" built by the Fernseh A.G. A large film camera with special lenses (by Astro) is on the roof. The camera can be laid flat and protected with a special cover to permit of easy transport. Exposed film from the camera passes immediately into developing, fixing and rinsing tanks in the van below and then on to the television scanner.

**Amazingly Short Time Lag**

From here, it passes through special drying ducts and is then rolled up and can be used in the same manner as any ordinary cinema negative. The wonder of the whole business, is the fact that only one and a quarter minute elapses between the taking of the picture and the televisual of it, and it is dried within the next three-quarters of a minute!

The van at present still requires a good cable connection for television frequencies to the nearest transmitter and requires a mains connection and a fresh-water supply, but provision has already been made for making a special "trailer" car complete with electric generator and water tank.

*On page 244, J. H. Reyner records his personal impressions of television gear shown at the German Radio Exhibition*

**The Cost—**

WHILE there are numerous methods of obtaining a certain measure of automatic volume control, there are only two arrangements that can really be called popular.

One method uses a metal rectifier in conjunction with the usual condenser and resistance network, while the other makes use of the rectifying properties of a diode valve. Both methods are fundamentally similar as they rely upon half-wave rectifiers to provide a D.C. voltage from an A.C. input, so that in theory there is little to choose between them.

**Comparing the Two Systems**

When the two systems are more carefully examined there are one or two points which require consideration. Take the metal-rectifier system first. With this arrangement a half-wave metal rectifier is connected between the anode of the second detector valve and earth. There is, of course, a small fixed capacity between the anode of the valve and the positive side of the rectifier; this is to prevent the D.C. voltage, instead of the A.C. voltage, being applied to the rectifier.

The centre point where the condenser and rectifier are joined is tapped and taken to a high resistance so that the minute D.C. currents in that circuit are applied as negative grid voltage to the preceding high-frequency stages.

The cost of such a circuit is round about 15s., including 7s. 6d. for the metal rectifier.



Carleton Dyer (left), managing director of Philco, chats with the Burgomaster of Bruges during the Belgian tour of Philco dealers

In the second arrangement, a double-diode-triode valve can be used; one diode takes the place of the metal rectifier, the second acts as a distortionless detector, while the triode is connected as an additional low-frequency amplifier.

Such a valve for battery operation costs 9s. and, as it is actually three valves in one, in addition to giving A.V.C., it improves the receiver out of all recognition. The same resistance and condenser network is required as with the metal rectifier circuit

**—of A.V.C.**

and there is no appreciable improvement in the efficiency of the A.V.C. action, but for an extra 1s. 6d. over the cost of the metal rectifier one can obtain distortionless detection and a considerable increase in gain from the low-frequency amplifier. K. J.



The real Philco tone and reception! A pleasant interlude at Le Zewre during the Philco dealer's tour of Belgium

# Crusaders' A.V.C.4

## Clearing Up Some Interesting Points

**F**IRST things first, as Roosevelt would say. About that missing wire. Of course, you have discovered it? So many have that we cannot believe its omission has caused much bother.

We refer to the short little wire that *ought* to have been shown connecting the filament of the second high-frequency-amplifying valve with the first high-frequency-amplifying valve.

For the sake of convenience you can call this wire No. 10A. It has been included in all blueprints after the first batch. Apologies to those who got one of the early prints!

### Ganging Is So Easy!

Ganging is so easy! Especially if you remember that by taking off wire No. 40, the self-adjusting volume control business is temporarily suspended.

Be careful when you adjust up the trimmers that you do so in such a way that the readings on the wavelength scale are not thrown out.

When you have nicely ganged up these trimmers from the point of view of the volume on a distant station, you may find that the wavelength readings are radically out. If so, try re-trimming on the assumption that the wavelength readings can be made right with the correct adjustment on the main concentric trimmer. That is to say, if you get the front of panel trimmer wrong, the readings will inevitably come out wrong.

Don't forget, when it is all over, to put back the wire No. 40, or that nice levelling effect on the strength and volume of the foreigners will not be obtained.

### For Pentode Fans

Are you a pentode fan? Have you gone in for the pentode version of the A.V.C.4, we mean? If so, you will have realised the good-quality effect of the Mullard PM22C. A nice valve, and no mistake.

You will remember that for the pentode version we have employed the automatic-bias system, whereby an 800-ohm resistance takes the place of a grid-bias battery.

This is a very good system but we need, perhaps, to say that any change in the valve involves a change in the value of the resistance.

Assuming you decide on a pentode output but for some reason or other try a change of pentode, you must take care to consult the makers about the right value of auto-bias resistance—or, as a Crusader, *ask us!*

By the way, please take advantage of your Crusader status if you build up the A.V.C.4. We offer you *free* advice on any little matter affecting the home building of this first Crusader effort.

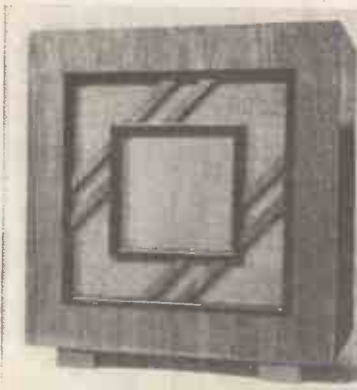
It is just a part of the Crusade to help you to build up our sets without any financial outlay either on the blueprint or in connection with the answers by our technical men to queries arising out of the set.

As there are three outputs you may be wondering which is the best. There is *no* best, and that's the truth. It all depends on what you want.

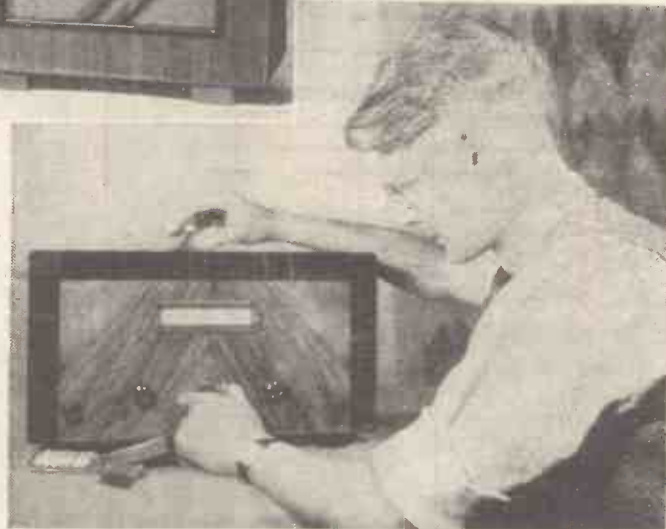
For good volume combined with the maximum economy of battery working it is probable that you will go in for the Q.P.P. system—as used in the original A.V.C.4. If you want more volume and are prepared to spend more on battery upkeep, the class-B system will appeal to you.

If ultra-sweet tone with quite an appreciable drain on the battery can be contemplated you must not fail to consider the merits of the straight pentode output circuit with the PM22C.

We are already being asked for a mains version of the A.V.C.4 by those fortunate enough to be on an electric-light supply. This is well in hand and will be presented to you just as



You wanted a separate cabinet for the loud-speaker—here it is, on the left. And below you see an interested listener settling down contentedly to operate the Crusaders' A.V.C.4 in its nice-looking table cabinet



soon as a perfected model passes our stringent tests.

The question at the moment is whether to use universal mains valves—valves with the new 13-volt 2-ampere filaments—or whether to stick to a straightforward A.C.-mains version.

Admittedly, that would leave the D.C. man out in the cold—as he is so often left!—but there are many knotty considerations to be borne in mind.

### A Real "Stunner"

No doubt a mains version of the A.V.C.4 would be a real "stunner." It would make an excellent all-electric model, thanks to its inherent stability on the high-frequency side. A real test of a battery design—can it be interpreted in terms of a mains set without sending things right up the loop? If so, you may take it that the fundamentals are inherently right.

Judging by the correspondence of Crusaders, our choice of two separate cabinets for the set and the loud-speaker has reflected majority needs very adequately. You can see the two of them at the top of this page.

## PARTS YOU WILL NEED FOR BUILDING THE CRUSADERS' A.V.C.4

### BASEBOARD

1 Peto Scott Metaplex, 16 in. by 10 in.

### CHOKES, HIGH-FREQUENCY

1—Varley screened, type B P26 (or Telsen, Lissen).

### COILS

1—Telsen triple unit, type W477.

### CONDENSERS, FIXED

7—T.C.C. tubular type, values: .0001- (2), .005-, .01- (3), .05-microfarad (or Dubilier, T.M.C.).

2—Graham Farish 1- (2), 2-microfarad (or T.M.C. Lissen).

### CONDENSERS, VARIABLE

1—J.B. three-gang .0005-microfarad with slow-motion drive, type Linatune.

1—Bulgin, .0003-microfarad differential.

### HOLDER, FUSE

1—Bulgin, type F5, with fuse bulb.

### HOLDERS, VALVE

\*4—Graham Farish, 4-pin (2), 5-pin, and 7-pin (or W.B. Telsen).

### PLUGS, ETC.

5—Clix plugs and sockets: marked Aerial, Earth, H.T., L.S.(2)

6—Clix wander plugs: marked H.T.+ , H.T.+1, H.T.—, G.B.+ , G.B.—1, G.B.—2.

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

### RESISTANCES, FIXED

7—Graham Farish 1½-watt, values: 10,000-(2) 25,000-ohm(2), 1-megohm(3) (or Telsen, Dubllier).

### RESISTANCE, VARIABLE

1—Ferranti 1-megohm with on-off switch.

### SUNDRIES

2—Ebonite strips, 3 in. by 2 in. and 2 in. by 2 in.

Connecting wire and sleeving.

3 yards of thin flex for battery leads.

1—Bulgin 2.5-volt dial lamp.

3—Peto Scott metal-mounting brackets, 2½ in. (2) and 1 in.

6 ft. screened sleeving.

1—Telsen pick-up terminal block.

1—Bulgin S92 switch.

### TRANSFORMER, LOW-FREQUENCY

\*1—Lissen Hypernik, type QPP (or Ferranti, Wearite).

## ACCESSORIES

### BATTERIES

2—Lissen 60-volt high-tension, type LN233.

1—Lissen 9-volt grid-bias, type LN190.

1—Exide 2-volt accumulator.

### CABINETS

1—Peto Scott table type for set.

1—Peto Scott for loud-speaker.

### LOUD-SPEAKER

1—W.B. Stentorian Senior.

### VALVES

2—Cossor 210VPT.

1—Ferranti H2D.

\*1—Marconi QP21.

### \* PARTS FOR ALTERNATIVE OUTPUT STAGES

### PENTODE VERSION

2—Graham Farish 1-microfarad condensers.

4—Graham Farish valveholders, 4-pin (2) and 5-pin (2).

3—Graham Farish 1½ watt resistances, 800, 5,000, and 15,000 ohms.

1—Varley Nicore 1 low-frequency transformer.

1—Mullard PM22C pentode.

### CLASS-B VERSION

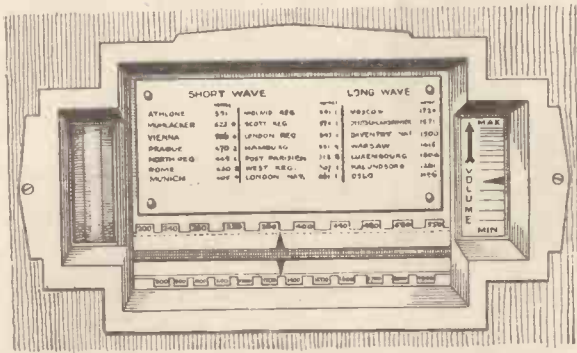
4—Graham Farish valveholders, 4-pin \*(2), 5-pin, and 7-pin.

1—Ferranti class-B transformer.

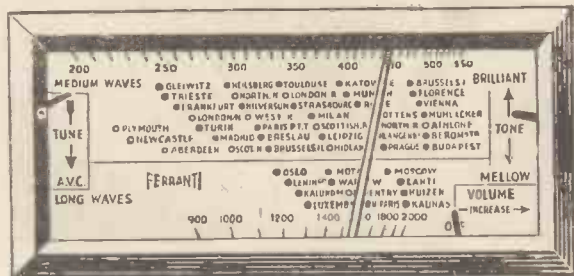
1—Ferranti HP2 valve.

(Complete kit of parts for this set can be obtained from the Peto-Scott Co., Ltd.)

# Dials Almost Tune Themselves T



A real full-vision scale—the Corsor. It not only gives you all the stations but shows how you stand for accuracy of tuning and volume output



Another scale that does more than just indicate the stations is the Ferranti, which gives a good indication of the volume and of the waveband being tuned

IF we had to compress all our impressions into one word about the developments revealed at Radiolympia this year, do you know what that word would be? "Dials." Because, when you have said all there is to say about circuit improvements, about new wonder valves, about new loud-speakers—in fact about any of the really worth-while developments of the year—you come back to the thing that everyone, no matter how non-technical, commented upon as they went round the stands—the amazing improvement in tuning dials.

### Scales That Were Not Good Enough

It is only a year or two ago that we had need to castigate many set makers for the lack of readability of tuning dials and scales. We, among others, drew attention to the fact that a scale revolving behind a very small aperture, and marked arbitrarily in 100 or 180 degrees, was not good enough.

Manufacturers have not taken these taunts lying down. On the contrary, without exception, all British set makers have worked on the idea of bigger, cleaner and more intelligible tuning indicators.

Gone are most of the microscopic dials and scales of yesteryear. Gone, too, the whole idea of a tuning scale seen "as through a glass darkly." No more fractionally viewed scales—but full-vision scales.

That is the first point of importance. The scale has become a large, open and fully viewed affair. It does not itself move any more. Instead, a pointer moves across it in some convenient way, traversing the calibrations in a way that admits of no doubt as to the setting.

Then, too, the markings on the scales are no longer divisions of 100 or 180 degrees. We have at the very least wavelength markings, but as an almost

Vast strides have been made this year in the tuning arrangements of all the latest sets. The most outstanding advance is in the use of full-vision scales, as distinct from the narrow-aperture scales of not long ago. Secondly, these scales are marked very fully in wavelengths and stations. Thirdly, the tuning-

general rule there are, in addition, the actual names of most of the foreign stations.

Thanks to the settling down of the Lucerne Plan—on the medium wavelengths, anyway—it has been possible to locate these station names with some degree of certainty that they will actually apply during reception. To offset the changes that are still made every now and then in the wavelengths of various stations, many set makers provide for the replacement of scales when modifications are introduced. Here only, a nominal charge is made for the revised scale.

### Problem of the All-waver

With the coming of the all-wave set, the problem of marking the scale is of course to a certain extent intensified. It is obviously not possible to mark in the dozens of short-wave stations with the same ease as on broadcasting wavelengths. Accuracy is very important on the short-wave settings—as a fractional error means a very appreciable deviation of frequency.

Scales tend, therefore, in all-wave sets to be marked in kilocycles or megacycles for the very short-wave bands. Although there is no doubt that the average listener is quite incapable of understanding the real significance of "frequency" in relation to "wavelength"—and although wavelength is obviously a more tangible expression than frequency, there are very definite advantages in a frequency-marked scale—particularly, as we say, in all-wave sets.

The real fan will revel in a frequency scale, giving as it does such a scientific air to the eminently simple process of tuning-in a station on a given wavelength.

We have been carefully looking at the many and varied types of tuning dials at the Show, and have drawn certain conclusions that may be of interest to you. We mentioned early on that microscopic dials were a thing of the past—but on re-considering the matter, we are not so sure that this is absolutely true as a matter of fact.

The chief fault of quite a number of otherwise well-designed dials is that the lettering is too small. Those with failing or weak sight would assuredly need a lens to read some of the dials. Then, again, many are sunk into the cabinet panels so deeply that you have to stoop down in order to peer into the aperture.

### Errors and Omissions

One or two dials we have looked at show glaring errors and omissions. This is quite indefensible, of course—and very misleading to new listeners. One dial on a well-known set leaves out Radio Paris on long waves—and calls the medium waves "Short."

While on the subject of accuracy, many set buyers must have wondered about the amazing number of stations dotted about on some of the dials.

Where the stations are oddly

scale markings are frequently augmented now with indications of volume and tone. Fourthly, as an invaluable aid to the exact location of stations under modern conditions of ether congestion and self-adjusting volume controlled sets, there are visual tuning indicators. Altogether the tuning arrangements

spaced to agree with the movement of the indicator line or arrow, it is quite satisfactory if the markings are really accurate. We can imagine, though, that if you had to tune to the point marked Athlone when you wanted Vienna, the dial would be more than a nuisance.

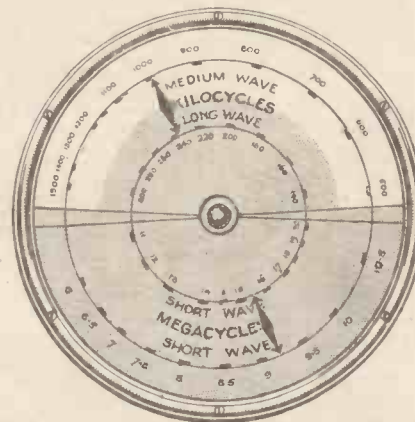
Some attempt has obviously been made by the designers of these dials to put themselves in the place of the listener as he actually tunes-in stations. This thoughtfulness has resulted in much less back-breaking affairs on many of the better-class sets.

For example, in the Atlas model, there is a full-vision scale that would be commendable if only for its clever lighting effects—but in addition, the whole scale is arranged to swivel bodily—a tall listener can tilt up the scale so that he can see without bending down.

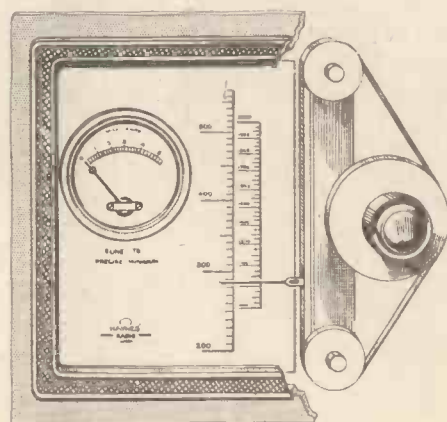
### Special Order of Merit

This ingenious arrangement deserves a special order of merit—it clearly gets over the difficulty of a deeply recessed scale.

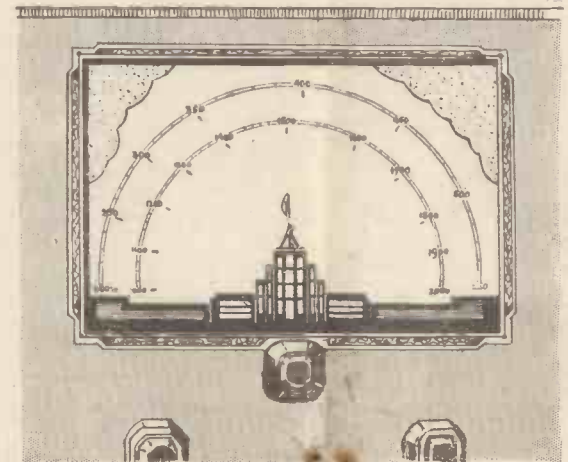
Before we end our grumbles about dials, let us remember with a sigh those that are so ill-fitting to the cabinets that when the tuning control is rotated the whole thing moves about. This is shoddy



For the real "fan", this British Radiophone tuning dial has been calibrated not in metres, but kilocycles. Each scale lights up separately when in use



A spring steel band carries the pointer of the Haynes arrangement and stops any chance of slipping. Tuning is helped by a minimum-deflection meter needle



Quite a novelty in dials—the Alba. The beam from the tower pictured above forms the tuning indicator—very effectively, 100

assembly at its worst. Nothing can be more irritating than a tuning arrangement that will not stay put. So be on your guard when you choose a set—make sure you actually try the tuning arrangement for yourself.

Another way out of the difficulty of ensuring that the markings on the scales shall be accurate has been adopted by several firms—notably H.M.V., Marconiphone and G.E.C. The idea is to give the main tuning scale markings as wavelengths and near by to fix well engraved station displays.

We noticed a good point on a Marconiphone dial that few people seemed able to appreciate just gazing around the stand. Underneath each calibration was a short thick

# o-day!

this year's sets represent a remarkably concerted effort among set makers in the cause of greater ease of control—an effort that for the most part has been entirely successful. Here the AMATEUR WIRELESS Technical Staff reviews the latest developments in this line of set design.

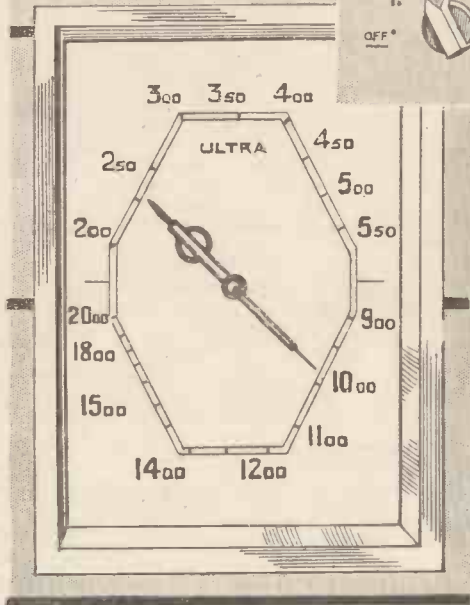
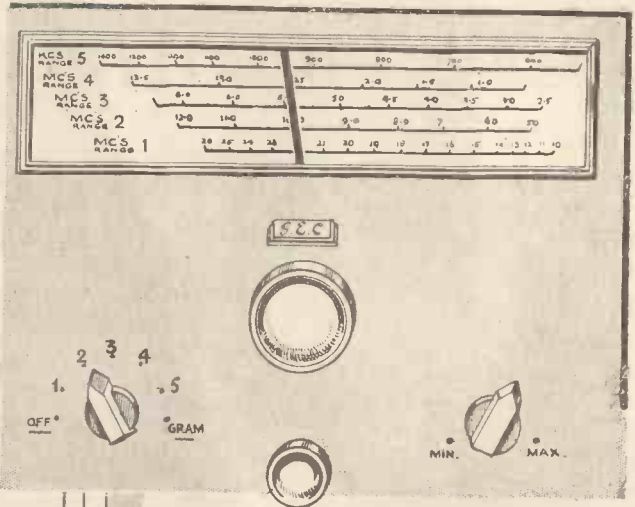
black line, which very usefully indicates the permissible variation that may arise in the exact setting. You know that any given wavelength will turn up within the limits of the length of this indication.

Now we come to quite another aspect of tuning dials. We have said a great deal about the markings, but so far nothing about the methods of indicating the exact point of tune.

In these days it is, of course, of very great importance to be able to say that you really are dead in tune. If you mis-tune by ever so little, you may spoil the quality very badly. What is equally important, you may find that you are bringing in a lot of unnecessary side-band splashing—twitters and all that—from other adjacent stations.

With the modern self-adjusting volume control set, though, it is by no means so easy to say when you are right in tune. Any slight mis-tuning tends to be made good by the self-adjusting action.

That is why so many visual tuning indicators have come into being recently. Many of the sets at the Show—in fact,



*Clock-face tuning is a novelty adopted in Ultra sets this year—the advantage being a widely spaced array of wavelength calibrations*

*For the G.E.C. Overseas 7, which is for medium- and short-wave reception, a five-division scale is calibrated in kilocycles and megacycles respectively*

nearly all the better grades—include some sort of visual indication, in addition, that is, to the wavelength or station markings on the dial.

Neon, shadow, searchlight, fluid-light and so on—all aim at giving the listener an indication of the exact point of tune. And they do so very effectively, we may add.

A light may climb up a column, or the intensity of the light may vary, or a shadow may increase or decrease in width—any such visual system gives the desired indication. Whether, after a while, the listener will actually bother to look at the indicator when his ear tells him that quite satisfactory reception is being obtained is a moot point.

### Visual Tuning Has Come to Stay

With very selective sets, there is no doubt that the visual tuning indicator has come to stay. Which will be the final form we should not like to say. The idea is not new, meters with dipping needles having been used with classy sets for years.

Indeed, in the Haynes sets, the visual tuning indicator is actually a meter, and you just watch the needle until for any given station it dips to the minimum.

In conclusion, we might touch upon a few outstanding examples. On the Alba set the dial is in the form of a picture, with the beam lighting up the required part of the scale coming from the pictured tower.

Ultra have gone in for clock-face tuning, with well-spaced wavelength calibrations all round the face. The hand moves round as the tuning knob is adjusted.

On the G.E.C. all-waver, the scale is most elaborately—quite justifiably—marked in kilocycles and megacycles for the medium and short waves respectively. A five-position waveband switch is linked with the five bands on the scale.

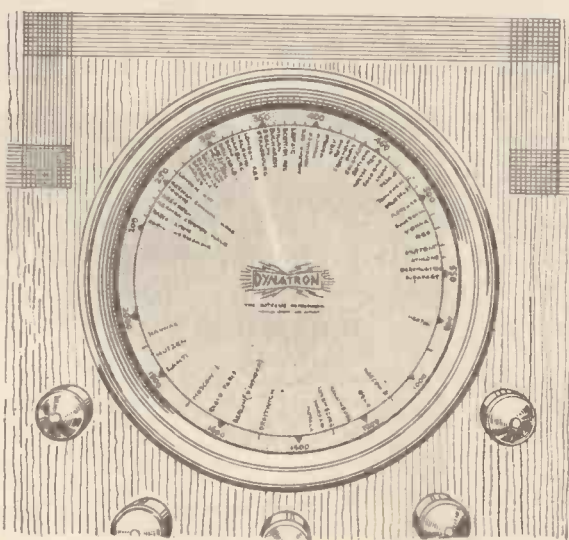
### Pointer to Show Actual Tone Variation

Ferranti have a very fine dial, with all the stations well marked as well as wavelengths. In addition, there is a pointer to show the tone variation from brilliant to mellow, and another pointer to show which waveband is switched in.

The Cossor is another set with a dial that shows a lot of auxiliaries, such as an arrow pointer for tuning, an arrow for volume control and a neon lamp for visual tuning.

One of the best of the frequency scales is the R.G.D., which is for short, medium and long wavebands. Although at first sight it looks rather complicated, the scale is very simple to study in practice—because each scale lights up separately with the waveband switching.

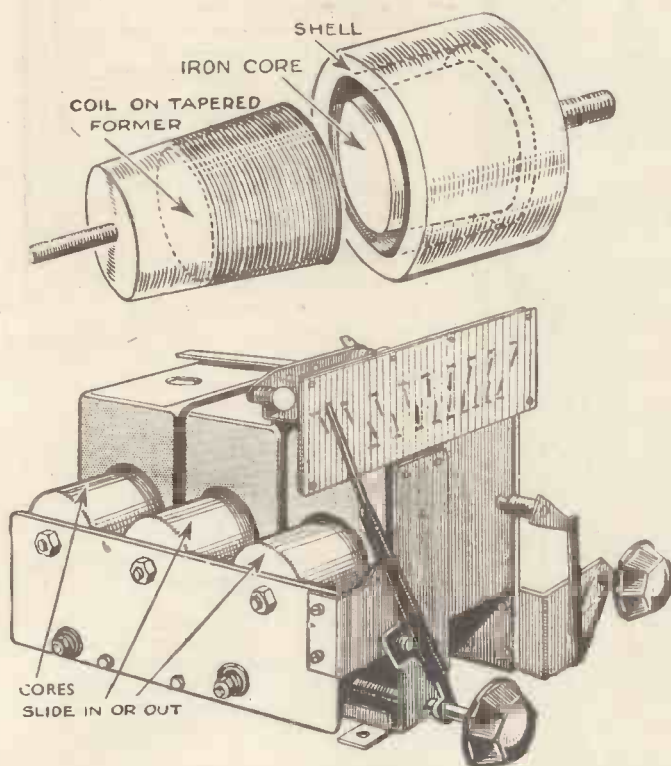
The Dynatron set includes a really outstanding scale. It is nothing less than a rotating neon-light pointer, brightening immediately a station is tuned-in. At one swoop this indicates the station by name, the exact tuning point, and the signal strength. Moreover, there are three degrees of selectivity—and the rotating beam widens or narrows according to the selectivity in action.



*Quite the most ingenious dial at the show—the Dynatron. The neon beam is the only movable part. A three-way selectivity switch gives three widths of beam—and for all three settings, you tune to brightest light*

# New Tuner for Constant Selectivity

## The New Varley Permeability Units



This is the new Varley permeability tuner, which does away with the usual multi-gang condenser and is claimed to have constant selectivity over all wavelengths

**T**UNING without a condenser is no new thing. Years ago, we all tuned that way—moved a slider along a massive coil, the only parallel capacity being the inter-turn capacity of the coil.

Later we gave up such cumbersome ways and evolved to coil-and-condenser tuning, with a fixed inductance coil, and a variable capacity condenser.

With the modern gang condenser, and multi-coil unit, this basic system holds good sway at

the low-frequency response would be a constant factor, and thus a fixed amount of tone compensation could be included so as to make the set's quality even on all wavelengths.

For some time now, coils for tuning have been made with a centre core of powdered iron. The effect has been to cut down the high-frequency resistance and so making the coils more selective. Less wire has been needed for a given inductance value.

Now if this iron core is made movable

the moment—but its place of honour is endangered by the development of a really sound permeability tuner.

We refer, of course, to the new Varley tuner. The inductance is varied by the moving in and out of the coils of special iron cores, which by altering the permeability of the coils, effectively alters their inductance.

Now this is a very important point. To be able to change the wavelength simply by altering the inductance does give advantages over condenser tuning.

As is well known, the usual tuning circuit, consisting of fixed coil and variable condenser, does not act in a constant way over the whole of a waveband.

If by some means this ratio could be kept constant—the ratio of L to R, we mean—as the tuning circuit is varied, it can be shown that the stage gain of the associated tuning circuit would remain constant, too.

Moreover, the effect of the tuning circuits on

inside the coil, it will have the effect of varying that coil's inductance. The inductance will be at a maximum when the core is fully in, and at a minimum when fully out.

A simple mechanism would not be much use in practice, though. Just pushing a piece of this iron in and out of a coil would not, that is to say, enable sufficient variation in inductance to be obtained to cover a complete waveband.

By special attention to the method of construction, as developed by the Varley engineers, the desired conditions can be obtained in practice.

### Three Years' Tests

Careful tests over a period of three years have failed to reveal any marked changes in the natures of the cores used in these coils. A rise of temperature produces a slight increase in permeability, but the initial matching arrangements are not affected.

The complete tuner can be obtained as a three-gang job for £3 7s. 6d., while a four-gang unit is listed as £4 5s. 0d. A padding coil can be obtained for 3s. 6d. to convert the tuner for super-het work—you see from this that, although the tuner works on a new principle, it is adaptable to all types of circuit.

We have been examining the three-gang unit and find that the coils are rigidly fixed, while the cores are mounted on a movable plate, which is controlled by a smooth and positive drive.

### Wave-change and Volume Control

A wave-change switch for either medium or long waves is mounted on the right, with a bracket supplied to enable a volume control to be matched up on the other side.

A small terminal block is mounted at the side of the unit to enable coupling coils to be linked together when using two of the coils in a band-pass type of circuit.

Altogether, although rather expensive, these Varley permeability tuners seem to offer an interesting field for constructor interest. If such coils catch on, they will of course come down in price.

## Brussels' New "Broadcasting House"

**W**ORK on the Brussels' Broadcasting House will start in 1935. As will be seen from the accompanying photograph, it will be a representative building in the modern style.

Seventeen studios will be provided. These will be as follows:—

One large hall of 15,000 cubic metres; one studio of 3,000 cubic metres; two studios of 1,000 cubic metres each; four radio drama studios attached to a D.C. panel; two "effects" studios; two studios for news bulletins; two studios for talks; two studios for rehearsals; and one research studio.

### Audience of Fifty in Each Studio

In the big hall there will be room for an audience of 350 persons; the next largest studio will have accommodation for an audience of 100; and fifty will fit into each of the medium studios.

In designing the studios, use has been made of the experience of the designers of the London and Berlin Broadcasting Houses. The "trapez" form of the studios is obviously taken from Berlin, whereas the provision of a D.C. panel, the air-conditioning plant and the provision

of a television studio has been taken from London.

Offices will surround two studio "towers" built of heavy brick, and thus prevent any street noises from entering.

Brussels has to provide two simultaneous programmes, one in French and one in Flemish, so that seventeen studios will be none too many. The Brussels broadcasting station was one of the first seven in Europe, but it has been impossible until now to provide adequate studio accommodation.

Brussels is a favourite station for many English listeners—particularly those who have spent their holidays on the Belgian coast.



Gulliland photo

Only a model at present—but this is what the new Brussels' Broadcasting House is going to look like when it is finished. Very modernistic, isn't it?

A. G.



# Stenodes for the Amateur NOW!

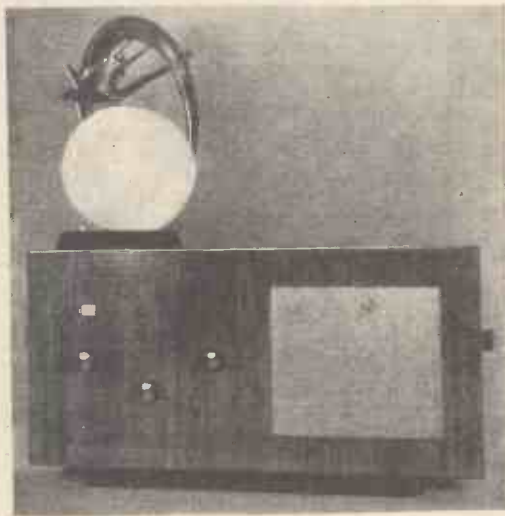
Here we briefly review the most outstanding set ever offered to the home constructor—a "Wireless Magazine" Stenode designed by Paul Tyers and approved by Dr. James Robinson, the original inventor

WHAT would you say is the most crying need in wireless reception to-day? Quality of reproduction, ease of control, sensitivity to weak stations—these are some of the attributes desirable in a modern set; but above all, over-riding every other consideration in an interference-infested ether, is SELECTIVITY.

### Europe's Motley Crowd

Unless the modern set is selective—and quite exceptionally so, at that—it is unable to cope with the enjoyable reception and reproduction of the scores of programmes radiated by Europe's motley concert of broadcasters.

So the super-het, has been developed, improved, and reduced in price for the masses of ordinary listeners. To-day the super-het is supreme, not because inherently it is the



A modern set deserves a modern cabinet—and this photograph shows you that the "W.M." Stenode has one!

perfect form of circuit, but because it has proved to be about the only practicable way of achieving something approaching the ultra-selectivity needs of the day.

Yet, for all the perfected frequency-changers and band-pass inputs, not to mention pre-first detector stages, the super-het does not entirely solve the problem of interference-free reception.

There are still conditions under which a well-designed 9-kilocycle separation super-het fails to bring in the wanted signal without background, with side-band twitters and other "noises off."

The reason is simple. All stations do not keep the required 9 kilocycles apart in frequency. Or, if they do,

the modulation is so heavy that they "spill over" into the adjacent channels.

It was to combat such troubles—of very closely working stations—that Dr. Robinson some years ago tackled the problem of selectivity from a fresh point of view.

The Stenode system was the result. Suffering for some time from considerable controversy—particularly among more learned radio engineers and mathematicians—the Stenode has come through as a system that really can give greater selectivity than any other.

What, in brief, is the Stenode? It is quite easy to understand the broad principle, even though the technical implications do lend themselves to somewhat acrimonious discussion. We are not concerned with theory, but with some very incontrovertible practice.

The Stenode's fundamental principle consists in the systematic sharpening up of tuning circuits to an extent that would normally be considered too great owing to the attenuation of the sidebands bearing the higher frequencies of speech and music.

In the Stenode the selectivity of certain tuning circuits is carried right beyond the normal limit—to the point where, without further circuit modifications, the output would be so deficient in tone that it would be unintelligible.

The Stenode looks after this attenuation by introducing, after the detector stage, a special tone-compensation valve stage, which has the effect of reducing the bass and so levelling up the audible frequencies carried in the original signal in a way that produces "straight-line" output.

That, then, is the principle of the Stenode—the use of ultra-selective tuning circuits which can, of course, be designed for any desired degree of frequency separation, together with tone compensa-



Top of the chassis of the "W.M." Stenode, specially designed by Paul Tyers. The set has been approved by Dr. James Robinson, the original inventor

tion to make up for the ensuing loss of the higher frequencies of the audible range.

Without this system the designer is definitely limited in his ability to increase the selectivity of the tuned circuits. He is limited by considerations of quality. If in a normal circuit the tuning stages are made very selective indeed the output quality is bound to suffer.

### Carried to Amazing Lengths

Dr. Robinson has shown that selectivity can be carried to amazing lengths so long as suitable tone correction is introduced to straighten out the frequency response.

One of the most obvious circuits to which this principle might be applied is the modern super-het. By a suitable design of intermediate-frequency coils (as by a variable coupling between the primary and secondary windings,) such a set can be made very selective indeed. It can be made selective enough to separate any two stations in Europe's ether, no matter what ratio of strength one may bear to the other—a strong local can be cut out in favour of an adjacent weak foreigner.

### A Well-known Designer

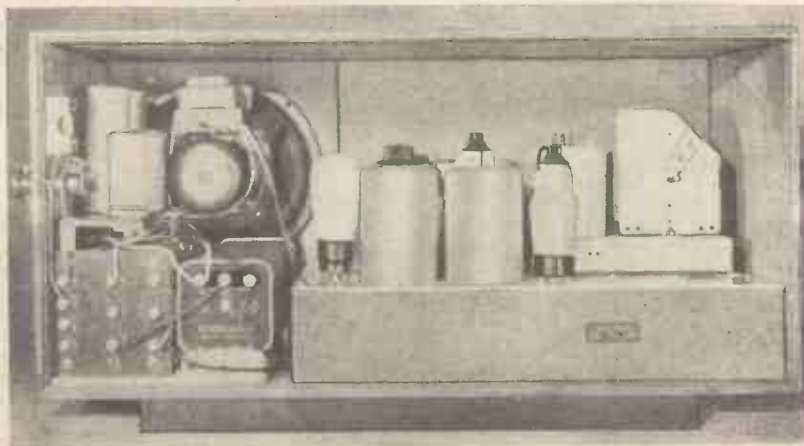
Paul D. Tyers, well known for his set designing, has applied Dr. Robinson's Stenode principles to an amazing set for the home constructor.

In the September "W.M." you will find many pages, fully illustrated, explaining the Stenode principle in detail—and giving full constructional information on how to build up the most selective A.C. mains super-het ever offered to the home constructor.

Complete with high-selectivity intermediate coils and suitable tone compensation, this new set is at once unbelievably selective and first class in its quality of reproduction.

This, the first of a series of Stenode sets to be described in *Wireless Magazine* is an A.C. version using five valves. The actual sequence is (1) pentagrid detector-oscillator, (2) high-frequency pentode intermediate amplifier, (3) double-diode-triode second detector, giving self-adjusting volume control; (4) triode amplifier and tone compensator; and (5) pentode output.

Among discerning amateurs the Stenode has long been looked upon as the set of the future. Well, *Wireless Magazine* for September has produced the set of the future—and you can build it NOW!



Full constructional details of this A.C. Stenode receiver—the most selective set yet—will be found in the September issue of "Wireless Magazine," now on sale

Sets of the Season Tested

# Ekco Model A.C. 85



There is no question that the new Ekco model A.C. 85 is a particularly attractive proposition to the listener who wants a new set

ONE of the most interesting exhibits at Radiolympia was on the Ekco stand, where there was an illuminated map of Europe, with dozens of different coloured bulbs, and a whole host of switches, all interconnected with a Model A.C. 85 receiver. This gear was set up to illustrate the outstanding developments embodied in this receiver and, in particular, the noise suppressor and station pre-selector.

### Good Reason to Be Proud

The Ekco people are proud of this development for two reasons. This receiver is the first to use these new developments and in addition, the set is, without question, one of the easiest receivers to operate that we have ever tried.

A brief summary of the circuit is sufficient to give a very good idea of the capabilities of the receiver. The first detector and oscillator circuits are electron-coupled within a Mullard FC4 frequency changer. The maximum stage gain is obtained from the single intermediate-frequency stage by the use of a Mazda steep-slope high-frequency pentode.

So as to obtain as near perfect as possible automatic volume control and detection a double-diode is used, followed by a separate 354 triode amplifier. All of these valves obtain the last ounce from the receiver, so that results are unusually good.

### Bakelite Cabinet

As usual, the cabinet is of moulded bakelite and can be obtained in either walnut or black and chromium finish. The first point which strikes every user is the very large tuning scale, on which are calibrated over eighty station names. Most of the stations marked can be received consistently—over half of them at good loud-speaker strength—without interference or fading.

The feature, however, that will interest all of our readers is the unique noise suppressor and station pre-selector. A small knob

in the centre of the panel is marked "Strong," "Medium," and "All Stations." When this knob is in the "Strong" position, the only stations that can be tuned in are those which are of good volume, free from static and fading; in other words, stations that can be relied upon to give perfect reception.

If the knob is switched to the "Medium" position, all inter-station noise is completely cut out while the receiver tunes in some thirty stations, all of good entertainment value.

Finally, after the knob has been switched to the "All Stations" position, the receiver works in the normal way like a standard super-het and brings in all the weak and strong stations without discrimination. Incidentally, background and inter-station noises are not suppressed.

There are only four controls; the most important is the tuner, a large knob in the centre, which controls a light beam to illuminate the names calibrated on the dial. The left-hand control is a simple combined on-off switch and volume control, while on the right is a combined wave-change and gramophone switch. The centre knob is the noise suppressor.

Delayed amplified automatic volume control really does prevent ninety per cent. of the fading experienced with Continental stations. When the set is being tuned from one end of the waveband to the other, the volume from the more powerful stations is more or less brought down to a pre-determined level, while weaker stations are amplified so that it is hardly possible to tell by ear whether the station is a local or distant one.

At the rear of the chassis is a semi-fixed tone control. This has three positions, medium, high or low, so that users can vary the pitch of the reproduction to suit their personal tastes.

The pick-up sockets, just above the tone control, can be used in conjunction with any standard pick-up, while no extra volume control is needed as it has been arranged for the internal volume control to operate on both radio and pick-up.



Clapham—or is it really Dwyer?—discusses the merits of the Ekco model A.C. 85 at Radiolympia

In addition to the external loud-speaker sockets, a switch is provided on the loud-speaker and should you not wish to use the internal loud-speaker this can be cut out by means of the switch. There is no mains aerial attachment for, in common with many other prominent manufacturers, Ekco have realised that a mains aerial is very inefficient, always produces a nasty background noise, and actually better results can be obtained from a few feet of wire trailing on the floor.

### Practically Constant Selectivity

We naturally were very interested in the performance of this receiver, particularly in view of its exceptional specification. The site selected for our test was a good one, some thirty miles from the local station, with an aerial 50 ft. in length and about 30 ft. high. Under such conditions, the selectivity was a little better than 9 kilocycles, and this degree of selectivity remained practically constant over both wavebands.

There is absolute silence between stations, and if the receiver is more than 2 kilocycles off tune, even on the local, nothing could be heard. As most listeners want only ten or a

### IN A NUTSHELL

Makers: E. K. Cole, Ltd.

Model: A.C. 85.

Price: £13 2s. 6d. in walnut or £13 13s. in black and chromium.

Valve Specification: Combined detector/oscillator (Mullard FC4) followed by a single intermediate-frequency stage (Mazda AC/VP1). Detection is by means of a diode with a second diode for A.V.C. (Mullard V914). A low-frequency amplifier (Mullard 354) drives the power pentode (Mazda AC/Pen) with a full-wave rectifying valve in the final socket (Mullard IW3).

Power Supply: A.C. mains, 200-250 volts, 40-100 cycles.

Type: Horizontal table model.

Remarks: The first receiver we have tried which uses a variable noise suppressor.

dozen alternative programmes, this pre-selector will be of the utmost value.

During daylight we had no trouble in receiving over twenty stations at good strength. We did not include those stations which were hard to receive or interfered with by other stations; after dark this log was increased to seventy-nine stations.

The tuning range is exceptionally wide. On medium waves the minimum wavelength was a trifle under 200 metres, the maximum being approximately 560. On the long waves, several Swiss and Russian stations between 700 and 800 metres were tuned-in quite easily, while the Hesto weather report could always be heard. We had no trouble in separating Kalundborg and Luxembourg, while there was negligible sideband splash between Zeesen and Daventry.

We have left until last, the all-important point of reproduction. We can assure intending buyers that the quality of this set is equal to any super-het that we have tried this year. The output is almost 3 watts and even at full volume there is not a trace of distortion, while the tonal balance is excellent.

Next Week's Set Test: Atlas Model 5-7-8 A.C. Super-het with Spectrum Tuning



The Pilot Kit SERVICE was founded in 1919

# CRUSADERS' A.V.C.4.

## NEW SPEAKERS—ELIMINATORS—KITS

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#### Peto-Scott SPEAKERS

Type S2 Q.P. PERMANENT-MAGNET MOVING-COIL SPEAKER. Ideal for the modern Q.P. Output. With full-size cone—midget only in price. Extreme sensitivity. Complete with input transformer. Cash or C.O.D. Carriage Paid, £17/6. Yours for 2/6. Balance in 5 monthly payments of 8/6.

Type S3 DE LUXE P.M. 123 MOVING-COIL SPEAKER. Tapped for Power, Super-Power, Pentode or Class "B" A speaker that is unsurpassed for sensitivity, exquisite tone, reliability and value. With oversize cone and tapped input transformer. Cash or C.O.D. Carriage Paid, £11/15/-. Yours for 2/6. Balance in 7 monthly payments of 5/-.

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#### 1935 ADAPTAGRAM

Convert Your Present Set to a Magnificent Radiogram

Here is the ideal Cabinet for converting your present set to a magnificent Radiogram. Hand French Polished by leading experts of London's piano trade. Chromium fret surround. All joints mortised and tenoned. Ready to take your set, speaker, power equipment and your own gram fittings. With ready-fitted motor board. Plain front or vignetted to take any panel up to 18 in. by 8 in., or specially drilled to your own dimensioned sketch at slight extra cost.

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#### CRUSADERS' A.V.C.4

**Q.P.P. OUTPUT**  
**KIT "A"** Author's Kit of first specified components including Peto-Scott Metaplex Baseboard, but less Valves, Cables and Speaker. Cash or C.O.D. Carriage Paid, £62/6. Yours for 11/3 and 11 monthly payments of 11/3.

**KIT "B"** As for Kit "A" but including set of 4 specified Valves, less Cabinets and speaker. Cash or C.O.D. Carriage Paid, £91/0. Or 12 monthly payments of 16/6.

**KIT "CT"** As for Kit "A" but including set of 4 specified Valves and specified Peto-Scott Cabinet for Receiver portion, less Speaker Cabinet and Speaker. Cash or C.O.D. Carriage Paid, £10/0/6. Or 12 monthly payments of 18/6.

**KIT "CC"** As for Kit "A" but including set of 4 specified valves and specified Peto-Scott Cabinets for Receiver and Loudspeaker, less speaker. Cash or C.O.D. Carriage Paid, £10/15/6. Or 12 monthly payments of 19/9.

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**KIT "A"** Cash or C.O.D., £6/16/6. Or 12 monthly payments of 12/6.  
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**KIT "C.C."** Cash or C.O.D., £11/0/6. Or 12 monthly payments of 20/3.

#### CLASS "B" MODEL

**KIT "A"** Cash or C.O.D., £6/6/-. Or 12 monthly payments of 11/6.  
**KIT "B"** Cash or C.O.D., £8/16/-. Or 12 monthly payments of 16/-.  
**KIT "C.T."** Cash or C.O.D., £9/15/6. Or 12 monthly payments of 18/-.  
**KIT "C.C."** Cash or C.O.D., £10/10/6. Or 12 monthly payments of 19/3.

If Peto-Scott Permanent Magnet Moving-coil de luxe Speaker required add £1/15/0 to cash price or 3/3 to deposit and each monthly payment.

#### NEW Manufacturers' KITS in Sealed Cartons

**COSSOR 357.** 3-valve (including rectifier) A.C. Mains Complete Kit includes Valves, Cabinet and Mains Energised Moving-Coil Speaker. Cash or C.O.D. Carriage Paid, £7 19/0. Balance in 12 monthly payments of 13/6.  
**COSSOR 352.** Three-valve Battery. Complete Kit with all components, Cabinet and Moving-Coil Speaker. Cash or C.O.D. Carr. Pd. £5/19/0. Balance in 12 monthly payments of 10/-.  
**LISSEN SKYSCRAPER THREE.** Chassis model with (Lissen) S.G., Detector and Pentode Valves. Cash or C.O.D., £3/17/6 Carriage Paid. Balance in 11 monthly payments of 7/-.  
**NEW LISSEN SKYSCRAPER FOUR ALL-WAVE CHASSIS MODEL.** Complete Kit comprises all components, including set of Lissen Valves. Cash or C.O.D. Carriage Paid, £5/12/6. Balance in 11 monthly payments of 10/3.  
**GRAHAM FARISH MYSTIC Q.** Kit for building, less valves, Cabinet and Speaker. (Cash or C.O.D. Carriage Paid, £2/0/0. Balance in 7 monthly payments of 5/6.  
 If required complete with Valves, Cabinet and W.B. Stentorian "Baby" Speaker. Cash or C.O.D. Carr. Paid £5/5/6 or 12 monthly payments of 9/9.  
**GRAHAM FARISH SKYRAIDER 3.** Complete Kit for building includes valves and modern walnut cabinet. Cash or C.O.D., Carriage Paid, £5/4/0. Balance in 11 monthly payments of 11/3.  
 If required complete with W.B. Stentorian Baby Speaker, Cash, C.O.D. Carr. Paid, £7/8/6 or 12 monthly payments of 13/6.

**EXIDE H.T. ACCUMULATOR 2-W.H. 60.** 120 volts, 5,000 m.a. In wooden crates. Cash or C.O.D. Carriage Paid, £4/13/0. Balance in 11 monthly payments of 8/8.

**B.T.H. MINOR PICK-UP AND TONE ARM.** With volume control. Cash or C.O.D. Carriage Pd. £1/1/0. Balance in 4 m'thly payments of 4/6.

**NEW GARRARD MODEL 202A.** 12-in. Turntable. Electric Motor for A.C. mains. Cash or C.O.D. Carriage Paid, £2/10/0. Balance in 8 monthly payments of 6/-.

**J.B. LINACORE.** Complete tuning unit comprising matched coils and condenser, type HPB (battery), type BPM (mains). Cash or C.O.D. Carriage Paid, £3 9/6. Balance in 11 monthly payments of 6/6.

**AVOMINOR UNIVERSAL A.C.-D.C.** Measuring Instrument. Complete in case with leads, clips and testing prods. Cash or C.O.D. Carriage Paid, £5/0/0. Balance in 11 monthly payments of 9/3.

**ROLA CLASS "B" SPEAKER AMPLIFIER,** complete with Class "B" valve and P.M. moving coil speaker. Cash or C.O.D. Carriage Paid, £3/6/6. Balance in 11 monthly payments of 6/-.

#### NEW SPEAKERS

**W.B. STENTORIAN STANDARD PERMANENT MAGNET M.-C. SPEAKER.** For power, pentode, and Class "B". Cash or C.O.D. Carriage Paid, £1/12/6. Balance in 6 monthly payments of 5/-.

**W.B. STENTORIAN SENIOR PERMANENT-MAGNET M.C. SPEAKER.** For Power Pentode and Class B. Cash or C.O.D. Carriage Paid, £2/2/0. Balance in 7 monthly payments of 5/9.

**BLUE SPOT STAR JUNIOR Permanent-Magnet M.C. SPEAKER** with 12 point matching transformer suitable for all outputs. Cash or C.O.D. Carriage Paid, £1/15/0. Balance in 6 monthly payments of 5/6.

**ROLA FR.5 P.M. MOVING-COIL SPEAKER.** Cash or C.O.D. Carriage Paid, £1/9/6. Balance in 5 monthly payments of 5/3.

**R & A "Victor" PERMANENT MAGNET MOVING COIL SPEAKER.** Complete with Universal Transformer, Cash or C.O.D. Carriage Paid, £3/13/6. Balance in 11 monthly payments of 7/-.

#### NEW ELIMINATORS

**ATLAS C.A.25,** for A.C. Mains, Class B and Q.P.P., four tappings: 60/80, 50/90, 120, 150 volt, 25 m.a. Cash or C.O.D. Carriage Paid, £2/19/6. Balance in 10 monthly payments of 6/-.

**NEW REGENTONE UNIT, V.P.30** for A.C. Mains. 100/250 v., three tappings: 10,20, 30 m.a. With L.T. Charger 2 v., .5 amp. Cash or C.O.D. Carriage Paid, £2/12/6. Balance in 9 monthly payments of 5/9.

**EKCO A.C. 10/20.** 100-125, 200-250 v. A.C. 40-80 cycles. 8/20 m.a. Cash or C.O.D. Carriage Paid, £2/2/6. Balance in 7 monthly payments of 5/9.

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# Interesting Captures to Add to Your Log

## To Aid Your Foreign Listening . . .

**LAST WEEK** we published a broadcast guide and radio map that enables any listener to identify most of Europe's worth-while stations.

**NEXT WEEK** we shall publish a special article explaining how actual foreign announcements can be identified and how various Continental languages can be recognised.

**R**ECEPTION conditions during the past week have so greatly improved that on most evenings I have devoted my time to listening to certain European stations which have been almost inaccessible since last spring.

Of these Bucarest (364.5 metres) which, after careful tuning, you should be able to disentangle from Milan, has proved one of the most interesting. Try for this studio towards 9.10 p.m., when very good concerts are broadcast, or again after the news bulletin (10 p.m.), when relays of dance music are taken from the Bassin Lido, or one of the principal restaurants such as the Continentale, Les Carpathes, Piccadilly, or Cina.

### First-class Orchestra

On two occasions I picked up operatic performances with first-class orchestra and singers at about 7.45 p.m., and although the station is not a very powerful one—as judged by to-day's standard—the signal was so steady that I held it for over an hour.

Another capture—perhaps a more difficult one—was Barcelona (EAI) on 377.4 metres, a tricky tuning, owing to its close proximity to the 120-kilowatt Leipzig transmitter. As a rule, from this Spanish station one can only get a very distorted broadcast, but occasionally, when the engineers are conscientious and stick rigidly to their channel, a very good transmission can be heard.

Should this occur in the later hours, you will be treated to the typical Catalan dance, the Sardana, to the accompaniment of high-pitched drums and a flute-like instrument which reminds you somewhat of Scottish pipes.

The Spaniards never seem to tire of its strains; there is a strong "Ravel Bolero" touch about them.

### Even Belgrade

Even Belgrade, which appears rarely on my log, on these nights was a worth-while transmitter.

Do not neglect to log carefully the dial readings of a number of relays, as they frequently prove excellent subsidiary channels for receiving a broadcast which from the original may be marred through some cause or other.

I was given a clear demonstration of this fact a few nights ago. A special programme taken from Italy by Germany and spoilt by

atmospherics on most wavelengths above 300 metres, thus including both German and Italian powerful stations, was thoroughly enjoyed through Trieste. The channel suffered no interference whatsoever.

If atmospheric conditions are unfavourable for listening on the long-wave band—and it is more affected than others—seek out a low wavelength; for instance, in most instances the Danish entertainments are pleasanter from Copenhagen direct than from Kalundborg at higher power.

News reaches me from the Danish capital that the winter season will be one of the best yet, as during these months many of the most famous singers and instrumentalists are taking part in concerts. Such names as Conchita Supervia (London), Erne Berger (Berlin), Jascha Heifetz (Paris), Wladimir Horowitz (New York) and a host of others have been specially engaged.

Erigo Tango (Buenos Aires) and Nicolai Malko (Leningrad) will conduct the State Symphony Orchestra. On September 11 the well-known Westminster Choir from the United States will broadcast.

Breslau, of which the power is to be increased to 100 kilowatts, will close down until the end of September; its duties will be taken over in the meantime by the old 17-kilowatt station.

Official—and, I hope, reliable—information has now been released regarding the new transmitters which the Spanish Government is planning to erect

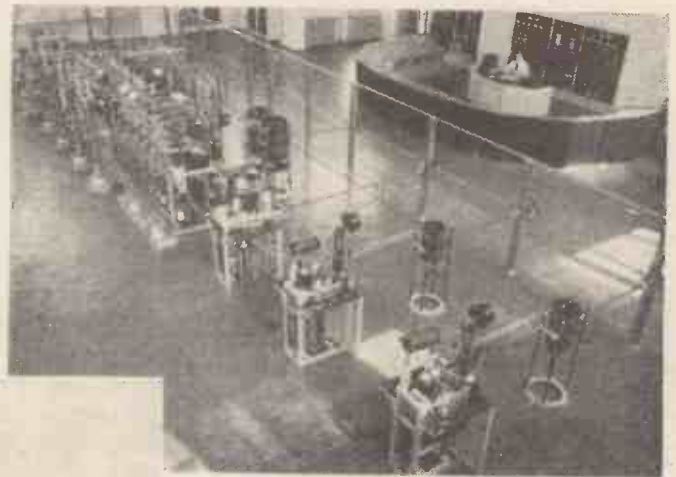
in its endeavour to reorganise the broadcasting system. The scheme will take three years to carry into operation. The first stations to be built are those of Madrid (50 kilowatts) and Barcelona (50 kilowatts), to work respectively on 293.5 metres and 247 metres. These should be ready within one year.

### Spain on the Long Waves

Six months later it is hoped to launch Madrid (National) 150 kilowatts (1,639 metres) and then in quick succession a 60-kilowatt at Seville (410.4 metres) followed by Corunna (30 kilowatts), 377.4 metres; Vizcaya (possibly Bilbao), 30 kilowatts, 238.5 metres, and a 10-kilowatt station to be erected on the Island of Tenerife (207.3 metres).

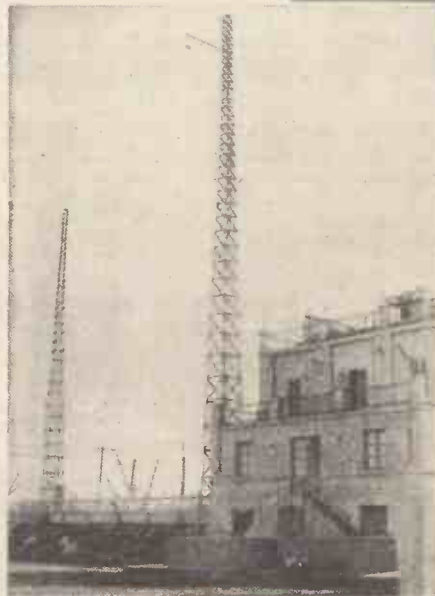
For the third year the plan calls for a 20-kilowatt transmitter at Valencia (352.9 metres), two 5-kilowatt relay stations at Murcia and Oviedo to operate on a common wavelength (207.3 metres), and finally a 20-kilowatt short-wave station at Madrid using two channels (13.92 and 31.58 metres).

If the scheme matures, Spain will then stand on a par with her neighbours.



Gulliland photo

A view of the new Mühlacker station, which recently had its power raised from 60 to 100 kilowatts. Note the semi-circular control desk



Postan photo

An interesting photograph of the aerial used at the Valencia (Spain) broadcasting station

The Czechs in the districts served by Kosice and Bratislava are not at all satisfied with the power of their stations, and consequently regularly turn to the German and Hungarian programmes for good reception. To counter this the Czech government has decided to erect without delay a 30-kilowatt transmitter at Banska Bystrica so that it may take up its duties next winter.

I learn that next winter we may have the luck of picking up broadcasts from Mexico, as, according to a report, at Saltillo (Coahuila) not far from that romantic spot Monterrey, made famous by dance bands, the Mexican authorities are erecting a 250-kilowatt to work on 556 metres (540 kilocycles). Whether its broadcasts are to feature political propaganda is not made clear, but it is stated that incidents of the private life of the President of the United States are to be given regularly as a serial!

# Broadcast Wavelengths

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

## Principal Short-wavers

Metres	Kilo-cycles	Station and call sign	Country
11.67	25,700	New Brunswick, N.J. (W2XBC)	United States.....
13.93	21,540	Pittsburgh (W8XK)	United States.....
13.97	21,470	Daventry (GSH)	Great Britain.....
13.98	21,460	Boston (W1XAL)	United States.....
14.00	21,420	Deal, N.J. (W2XD)	United States.....
14.17	21,160	Buenos Aires (LSL)	Argent. Republic.....
14.47	20,730	Buenos Aires (LSY)	Argent. Republic.....
14.72	20,380	Rugby (GAA)	Great Britain.....
15.25	19,540	Rome (IRW)	Italy.....
15.78	18,900	Prangins (HBF)	Switzerland.....
16.86	17,790	Daventry (GSG)	Great Britain.....
16.87	17,780	Boundbrook (W3XAL-N)	United States.....
16.83	17,770	Eindhoven (PHI)	Holland.....
16.89	17,760	Zeese (DJE)	Germany.....
19.47	15,410	Riobamba (PRADO)	Ecuador.....
19.56	15,340	Schenectady (W2XAD)	United States.....
19.64	15,270	Wayne (N.J.) (W2&E)	United States.....
19.67	15,250	Boston (W1XAL)	United States.....
19.68	15,243	Paris (Colonial) (FYA)	France.....
19.72	15,210	East Pittsburgh (W8XK)	United States.....
19.73	15,200	Zeese (DJB)	Germany.....
19.82	15,140	Daventry (GSF)	Great Britain.....
19.84	15,122	Vatican (HVJ)	Italy.....
23.39	12,825	Rabat (CNR)	Morocco.....
25.00	12,000	Moscow (RNE)	U.S.S.R.....
25.25	11,880	Paris (FYA)	France.....
25.27	11,870	E. Pittsburgh (W8XK)	United States.....
25.3	11,860	Daventry (GSE)	Great Britain.....
25.40	11,810	Rome (ZRO)	Italy.....
25.45	11,790	Boston (W1XAL)	United States.....
25.51	11,760	Zeese (DJD)	Germany.....
25.53	11,750	Daventry (GSD)	Great Britain.....
25.63	11,705	Paris (Colonial)	France.....
26.83	11,181	Funchal (CT3AQ)	Madeira.....
28.98	10,350	Monte Grande (LSX)	Argent. Republic.....
29.04	10,330	Ruysselede (ORK)	Belgium.....
30.43	9,860	Madrid (EAQ)	Spain.....
31.28	9,590	Philadelphia (W3XAU)	United States.....
31.28	9,590	Sydney (VK2ME)	New South Wales.....
31.3	9,585	Daventry (GSC)	Great Britain.....
31.35	9,570	Boston (W1XAZ)	United States.....
31.36	9,565	Bombay (VUB)	India.....
31.38	9,560	Zeese (DJA)	Germany.....
31.45	9,540	Jeloy (LKJ)	Norway.....
31.48	9,530	Schenectady (W2XAF)	United States.....
31.51	9,520	Skamleback	Denmark.....
31.55	9,510	Daventry (GSB)	Great Britain.....
31.55	9,510	Caracas (YV3BC)	Venezuela.....
31.60	9,493	Lisbon (CT1AA)	Portugal.....
36.65	8,186	Rio de Janeiro (PRA3)	Brazil.....
37.48	8,035	Rabat (CNR)	Morocco.....
38.47	7,797	Radio Nations (HBP)	Switzerland.....
45.38	6,610	Moscow (RW72)	U.S.S.R.....
46.53	6,447	Barranquilla (HJABB)	Colombia.....
46.69	6,425	Boundbrook (W3XL)	United States.....
48.86	6,140	Pittsburgh (W8XK)	United States.....
49.02	6,120	Wayne (W2XE)	United States.....
49.08	6,112	Caracas (YV1BC)	Venezuela.....
49.18	6,110	Chicago (W9XF)	United States.....
49.18	6,110	Boundbrook (W3XAL)	United States.....
49.22	6,095	Bevmanville (VE9GW)	Canada.....
49.48	6,065	Byberry (W3XAU)	United States.....
49.5	6,060	Nairobi (VQ7LO)	Kenya Colony.....
49.5	6,060	Skamleback (OXY)	Denmark.....
49.59	6,050	Daventry (GSA)	Great Britain.....
49.67	6,040	Boston (W1XAL)	United States.....
49.83	6,020	Zeese (DJC)	Germany.....
49.92	6,010	Havana (COC)	Cuba.....
49.96	6,005	Montreal (VE9DR)	Canada.....
50.0	6,000	Moscow (RNE)	U.S.S.R.....
50.25	5,969	Vatican (HVJ)	Italy.....

## Long-wave Stations

Metres	Kilo-cycles	Station and Call Sign	Country	Power (Kw.)
1,107	271	Moscow (RCZ)	U.S.S.R.	100
1,145	262	Madona	Latvia	20
1,154	260	Oslo	Norway	60
1,209.6	248	Scheveningen Haven	Holland	5
1,224	245	Leningrad	U.S.S.R.	103
1,250	240	Vienna (Exp)	Austria	3
1,261	238	Kalundborg	Denmark	63
1,293	232	Kharkov	U.S.S.R.	35
1,304	230	Radio Luxembourg	Grand Duchy	100
1,312.9	229	Ankara	Turkey	7
1,339	224	Warsaw	Poland	120
1,354	221	Motala	Sweden	30
1,395	215	Eiffel Tower (Paris)	France	8
1,442	208	Reykjavik	Iceland	16
1,442	208	Minsk	U.S.S.R.	35
1,500	200	Daventry National	Great Britain	30
1,570.7	191	Deutschlandsender	Germany	60
1,612.3	186	Istanbul	Turkey	5
1,648.3	182	Radio Paris	France	80
1,724.1	174	Moscow (I)	U.S.S.R.	500
1,807.2	166	Lahti	Finland	40
1,875	160	Hilversum	Holland	50
1,886.7	159	Brasov	Roumania	20
1,935	155	Kaunas	Lithuania	7

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# Real Television for Four Hours a Day

In this article J. H. Reyner, B.Sc., A.M.I.E.E., who has just returned from a visit to Berlin, explains how television is progressing in that country. The Germans are really getting down to short-wave picture transmission.



Gulliland photo

Cathode-ray television receiver made by the Fernseh A.G. It picks up the standard German 180-line 25-frame picture

**H**ALLE 8—FERNSEHEN. Think of it! A whole hall, about 100 ft. by 50 ft., devoted to television. Here in semi-darkness were to be found exhibits by the leading firms in this latest branch of the art. Let us look at this stand—a popular one to judge by the people clustered round.

### Production Models

Four production model receivers are grouped along the stand. At the top is an opening about 10 in. by 8 in., in which is a brilliant picture which one could easily mistake for a home cinematograph, so good is the definition. All four receivers are showing the same picture—a transmission of a standard German *tonfilm*, containing mainly medium and long shots, with an occasional close-up.

All four pictures hold rock steady and are in perfect synchronism with the sound from the loud-speakers. Cathode-ray tubes are being used, but the usual green or blue colour is absent. An improved type of screen is employed which gives a rich warm sepia affect, very nearly a true black and white.

The absence of origin distortion (that wavy effect on the two axes of the picture) indicates that a hard tube is being used, and on inquiry I find that this is so.

### Special Transmissions

The exhibit in question was by the Loewe Company. The models shown were production types, and I was shown photographs of batches of these instruments being assembled. They are not yet available to the public, however, but are being supplied to a limited number of dealers for experimental purposes. To facilitate development the German Post Office is radiating transmissions on ultra-short waves for some four hours each day.

"How about synchronism?" I inquired. Last year most of the firms were running off the A.C. mains and were using these for synchronising. This is, of course, not really satisfactory unless transmitter and receiver are both supplied from the same mains.

I was told that this year the Loewe Company were using a



Gulliland photo

Chassis of the new Telefunken combined sight and sound short-wave receiver, which makes use of a "hand" cathode-ray tube

definite synchronising signal radiated at the same time as, and forming part of, the picture—a development, in fact, of the "black-band" method used on the B.B.C. 30-line transmissions. To demonstrate this the picture was thrown out and resynchronised in a few seconds.

The Telefunken Company was also showing. Here only one machine was available, the picture being slightly larger and, if anything, more brilliant. The same transmission was being used, namely, 180 lines and 25 pictures per second, this having been standardised for the time being by the German Post Office. Whether they will continue to use 180 lines remains to be seen. While the definition was remarkably good—you had to look closely to see the lines—some workers in this country claim that adequate results can be obtained with only 120 lines.



Gulliland photo

The scanning disc of this German film transmitter for television operates in a vacuum. It is made by the Fernseh A.G.

There was a good demonstration of the Tekade mirror-screw receiver. This was using 90 lines, having a picture rather longer than it was broad. With such a shape the Tekade Company claim that they can limit the band width required to about 25 or 30 kilocycles and that transmissions are, therefore, possible on 200 metres if three, or perhaps four, channels could be allotted.

Since the range of the ultra-short wave transmissions is limited to ten or fifteen miles, they claim that there is a need for some system which can cover a reasonable area.

### Encouraging Results

Whether the authorities will agree or not remains to be seen, but the results shown were very encouraging and were perfectly passable for all ordinary uses. Full-length figures, and even scenes showing five or six characters, were reproduced clearly. A white light, modulated by a Kerr cell, was used, and the picture was brilliant.

It suffered from the usual disadvantage of the mirror-screw system that if viewed from the side the picture appeared split. I was also shown a 180-line mirror screw, but this was obviously experimental and the results were not convincing.

The von Ardenne velocity-modulated system was not working at all well, and it would seem that the more orthodox systems using intensity modulation are more likely to survive. The



Keystone photo

This special camera, with a long-focus lens, televises actual outdoor scenes with only a short time lag

Fernseh A. G. and the Post Office were also showing cathode-ray receivers using soft tubes. These tubes are similar to the oscillograph tubes used over here. They are filled with a small quantity of gas and operate on much lower voltages. The definition, however, was not so good, and on the Fernseh tube considerable origin distortion was present.

# Down on the Short Waves

By KENNETH JOWERS

ACCORDING to all reports static has made reception almost impossible this last week, which is rather fortunate, as most of the hams seemed to have spent all their leisure time at Radiolympia.

W. A. Clemenson had some spare time, and amongst the stations he heard during the week were quite a number of new ones, although the log is very poor compared with the previous week. On 20 metres the best stations were T13WD, Costa Rica; W2DEU, W2DEW, W5NOC, VP5CZ of Jamaica; VE4DU of Canada; and T12TAO of Costa Rica.

On 40 metres, conditions were a little better and ZL2PC, ZL2LK, ZL2GN, ZL3CC, ZL4AF, ZL1GB, ZL1GX, ZL3BJ, all of New Zealand; K5AM in Canal Zone; and HC1JW of Ecuador were all heard.

### Holland Visits Essex Hams

G6KV in a letter tells me that the operators of PAOASD have been over in this country for a visit to Radiolympia and called on some of the Essex hams, including G2LZ, G6PA, G6KV and G2AR.

I got some information about a D station in rather an interesting way. I was trying to find out the address of D4BIA and the reply was apparently sent from Germany to a correspondent, Mr. John Preston in Ayrshire, who happened to be writing to G6KV, the information being passed on through that station. As this German station, D4BIA, is coming over at very good strength, the address will most probably interest a number of readers. The QRA is Horstmar C/Lemgo, Land Libbe, Germany. The operator is Rud Peters.

Some of the Californian stations are coming in pretty well these days. This is rather unusual for the first to fifth and seventh to ninth district stations are not at all reliable. W6QD has just sent a very nice QSL card to W. A. Clemenson, confirming his reception on 20 metres.

W6QD is operated by Herbert Becker in Los Angeles, California, who works on 20 metres with a crystal control transmitter having an output of 100 watts.

### Worked All Continents

Several other district stations in the same locality are on the air very regularly, so readers should watch out and see whether they can hear such stations as W6GRL, W6DIO, W6HXU, and W6ACL. W6CXW is operated by Henry and Sam Sasaki, who have worked all Continents and eighty-four countries, so there is no reason for your not hearing them over this side.

In the South of England, certain correspondents find conditions quite satisfactory. R. D. Everard of Standon with his eight-valve super and a short-wave converter has logged 125 calls on the 20-metre band.

Some of the best stations heard by Mr. Everard and by other correspondents in the South of England were CM6XS, W4BSH, W1DHT, W3BOF, W1BIO, W2DRL and the Canadians VE2CA, VE1BG, VE2DX.

Norman Hobby, of Birkenhead, reports that although he hasn't heard an English station on his short-wave receiver, his log is piling up with fresh 20-metre stations from the American Continent. Other stations heard by Mr. Hobby are VE1HG, VE1DL, NY1AB, PY3AD and EA3AG.

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# Low-priced British Valves

VISITORS to Radiolympia seemed to be intensely interested in the construction of Hivac valves, which are to-day one of the cheapest British range available.

Hivac's have been in existence for several years, and have consistently produced high-quality valves. The cheapest valve is the H210 battery detector, which has characteristics which cannot be bettered even by valves at a considerably higher price.

This H210 has a mutual conductance of 1.5 milliamperes per volt, giving an amplification factor of 25, and as it is entirely non-microphonic, it is an excellent detector, particularly for short-wave receivers.

Even though the prices of these valves are low, do not for a moment imagine that the range is restricted. The DDT220 is a double-diode-triode used for A.V.C., diode detection, and low-frequency amplification simultaneously. This three-in-one valve costs 7s.

One of the most interesting battery valves is the PX230, a super-power output triode which takes .3 ampere at 2 volts, has a mutual conductance of 3.5 and gives an undistorted output of 450 milliwatts. This valve is priced at 7s. 6d. The impedance is 1,850 ohms.

A valve that is unique in this country is the DB240. This valve is actually three complete valves in one bulb, and consists of a triode driver and a complete class-B

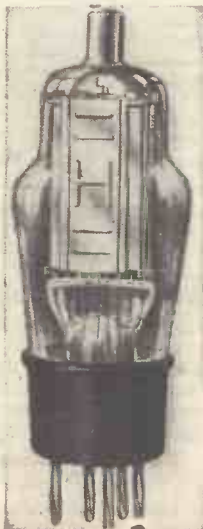
valve. It costs only 15s. 6d. and gives an undistorted output of 1,250 milliwatts. It is, of course, for battery operation only.

A high-frequency pentode for 10s. 6d. is an achievement of which Hivacs can be justly proud. Their HP215 has an impedance of 500,000 ohms and an amplification factor of 600. The SG220, their star battery screen-grid, is also ultra efficient and has an amplification factor of 500 and a slope of 1.5 milliamperes per volt.

The range of mains valves is equally as interesting as the battery range. There are 4-volt triodes for 9s. 6d., double-diode-triodes for 12s. 6d., and in fact, valves for every position in almost every set. The AC/Z is an exceptionally good output valve, having a mutual conductance of 8 milliamperes per volt and gives 3,400 milliwatts without distortion. This valve is priced at 15s. 6d. It is possible to obtain a screen-grid valve that has an amplification factor of 1,750 for 13s. 6d., and a high-frequency pentode that has an amplification factor of 1,100 times for the same price.

All of the screen-grid valves and high-frequency pentodes are available in either fixed or variable grid base types with metallised bulbs.

Two full-wave rectifying valves are available, the UU120/350, which gives 120 milliamperes at 350 volts and the UU120/500, giving 500 volts at a similar current.



Typical mains valve in the Hivac range

By J. GODCHAUX ABRAHAMS

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Marconi photo  
Testing out a completely portable ultra-short-wave transmitter

**S**HORT waves scored heavily a few nights ago when, unable to sleep owing to weather conditions, I turned to my radio receivers for relaxation in the middle of the night.

At the outset, considering it a good opportunity for DX searching, I tried out the broadcasting band and, although several North and South American transmissions were logged, atmospherics were so persistent that no programme could be listened to with pleasure.

On the other hand, when the short-wave set was brought into action, conditions were very different, with the result that broadcasts via Boston, Boundbrook, Pittsburgh and Schenectady were held with ease until 4.30 a.m. Electric interference on the short-wave band, even on stormy nights, is seldom so troublesome as to prevent reception.

Some time ago a rumour to the effect that the League of Nations transmitter at Prangins (Switzerland) was to be used for broadcasts of musical programmes was officially denied; to-day, however, the matter is being seriously considered. Tests have been made and, having proved satisfactory, a Vienna programme was recently relayed through this channel to the United States.

The scheme is considered feasible, and we may shortly hear, as a start of the series,

a relay of a special concert from Budapest.

A 10-kilowatt short-wave transmitter is being erected at Tandjong Priok (Netherlands East Indies) to work on various channels between 40 and 80 metres for the broadcast of radio programmes to Europe, in reality destined to Holland. So far, the Bandoeng transmitters have given only scanty fare in this direction and the new station may offer more scope.

**Rome's Wavelength**

There appears to be a possibility of an alteration being made in the wavelength of I2RO, Rome, now on 25.4 metres, as from official sources I learn that alternative channels have been allotted to this transmitter, such as 49.46 metres (6,065 kilocycles), 52.4 metres (5,725 kilocycles), 54.01 metres (5,555 kilocycles), 42.98 metres (6,980 kilocycles), 31.13 metres (9,635 kilocycles), and 30.67 metres (9,780 kilocycles).

So far I have not yet picked up any tests, but I am told that some have been carried out on 30.67 metres.

Germany is feverishly working on her new 50-kilowatt short-wave Zeesen transmitters and hopes to have them ready by the end of 1934. Call signs and wavelengths have already been allotted to them and you will do well to note them, as they differ slightly from the channels at present in use.

DJR will be on 19.56 metres (15,340 kilocycles); DJQ, 19.63 metres (15,280 kilocycles); DJP, 25.31 metres (11,855 kilocycles); DJO, 25.43 metres (11,795 kilocycles); and DJN, 31.45 metres (9,540 kilocycles). We shall doubtless be picking up tests on these wavelengths during the next two months.

**Two Easy Captures**

Two stations to which reference is seldom made and of which the broadcasts are easy to capture are CNR, Rabat, and CT1AA, Lisbon. The former continues to work regularly every Sunday between B.S.T. 1300 and 1500 on 23.38 metres and from 2030-2300 on 37.33 metres. If you wish to hear CT1AA, try on either Tuesdays or Fridays between B.S.T. 2130 and midnight on 31.60 metres. Remember the cuckoo call.

Occasionally broadcasts are made on other evenings, but apart from the two mentioned there is no regular schedule.

I find there is now a slight alteration in the times of W3XAU, relaying WCAU, Philadelphia; it is on the air daily on 31.28 metres from B.S.T. 1700-0050, and on 49.5 metres from B.S.T. 0100-0400.

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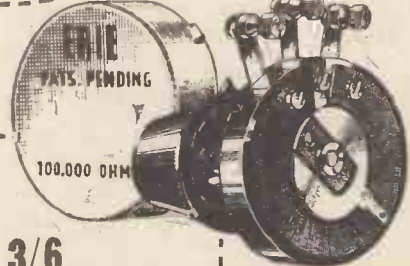
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Criticisms by WHITAKER-WILSON

# My Broadcasting Diary

**D**O you remember the story of the lady who had a pet chameleon? When she put it on a pink cushion it turned pink, on a green cushion it turned green. Then the maid put it on a Tartan plaid. You remember what happened then? *It bust.*

That is what will probably happen to me if I try to hear all I want to this week.

**Sunday**

**S**CHUMANN'S *Carnaval* might have been voted not quite the thing for Sabbath broadcasting at one time but, having heard it again after many years, I came to the conclusion it is very harmless in that sense. And it is very good music. Furthermore I liked the way Adela Verne dealt with it.

**Monday**

**D**ECIDED to leave the Wagner Prom alone and concentrated on the Chinese play called *The Gates of Carven Jade*. Very glad I did. Quite one of the best pieces of writing I have listened to for a long time. The language was most impressive all through and the voices admirable.

Robert Speaight as Narrator, Ion Swinley as the Emperor, Henry Hallatt as the Holy Man, proved what voices can mean to radio. A word of praise for the excellent music by Ernest Toch. Very Eastern and also extremely melodious.

I was delighted with the whole production.

**Tuesday**

**I**NCLINED to think the Prom to-night a bit of a flop. Candidly, the only work I really liked was *The Fountains of Rome* by Respghii. The rest of the programme was largely tripe.



L.N.A. photo

Sir John Reith snapped during a visit to the B.B.C.'s theatre at Radiolympia

Why is anyone allowed to sing Tchaikovsky's *To the Forest*? Percy Heming did his best with it, but the thing is overloaded in the accompaniment.

I expected great things of Lionel Tertis in the Fantasy for Viola and orchestra by Arnold Bax. He played beautifully, but the work was a very dull effort.

Ther-May Blyth sang some *Wozzeck*. She was excellent but the music was sordid to a degree. We can do without *Wozzeck*. Altogether, a dull Prom.

**Wednesday**

**A**LITTLE knob-twisting to-night in order to be friendly to everybody. I tarried with Hughie Green for awhile before switching over to catch Solomon playing the D Minor Piano Concerto of Brahms at the Prom.

Solomon in all his glory, from the tonal point of view. A great rendering. Sent the high-brows into raptures, judging by the reception.

Not feeling like taking on a Brahms symphony—Solomon had given me all the good music I wanted for the evening—I reached out into the Midland Regional and heard one of the Stevens plays from Coventry, which I enjoyed.

Later I listened to the Arcadia Follies from Skegness. A very smart show. Why they couldn't have been relayed into the London Regional and given the C Orchestra a rest, particularly as there was a Prom on the National, beats me.

**Thursday**

**H**ERMIONE GINGOLD showed her pluck in opening the Radiolympia show. A thankless task but she stood up to it. Then those sixteen girls nearly danced the baseboard out of my set.

I quarrel with my friend John Sharman for putting on Jass and Jessie in our part of the programme, even though Eric Maschwitz chatted pleasantly and descriptively from the wings of the stage. Why not have put that bit on when we weren't listening?

Claude Dampier, accompanying Billie Carlyle, made me laugh a lot. He was so natural over it and so cheerful over his mistakes. I think he is a coming comedian in the broadcasting world. He has a tip-top style.

Collinson and Dean talked a great deal, but they did not say anything that amused me in the least. Not a line worth repeating. "I suppose Aberdeen is in Ireland?" "No; you are thinking of Paris." "Oh, am I?" is typical. I can't laugh at that sort of stuff. Sorry.

The band played very badly for Ann Penn. Hardly with her for two bars in succession. Didn't they rehearse with her? Incidentally I disliked Miss Penn's domestic scene intensely. Altogether I must say I was disappointed. A poor entertainment.

The only interesting thing about Radiolympia was Christopher Stone's account at the end of the news bulletin.

**Friday**

**I**LISTENED to Mr. J. I. Taylor playing on the organ at Broadcasting House. He helped to build it and he understands it. I liked his improvisation.

My Beethoven listening centred round Katharine Goodson and the *Emperor* Concerto principally, because I wanted to see if I am still tired of that concerto. I liked her playing.

**Saturday**

**A**FTER a few minutes I left Radiolympia to itself. I'll try it again next week. I looked down the Prom programme and found two or three likely items.

Glad I did, because the orchestra played Mendelssohn's *Ruy Blas Overture* as well as I have ever heard it played. I followed every bar with a score and thoroughly enjoyed it.

Conchita Supervia created a furore with her singing of Rossini. Not surprised; her technique is amazing. The Promsters roared their applause.

Lisa Minghetti played the Max Bruch violin concerto admirably. Occasional deviations from the true pitch, in octaves and double-stopping especially, brought forth my sympathy. The hall would be very hot, and it is not easy to manage passages of that difficulty when your G string is trying to go sharp all the time.

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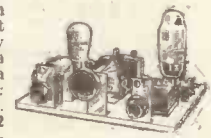


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A fee of one shilling, postal order (not stamps), a stamped, addressed envelope and the coupon on this page must accompany all queries.

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.

Modifications to proprietary receivers and designs published by contemporary journals cannot be undertaken. Readers' sets and components cannot be tested by us. Queries cannot be answered by telephone or personally. Readers ordering blueprints and requiring technical information in addition should address a separate letter to the Information Bureau and should see that their remittance covers the price of the Blueprint and the amount of the query fee.

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

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

**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.

**Osram Valve Guide**

**I**F you don't get anything else, you must write to the General Electric Company for one of their new Osram valve guides. The words "valve guide" is rather a poor way of describing it, for it is more of an amateurs' reference book than anything else. Although it is quite small it gives details of every standard Osram valve, including rectifiers, universal, D.C. and A.C. valves.

It gives all the dope you want on the new battery Catkins and it shows the pin connections for all the valves. On pages 24 and 25 are shown the positions of the pins in the seven- and five-pin valve bases. If you have any difficulty in working out Ohm's Law or want to know how many watts are dissipated in your set, this is shown on page 59 while if you don't know what value resistance is needed to cut down the high-tension voltage to your detector valve, you can find out by referring to page 58.

Altogether it is a very useful booklet.

178

**New Short-wave Components**

**I**CANNOT stress too highly the importance of the new Wearite Mycalex short-wave components. These have been designed so that the amateur can construct highly efficient short-wave receivers with the minimum of expense.

But don't for a moment think that this is all that Wright & Weaire are making. Their new list (No. 834), besides giving lots of circuits on how to use their components, tells you all about iron-cored coils, including one for 5s., a special transformer for class-B amplification, and an entirely new range of mains transformers. Their range of high-frequency chokes and mains chokes is wonderfully complete. This catalogue is certainly worth having.

179

**Ormond Produce Sets Again**

**T**HE Ormond Engineering Company are very well-known for tuning condensers and other components for the home constructor, so it is not surprising that they should decide to market receivers which embody all of their experience gathered during the last few years.

What do you think about a three-valve class-B battery set with clockface tuning and twin loud-speakers at £7 10s., or a similar type of receiver with one loud-speaker for £6 10s.? Details of these receivers and other sets of Ormond manufacture can be obtained from their new catalogue, which has just been issued. Get a copy.

180

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- 4/11 A.V.C. UNITS (list 10/-), with full instructions for any battery receiver.
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- 2.—Every member will also be entitled to free technical advice in connection with any of all of the four special Crusader sets mentioned above (each query must be accompanied by a stamped and addressed envelope for the reply). In the case of queries regarding any other "Amateur Wireless" sets the usual rules of the Information Bureau must be observed.
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