

**RADIO IN THE FAR NORTH** (SEE PAGE 576)

# Popular & Wireless & TELEVISION TIMES

SOME UNUSUAL  
AERIALS

EVERY  
WEDNESDAY  
PRICE

3<sup>0</sup>

No. 766.  
Vol. XXX.  
Feb. 6th, 1937

**A MIGHTY SET FOR THIS MEMORABLE YEAR!**

*Next Week:*

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**CORONATION SET**

**THE SUPER CENTURION**

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# POPULAR WIRELESS

## AND TELEVISION TIMES

Editor: G. V. Dowding

Asst. Editors: A. Johnson-Randall, A. S. Clark

BUSY B.B.C.  
TIMELY TIP  
NEW STATION

### RADIO NOTES & NEWS

SINGING MOUSE  
MY STARS  
DON'T SHOOT

#### Lifeboat Radio

NOT long ago the Margate lifeboat put out to the assistance of a French vessel which sank in the vicinity with the loss of seven lives. Half an hour after the lifeboat had started her struggle with the seas it became known that she was making for the wrong position, but there was no means of informing her, for she was *not fitted with wireless*.

The first SOS from a ship in distress often gives an estimated and inaccurate position, afterwards corrected. It seems vitally important that rescuing vessels should be able to communicate with the ships they are trying to save. The Royal National Lifeboat Institution is fully alive to this situation, and has carried out extensive tests with lifeboat communications.

#### Engineering Excitement

ENGINEERS of the B.B.C. are already wondering whether they are going to squeeze in all they have got to do this year before the wild bells ring out across the snow for 1938.

Six months ago they were facing an ambitious programme, with Coronation prospects to complicate it. And recently it was decided to nip in a new station for the South Coast in 1937, at Start Point, and improve West Country reception.

Now comes the rumour of a possible string of ultra-short-wave relay stations to supplement the Regional service, starting with an aerial on Broadcasting House. Such a scheme brings us down to television wavelengths—and when television is mentioned the said engineers roll their eyes zenithwards and groan with one accord.

For what Sir John says goes; but the engineers are the fellows who carry it through.

#### "Telegraph's" Timely Tip

WRITING recently to the "Daily Telegraph," a correspondent points out that any all-mains receiver can

be rendered independent of the mains in an emergency by the mere addition of a crystal detector and phone terminals. Wired across the first tuned circuit, these enable the programmes to be followed should the grid blow down, the power station blow up, the fuse blow out, or the roof blow in.

He suggests that manufacturers of mains sets should make this simple provision; and I commend the idea, and further suggest that constructors and handymen

and correspondents of our Queries Department in particular will gratefully recall his initials, for he had a wide and sympathetic grasp of the constructional problems of the set-builder.

While gardening at home with a scratched finger he contracted tetanus. Symptoms developed within a few days, and despite all efforts, he died on January 23rd.

Our deepest sympathy—and yours, I know—extends to his young wife and to his relatives.

#### MANCHURIA'S NEW STATION



General Electric Co., photograph. Modernistic design is a feature of the new Manchurian broadcasting station at Dairen. Note the call letters J Q A K on the building.

should "roll their own." Not only might the scheme be valuable in a national emergency, but it also might save the set-owner from feeling such a fool when visitors ask him to get the news on a broken-down set.

#### In Memoriam

It is with deep regret that I have to record this week the death of one of the most popular members of "P.W.'s" staff, Mr. J. R. Wheatley. Stunned by the suddenness of the tragedy, we who are left can hardly believe that his friendly presence has been withdrawn for ever.

J. R. Wheatley joined "P.W." in 1925,

#### The Rising River

YOU remember the fellow who boasted of the fine house he had bought "with the river at the bottom of the garden," but who found, on his next visit, that the garden was at the bottom of the river! Well, the River Seine has often given the Parisians that kind of shock. And because of the Seine's habit of turning a landscape into a waterscape at certain seasons, the architects of the U.S. Pavilion, to be built on the banks of the river for the forthcoming exhibition, urgently needed the plans to lay the foundations. The plans were in New York, and Old Man Atlantic was in between. "How come?" said the architects.

Then somebody remembered the radio picture service. Brows were unbent, backs were slapped, and, amid a chorus

of "You seditis" and "Atta boys!" the order was given to transmit the plans by wireless picture service across the Atlantic.

A few hours later the plans were in Paris; another bit of radio and architectural history had been made, and the boys had gone out for a quick one in celebration.

#### New Tunis Station

The French authorities have earmarked 10,000,000 francs as a *dot* for the new Tunis station, which is to be the biggest in Northern Africa. There is talk of using 150 kilowatts.

(Continued overleaf.)

NEXT  
WEEK:

## JOHN SCOTT-TAGGART'S CORONATION SET

## TELEVISION TELESCOPES TO HELP ASTRONOMERS

### Quiet as a Mouse

THE old adage about being as quiet as a mouse has been shattered into a million-sided smithereens by America's latest radio star. She is Minnie the Singing Mouse, who you heard about in our American page last week.



She was discovered by the curator of an industrial home for children. He heard a lot of chirping and singing in the cellar, went down

expecting to find a canary, and there he saw Minnie, trilling away her blues like a prima donna.

The curator was fond of animals—and not averse to a gold-mine when he saw one—so he rescued Minnie from her cellar, and wrote to the broadcasting people about her. They just wouldn't believe at first, but when a couple of the boys went round, oozing incredulity, Minnie sang her way right into their hard hearts, and they arranged a nation-wide broadcast for the world's one and only singing mouse.

When the fateful time arrived Minnie not only obliged the "mike" with a cheerful little earful, but she coughed up an encore that brought in a record fan-mail. Her owner declares that Minnie must now be insured—there are so many nasty old cats about who envy her!

### Are You An Aerial

THE theory that each of us is a wireless station in himself has often been tentatively mentioned, but now it seems that a French investigator has found definite scientific corroboration.

He has been working on therapy problems and has found that the electro-magnetic radiations of the normal human body correspond with a wavelength of thirty or so millimetres. Human wavelengths appear to be affected by health, but whether poor health alters the frequency, or a change in frequency causes poor health, is not known.

## BOLTON WANDERERS

Northern, February 11th

Tom Cragg, Manchester sports writer, is to broadcast on February 11th a talk about another of those five "Northern Football Pioneers" which helped to form the League in 1888. This time, he is to talk about Bolton Wanderers—the only club which has so far won a Wembley Cup Final three times. The club was formed in 1874, originally in connection with Christ Church School, Bolton. It will be remembered that Bolton's first victory at Wembley was on the occasion of the first Cup Final ever held there—the famous Final of 1923, when a quarter of a million people attempted to fit themselves into a space designed to hold only half their number.

In connection with human wavelengths, my friend "Romeo" raises the interesting question of whether the solar plexus is the vital spot. So far as I can learn the particular organs have no special significance, but the body behaves much like any other radiator, and therefore the maximum effect is noted "amidships," where current-flow is at its maximum.

### Tragedy of an Announcer

MORE than once I have referred in these Notes to Herr Scherz, the world's first announcer. He began making friends with the microphone audience thirty-six years ago. This was before wireless telephony was known, when he was in charge of the announcements at the Budapest relay station, which operated a linked programmes-by-telephone service from the Opera House.

Later, when broadcasting as we know it came along, he was obviously the best man for No. 1 announcer of Budapest, and he became a great favourite with his radio audience. Then came tragedy.

After a severe illness he lost his voice, and all the specialists failed to restore it, so he resigned his announcership and became the station librarian. He always hoped to have his voice restored, but now it is stilled for ever. Rest in peace, old friend. Your niche in history is assured.

### My Stars

YOU would think that astronomers would have quite enough to do in keeping an eye on Mars, Jupiter & Co., without bothering about television, wouldn't



you? But as a matter of fact astronomical eyes are being reluctantly unglued from big telescopes all the world over, for the star-gazers are realising that they ought to have kept an eye on television from the

first. It is right up their street.

The televisionary takes a glimmer of light, amplifies it, and then throws it (via Alexandra Palace, etc.) on to the screen. Astronomers also start with a glimmer of light, but they never thought of high amplification until television showed them how. The world's biggest telescope is a 100-incher, and for some years more the astronomers will be working on a 200-incher, on which all hopes of heavenly investigators were founded. It may be that, before it is ready, television technique will have done more for astronomy than was ever hoped of the new giant instrument.

### Station and Wavelength Shuffle

SO much choppee-change has been talked about recently that a plain statement of the B.B.C.'s 1937 intentions will clear the air. Here's the position in a nutshell:

In July next the Scottish National will join London and North Nationals on 261.1 metres, leaving the 285.7-metre wavelength free for (temporary) use by Washford Cross. The West Regional programme will then go out on this wavelength, leaving 373 metres free for use as a Welsh Regional programme.

The South Coast will later have its high-powered programme on 285.7 metres from the proposed Start Point station, replacing Plymouth and Bournemouth. Another new station, of medium power (location

not yet decided) will bag the old Bourne-mouth-Plymouth wavelength (203.5 metres) to serve Bristol and parts of North Devon and Somerset.

## STRANGE TO RELATE

National, February 11th

"Strange to Relate" continues to arouse the greatest interest among listeners. Each programme is the cue for a fresh stream of letters with personal experiences for the series. Coincidental meetings and articles lost and found after a lapse of time have, however, outworn their welcome, and the producer is only paying attention to items of recent or long-past history that seem to suggest themselves as suitable for dramatisation. The two Unknown Reporters appear again on February 11th with unusual information about one of London's well-known buildings, the deeper-voiced one of the two having recovered from his bout of mince-pies in the Christmas edition. The lives of seafarers seem to provide a veritable "widow's cruse" of material suitable for such a programme, so that it is not surprising to hear that there will probably be another incident of the Atlantic in the next edition.

From February 1st the new Beaumaris station takes the same wavelength (373 metres) and programme as the Regional at Washford. I think that's all. Oh, no! I've remembered that just to elucidate matters the B.B.C. has decided to call the Beaumaris station Penmon. They would, wouldn't they?

### Don't Shoot

RECENT motoring activities of the C.I.D. (Criminal Investigation Department) at Scotland Yard have apparently led to a little misunderstanding. The facts are that officers have been inspecting a Chrysler car specially fitted with windows 2 in. thick—in fact, bullet-proof. They also inspected a special radio-equipped Hillman car, having wireless telephony apparatus.

These are the facts. There is no truth in the statement that all the police wireless cars are now to be fitted with bomb-resistors and bullet-diverters; dash it all, they are not such a nuisance as to need all that!

### Czechoslovakia Marches On

SINCE radio was introduced into Czechoslovakia there has been no check-ing nor slovak-ing in the rate of its progress.

The year 1937 is to be no exception, for the Bratislava station is to have a big brother in the neighbouring village of Neutra; and as the young fellow will start off with 100-kw., our old friend Bratislava will be relegated to marking time and light local duties.

Another 100-kilowatt will rise from the ashes of the old Brno station, which is due for replacement. (It's a thousand pities that the new station is not in some other town, for the name Brno is a perpetual plum in the mouth.)

What's more, they say the Czechoslovakians are going in for television, too. Remember the travel posters showing the native gazelles, with hands on hips? We must save hard for television, chaps. **ARIEL.**



# SOME UNUSUAL AERIALS

THERE is, perhaps, no other radio device which is so accommodating and versatile in nature as that ether energy collecting system which we designate by the term "aerial."

It is owing to the fact that the conventional types of aerial are three in number (i.e., the outdoor, the indoor, and the frame aerial), that many constructors are apt to forget that quite a number of other devices can be used for the purpose of picking up transmitted signals and of conveying them to the receiver. This article describes just a few of these curious types of aerials, in the hope of interesting the man who wishes to carry out a number of radio experiments, and with the absolute minimum of apparatus.

These aerial types are practical ones, and a very considerable number of fascinating experiments can be conducted with them.

Bedstead aerials in which the aerial lead of the set is connected to a metal bedstead or wire mattress are well known. Quite an interesting little variation of this principle, however, is that which we may conveniently term the "rug" aerial. In this device, which is illustrated at Fig. 1, a length of well-insulated wire is threaded through the edges of a large bedroom rug or carpet. One end of the wire is left free, whilst the other is taken to the aerial terminal of the set.

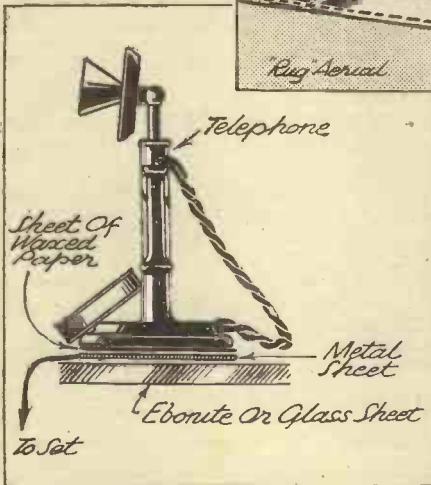


Fig. 2. Not a particularly effective scheme, but it does work!

Another type of domestic aerial which is quite a novel affair is the piano aerial.

Many domestic pianos are long suffering instruments, and in these days of wireless many of them seem merely to fulfil the function of providing a convenient stand for flower-pots, photo-frames, and the other infinitely varied and multitudinous knick-knacks of our national domesticity.

Now, if you have such a Victorian relic whose days of "Harmonious Blacksmith" variations and "Maiden's Prayer" have long passed, why not put it to a really up-to-date use? The strings of a piano will very often provide quite an interesting receiving aerial.

### Directional Properties

In carrying out experiments with the piano aerial, it must be borne in mind that such an aerial has very directive properties. It is, in fact, a sort of large frame aerial. Thus the position of the piano in the room will have a very great influence on the results obtained from the use of the aerial.

Naturally, we do not advocate the converting of any good piano into an experimental aerial of this type. It is only in those instances in which a piano of the "old crock" type is available that this modern role for it is suggested. A good piano would

*Amusing experiments that can be made with very little preparation and without any costly equipment*

### DISGUISED BY THE RUG

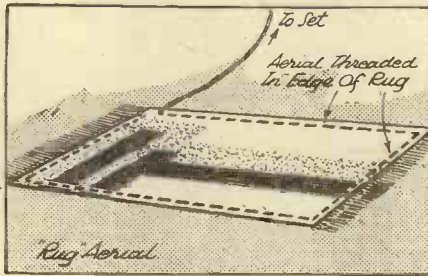


Fig. 1. Here's something which you may not have thought of.

certainly be put out of tune by such a procedure. However, apart from this, no other harm is likely to accrue to a piano so used. Nevertheless, only old and disused instruments should be

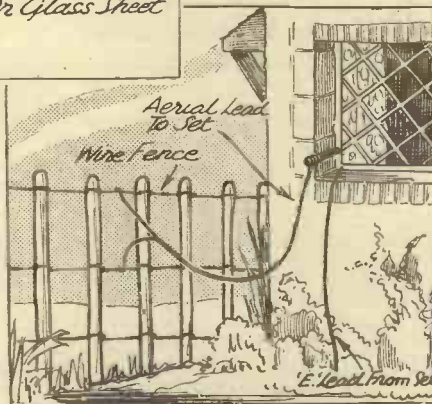


Fig. 3. How wire fences with wooden posts can be utilised.

utilised in this fashion, if only to be on the safe side.

As a final example of indoor devices which may on occasion be brought into service as radio aerials, we may deal with the "telephone aerial." This, as the diagram (Fig. 2) indicates, is very readily fixed up. A sheet of metal is laid flat upon a sheet of glass or ebomite, and a lead is

taken from the metal sheet to the aerial terminal of the receiving set. On top of the metal sheet is placed a sheet of thin waxed paper, and the telephone instrument is allowed to rest upon this. Signals are often far from being strong by this mode of reception, but anybody possessing a telephone on the premises will find the experiment of interest, for it illustrates the fact that an ordinary house telephone line can pick up ether energy and transmit it to a rectifying circuit by the simple capacity arrangement comprising the metal sheet and the waxed paper upon which the telephone instrument rests.

### Using a Tree

Turning now to a number of curious and out-of-the-way outdoor aerials, let us consider, first of all, the "tree aerial." That the majority of tall trees are able to absorb very considerable amounts of radio energy is a fact which has been known for at least twenty years. Working on this fact, Major George O. Squier, of the American Army Signal Corps, successfully utilised trees for the purpose of picking up electro-magnetic waves. These experiments were carried out a considerable number of years before broadcasting began. However, owing to the inefficiency of the tree aerial, little has been heard of it since. Nevertheless, no keen amateur should miss taking an opportunity of conducting a few experiments with natural aerials of this type.

The apparatus required is simple. It consists of a stout rod of brass, steel, or copper, and—a tree (the taller the tree the better).

The tree aerial is fitted up simply by driving the metal rod into the trunk of the tree at a distance of about a foot or two from the ground. A lead from the end of the rod is then taken to the aerial terminal of the receiver. For the earth connection an ordinary metal stake driven into the ground will suffice; or, on the other hand, the earth connection can be made by driving a metal rod into a neighbouring tree, whilst in some cases the set may be made to function without any direct earth connection at all.

### Choose a Tree Which is Isolated

Despite the fact that the trunk of the tree provides a direct earth path for the electric waves picked up, some of the collected energy will flow into the receiving set, and if the latter instrument is suitably sensitive, reception will be obtained. Preferably, the tree selected for these experiments should not be situated in a wood or near any tall building. It should stand by itself more or less in the middle of a field. The driving of the metal rod into the trunk will

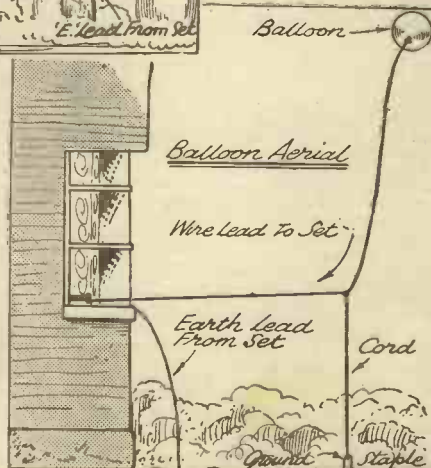


Fig. 4. A very novel aerial is illustrated in this figure.

(Continued overleaf.)

## SOME UNUSUAL AERIALS

(Continued from previous page.)

do little harm to the tree, provided that it is a fully grown one, and that after the rod has been withdrawn the hole in the tree-trunk is stopped up with a little clay.

Enthusiasts would do well to conduct a few experiments in the utilisation of wire fences and railings as aerials. In many cases

### HELD BY THE WIND

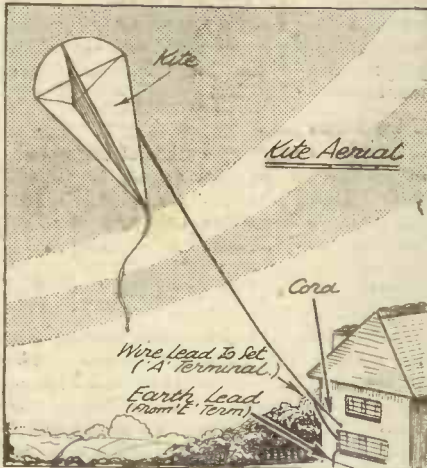


Fig. 5. Marconi conducted his first transatlantic experiments with a kite aerial.

a fence running along the side of a field will be found to consist of a series of parallel wires secured to wooden posts. Hence the insulation of these wires in dry weather is fairly good, and they may be brought into service as an improvised receiving aerial in the manner depicted at Fig. 3.

Fig. 4 also shows another type of improvised outdoor aerial. This is the balloon aerial. It consists of a balloon filled with hydrogen or coal gas, to the end of which is attached a length of No. 24 or 28 D.C.C. wire. When released the balloon rises in the air, and is held captive at any distance above the ground by the aerial wire. This type of aerial is capable of affording really strong signals.

### For Portable Sets

Still another type of aerial (illustrated in Fig. 5) is the kite aerial, which, as its name suggests, consists of a kite flown in the usual manner. The kite, however, is held captive by wire instead of by the more usual string or twine.

Lastly, a curious form of aerial from which good results are said to have been obtained in portable set working is the umbrella aerial depicted in Fig. 6. It consists of an old umbrella to each of the metal stays of which is attached a piece of wire. Near the handle of the umbrella is placed a block of wood, and the wire leads from the umbrella stays are threaded through holes in this wooden block, afterwards being all joined together to form a down lead. The umbrella is then mounted on the top of a pole, or

upon the branch of a tree, and the down lead is taken to the receiving set underneath. In conclusion, however, we must add that we have had no experience with this suggested type of aerial; but, nevertheless, its construction and utilisation will form the subject of an interesting experiment for the keen listener.

### A NOVEL ARRANGEMENT

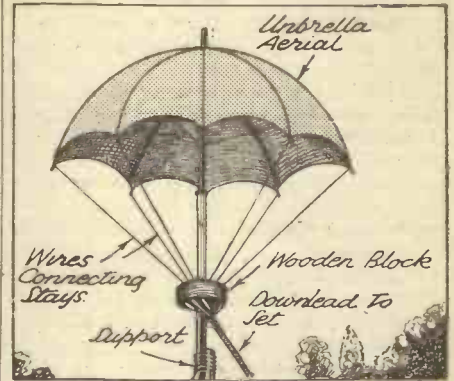


Fig. 6. An old umbrella adapted for use as an aerial.

Doubtless many other ingenious ideas with regard to objects that can be used as aerials will occur to the reader, and many an amusing and instructive hour can be spent with a small but efficient portable receiver, some wire, and, more important still, some fine weather.

IT is only just over ten years since we have had loudspeakers for our radio sets that could really be called by that name. Before 1926 there was little enough to provide us with music that could be heard by everybody in the room. Ear-phones with trumpets on them—that was the class of thing to which we all listened, and which, I must admit, we thought truly wonderful.

If we heard the same instruments now we should run from the room with our hands over our ears. Tinkling tinniness, scraping diaphragms, all middle notes with almost complete absence of top, and nothing whatever below about 150 cycles.

But the loudspeaker had arrived and we were enthusiastic. Radio had made a great step forward; we had been able to discard the uncomfortable earphone, with its gasty isolation. We could gather round the speaker as a family and enjoy all the jokes—and the fat stock prices—together.



The Pye "Match-All" unit for extension speakers.

Gradually the speaker developed, and with it the receiver itself. Grid bias came into general use, and the quality of reproduction went up 100 per cent. Over the merits of resistance coupling and transformer coupling were fought great battles, while anode bend and leaky grid rectification split many a friendship among budding home constructors.

The superhet came, disappeared for a few years, and then returned. The screen-grid valve arrived, dealing neutrodyne systems a death blow for which we were unfeignedly thankful. The output pentode came, and then—if my memory is right—burst on the world in general, and the home constructor in particular, the fact that for many years he had been connecting up his loudspeaker all wrong.

He had been joyfully connecting it to the output terminals of the set, regardless of the type of valve he had in the output valve sockets. The arrival of the pentode made him sit up and think. That type of valve could not be put into the output stage of the set, connected up to the same old loud-speaker and expected to work right away. It simply would not; you had to have some sort of a transformer, a new fangled affair called a matching transformer, or else a tapped choke thing.

And so to our home constructor minds came the

## THOSE EXTENSION SPEAKERS

The need for correct matching

By K. D. ROGERS

realisation that the valve load must be adjusted so that the speaker and valve are matched. We learned that if the load was wrong then the quality would be wrong, and the strength of the output would suffer.

So every speaker was provided with a special transformer, for moving-coil speakers had taken the place of the old horn types and the moving-armature variety was fast going.

We learned to match our speakers and sets. The carefully thought-out transformers which the speaker manufacturers gave us on their instruments allowed us to do this job quite easily.

And then somebody said we ought to have a speaker in every room. Worked off the main set and so connected that we could switch them off or on, singly or all at a time. Good, we said, we will. Give us the speakers and we will connect them to our home-made sets and to the commercial receivers we are using. But you will have to tell us how to do it.

Easy, they said. Just connect them in parallel. We did, and we did not like the results. The extension speaker began to get a bad name. Then others came along and said that we had forgotten all we ever knew about matching, and it was our own fault that we did not like the speakers. They should be matched to the output valve in the set and to the speaker that was normally connected to the set.

To the rescue of those who are in the doldrums of matching, let me introduce the Pye "Match-All" extension speaker link. It is a neat little box with—but I must not tell you what is inside—with a number of terminals. It allows you to connect your extension speaker to any set having any sort of speaker inside it. And it provides the power for you to match the speakers together beautifully.

You connect the box to the set, placing it close to the set and then connect the extension speaker

leads to the other set of terminals on the "Match-All" box. A very clear set of instructions is provided so that you can hardly go wrong in the connecting of the speaker link, there being seven different ways in which the link can be connected, so that very accurate matching of any ordinary speaker is provided.

In use I found the link very good indeed. It took but a few seconds to connect it in circuit between the set, and the extension speaker and the matching was certainly excellent.

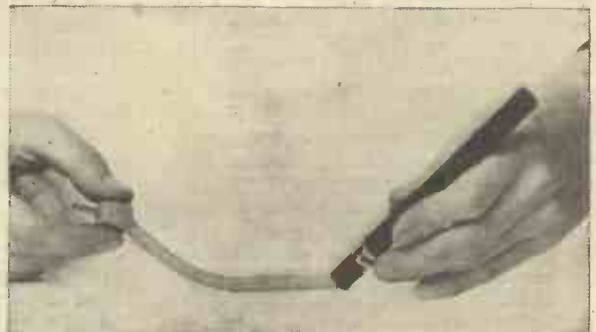
Pye Radio certainly has some good ideas. And that speaker link is not the only one that has come from their factory recently. Have you seen that natty portable aerial they have produced? No? Then you should: It is illustrated here.

Just like a large fountain pen, it fits into the waistcoat pocket. On one end is a pin, for insertion into the normal socket provided on some sets for the aerial plug. It is advised that the sets with which the aerial is to be used should be fitted with such a socket.

A slight pull on the other end of the "pen"—after unscrewing the top—and a spiral aerial appears. This can be stretched out to about 14 feet and hung anywhere convenient. When you have finished you merely detach the aerial and, walking towards the set with the "pen" in your hand you allow the spiral to coil itself up again inside the barrel of the "pen." Then the top is screwed on, the pin pulled out of the aerial socket on the set, and the whole aerial goes back into your waistcoat pocket.

A novel, useful and extremely efficient idea. And the cost? Just half-a-crown.

### A NOVEL PORTABLE AERIAL



Another Pye component—a novel aerial which can be attached to any set in a moment. When not in use, it slips into the waistcoat pocket after the style of a fountain pen.

# MIXING BATTERY ACID

*Some Valuable Hints on a Subject of Interest to all Radio Enthusiasts*

**T**HE question of the correct mixing of acid for an accumulator is a very important one, for the wrong strength of acid, or the use of hard tap water instead of distilled water, may result in the battery being ruined, or else in its life being seriously reduced.

If you have in your neighbourhood, at a handy distance, a distributor of one of the special brands of accumulator acid, the problem is solved for you, for this acid is ready mixed for pouring into your battery.

### Use the Right Materials

Otherwise you will have to mix up your own acid, and there are certain precautions to be observed in carrying out this process.

Firstly, you must have the right materials to begin with. These are pure concentrated sulphuric acid, obtainable from a chemist at about 3d. an ounce, and ordinary distilled water.

Under no circumstances, except those of extreme urgency, should hard tap water be used in an accumulator, for it contains impurities which will give rise to trouble sooner or later.

Secondly, the vessel used to mix the acid must be acid-resisting. A tin, obviously, must not be used. Either glass, china or enamel may be used, but if an enamel vessel is employed be sure that it is not chipped.

### A Word of Warning

Thirdly—and this is most important—always add the acid to the water, *never* do the reverse, or there may be serious consequences.

Sulphuric acid does not just mix with water or dissolve in water as would methylated spirits or salt respectively. Actually, it combines with it chemically, and in doing so a considerable amount of heat is generated. Sulphuric acid, as a matter of fact, has a very great affinity for water, and combines with it rather violently, especially if there is only a small amount of water and a lot of acid. So if water is added to acid the heat generated may be sufficient to make the acid boil violently, and hot acid may be projected on to hands or face.

### Deciding the Density

If, however, the acid is poured slowly into the water, the large bulk of water (on account of the proportions used), and the fact that the acid is added to the water, does not give rise to a sudden increase in temperature. At the same time, the water will get quite hot—hotter, indeed, than the hand can bear—so the mixing, under any circumstances, should be done slowly.

It is important that the acid and water be mixed in the correct proportions in order to produce the desired density "electrolyte," as the dilute acid is known. This value varies with different types and makes of battery, and the label on an accumulator should always be consulted before starting to mix your acid.

If you have a hydrometer it is a simple matter to read off the density of the acid after you have mixed it. Make sure, how-

ever, that you take your readings after the acid has been allowed to cool down, for just after mixing, when the electrolyte is still very hot, the density reading you obtain will be much lower than it should be. An approximate correction is given by reckoning a decrease of .001 in density for every 3 degrees rise in temperature, the normal temperature at which the density should be read being 15 degrees Centigrade. Without a hydrometer you will have to mix acid and water by measurement, and the following proportions give you the densities tabulated against them.

### The Proportions

Parts Water.	Parts Acid.	S.G. of Elec.
4½	1	1.200
3¾	1	1.230
3½	1	1.260

From these figures it will be seen that density of concentrated brimstone sulphuric acid is taken as being approximately 2.375, and this will enable you to work out your own proportions.

Remember that the more acid you have the denser the solution, and vice-versa. When making the final adjustments to the electrolyte to get it exactly the right density, add acid or water (as may be required) very gradually, and stir it well with a glass rod after each addition before taking a reading, so as to make sure that the solution is uniform.

## WHEN CLEANING AN ACCUMULATOR

**W**HEN removing the acid from an accumulator which it is desired to clean out thoroughly, it is sometimes difficult, owing to the peculiar construction of the accumulator, to remove the last few drops of liquid. Thus it is that in such instances there is often left lying at the bottom of the accumulator a layer of liquid a quarter and, occasionally, even half an inch in depth. This liquid contains most of the accumulator sediment. Hence, it is always desirable that it should be removed more or less completely when cleaning out the battery thoroughly.

### A Simple Method

About the best way of effecting the complete removal of this "sediment layer" of liquid consists in lowering a thin rubber tube into the accumulator and by very carefully sucking up the liquid by dint of applying the mouth to the outer end of the tube (the very greatest care being taken not to suck any of the acid into the mouth), or, better still, by attaching a hollow rubber ball, as seen in the illustration, to the outer end of the tube and by squeezing this. After the air has been expelled from the rubber ball and tube the liquid at the bottom of the accumulator will rush up into it and can thus be effectively removed.



How the tube is inserted through the vent hole of the cell to suck the acid out.

The rubber ball and tube seen in the photograph were actually taken from the shutter of an old camera. Any type of narrow tubing, however, will suffice for the purpose, and for the necessary rubber ball a small rubber nose syringe will serve the purpose excellently, since the rubber tubing may be attached to its pointed nozzle very readily. **J. F. S.**

## FORTY THOUSAND WORDS ON ONE TEST MATCH

How England Hears the News

**S**OME indication of the wonders of modern communications is given by the speed with which the Test news is coming through to the public in this country.

Special arrangements have been made by Cable and Wireless Limited to ensure the utmost dispatch, and urgent messages have been received within two minutes of their dispatch from Australia.

There are direct telegraph lines between the various Test Grounds and the Cable and Wireless Offices in Australia, and the fall of a wicket is known in England almost as soon as the defeated batsman arrives back at the pavilion.

### By Cable and Beam Radio

Many of the messages arrive from Australia over the world's longest cable, which crosses the Pacific Ocean between Australia and Canada, a distance of some 3,457 nautical miles, during portions of which the cable lies at a depth of over 3½ miles.

Other Test cables come over the normal London-Australia route via the Straits, the Red Sea and the Mediterranean, while messages have also been sent via the Cape and Madeira cables and on the direct Anglo-Australian Beam Wireless Service.

Some idea of the public interest in the news can be gauged from the fact that during the first Test at Brisbane 40,000 words were telegraphed to London alone.

## MORE DANCE BROADCASTS

Henry Hall and the B.B.C. Dance Orchestra are now giving a half-hour programme each Saturday at 11.45 a.m. on the Regional wavelength. This is additional to the Friday day-time dance broadcasts given in the National programme by the B.B.C. Dance Orchestra.

# RANDOM RADIO REFLECTIONS

By Victor King

TRANSMITTING ELECTRICAL ENERGY WITHOUT WIRES :: IGNITING EXPLOSIVES AT A DISTANCE  
:: A WORRIED INVENTOR AND THE SEQUEL

## POWER BY RADIO

I NOTE that a popular astrologer has predicted that before very long a system for sending power by radio will be discovered. Well, I'm not a reader of the stars, but I predict that this prediction won't come right. At least, I give it as my opinion that no economical system of radio power distribution will soon, if ever, be discovered.

And I don't know if we want it, any more than we want systems of domestic gas or water distribution without pipes. After all, one of the essentials of distribution is control. And, leaving you to work that one out, let me tell you about a secret demonstration I saw some years back.

An Italian gentleman claimed to be able to transmit the power from a 6-volt accumulator to a small electrically-driven boat by means of "focused magneto-power beams." Together with a bunch of other interested folk, I turned out at five o'clock one spring morning to see the thing work on a pond in the north-eastern outskirts of London.

"Eef he works wit' dis leetle engines, he works wit' da beeg sheeps, yes?"

We all agreed that the idea ought to be applicable to the "beeg sheeps" if it proved successful wit' da leetle sheep.

First, we examined the small vessel very closely. It was about four feet long, and seemed to contain nothing but a tiny electric motor and a lot of little coils connected to a long, extended coil slung between two masts. There was no concealed battery. We tested for that with a delicate galvanometer, using a little idea of my own.

We also examined the "transmitter"—an accumulator of a quite ordinary type, more coils and a switch. Then one of the Italian gentleman's assistants (there were three of them) carefully placed the boat in the water and joined his compatriots in a little huddle round the "transmitter."

Next, they all stood back a bit, leaving only the proud inventor at the point of control with his hand dramatically poised over the switch.

"I pressa heem! Cleek!"

We all stared intently at the little vessel, rocking gently at the edge of the water.

"He go!" shouted the Italian; and, sure enough, it very slowly moved outwards into the pond.

It travelled about twenty feet at a speed of two miles per hour or so, then stopped. Again the assistants and their maestro went into a huddle over the transmitter, and, after a few minutes of poking about, it was announced regretfully that there had been a slight breakdown.

"He go, yes?" said the Italian gentleman, with glinting, hopeful eyes.

"The electricity travels through the air, is caught by that coil affair between the masts, drives the electric motor and thus turns the propeller?" I asked.

"Si! Si!"

But when they'd got the boat ashore again, I pointed out to the other experts that the bit of match-stick I'd surreptitiously stuck into the armature of the motor was still successfully jamming it!

Yes, I'd guessed it was all a fake, but I don't know to this day quite how it was worked, and your guess here is as good as mine.

## A "Destructive Ray"

I also saw a demonstration of that "destructive ray" due to another Italian gentleman. You may have read about it at the time. This chap claimed to be able to ignite explosives at a distance. A fine demonstration, that. He sent a small boat out and, when it was at a distance of some two hundred yards, he pressed a button on his transmitter (which was no larger than a biscuit box) and, boom! The boat suddenly blew to bits. But we do know exactly how he worked this stunt. There was a hole in the bottom of the thing which was stopped up by means of a lump of either sugar or salt. When the water permeated through this, it contacted some sodium, which at once burst into flame and ignited the explosive. Of course, the inventor knew to within a few seconds when that would happen, and so was able to press his key at the right moment.

Misplaced ingenuity! Why do these fake inventors fake? What is their motive? They must surely know that they could never expect to sell their fakes. Or do they? Or is it just to satisfy a craving for notoriety?

## He Struck a Snag

There is a third alternative, and I can give you a case to prove it, though I can't, in fairness, give names. Three years ago, a young man got into touch with me. He was in a terrible stew. Quite sincerely, he had thought he'd hit upon a very valuable idea. He communicated his enthusiasm to a manufacturer of—sorry, I forgot; I mustn't give a direct clue. Anyway, this old boy advanced a



Charming Suzanne McClay smiles at the Marconi-E.M.I. Emitron camera during her television programme from the Alexandra Palace. Miss McClay sings French and English songs.

large sum of money to this young man, so that he could develop and produce a finished model.

But the initial, practical experiments revealed a snag. A huge snag. A devastating snag. Could I, asked the young inventor tearfully, get him out of the jamb? He'd spent a lot of the money advanced, and hadn't the moral courage to tell his backer that the idea was a dud. Could I help him to surmount the difficulty?

"In short," I said, "you want me to invent the idea all over again for you from scratch." And that is what it really amounted to, but it was a quite hopeless task. It just couldn't be done. I wanted to help the young man, and so, after giving the whole matter considerable thought, this is what I finally suggested.

"The whole scheme is based on false premises," I said. "It's like trying to build a stone castle with wooden bricks. To succeed, you'd first have to discover something fundamental, like the transmutation of matter. But that you've thought of the idea at all proves you, at least, have imagination. That you've managed to get backing seems to prove that you have enthusiasm. Right! Go away and invent something else, always making sure you think in terms of things you know. With that imagination, that enthusiasm you displayed in this other and abortive venture, plus the stimulation of a desire to justify the faith of your backer, scheme up something really hot and good. Give yourself a month of intensive thinking, and if you fail, tell the old gent all about it. He won't eat you—probably. After all, he must have regarded the advancement of his money as a pure speculation; and, anyway, you haven't spent all of it. If you succeed, still tell him the truth—that the first idea flopped out in practice, but you've brewed something else."

Well, that young chap followed my advice, and he thought and thought and thought, and then he laughed and laughed and laughed. He's probably still laughing,

(Please turn to page 586.)



# ON THE

# SHORT WAVES



## SUPERHET LAYOUT

Some hints on the construction of a de-luxe set.

By W. L. S.

THIS page, which is usually devoted to some topic connected with the design of short-wave receivers, has not often been given up to the superhet. Acknowledged to be the finest of all short-wave receivers for telephony, the superhet seems to have been continually growing in complexity, always keeping just a little way ahead of the home-constructor who has been chasing it—always “in the next field.”

It's time we stopped this and got down to brass tacks, so let's try to find out why the superhet has stumped so many. I think the whole thing can be boiled down to complexity and that matter of layout.

### Layout Importance

Anyone with a little practical experience of short waves can lay out, on his own baseboard, a jolly good two- or three-valve receiver. He may be able to carry a superhet circuit in his head—not a very difficult matter, after all—but when he comes to translating it into a three-dimensional layout, he finds it appallingly complicated. If he has the courage to go on and to try it, he generally finds the whole thing so hopelessly unstable and “touchy” that he gets thoroughly fed up with himself and drops the whole business.

The fact of the matter is that it's no good thinking of a modern superhet in terms of a panel and baseboard, with unscreened coils and two nice tuning condensers in the front. With the high-efficiency valves that we have nowadays, not to mention the appallingly efficient air-cored intermediate-frequency transformers, it is a man's job to stabilise a superhet unless the layout is carefully planned and just right.

### Keeping Down the Wiring

Let's think in terms of a chassis from now onwards—a metal chassis with a turn-down of about two inches, and all important connections made underneath. Several modern I.F. transformers are made specially for chassis mounting. They are bolted on to the chassis from the top, automatically earthing their cases, and terminals or leads protrude through on the underside, conveniently near the valve-holders or other components to which they have to be connected.

Chassis construction reduces this part

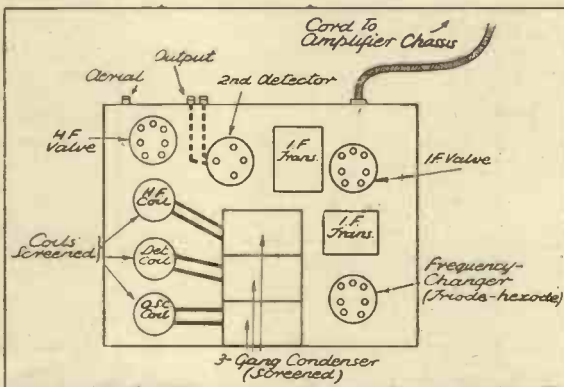
of the wiring by more than half. The short-wave coils, too, can be fitted into chassis-type valve-holders, and need have no above-board connections at all.

The valves should be given screened leads from their top terminals. In short, the layout should be that of a good modern broadcast receiver, “only more so.” And so as not to make our superhet chassis an unwieldy contrivance, I suggest that we use two of it!

The H.F. stage, frequency-changer, I.F. and second detector can easily be mounted

At this stage I'm not going into details about the circuit. Suffice it to say that a perfectly straightforward H.F. stage (using a pentode), followed by a triode-hexode, makes a really fine signal-frequency unit. The I.F. stage is nothing more than an ordinary H.F. amplifier working at a fixed frequency, and should be designed and treated as such. The second detector, preferably working on anode-bend, offers no snags. In fact, the only thing that can trip one up is the general layout and the risk of instability if it is bad.

## H.F. CHASSIS ARRANGEMENT



These two diagrams are W. L. S.'s suggestion for a superhet made in two parts, viz. an H.F. chassis and a separate amplifier and power-pack.

on one chassis of reasonable size, and the other can carry the power-pack and a lusty output stage—possibly a pair of biggish valves in push-pull.

The two diagrams on this page show, rather roughly, my scheme for such a pair of chassis. The two units, together, should make a short-wave telephony receiver *de luxe*.

One of the major snags about short-wave superhets is the coils. If we can't buy a three-coil, three-condenser unit, we have to make the best of a bad job with the latter half only. That means using three separate sets of coils, and makes wave-changing a bit of a lumbering business. But the ingenious reader who really means to make a job of things will find some way of coupling a set of three coils together so that they may be inserted in one block with the minimum waste of time and trouble.

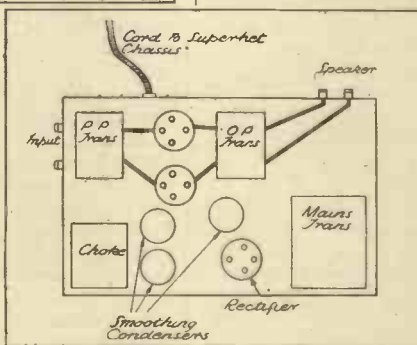
### Simplicity of Tuning

Get a superhet going at all well and you will be amazed at the ease of tuning, the strength of the better known stations, and the air of solid comfort about the operation of the set.

Now I admit that, compared with the simple but effective little short-wave sets that have been all the rage for many years, and, for that matter, still are, this is a big job and a complicated one. If you want band-spreading you have another three-gang condenser to think about.

In fact, you have a rather bewildering array of parts to buy and to wire up. I do think, though—and I hope you will—that it is worth while. You will have a receiver that is free from the need for “fiddling.”

## AMPLIFIER & POWER-PACK



### Like Locals

You will be able to treat the better known short-wave stations as if they were locals, using the speaker all the time, and you will have shifted your short-wave recep-

tion out of the “kitchen-table” or “work-bench” category into the “drawing-room” department.

Needless to say, if such a prospect doesn't appeal to you (if, in other words, you are the DX-hound I wrote about a few weeks ago), then don't do it. If it *does*, though, get down to it while the long winter evenings are still upon us, and, by way of encouragement, I'll go into further details about it next week, and mention a few practical points that have cropped up in the making of my own set, of which I have been thinking as I have written this page.

ON THE SHORT WAVES—Page 2

# POINTS from the POST-BAG

## W. L. S. Replies to Correspondents

A NUMBER of readers, tuning round the 31-metre band in the hope of hearing the Test Match reports direct, have been sold a large size in pups. They have heard the Test Match commentary, but it has been a relay from Daventry, putting it out for other parts of the Empire. Regarding the channel by which it comes from Australia to this country—well, there you have me!

One of the readers who raises this query—G. M., of Llanelly—says: "I have a three-pin all-waver. Do you think I should get Australia direct at loudspeaker strength on this set?" How should I know, G. M.? What particular breed of all-waver is it? Is it bad or good? What's your aerial like? What sort of a district for reception do you live in? Instead of answering your question, I've had to ask five more!

More queries on short-wave amateur transmission have been flocking in. I do hope that they were written before my last little outburst on the subject. Please turn back to the last two or three numbers, readers concerned. I really can't mention that "Guide" any more.

C. H. O. (Hull) is building a short-waver, and forwards his circuit with some queries. Seeing that these must be of pretty general interest, I am dealing with them "in public."

First, he wants to know the best voltage to use on the screen of an H.F. pentode—and can he obtain it by a resistance from his full supply of 120 volts? I always advise readers to stick to the valve makers' recommendations—most of them give the optimum voltage, and many show a network of resistances and decouplers for obtaining it. I suggest, however, that 60 volts, obtained from a "1:1" potentiometer across the H.T. supply, will do. Two 50,000-ohm resistances in series, with the screen connected to their common point, will do it.

On the anodes of the H.F. stage and the detector you should have, preferably, the full 120 and about 60 volts.

C. H. O. is worried because his layout means that the H.F. pentode will be upside-down or at an angle; he needn't be, because that won't matter at all. He also inquires about a potentiometer for controlling reaction, but as his circuit with a condenser is quite a nice one, I don't recommend the alteration.

Finally, he says that he understands that the values of resistance-coupling components to the last valve depend upon the preceding valve. Quite right—they do; but with a general purpose valve he won't be far wrong with an anode resistance of

50,000 or 100,000 ohms, a grid condenser of .005 mfd., and a grid-leak of 1 megohm.

K. L. W. (Ayr) writes as follows: "Noting that some of your readers were asking for blue-prints, I am enclosing a few, and hope you will forward them to any reader who would like to have them. I also have a number of 'P.W.'s' for 1932-33, and will gladly forward them to any reader who is willing to pay postage for same." The full address is K. L. Watt, 2, Burnfoot, Patna, Ayr, Scotland. The blue-prints (of varied and unbelievable assortment) are in my own drawer. Anyone interested should ask me for further particulars.

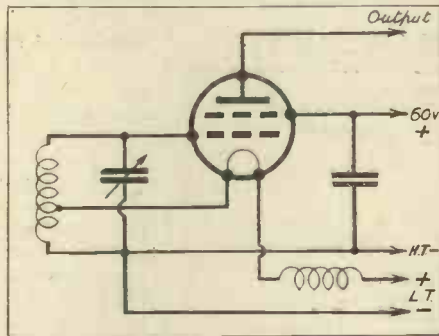
K. L. W. wants a design for a short-waver with a screened-grid detector, R.C. L.F. stage, and final transformer-coupled stage. He apparently believes in plenty of noise! I will try to evolve a good set on those lines for the "standard-baseboard" arrangement, which is starting off again shortly.

E. W. A. (Grays, Essex) tells me that he still uses a single-valve adaptor with two-pin plug-in coils. He has made some coils for the ultra-short waves, and has no trouble in receiving the Alexandra Palace

transmission on them. He makes no alteration either to his adaptor or aerial to do this. He is twenty-five miles from A.P.

I wonder how many readers still use two-pin plug-in coils? They used to

### FILAMENT-TAP SCHEME



A filament-tap circuit reproduced by W. L. S. in response to a query from F. R. M. (Manchester). On the right is the practical layout.

be tremendously popular, but the present cult of the compact four-pin coil (for which I am more or less responsible, I'm afraid) has ousted them. E. W. A. uses

coils of 1-in. diameter, soldered to suitable plugs for the two-pin holders; 3 turns grid and 4 turns reaction enable him to cover the television wavelengths, so I imagine that he would have no difficulty in getting his adaptor down to 5 metres.

The sketches on this page are reproduced in response to a query from F. R. M. (Manchester), who wanted to see a good layout for one of the various "filament-tap" circuits, often called "electron-coupled." One shows the circuit arrangement in its basic form, and I won't bother to explain its working, as I've done that so often.

The other sketch shows the nice kind of layout that can be evolved from it.

# Short-Wave News

APPLICATIONS for the "P.W." DX Certificate have been flocking in at a goodly rate for the past few weeks, a number of readers having qualified for the award. As our first printing of these certificates is nearly exhausted, I discussed the matter with the Editor, and we finally agreed that it is time to put a "closing date" on applications for this proof of your efficiency as a short-wave operator.

We are going to replace it by something that is even more difficult to gain, and which will, in consequence, mean even more. Our plans are not yet fixed, but I can drop a hint by saying that I propose to divide up the world into a number of areas, and readers who can provide proof that they have received a station in each of those areas will be awarded something really nice in the way of a certificate.

### The "P.W." D.X. Certificate

It was in April, 1936, that we first drew up and announced the "P.W." DX Certificate in its present form. Accordingly we are going to withdraw it on April 30th, this year. All applications for this certificate must be received before that day; and if the supply of certificates is exhausted before then, "orders will be dealt with in strict rotation," as the advertisers say.

This decision, of course, makes the existing certificates even more valuable, since only a limited number of them have been issued, and they will be fairly "exclusive," even when the whole stock has been sent out.

To catch the eyes of readers who have not bothered to cast their eyes over the above, let me say, in capital letters: IF YOU WANT YOUR DX CERTIFICATE, YOU MUST APPLY FOR IT BEFORE APRIL 30th, 1937.

I have been listening a good deal this week, both on my own home-made "straight" receiver and on my excellent commercial all-waver, and it

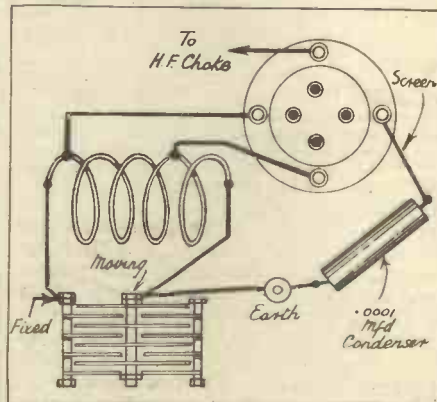
seems to me that conditions are going to show some slight signs of falling off before long. They are still exceedingly good, but there has been more fading on some of the stations that used to be steady, and some of the weaker ones are still weaker.

The amateur bands, at times, reach a state which is dangerously near to coming under the title of "Dead." Once or twice I have found the 20-metre band completely blank at times when one would expect it to be lively.

All this may prove something or other, or it may not; but I think we are in for a spell of conditions which are poor, compared with the glorious times we have had recently.

W. L. S.

### HOW IT IS WIRED



# TELEVISION TOPICS—Collected by A. S. Clark

A weekly feature which will keep the reader au fait with all the latest news and developments in television science. It will appeal alike to the newcomer to television and the advanced experimenter



A general view of the R.C.A. television transmitter in the Empire State Building, New York. The pipes near the ceiling are not connected with ventilation but with the feed system to the aerial.

## “TELEFRAMES” Items of general interest

WE learn that one television model receiver is to be made by Haleyon.

It will have 19 valves and employ a superhet circuit. The picture is to be 8 ins. by 7 ins., and the instrument design incorporates an all-wave sound receiver. At present no definite release date or price has been fixed.

With regard to Murphy television receivers, which readers will remember were dealt with and illustrated a while ago in these Topics, it is understood that models are to be available for the Coronation in May. No prices, at the time of writing, have been announced.

### FOCUSING THE SPOT

Users of experimental cathode-ray television apparatus should bear in mind that focusing of the spot, and therefore picture sharpness, is dependent on the ratios of the voltage on the electrodes of the tube. The voltage on the screen, which also controls picture brightness is thus partly responsible for focusing, and consequently an alteration in brightness should be followed by an adjustment of the voltage on other electrodes in order to keep focusing correct.

### WHICH SYSTEM?

It will be welcome news when the B.B.C. tells us which of the two systems of television is to be adopted at the Alexandra Palace. Little purpose, if any, can be served by extending the side by side trials, and the simplification to one system should enable the prices of receivers to be lowered.

Every little reduction in the price of television receivers helps, and this question of price is perhaps the biggest obstacle to rapid development of the science at the present time.

### SPECIAL MATERIAL

Television is a new and special form of entertainment, and, as such, deserves to have material specially written to suit its technique. The value of adapting material written for another form of entertainment will always be doubtful.

In view of this, the news of Mrs. Bissell Thomas and the play she wrote after seeing a television demonstration is very welcome.

### THEY MISS IT

We heard of some people the other day who have had a television receiver on extended trial, and which has now been removed. They said that in spite of the programmes lasting for only two hours a day, they missed them very much—

much more than they would miss their ordinary radioset. Which goes to show there may be more in the fascination of television than meets the eye.

### REMEMBER

Ordinary single rubber-covered flex of the inexpensive type is not suitable for the high voltages of television. Flex intended for high voltage work should always be employed.

### AMATEUR BOXING CONTEST

Amateur boxing is to provide television's first outside broadcast of a competitive event to-morrow, Thursday, when viewers will see contests in a tournament staged by the Alexandra Amateur Boxing Club in the Concert Hall of Alexandra Palace. Two important England v. Ireland matches are to be televised in the evening transmission. The first encounter is between F. J. Simpson, amateur light-weight champion of Great Britain for 1936 and Berlin Games representative, and Corporal T. Bonham, Irish Free State Army champion, 1936; and the second is between W. S. Pack and T. Byrne, the amateur welter-weight champions of Great Britain and Ireland respectively.

It is hoped that a commentary will be given by Harry Mallin, undefeated middle-weight champion of the world, who will be seated at the ring-side with Leslie Mitchell, the television announcer. From time to time viewers will have glimpses of the commentators and a section of the audience, which is expected to number at least 3,000.

### A G.E.C. CHASSIS



An interesting view of the complete chassis of a G.E.C. television receiver. The double time base is in the foreground.

## CATHODE-RAY TUBE RELEASES

WE are pleased to be able to give readers the details of new cathode-ray-tube releases on the following page. In the case of the Ferranti models, prices at the time of writing have not been fixed, but it is anticipated that they will vary between £8 and £15 according to size.

These tubes are stated to be of such a shape that they give an almost flat screen, and are given an external pressure test equal to three atmospheres. An internal coating of Acheson's Colloidal Graphite is affixed by a special Ferranti process to minimise reflection and remove any charges accumulating.

It will be noted that this tube has magnetic focusing as well as scanning. The following particulars refer specially to the 14-inch model. The limit of the beam current modulation is 0/250 microamps. Focusing ampere turns are 200/300. Scanning 10 m.a. for two 500-turn coils. This varies with the coil design, naturally. Grid-base cut off light 10/50 volts. Picture 10 ins. x 8 ins.

### Available to Special Order

The H.M.V. tubes, we understand, are available to special orders only, dealers not carrying stocks. All orders will be dealt with in strict rotation.

It will be noted that modulation volts are given from black to defocusing. The figure thus represents the number of signal volts required to be applied to change the picture from black right up through all shades of light to full white and beyond to the point where additional positive on the modulating anode begins to affect the electronic lens system formed by the different voltages on the succeeding anodes, resulting in the tube going out of focus.

Due to the magnetic deflection, there are no deflector electrodes in these tubes.

# TELEVISION TOPICS—Continued

## TELEVISION FOR BEGINNERS

G. Stevens discusses the question of building television receivers this week.

**T**HERE are quite a number of people who are surprised to find that their ordinary all-wave set will not do for television reception—in fact, there are some who think that as soon as they buy a tube and put it on to the receiver they will see pictures. If you have understood these articles, or the greater part of them, you will know better, but there are still some questions which remain to be answered.

### It Depends on You

In the first place you might say, "Can I build a television receiver?" The answer mainly depends on your capabilities as a constructor. There are a number of professional radio engineers who consider that the home constructor cannot build a television receiver, not because he is incapable or insufficiently experienced, but because the truing up and adjusting of a television receiver require apparatus which he has not got and which would be very expensive to obtain.

Take the simplest case of a cathode-ray tube which suddenly

develops loss of focus. It is simple to blame the tube, but supposing that the tube is checked by the makers and returned as O.K.

This means a systematic checking of the components to find where the volts have gone to, and the only means is to use an electrostatic voltmeter reading some thousands of volts—about £4.

It is certainly possible to ask a friendly dealer to oblige, but one never knows where it will stop. And then there is the ganging of the receiver and the initial tuning—an oscillator saves an enormous amount of time and trouble, but very few of us have oscillators on the shelf ready for service.

### By No Means Simple

This may sound very pessimistic, but it is not meant to be. It is only a warning that the construction of amateur television receivers is not quite so simple as the ordinary sets to which you have been accustomed, and unless you are prepared to see the thing through it is better to rely on someone who has the

necessary aids to help you in the construction and fitting up.

The receiver can be as simple or as elaborate as the corresponding broadcast receiver: it is a question of cost and locality. It is not desirable to start with an elaborate receiver if a simple one will do, for obvious reasons, and it is always as well to remember that the simpler the circuit the less the risk of anything obscure going wrong with it.

### What Do We Need?

After these solemn words of warning we might get down to considering ways and means. What do we require for a complete television set? Answer: One sound receiver (unless you prefer to watch in silence), one vision receiver, one scanning circuit, one cathode-ray tube, and two or three assorted H.T. units.

The sound receiver is the easiest of the lot, as it is of the ordinary short-wave receiver type with no elaborations beyond the special coils necessary to tune down to 7 metres. The power output from the Alexandra Palace is ample to enable the sound to be received within a radius of about 40 miles. It is the most risky thing of any to quote range figures, because as soon as a figure is given, up comes somebody and says, "I live forty-one and a half miles away and the sound is so loud that my speaker cone turned inside out when I tuned in."

On the other hand there is always the poor man writing from Hornsey to say that he can't hear the sound over the radio, but listens at his front door to the programme borne over the air!

Seriously, the variations in the quality and strength of short-wave reception are quite likely to give results like these absurdities, and the first thing to do is to glean information from people in your locality who have actually heard the transmission, and the closer they are to you the better.

### Using a Converter

Assuming you know that you will receive the sound signals at reasonable strength, there is no reason why you should not use an ordinary receiver with a special short-wave converter. It is considerably cheaper than the building of a special one, although it has one or two drawbacks.

For example, the sound will come from a different part of the room from the vision, unless you mount one on the other. Secondly, your receiver may not be of the "high-fidelity" type and you may not gain the full advantage of the increased frequency range of the short-wave sound transmission. But the idea is an excellent one and entails a minimum of expense and trouble.

The vision receiver is quite another thing, and we can leave that for another time.

### "HIS MASTER'S VOICE" EMISCOPE TUBES

Type		9 in.	12 in.
Heater	Volts	4	4
	Amps	1.3	1.3
Normal Operating Volts	Anode 3	3000	3000
	Anode 2	1000	1000
	Anode 1	300	300
	Grid Bias	24	24
	Modulation*	8	8
Max. Anode Volts**		6000	6000
Sensitivity	X Plates	(Not fitted, tubes intended for magnetic deflection)	
	Y Plates		
Type of Tube		Electrostatic focusing hexode.	
Capacities mmF.	G—E		
	C—E		
Modulation Sensitivity	mA/v.	25	25
Max. Input Power to Screen per sq cms.(Watts)		0.01 watts/ cms <sup>2</sup> .	0.01 watts/ cms <sup>2</sup> .
Screen Colour		White	White
Dimensions cms.	Diam. of Screen	8½ in.	11 in.
	Max. Diam.	9 in.	12 in.
	Max. Length	22½ in.	27½ in.
	Base	Side contact	Side contact
Price		11 Guineas	15 Guineas

\* Peak-to-peak volts between black and de-focusing.

\*\* Maximum voltage for A3 or A2 in 3— and 2— anode tubes

### FERRANTI CATHODE-RAY TUBES

Type		T10	T12	T15
Heater	Volts	2	2	2
	Amps.	1.5	1.5	1.5
Normal Operating Volts	Anode 1	4000	4000	4000
	Grid Bias	-50	-50	-50
	Modulation*	-20/-50	-20/-50	-20/-50
Maximum Anode Volts**		5000	5000	5000
Type of Tube		Magnetic focusing and deflection.		
Capacities mmF.	C—E	5.0 mmF.		
	C—E	Designed to run with cathode earthed.		
Modulation Sensitivity	mA/v.	1	1	1
Max. Input Power to Screen per sq. cm. (Watts)		.009	.007	.004 watts
Screen colour		Black and White.		
Dimensions cms.	Diam. of Screen Max. Diam. Max. Length	9 in.	11 in.	14 in.
		10 in.	12 in.	15 in.
		24 in.	24 in.	28 in.
Base		Standard 7-pin valve base, using only 4 pins (pins 3, 4, 5 and 7).		

\*Peak-to-peak volts between black and de-focusing

\*\*Maximum voltage for A3 or A2 in 3— and 2— anode tubes.

# GERMANY'S TELEVISION

Considerable progress has been made in German television since 1932, noteworthy developments being the opening of a telephone-television service between Berlin and Leipzig and the provision of public viewing halls in Berlin. A great fillip was given to the science during the Olympic Games of last year; when many of the events were televised for the benefit of those who could not attend the games.

**G**ERMANY'S first big step in television was the establishment throughout Berlin and its environs of twenty-five television receiving stations where visitors and citizens may view events taking place at the moment; and the second the first large telephone-television connection in the world, between Berlin and Leipzig, put into operation last year by the Reichspost.

Hitherto the German people have regarded television as a plaything of that rather privileged cult—scientists. With these actual demonstrations of the everyday use to which it may be put, however, radio stores throughout the country are being besieged by enthusiasts for information on when sets within their means will be manufactured.

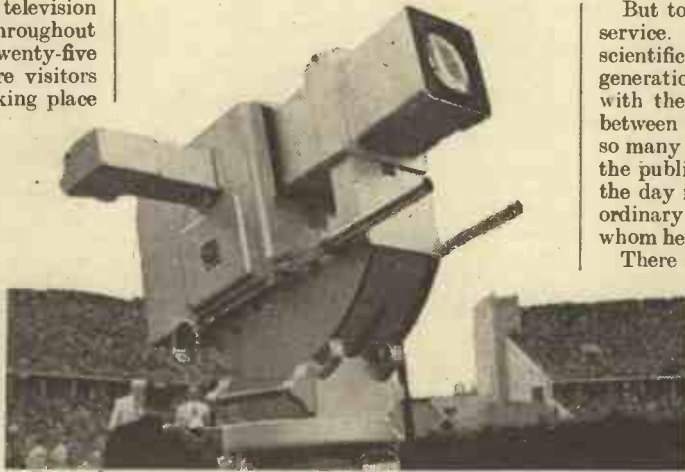
Germany has indeed made great strides in television since 1932 when the Reichspost erected a powerful ultra-short-wave transmitter in Berlin-Witzleben. Transmissions had been carried on there since 1929, but with the new transmitter their programmes showed a decided improvement. Two years later a second transmitter was built, making possible the synchronisation and transmission of the scene's accompanying sound.

Much of the German progress realised during the past year may be credited to the Olympic Games in Berlin. They gave television a handicap in its race for practical use that it ordinarily could not have commanded. In planning to make the XI Olympiad the biggest and most complete of all, Germany gave considerably more attention to the science of broadcasting sound and vision pictures than it otherwise would have warranted.

## Five Cameras Employed

The twenty-five television receiving stations were primarily established for the out-of-town and foreign visitors who, for one reason or another, could not attend the games. A most complete coverage of these events was given. Five huge iconoscopes were located throughout the Reich Sport Field to pick up the events, and two special television cables connected the field with the television transmitter at the Berlin radio tower. The pistol shot at the beginning of all races also opened the lens of the motion picture camera connected with the iconoscope, and while the event was being televised, it was also being "shot" for later projection.

Many of the public television stations are located in official buildings. At almost any time of the day one may wander in, take a seat, and watch the events as they take place in all sections of the city. Just as the days of the penny arcade were a forerunner of the vast cinema industry, so this



One of the iconoscope cameras used for televising the Olympic Games in Berlin.

public television service may well be an indication of what one can expect of this medium of entertainment in a few years to come.

The projector receiving sets at first glance look like an ordinary console radio. The pictures are 8 by 10 inches in size, with 180 lines and 25 frames per second. They attain a remarkable picture quality of a greenish hue, and the accompanying sound is for the most part quite clear and understandable.

The sending studio, located in a post office not far from Berlin's "Rundfunkhaus," is quite small and unpretentious. Hung with rough sacking, the only object in the 10 ft. by 12 ft. studio is a high stool on which the artists perch directly in front of the huge iconoscope.

By turns, a Greek tenor who sings Italian arias with quite a degree of finesse, but whose wit would have made of him a much better comedian; a swarthy mandolin-playing and singing Cuban; a lovely blonde frau-lein announcer, who incidentally aspires to the London stage; appear before their small but enthusiastic audience. They all display some nervousness in their work, and their decided efforts to keep a broad grin always in evidence gives the audience a feeling that these people are amateurs.

## The Use of Special Make-up

On the whole there is not much fuss made about special make-up for an appearance on television. Some of the performers use a panchromatic make-up, applying a sunburn shade of powder and lipstick of a brownish hue. Some women, however, use their own street make-up with quite a degree of success in the transmission.

Interspersed throughout the evening schedule of live talent are cinema reels. Running more or less to current events and travelogues, they show a wide variety of subjects, many of which had previously been televised.

But to return to the television-telephone service. What seemed to most people a scientific marvel not to be realised by this generation, has actually come into being with the inauguration of a regular service between Berlin and Leipzig. Heralded for so many years as one of the things to come, the public finds it almost unbelievable that the day is near at hand when it will be an ordinary occurrence to see the person to whom he is telephoning.

There are two offices in Berlin where one may place these calls—at the Potsdamer Platz, not far from the famous Unter den Linden thoroughfare of embassies; and at the Zoo station near the gay Kurfurstendam, street of night clubs and sidewalk café.

Suppose someone living in Berlin had a sudden desire to see a relative or friend who lives in Leipzig, fifty miles away. All he need do is go to either one of these two offices, give the name and address of his friend, and the time he would like to make the call.

The person in Leipzig is immediately informed, and at the appointed time they sit down before a small screen and the pictures of each are transmitted over a special cable from Berlin to Leipzig and vice-versa. They might well be sitting across the dinner table conversing, so clear is the transmission.

## Pictures Three Feet Square

Still another big step has been taken by Germany with the Telefunken Gesellschaft's introduction of a method for projecting pictures on a screen 3 ft. square.

These larger pictures are produced by a cathode-ray tube receiver, but in the new instrument the cathode-ray bulb is very small and the end instead of being curved is flat in order to eliminate distortion in the image, and thick so that it may withstand outside air pressure.

The picture thrown on the end of this tube is about 2 by 2½ inches, and the end of the tube is fitted to a large projection lens, which enlarges and throws it upon a separate screen. To obtain a bright and sharp enough picture on the end of the tube, the power has been stepped up to 20,000 volts.

R. C.

## PALMISTRY AT THE "BIG HOUSE"

Of a quiet and retiring disposition, Bert Handle of the B.B.C. Variety Orchestra, pursued the even tenor of his life playing the guitar for the Orchestra. Like a bolt from the blue it was discovered suddenly that Bert Handle had studied, over a long period of years, the art of palmistry. With him it has been an absorbing hobby and is now part of his make-up. The result is that members of the Variety Orchestra now know the whys and wherefores of their variegated lives. Bert Handle is so clever with his diagnoses that many broadcast officials refuse to let him see the inside of their hands.

# RADIO IN THE FAR NORTH

*The Oxford University Arctic Expedition returned from North-East Land at the beginning of last Autumn after carrying out wireless research on the Heaviside Layer, or Ionosphere. Below A. B. Whatman, of the Royal Corps of Signals, gives a fascinating account of the activities of the Expedition.*

**T**HE Oxford University Arctic Expedition, 1935-6, returned in September from a fourteen months' visit to North-East Land, approximately 80° North and 20° East, where it succeeded in carrying out a comprehensive programme of scientific research.

## An Island Covered With Ice

North-East Land is an island which consists almost entirely of a sheet of ice, which rises at its highest point to 3,000 feet, and only on the north, south and west coasts does a narrow coastal belt of low, rocky mountains raise their heads above it. The east coast consists of a cliff of ice, 150 ft. high, stretching for over 100 miles.

Probably no previous expedition has ever taken such a large amount of wireless equipment, for, besides having three wireless telegraph stations, it also carried out research on the Heaviside Layer, or the Ionosphere as it is now generally called. The total weight of all the apparatus, when packed, was several tons, and 1,600 gallons of petrol were taken for running the engines for the research and for the communications.

The base station was the largest of the

three, and was fitted with a 1-kw. transmitter whose power was obtained from dynamos driven by an Austin Seven engine. This set was used for monthly communication with Portishead Radio, which handled the Press traffic of the expedition, and for monthly communication with Mr. Douglas Johnson, G 6 D W of Kingston Hill, who had obtained special leave from the General Post Office to send and receive private and technical messages to and from North-East Land. The set was lent by the War Department.

At the base was also a 15-watt transmitter, made by Gambrell Bros., which was used for sending weekly to Advent Bay, Spitsbergen, and for thrice-daily weather reports which were sent to Bear Island Radio, situated half-way between Norway and North-East Land. These weather reports were eventually relayed to the Air Ministry, so that if my readers noticed any improvement in the weather forecasting between September, 1935 and April, 1936, they now know the reason why. Perhaps, however, they found the opposite.

## Cycle Generators

This low-power sender was also used for daily work with the two other expedition stations, which were situated in tents buried down deep into the ice of the interior, referred to above, and usually known as an

.....  
The operator at one of the ice-cap stations passes the time reading, while his supper is cooking on the primus stove. The tent was buried eight feet below the snow surface, but despite continuous blizzards and low temperature, the interior was always warm and comfortable.



Dogs drawing a sledge over the ice in the early spring. The dogs are driven in the fan system—that is, each dog is attached by a separate trace to the sledge.

“ice-cap.” The power supply was obtained from a pedal-driven generator, kindly loaned by Haslam & Newton, Ltd. One of the ice-cap stations was equipped with a similar installation, but a rather smaller generator was used, lent by Mortley, Sprague & Co., Ltd. The other station had only a receiver. All three stations used Eddystone All-World-Four receivers, and communication was always perfect.

It is worth remarking that the pedal-driven generator is an extremely reliable and handy piece of machinery, very suitable for portable transmitters, particularly where the use of a rotary transformer is ruled out because of the difficulty of accumulator charging.

## Taking Pictures of Echoes

The apparatus for the Ionosphere research required alternating current, and this was obtained from a 230-volt generator driven by a governed 2 h.p. Petter engine. It was a somewhat complicated apparatus, and was built under the guidance of the staff of the radio research station, who also planned the programme to be carried out, and lent part of the receiving gear.

The method of studying the layers is briefly this. The transmitter is arranged to send out a very short burst of waves, 50 times per second. Part of these waves travel directly across the ground to the receiver, which is placed about 70 yards away. Another part goes up to the layers and is reflected down and reaches the receiver a split second later than the part which has come direct. This time lag is accurately measured by means of a cathode-ray oscillograph, and a photographic record is made. The fact that 50 bursts of waves are sent out each second enables the pattern seen on the screen of the oscillograph to appear stationary. The layers behave differently to waves of different frequencies, and a complete observation consists of making a photograph of the echo pattern from the lowest frequency at which echoes appear, to the highest, working

(Please turn to page 585.)

## WHILE HIS SUPPER COOKS



# BEAM VALVES BY CARDEN SHEILS

IN the ordinary way the electrons set free from the filament of a valve may be said to be "broadcast" in the sense that they are emitted from it in all directions. Their subsequent path to the plate is, of course, controlled by the grid, but since this is wound spirally around the length of the filament, it does not exercise any definite directional effect.

The latest development in valve working is to focus the electrons into a directed jet or beam, which is then swung to and fro by the applied signal voltage, so that it hits or misses the plate, and so sets up amplified signal currents in the output circuit. The newcomer, which is known as the "beam" valve, in some ways resembles a cathode-ray tube more than the standard type of valve to which we have become accustomed.

Here are some of the arguments in favour of focusing the electron stream :

It has been known for a long time that certain advantages would be gained if the plate could be spaced well away from the grid. But in actual practice it was found that the separation led to more loss of power than was worth while. In other words, the amount of current which can be forced through the ordinary type of valve falls off very rapidly as the inter-electrode spacing is increased.

### The Effect of Electrode Crowding

And so designers crowded the filament, grid and plate as close together as possible. This, however, gave rise to undesirable capacity-coupling between the grid and plate, and so handicapped the valve as a high-frequency amplifier. As a remedy they introduced a screening-grid, which reduced back-coupling inside the bulb, but gave rise in turn to secondary emission. Finally, to overcome the so-called dynatron effect, they added a suppressor grid, and so arrived at the modern pentode, where no less than

*A new type of radio valve in which capacity effects are overcome by adopting similar methods to those used in cathode-ray tubes*

five electrodes are fitted inside the bulb, more or less on top of each other.

The idea of forming the electrons into a jet or beam represents a new attack on the problem of spacing the grid well away from the anode. It also increases the sensitivity of the valve, because a long jet of electrons is obviously more responsive to a given deflecting force than a short one.

### High Sensitivity

On the one hand, therefore, we get the advantage of high sensitivity, with no undesirable capacity-coupling between the input and output circuits, and no objectionable "dynatron" action between plate and grid. On the other hand, there is little loss of power because all the available electrons are concentrated into one narrow path. This

prevents the kind of leakage which occurs, for instance, between the edges of the ordinary spiral grid and the inner surface of the glass bulb.

Fig. 1 shows schematically the electrode arrangement used in one type of beam valve. The filament F is surrounded by a negatively charged tube G, which repels the electrons and so bunches them together into a beam, in much the same way as the Wehnelt cylinder does in a cathode-ray tube. Just above the tube is a flat plate P, which carries a high positive voltage, and has a central aperture through which the beam of electrons is accelerated towards the collecting anode A, which is cup-shaped and located at the far end of the bulb.

The tube G, in addition to focusing the electrons into a beam, also serves to control the number of electrons which reach the grid. That is to say, it contains the output current in accordance with the applied signals.

### The General Assembly

Fig. 2 indicates more clearly the way in which the jet-forming electrodes are assembled inside the bulb. In this case the cathode is indirectly heated, and the control tube G takes the form of a cylinder, with a narrow slit at the top, through which the electrons pass under the pull of the accelerating electrode P. Above the latter is a perforated guard-plate P<sup>1</sup>, which protects the lower electrodes from any secondary electrons produced by the impact of the primary stream against the collecting anode A.

The diameter of the guard-plate is made substantially the same as that of the glass-bulb, the side flanges B are added to complete the separation. It will be seen that the

anode A is set at a comparatively large distance away from the filament and grid, the spacing being fixed by two leads fused into a common glass bead C. The spacing reduces capacity coupling between input and output to an absolute minimum, even in the case of very short waves, whilst the guard-plate effectively prevents any dynatron effect.

The control action of the tube G depends upon the extent to which the electrons are diverted away from the central apertures. Even when the jet is not deflected to one side or other, there will be some marginal loss in passing through the apertures, and this in turn tends to reduce the maximum current which can be fed to the anode.

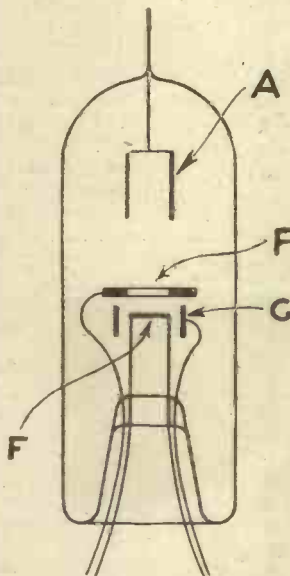


Fig. 1. Showing the disposition of the electrodes in one of the new valves.

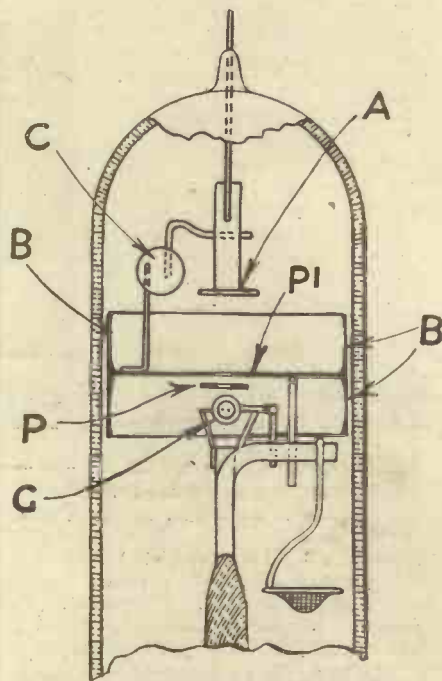


Fig. 2.—A pictorial sketch illustrating how the valve of Fig. 1 is arranged in practice.

Fig. 3 shows a type of beam valve in which this kind of loss does not occur, so that it is particularly suitable for power work.

In this so-called "critical-distance" beam valve the focusing effect is produced by the action of two spiral windings G, G<sup>1</sup>, which surround the filament F in much the same way as the ordinary control and screen grids. The two windings are, however "staggered" relatively to each other in such a way, and the biasing voltages and distances are so chosen, that the electrons are all clustered inside the shaded area.

This is proved by the fact that if a cylindrical anode A is used, the parts lying outside the shaded area can be cut away without affecting the total output current. As before, the anode A is spaced well away from the grid and cathode, so that there is no internal capacity-coupling when the valve is used for short-wave working.

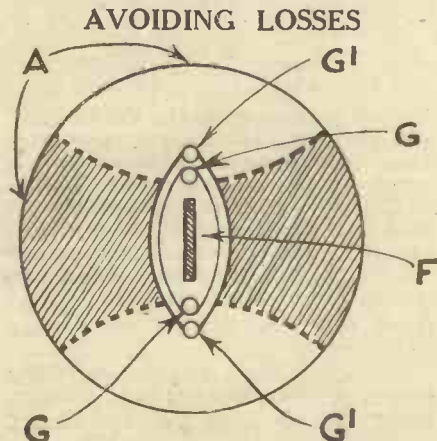


Fig. 3.—An electrode layout which avoids certain electron losses that occur in the Fig. 2 valve.

# LEARNING FRENCH THROUGH YOUR RADIO

**A** PART from the IRREGULAR VERBS there remains now only one class of verbs to be learnt. A specimen of this class—not a large class by the way—is RECEVOIR (to receive).

The TWO PARTICIPLES of RECEVOIR are RECEVANT, REÇU.

I want you to notice the cedilla accent (¸) under the c in the PAST PARTICIPLE REÇU. Let me explain this. The c in RECEVOIR is always soft. That is, it is always pronounced like an English s. But a French c can be both soft and hard. In fact, it is always hard when it comes before an a, o, or u. Take, for instance, the French word for a peanut—une cacahuette. This is pronounced kah-kah-wet, because both the c's are followed by an a. In certain TENSES of RECEVOIR the c is followed by a, u and an o. In these TENSES, then, the c should be hard. But I have told you that THE C IN RECEVOIR IS ALWAYS SOFT, AND IT IS MADE SOFT BEFORE AN O OR A U BY PUTTING THIS CEDILLA ACCENT UNDER IT.

Try to remember this in French:

- CA is pronounced kah
- ÇA is pronounced sah

Now to conjugate the NINE TENSES of RECEVOIR.

**TENSE No. 1**

Je reçois	re(r)-səwah	I receive,
tu reçois	re(r)-səwah	etc.
il reçoit	re(r)-səwah	
n. recevons	re(r)-səw(ə)ng	
v. recevez	re(r)-səwah	
ils. reçoivent	re(r)-səwah	

(Note the cedilla accent, and be able to account for its presence or otherwise.)

**TENSE No. 2 (I was receiving, etc.)**

Recevais, recevais, recevait, recevions, receviez, recevaient.

(Note there is no cedilla in this Tense. Why?)

**TENSE No. 3 (I received, etc.)**

reçus, reçus, reçut, reçûmes, reçûtes, reçurent.

(Observe the cedilla throughout here.)

**TENSES 4, 5, 6, and 7 (Always easy!)**

J'ai reçu	I have received
J'avais reçu	I had received
J'aurai reçu	I will have received
J'aurais reçu	I would have received

**TENSES 8 and 9 need careful attention.**

JE RECEVRAI	I will receive, etc.
TU RECEVRAS	
IL RECEVRA	
N. RECEVRONS	
V. RECEVREZ	
ILS RECEVRAIENT	
JE RECEVRAIS	I would receive, etc.
TU RECEVRAIS	
IL RECEVRAIT	
N. RECEVRIIONS	
V. RECEVRIEZ	
ILS RECEVRAIENT	

(Note again that in these two tenses there is no need for the cedilla.)

Well, this is the verb TO RECEIVE. What about those other English verbs that end with the syllable -CEIVE? Words like con-CEIVE, de-CEIVE, per-CEIVE, etc. Remember this, will you. They appear in French in the same form as RECEVOIR. Look! con-CEVOIR, dé-CEVOIR, aper-CEVOIR. It's a point

*This is Part 46 of our special language series*

By S. C. Gillard, M.A.

worth remembering, don't you think so? Let me give you a few sentences on the word CONCEVOIR (to conceive). Just notice how exactly like RECEVOIR it is as regards conjugation.

J'ai conçu de l'amitié pour Monsieur X  
I have taken a liking to Mr. X.

Elle avait conçu des soupçons contre moi  
She had become suspicious of me.

**"FIRST TIME IN THE RING"**



German secondary schools have recently introduced boxing lessons into their regular curricula and these are being backed up by special broadcasts. Here we see Frank Krüger explaining the principles of boxing to young listeners in the "First Time in the Ring" Series, which was broadcast in the Berlin programme.

Ils conçoivent des doutes sur le succès de l'entreprise  
They have doubts regarding the success of the enterprise.

Les espoirs que nous avons conçus.  
The hopes that we have entertained.

Je ne conçois rien à cela.  
I don't understand it at all.

Cela se conçoit facilement.  
That is easily understood

Conçoit-on!  
Fancy!

I would like you to notice, too, in the sentences above, the cedilla accents. Not only those in CONCEVOIR but in the other words as well.

DEVOIR (to have to) is another important verb of this conjugation. It is so important, however, that it demands almost a whole page to itself. I will deal with it next week.

Here is a test on the verbs I have given you above. Write out the following sentences, putting the verb in TENSES 1, 4 and 8 respectively.

- (1) Je *recevoir* des amis chez moi.
- (2) Vous ne nous *décevoir* pas.
- (3) Il *apercevoir* mon erreur.
- (4) *Concevoir*-tu des espoirs?
- (5) Les *recevoir*-nous?
- (6) Cela nous *décevoir*.
- (7) Ils *recevoir* tout mon argent.
- (8) Ne *concevoir*-vous d'autres plans?
- (9) Vous *l'apercevoir*.
- (10) Le *recevoir*-il?

Fair copy next week.

I want to talk about IMPERSONAL VERBS now. These verbs are found in

ONE PERSON only—the 3rd Person Singular. IL, instead of being translated HE, is translated IT. The English impersonal sentences "it is cold," "it is raining," "it is important that . . ." show what I mean.

Of course, these IMPERSONAL VERBS have their NINE TENSES like other verbs, but, let me repeat, ONLY ONE PERSON.

There are a number of IMPERSONAL VERBS which are used in connection with the WEATHER. Hence their importance, for in France, as in England, the weather is a popular topic of conversation.

We will classify these WEATHER terms as far as possible. A number of them involve verbs of the 1st Conjugation. (See Part 18.)

il éclaire (eh-klaïr)	it is lightening
il dégèle (deh-shehl)	it thaws
il gèle (shehl)	it is freezing
il grêle (grehl)	it is hailing
il neige (nehsh)	it is snowing
il tonne (tonn)	it thunders
il tombe de la pluie	it is raining

It is to be noticed, however, that although theoretically all these verbs have the usual NINE TENSES, in practice only two tenses are commonly found—the PRESENT and the IMPERFECT. Look at their IMPERFECTS:

il éclairait	it was lightening
il dégelait	it was thawing
il gelait	it was freezing
il grêlait	it was hailing
il neigeait	it was snowing
il tonnait	it was thundering
il tombait de la pluie	it was raining

Other 1st Conjugation verbs which are not WEATHER verbs are:

il arrive	it happens
il importe	it is important
il y va de	it is a question of

Verbs of other Conjugations are also used IMPERSONALLY. Such as:

il s'agit de	it is a question of
il faut	it is necessary
il pleut	it is raining
il paraît	it appears

Another group of IMPERSONAL VERBS are those which employ the 3rd Person Singular of FAIRE (to make, to do.) Again, these refer to the WEATHER.

il fait beau	it is fine
il fait du brouillard	it is foggy
il fait chaud	it is warm
il fait doux	it is mild
il fait jour	it is daylight
il fait nuit	it is dark
il fait du soleil	it is sunny
il fait de la neige	it is snowing

(These expressions in the IMPERFECT are: il faisait beau, chaud, nuit, etc.) These eight sentences might be used in answer to the question QUEL TEMPS FAIT-IL? (What is the weather like?) With FAIRE, several, if not all the NINE TENSES might be used, so I ought to give you the 3rd Person Singular of this verb throughout.

IL fait, faisait, fit—a fait, avait fait, aura fait, aurait fait—fera, ferait.

You will see from this that the TWO PARTICIPLES of FAIRE are FAISANT, FAIT. We use verbs IMPERSONALLY

(Please turn to page 583.)



FROM OUR READERS

# ARE SHORT WAVES REFLECTED OR REFRACTED ?

The Editor, POPULAR WIRELESS.

Dear Sir,—It often happens, in the attempts to explain the reception of stations at considerable distances, that the words "reflect" and "refract" are used quite loosely. This is very undesirable at the present time, when scientific pursuits need, among other things, a definite language.

The word "reflect" pre-supposes a reflecting surface, whether uniform or broken, to which the laws of reflection (such as the angle of the incident ray to the normal is the same as that of the reflected ray) may be fully applied. Is it possible to imagine seriously that in the ionosphere there is such a surface? On the other hand, from quite ordinary knowledge of our atmosphere, is it not obvious that in a medium so changeable it must be that transition from one state of pressure to another, from one degree of ionisation to a greater or less degree—in short, from one condition to another must be gradual!

I think the word "refract" is not much used because of the physical experiments of our schooldays, when we learned how light (i.e. ether waves) is bent on passing from one medium to another more or less dense (who does not remember the stick half immersed in water?). But surely in an age of widespread scientific education, it is only going a little further to realise that changing conditions of a medium, such as the atmosphere, may be gradual, and that therefore refraction must also be gradual so that ether waves may be bent round in any direction. If this is insisted on, the vagaries of long-distance reception become more understandable, since changing reception is the result of a changing degree of refraction brought about by changing atmospheric conditions.

Wishing your journal every success,  
Yours faithfully,

E. FISHER.

33, Freeth Street, Oldbury, nr. Birmingham.

### USING A VIBRATOR CIRCUIT

The Editor, "Popular Wireless."

Dear Sir,—Many thanks for your reply to my inquiry in "P.W." Curiously, I received from Bulgin's their monthly bulletin, which has a vibrator circuit printed therein. It arrived soon after sending to you. I have assembled my parts, having got an H.T. transformer from Messrs Bulgin, but sad to say it is a 6-v. centre-tapped trans. However, I have fitted it to work on half wave and get surprisingly good results on about 90 volts, which feed a Class B three, no screened-grid stage.

I have tried it on an S.G.3 with equally good results. The set is used on the average 10 hours a day owing to an invalid mother. Well, using a 40 A.H. accumulator, it lasts a fortnight. Pretty good, 3d. a week, isn't it? I have been working it for a month now.

The parts used are a reed made from a clock spring with magnet points attached. The coil for energising is an old electric bell bobbin re-wound with thicker wire. I use an old eliminator choke for smoothing, together with two 8-mfd. electrolytic condensers. I enclose a diagram of the circuit. Thanking you for all

*A reader puts forward some interesting arguments in favour of the term "refracted" in connection with short-wave propagation*

your trouble and for telling me where to get a 2-v. transformer. I might add my unit cost me 15s. 6d. in hard cash, but being a bit of a set repairer in my spare time, I have plenty of old parts—some good, some bad.

Yours truly,

R. STOVELL.

Merrow, Guildford.  
P.S.—There is no trace of hum or crackle from the loudspeaker.

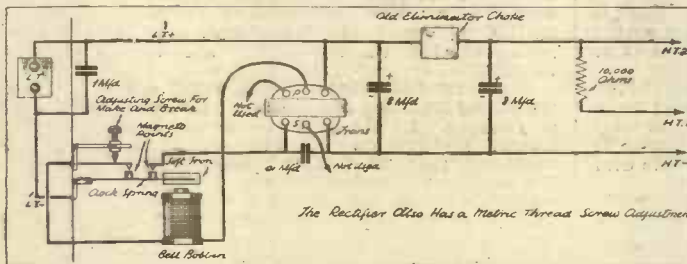
### A SUMMING-UP

The Editor, POPULAR WIRELESS.

Dear Sir,—I read with interest the letters of Mr. Hardman and Mr. Ladner on S.W., but I think both are a little misleading. In my view, Mr. Hardman gives far less credit than meets the case, while Mr. Ladner is just a little too enthusiastic.

Although I cannot agree with all that is

### H.T. FROM AN ACCUMULATOR



The half-wave circuit used by Mr. R. Stovell and described in his letter.

said against S.W., I will admit they are far from being ideal for family entertainment. Mr. Hardman pictures for us an English gentleman twiddling knobs in the small hours and getting nothing but howls and screeches.

Now it is hardly possible for even a poor operator to go round the dial without hearing a few Europeans and (almost any night) Americans at good strength.

Mr. Hardman also thinks listeners are being "bitten" by many of the all-wave sets now on the market.

As these sets do not cost a great deal more than the usual broadcast set, they are probably worth the little extra cost, when we consider that S.W.'s are just "growing up." Then, again, nobody need be misled by manufacturers' enthusiastic reports, as dealers will always be pleased to demonstrate, and what a set can do in their hands can be repeated by anyone with a little practice and, of course, equally favourable weather conditions.

No, Mr. Hardman, S.W. has more entertainment value than you would have us believe, while not so real, as Mr. Ladner says in his letter.

We must all agree that the broadcast set took time to "grow," so must S.W. "grow."

I do not consider there is anything to be surprised about that so many listeners do not think S.W. real entertainment.

The stuff that millions of these people have known as radio is something far different from the shaky, unreliable stuff we know as S.W.

The ordinary listener, which I would call the chap who is after real entertainment, is not concerned about the difficulties which have to be faced in trying to give us a compact, all-wave set, working really well on all bands and employing only three or four knobs and switches.

Now that more and more people are having a taste of S.W., perhaps manufacturers will be pushed on, and the ideal all-wave set will be with us sooner than we expect.

Yours faithfully,

R. MACGREGOR,

12, Glamis Road, Forfar, Scotland.

### GOOD OLD B.B.C. !

The Editor, "Popular Wireless."  
Dear Sir,—K. D. Rogers' "What do listeners like best?" interested me very much. The question is a nasty one. Mr. Silney has a difficult and unenviable task before him. I wonder if it is really possible to satisfy the cravings of all the millions of listeners in these well-known islands?

I don't suppose it is, not even if the B.B.C. were better off financially.

I wonder when more money will be available for the betterment of the programmes?

Looking into the future a little way, I can see costly television stations being erected (loud applause), and television sets being manufactured by mass production methods (still louder applause). I expect the majority of listeners are eager to share the enjoyment and thrills television can provide, which is as it should be.

Television is a home entertainment. All this will mean more money, for progress, it seems, is expensive, and so it appears that the ordinary broadcast programmes will continue to be dry and dull. Speaking for myself, the programmes are quite interesting, I find there is something different all day long, and that there is no room for grouching whatever. The B.B.C. should receive praise, and lots of it, and not abuse, as some listeners seem to think.

Yours faithfully,

GEORGE STYLES.

90, Fife Street, Nuneaton, Warwickshire.

### KNOCK ! KNOCK !

The Editor, POPULAR WIRELESS.  
Dear Sir,—The following story is perfectly true, and we often have a good laugh about it.

Several years ago I erected a new 30-ft. aerial pole at the bottom end of our garden. Having dug a nice hole I managed to raise the rather heavy pole and dropped it in. I had just rammed the earth firmly around the base, when my young lady friend came on the scene of operations. After looking thoughtfully at the top of the pole for a few moments, she suddenly asked with a puzzled air: "How ever did you get up there to knock it down?"

Wishing the "P.W." continued success,

Yours truly,

J. CURWOOD.

"Richebourg," Firs Avenue, Felpham, Bognor Regis, Sussex.

### PROVING THE RULE

The Editor, "Popular Wireless."  
Dear Sir,—A very interesting thing happened the other day, which shows how very careful one must be when showing off one's knowledge of wireless. I was listening to one of the Zeesen stations on my S.W. set, and as the set was making strange crackling noises I removed the aerial from the socket on the set.

To my great surprise I could tune the same station in, a few degrees away from the former dial position, just as loud as with the aerial. In order to show my friend that I was not in the least surprised, I explained at great length that it showed how very important a part the earth

(Continued overleaf.)

# FROM OUR READERS—Continued

played; as, I said, it is really a direct link with the transmitter.

Having thus far impressed my friend, I said I would prove it by disconnecting the earth wire.

This I did, and to my dismay once more tuned-in Zeesen (the same one) with hardly any appreciable loss in signal strength! I now had no leg to stand on, and vowed I would keep my knowledge of wireless to myself in future.

Yours truly,

C. S. HEATH.

Dunstan, Tadworth, Surrey.

## OH YEAH!

The Editor, POPULAR WIRELESS.

Dear Sir,—You have asked for a funny story: how is this one? Close to my home is an aerodrome, on the borders of which are built council houses. A workmate of mine visited a friend of his in these houses, and returned with this yarn: "Where I went the other night, my friend had a mains set, but it picked up considerable interference from the workshop on the aerodrome. Through the speaker came the noise of an engine being started, wood being sawn, metal being sawn and filed, hammering, and a spanner being dropped—in fact, the interference was so bad that you could even hear coke being shovelled up and thrown into the stove-pot."

Yours sincerely,

WILLIAM CLEWS.

35, Alberta Street, Longton, Staffs.

## INVERTED VOLTS

The Editor, "Popular Wireless."

Dear Sir,—I see that W. L. S. was discussing the Screen-Grid Valve as detector recently in several circuits which are avowedly freak.

I enclose circuit which I have been using for some time in our ordinary house receiver. It has shown no shortcomings, while, owing I believe to the fact that the valve is being worked in the negative kink, the selectivity has to be tried to be believed.

I can make it work only with a Mullard P.M. 12A, although the manufacturers, when I wrote asking them whether my sole copy of this valve was a freak, assured me that it was possible to do the same with their other S.G.s. I have tried with three P.M.12s, but without success.

The components given are optimum values arrived at after a lot of experimenting, except the 3,000-ohm resistance on the screen. This happened to be the nearest to the usual 1,000 that I had by me.

Faithfully yours,  
WILLIAM B. WEST.  
"Trouville," Middle Deal Road, Deal, Kent.

## "I'LL SECOND THAT!"

The Editor, POPULAR WIRELESS.

Dear Sir,—May I support Mr. J. Rundle's plea for an A.C. mains 2 H.F. straight set with push-pull output, as outlined by him in the Jan. 16th issue of POPULAR WIRELESS? I would add, with A.V.C. designed to minimise the effects of fading rather than aiming at constant volume on all stations, and not too big an output, but it must be push-pull.

Yours faithfully,

PERCY J. FOSTER.

"Runnymede," Beally Avenue, Cardiff.

## FROM CRYSTAL TO S.T.800

The Editor, "Popular Wireless."

Dear Sir,—I like one thing in particular in "P.W.," and that's readers' letters on their radio experiences. Of course, my own are no exception, and I can remember many comical incidents since I started on wireless about three years ago. When I began I didn't know a thing about it, and it was only suggested to me

by a pal who played about in a shed with a crystal set, using an aerial of about fifty one-ft. lengths of different wire and a home-made earphone. Of course, he couldn't make it work, so I bought it for 1s. 6d.—complete with earphone.

However, I got it home and routed out an old wireless book, dated about 1926, and it was full of crystal sets, so I wound another coil, as it said, and wired it up to a copy, with ordinary cotton-covered wire and twisted joints everywhere. Then I got a real pair of earphones!—and a friend came across to see it.

He sat down with the 'phones on his head and scratched about with the cats-whisker for about an hour trying (as he kept saying) to get a "pop." The upshot was we discovered with a rush that we had no aerial or earth. So the friend promptly cleared off and left me to put up an aerial. I bought two insulators and wire, etc., and tied one end to the clothes post and the other end to the gutter, and on that same Sunday night the set struck up—and worked!

To have seen that set, with its coil round a cocoa tin, its crystal mounted on a match-box, and a variable condenser that wouldn't turn, I often wonder how it ever did work! But it did, and since that day I've never left wireless alone for a minute. After using his set for about a month a neighbour bought a new commercial set and gave me his old one—a three-valver—det. and 2 L.F., with two old transformers and very old valves.

Again, the friend appeared and sorted out the battery leads and lent me an old H.T. and accumulator. An old horn speaker was also caged. And then the great switch-on, and the excitement when the speaker squeaked forth! The next day I discovered that the set wouldn't work, and my pal told me that it was nothing unusual—it was only the accumulator conked out—and of course that wasn't the first time I was to experience that sudden fade-out!

After this all went lovely. I put the set in a cabinet, bought a good speaker, replaced the valves and transformers and eventually nearly had a new set that worked well for a good time. And so I went on making sets, until I built a complete radiogram to my own design, complete with set, gramo, dial and turntable lights, automatic stop, and complete fittings—and we've still got it. Then came short- and all-wave designs, and after dozens of successful

short-wavers from W. L. S., I've finished off with the S.T.800—the best set I can honestly say I've ever made. Now I think I must close by wishing you and "P.W." every success in wireless design.

Yours faithfully,

S. A. KNIGHT.

5, Bailey Road, Westcott, Nr. Dorking, Surrey.

## STILL GOING STRONG

The Editor, POPULAR WIRELESS.

Dear Sir,—Every week I read with interest the letters in "P.W." I am not well versed in the technical side of wireless, but just know sufficient to maintain my own little 2-valve set, about which the history might interest you.

As you probably know, Aldershot is a big military station. Well, about six years ago, my brother-in-law was in the sergeants' mess one night when it was announced that some adventurous person, having bought an up-to-date wireless set, was going to raffle his old set for 1s. per ticket.

Tickets went round, and to cut a long story short, my brother-in-law won it. He brought it round to my house. We got an aerial and batteries fixed up and two nights later sat marvelling at the squeaky music that came straining through the earphones. It was incredible, we all said, as the family listened one by one.

Then yet another wonder was added. A horn speaker was heard of for sale, and this, after a ridiculously high price being given for it, eventually found its way to the L.S. terminals

on our funny little box on the table, with two enormous and ugly-looking dials on the front and a bunch of spare coils lying beside it.

Then came the disaster. One night, having put the cat out 'because it was stamping its feet on the carpet, the entire family sat round the funny little box. Coils were put in, dials were set, and then the switch was pulled out. What did we hear? Nothing. Our wonderful apparatus had gone wrong. Or was it the station? But after

15 minutes had passed with still no results, we decided it was the set.

My brother-in-law was sent for, and he, who knew quite a bit about wireless, made several tests, then said that one of the valves had gone.

After much discussion we decided to strip and rebuild the set, as by this time we had had about eight months' wear out of it.

New valves, transformer, and condensers were added, together with a dual-range coil, and so once more the little box returned to its place on the table, this time giving more volume and better reception.

The next addition was a mains battery eliminator. This improved still more the tone and reception of the set.

And so time passed, our little set continuing to give us enjoyment until not so very long ago, when yet another disaster occurred.

One afternoon, when everyone was out, my father went in to find the living room was being gutted by a fire, the source of which was never known. The fire was, however, not so serious as it had at first seemed, and three or four firemen soon had it under control. But, alas, the cabinet of my set was scorched, the exterior wires were burnt, and I thought it was the end of the little set which gave me so much enjoyment, but after an examination, and to my relief, the inside was undamaged! And so, after replacing the cabinet and the exterior wires, music once more came up through the speaker.

And so the set went on. Then, having by this time got more acquainted with the wonders of wireless, I thought I would try my luck at converting it into a radiogram.

I got a friend who is a carpenter to build a cabinet, and in the meantime bought a gramophone motor and turntable and a B.T.H. pick-up. I also added a pentode valve and moving-coil loudspeaker. The cabinet was finished, a very nice piece of furniture with oak panels and doors, standing 3 ft. 6 ins. high. The set, speaker, and gramophone were installed, complete with mains fuses and interior light.

No longer stands that table in the corner with its assortment of batteries, etc., on it. But in its place stands an up-to-date "Radiogram 2" mains set giving very good reception of English and foreign stations. And I wouldn't swap my set for any of your modern sets, and anyone is welcome to hear it.

I remain, yours truly,

C. J. CADWELL.

Yd. Foreman's Qtrs., W.D.-hands Yard, Stanhope Lines, Aldershot, Hants.

## A GUINEA

is paid each week for the letter which, in the Editor's opinion, is the best one sent in by a reader (Mr. E. Fisher gets it this week), and there is no reason why you should not win one.

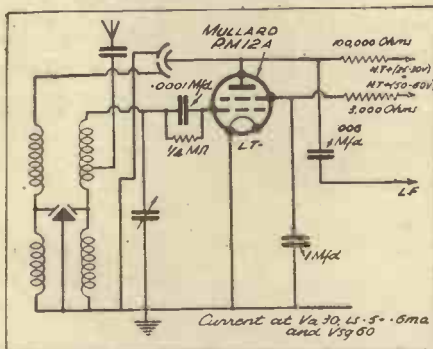
If you have had any interesting radio experiences—and who hasn't?—or if you have any opinions of general radio interest to ventilate, send them along to "P.W."

This page is open to readers every week, and from each batch of correspondence we select those letters which we consider to be of the greatest general interest to other readers.

So don't hold back! Remember you may get a guinea

## FOR YOUR LETTER

## A SELECTIVE CIRCUIT



The chief feature of this circuit, sent by Mr. William B. West, is that the screen-grid volts are higher than the anode volts.

# BE CHEERFUL— WITH HARRY DAVIDSON!

Well-known Director of the Commodore Grand Orchestra—  
famed for its Saturday lunch-hour broadcasts—who believes in  
"brightness in everything . . ."

By Fleurette Calver

"WELL," said Harry, having dismissed his tailor and various other people, "what can I do for you?"

"Tell me all about yourself, and your orchestra," I replied, and gave him a lead by asking him if he was a naval man, as his signature tune rather implied.

"Oh, no!" he laughed. "*Sons of the Sea* was inspired partly by the fact that our orchestra, as you know, is called the Commodore Grand Orchestra, and partly from the name of the A.B.C. theatre firm. I believe in brightness in everything, and when making up my programmes I always choose the most cheerful music—hence the rollicking signature tune."

"I suppose you have a great many request numbers?"

"Yes. Thousands, from all over the country. And we put hours of practice into the programmes. Choice of music is one of the greatest problems in broadcasting, as with so many listeners to please the greatest care must be taken. But we try to stick to our policy of helping to cheer people up."

## Fine Pre-War Record

"I believe you were quite successful even before the War," I ventured.

Harry smiled (and what a smile!).

"I was a cinema pianist, and consequently had to know how to play every conceivable piece of music for the purpose of fitting the various scenes depicted. This could be done only by committing everything to memory. Then the organ crept into various cinemas—notably with the Davis Circuit. I started at their first cinema, the Pavilion, Highgate, and went to every other theatre they built, including the Marble Arch Pavilion, which was considered one of London's greatest cinemas. From there I was appointed Musical Director of the great Trade Show house, the Shaftesbury Pavilion, where I had one of the finest orchestras in the country.

"At the height of my success the Army claimed my services, and after the War Sir Oswald Stoll sent me to Newcastle to open the Tyne Theatre—afterwards named the Stoll Picture House, to conduct an orchestra of twenty-five musicians, the biggest orchestra at any cinema in the North. Wonderful stage setting and acts soon set the people talking, and consequently this House became the rendezvous of the North. I was in Newcastle four and a half years, then went to the Majestic, Leeds, as sub-conductor and solo organist. I was also in charge of the dance band in the restaurant, which went "on the air" every evening from five to six through the

Leeds station. I was there seven and a half years.

"And then——" I queried.

"I was appointed to the Commodore Theatre, Hammersmith, as solo organist, and started making gramophone records, which have been broadcast and sold all over the world. Soon after this, I was given the chance of directing the Commodore Grand Orchestra, which is famous for having broadcast for over six years every Saturday between 1 and 2 p.m. besides doing on an average two other broadcasts during the week. Of course, on 'high-days and holidays' the Commodore Grand Orchestra is almost a 'cert' on radio programmes."

So now you know. If you feel blue, think of the *Sons of the Sea*, and if it happens to be a Saturday morning—well, tune in.

## RUNNING EXTENSION LEADS

A simple method of overcoming what  
at first sight seems a ticklish job

**L**OUDSPEAKER extension leads can be run along picture rails or around the skirting of a room quite neatly by the most inexperienced of amateur electricians, but a nasty little problem has to be faced when it is a question of carrying the leads out of one room into another. True, they can be run round the door jamb or under the door, as most doors fit so beautifully that plenty of space for this is available!

But it is at such a point that the wires almost invariably become visible and spoil an otherwise nice little job. The alternative of drilling a hole right through a wall is not to be faced lightly, but it is remarkable what can be done underneath flooring.

### Not a Difficult Task

One only has to watch a workman from the gas company or a professional electrician at work putting in new piping or wiring or inspecting systems already installed to gain an insight into the possibilities that lie beneath the boards. For the most part floor boards come up very easily. And in practically every room there are boards that come up with greater ease than others. These are the boards which the above professionals cunningly replace rather loosely in order to facilitate any of their further operations. And here



HARRY DAVIDSON

let us add is the secret of the creaking board which haunts most of our domiciles!

It may sound a big job to many people, but it is really quite easy. The carpet or linoleum can be rolled back and, with the assistance of a large chisel, a board can be prised up. In some cases it will be found that the dividing wall between rooms extends unbroken right across the rooms under the boards and even under doorways, but in none of the houses where we have explored these regions have we failed to find a convenient hole. But one must keep well away from all gaspipes and electric wires or the authorities concerned will be distinctly peeved.

It is surprising how much space exists underneath the floors. With numbers of sticks tied together we have managed to pass wires under a whole intervening room, but we must admit that we had to negotiate some very awkward beams!

## A BLACK ENAMEL FOR METALWORK

**T**HE many varieties of quick-drying black enamels which are sold in bottles or tins are not usually inexpensive commodities, and for some trifling local enamelling of a loudspeaker horn, a transformer case, or some similar component which has acquired a somewhat shabby appearance, the expense incurred in purchasing an entire tin or bottle of enamel is quite out of proportion with its usefulness.

Many constructional amateurs, however, have by them a quantity of ordinary clear varnish, and, in such instances, a black enamel suitable for the above-mentioned uses can very easily be made.

Dissolve two parts, by weight, of finely-powdered lamp black in twenty parts, by weight, of the clear varnish, and stir the mixture very thoroughly.

This composition will make an excellent black varnish. It is slow drying, but it possesses a good "body" and, next to a stove enamel, it is very resistant to rough handling. Moreover, the black varnish can be made up in very small quantities at a time, thus eliminating any possible waste.

## HAVE YOU TRIED A GLASS PANEL?

*You have probably seen glass panels on Exhibition receivers and admired the smart effect achieved. If you take a pride in your workmanship—and doesn't every constructor?—why not try one yourself? It's not a difficult job, as you will see.*

THE use of glass as a panel is generally avoided by constructors on account of the supposed difficulty in handling it. It must be admitted, in fact, that the listener who likes to experiment with his set, and who contemplates adding to or altering any of the panel components, would be well advised to stick to ebonite. But the constructor who intends his set to be both permanent and ornamental, and who is prepared to take a little more care than usual, will find that glass offers many advantages over the more orthodox panel. Glass, incidentally, is an excellent insulator.

### Like Framing a Picture

To obtain the best results, more than usual care must be taken in preparing the panel, and it may be necessary to modify to some degree the layout of your set.

Suppose, for example, you have a cabinet, with front inside measurements 12 in. by 10 in. You will require some picture beading of the type shown in the sketch. The dimensions of the glass will depend upon the width of this beading. With the beading shown, of course, the glass should be 10½ in. by 8½ in.

Briefly, in fact, we proceed merely as in framing a picture, the outside frame measurements to be 12 in. by 10 in., with the glass taking the place of the picture. The beading cut to length, the corners should be mitred with extreme care. Every care should be taken to ensure that the frame is a perfect fit into the cabinet. The frame made, we can turn our attention to drilling the glass.

### Method of Drilling

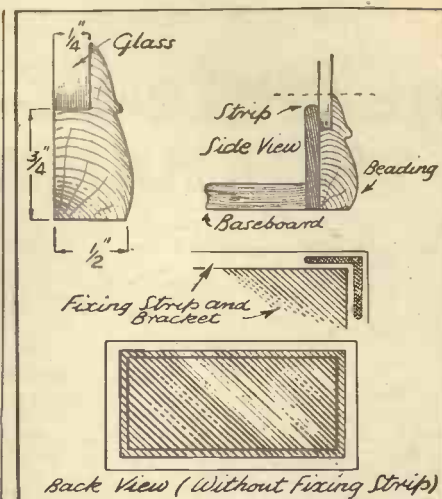
In order to lighten this part of the task, it is best to bring all terminals to an ebonite strip at the rear. This done, the average owner will find that he has only three, or perhaps four, holes to drill, each perhaps ⅜ in. in diameter. Place the glass on a perfectly flat surface, to obviate all risks of breaking or scratching it. A geared drill is preferable, as the drilling must be done slowly.

The question of drills is of paramount importance. Ordinary drills are useless. Specially prepared drills can sometimes be obtained, but personally I prefer three-cornered files, ground smooth and pointed. Drill slowly, bearing gently but firmly. For large holes it is best to drill an ¼-in. guide hole, as it proves quicker in the end. A compound of camphor and turpentine applied to the point of the drill will help matters considerably, while ordinary oil is better than nothing. The drills should be sharpened frequently with a small file. When half-way through, turn the glass and recommence on the opposite side.

### Final Fixing

The glass drilled, it can be placed in the frame and fastening strips screwed on. It is not essential to mitre these, but the top of the strip should not protrude above the level of the beading on the other side of the glass. Small brackets may be fixed on the corners, as shown. All fixing strips and brackets should, of course, be screwed from the inside.

The panel should now be ready for fixing to the baseboard. The constructor can judge for himself the number and size of the screws, but it is generally wise to add angle



How the beading and fixing strips are arranged.

brackets, whatever the size of the panel.

When fixing your components to the panel it is advisable to place a thin leather washer between the glass and the fixing nut. Do not screw up too tightly.

## WHEN THE BLUE LAMP GLOWS

*... It's Rehearsal Time at the B.B.C.*

JUST behind the main entrance hall at Broadcasting House, on one side of the artists' foyer, there stand three large notification boards, rather like the train indicators at London's main-line railway termini. Two of them show, at a glance, the traffic of the day, the hour-to-hour programmes on National, London Regional and Empire waveband, the studios in use, and so on; the type of indicator that even the stranger might visualise.

But few strangers would anticipate the third black board and its close-banked lines of data. It shows the rehearsals due for the day—rehearsals to begin at 9 or 9.15 a.m., and to go on, in quick, almost never-ending succession until, perhaps, two o'clock the following morning. Yet how many people think of rehearsals—drama rehearsals, talks rehearsals, music rehearsals, and many more—that precede the evening when, seated comfortably at home they, at the flick of a switch, hear only the finished production, with its first-night glitter and quick-flowing continuity.

Come, then, and see for yourself what happens at one of these "undress" shows. Way down in studio BA—twenty or thirty feet below street level—producer John Watt is compressing five hours' script into sixty minutes of broadcast time. In one grey-carpeted studio, with soft lights, a girl with fair hair is softly singing a love-song in the "ribbon" microphone which hangs between her and the window of the silence room. High on two of the walls are a line of lamps—one blue, one red, one yellow. The blue is the only one alight. Blue for rehearsals.

Mr. John Weaver, standing on a section of floor raised like a stage, is following his score, directing his orchestra and watching

the singing girl at the same time; now and then you see him glance towards the eye-like window of the silence room. You might imagine that he was asking without words: "Could that have been a flat one!" If it was, or if anything else needed "re-touching," the voice of producer John Watt would crash through a loudspeaker in the studio: "Stop, stop, stop!" Not an imperious command, though it achieves the result of one—but a kind of whimsical "Whoah!" And doors fly open as he sweeps from silence room to studio to explain a point of two. Always in good humour, with a good-natured jest now and then to keep everyone in an 8.30 p.m. frame of mind at 11 a.m. That may sound easy, but—Then, back to the silence room. The turn begins again and John Watt listens—with a stop-watch in his hand—rather like a timekeeper in what seems a hopeless race against time.

### Microphone Balance

Inside the actual studio a group of young men, some in evening dress, others in flannels, and girls in trim costumes, lounge in easy chairs, a critical eye on whoever happens to be singing, joking or laughing into the microphone. The band, which has a "mike" to itself, seems, to the untrained ear, to swamp the voice of the singer. Yet, in the silence room, whence the balanced blend of voice and band is fed by special circuits, the effect at rehearsals is virtually that which the listener hears.

There may be five, six or more rehearsals before a radio show—the final one only a few hours before the announcer introduces it to you; the climax of weeks of hard work. Each show, too, has its own problems, are finally overcome.

## LEARNING FRENCH THROUGH YOUR RADIO

(Continued from page 578.)

very frequently in English too. As, for instance:

There remains only one thing for me to do.

There happened a terrible accident in front of my house this morning.

Similarly in French:

Il ne me reste qu'une chose à faire.

Il arriva ce matin devant mon domicile un accident terrible.

Lastly, here are a number of words and phrases which I wrote down as I listened to a **FILM TALK—LES FILMS DU MOIS—The Films of the Month.**

Un film dramatique—a photo-play, drama

muét—a silent film

parlé—a talkie

sonore—a synchronised sound-film

de reportage—a topical film, news film

d'actualité—a topical film, news film

à épisodes—a serial film

Le grand film français—the great French film

M.D. dans son rôle de H.—M.D. in the part of H.

Le grand metteur en scène français—the great French producer

Un vraiment très bon film—a really good film

Une série de films joyeux—a series of laughable films

Un excellent film d'aventures—an excellent adventure film

Un film d'espionnage—a spy-picture

Un des chefs-d'œuvre de Marlène Dietrich—one of Marlene Dietrich's masterpieces

Un excellent drame d'aventures—an excellent drama of adventure

Qui jusqu'au bout tient le spectateur en suspens—

which holds the audience in suspense right to the end

Cet excellent acteur Peter Lorre—that excellent actor Peter Lorre

Il tient le rôle du vampire dans le film "Le Maudit"—

he plays the part of the blood-sucker in the film "Le Maudit"

"Le Maudit"

# DON'T MISS NEXT WEEK'S "POPULAR WIRELESS"

It will contain full details of

## JOHN SCOTT-TAGGART'S CORONATION SET THE SUPER CENTURION

AND

### A 1'- FULL SIZE BLUEPRINT FREE

NEXT WEDNESDAY

Price 3d. as usual

On vient de mettre à l'écran la célèbre pièce burlesque de Molière—they have just filmed the famous burlesque play of M.

Le dialogue—the dialogue

La comédie—the comedy

Les interprètes—the performers, cast

Sur la scène—on the stage

Sur l'écran—on the screen

La mise en scène—the staging, production

Le théâtre classique est inutilisable pour le cinéma—the Classic Theatre can't be used for the screen

Le faux et l'artificiel sautent aux yeux—the false and the artificial catch the eye

Deux films excellents—two excellent films

Le scénario très amusant—the very amusing scenario

Ne manquez pas ces deux films—don't miss these two films

Un film de Jeunes pour les Grands—a film about young people for adults

Permanent de midi à minuit—continuous performance from midday to midnight

Le dernier triomphe de G.A.—the latest triumph of G.A.

Le film du moment—the film of the moment

Un film qui coupe la respiration—a film that takes your breath away

Cette belle artiste Jessie M.—that beautiful artiste Jessie M.

Le plus grand succès de l'écran—the greatest screen-success

Le film le plus drôle qui soit—the funniest film imaginable

Un film qui plaira à tous—a film that will please everybody

Films parlant anglais—English talkies

Sous-titres français—French sub-titles

Ce film passe au Cinéma des Champs-Élysées—

this film is being shown at the Cinema of the Champs-Élysées

Mickey, dessins animés en couleurs—Mickey, motion-picture cartoons in colour

Elle a pour interprètes principaux—its principal artistes are

La mise en scène fastueuse—sumptuous production

La musique entraînante—lively music

Les jolies girls—pretty girls

Les scènes délicieuses—delightful scenery.

Dont l'interprétation réunit les noms de . . . —the cast of which contains the names of . . .

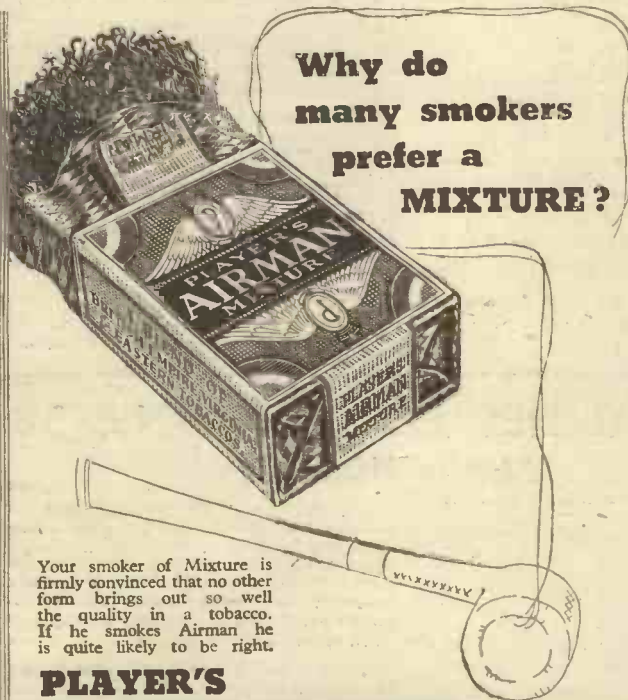
Un film policier qui ne ressemble à aucun autre—a

police-film which resembles no other

"Trafic d'Armes" qui continue sa carrière au

Cinéma Balzac—"Traffic in Arms" which continues its run at the Balzac (Cinema)

Une vedette de l'écran—a film-star



Why do many smokers prefer a MIXTURE?

Your smoker of Mixture is firmly convinced that no other form brings out so well the quality in a tobacco. If he smokes Airmen he is quite likely to be right.

# PLAYER'S AIRMAN MIXTURE

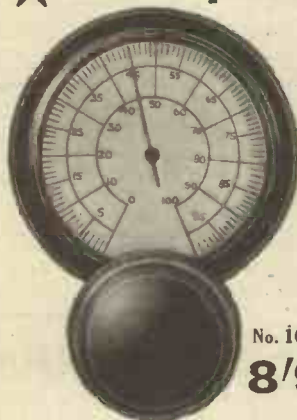
ALSO OBTAINABLE IN FLAKE OR NAVY CUT

10<sup>d</sup> PER OZ

NAVY CUT DE LUXE 10<sup>d</sup>

P.A. 51C

## ★ Incorporates the Best in DIAL DESIGN for MODERN Short Wave TUNING!



No. 1070

8/9

The movement can be mounted from panel or baseboard.

The dial is noiseless in operation even on the highest frequencies.

The open vision scale is clearly readable and divided in a new attractive manner into 100 divisions so that the indicating pointer has ample space for accurate settings.

The readings are arranged to increase as the frequency increases, which is in keeping with modern practice.

The movement is superbly smooth in action, without backlash on both the 20-1 and the 100-1 speeds.

The dial face fits on the front of the panel so that no large panel gap has to be cut unless it is desired to illuminate the scale from the back.

The dial can be used on panels up to 1/4" thick and takes the standard 3/8" spindle.

The escutcheon has a simple dignified appearance and is beautifully finished in oxidised silver relief.

## EDDYSTONE FULL VISION DUAL SPEED DIAL

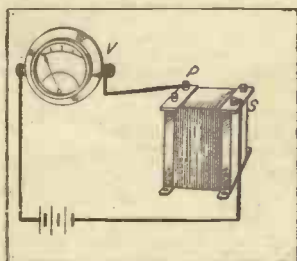
Sole Manufacturers: STRATTON & CO., LTD., Eddystone Works, Birmingham

London Service Depot: Webb's Radio, 14, Soho Street, Oxford Street, W.1.

# INCREASED H.T. CONSUMPTION ACCOMPANIED BY CRACKLING

S. C. (Croydon).—*I have had my set running satisfactorily for some years, but lately the anode current consumption of the detector valve has gone up to more than double and the signals have dropped. Also, there is an intermittent crackling noise, which I think is due to the transformer. As a matter of fact, I am pretty certain about this as I have changed the transformer and I get no crackles, and the anode current goes back to normal. What is likely to have happened to the transformer? How can I test it?*

It would seem that there is a leakage between primary and secondary or between primary and the core, or earth. The drop in signals may be due to the actual fault in that the secondary or primary windings may be faulty and be giving a reduced ratio or even poor connections, or the drop may be due to the fact that there is an H.T. leak and so the voltage on the valve is less than it should be. You



★ ★  
Fig. 1.—How the test between primary and secondary is carried out. (See reply to S. C., Croydon.)  
★ ★

have not apparently tested the voltage on the valve, though you have tested the current.

The first thing is to test the transformer windings for continuity. This is done with a small cell, say a part of a grid bias battery, and a voltmeter. Then test between the two windings to see if there is leakage between the two. You should not be able to get any voltage reading in the circuit shown in Fig. 1.

Then with the transformer connected as shown in Fig. 2 try another test. If you get a reading in the meter you may be pretty sure that there is a serious leak between the primary and the core. Raise the voltage to quite a high value before you pass this test as conclusive. Use an H.T. battery and an H.T. voltmeter. If no reading is shown try a lower voltage meter or even a milliammeter, for with no reading on the H.T. voltmeter it should be safe enough to try the milliammeter in circuit.

While you are at it you might as well try the same test but connect the battery to the secondary winding instead of the primary, and also try it connected to each end of the windings (primary and secondary) in turn.

I think you will find that there is a definite fault in your transformer and that in all probability the second test will show a reading in the meter. If it does there is nothing you can do about the transformer except send it back to the makers and get it repaired or changed.

### THANK YOU

F. W. Reading (Water Orton) writes to ask me to thank all those readers of "P.W." who were good enough to send him answers to his SOS for S.T.700 blue prints. He had over 400 letters and cards. Those who sent blue prints which will not be required will be getting them back in rotation. And on behalf of "P.W.," too, please accept our thanks.

But with the thanks letter comes another in less pleasant vein. Here it is. A reader asked for details of the "Cosmic" Three. The writer of the letter sent a card to the address given. He received a letter asking for the blue print and also any spare parts that he might have. Note that, please, "P.W." is not a spare parts agency.

No suggestion of paying for the parts was made, and though the blue print and cuttings of "P.W." concerning the set were sent, no reply in the way of acknowledgment or thanks has been received. The writer of the complaint ends up with this: "I am afraid it has made me a bit unconcerned now about SOS's, for I have not offered again, although I have

seen in 'P.W.' several times where I could have obliged."

Now then, you readers. Please have the decency to answer these senders of blue prints, especially after you have had the goods "delivered." I am afraid that the next letter of this sort that I receive will cause me to close these columns to SOS messages.

### THE PENTODE SCREECH

L. H. D. (Newmarket).—*Why does the pentode over-emphasise the high notes?*

The main trouble is that the pentode is a high impedance valve when compared with the ordinary output triode. It therefore has to have a high impedance output coupling arrangement so that the valve shall be properly matched. That means unfortunately that all too often the high notes in the pentode are better amplified than are the low notes. Obviously the high impedance output will offer a greater impedance to the higher audio frequencies than it will to the lower frequencies, and so we get the high notes very well reproduced while the low notes are not so well reproduced.

That is why—apart from the fact that the pentode is prone to develop third harmonics—we have to use a tone-corrector if we are using a speaker that is good on the high notes and also are using a pentode.

The tone-corrector merely by-passes the high notes, the by-pass effect increasing as the frequency of the notes increases.

A condenser placed across the output of the pentode will have the effect we require—of offering less impedance to the high notes as the frequency goes up—but it has in itself the undesirable effect of tending to tune the output circuit and to produce an impedance peak which might be very unpleasant.

So we place in series with the condenser a resistance which damps out the tuning effect and allows us to obtain the gradual decrease of impedance with increase of frequency which nullifies the increase of impedance with frequency which is provided by the high impedance output choke.

A plain resistance could be used instead of the condenser to reduce the high notes, but this would have the undesirable property of by-passing the low notes as well, and this is certainly not what we require.

You may ask why we cannot use an output coupling device of lower impedance and so avoid the high note exaggeration. This is impossible, because it would offer a load to the valve which would not enable us to get the maximum power out of it, the power being determined by the ratio between the impedance of the valve and the impedance of the load placed across it, or, in other words, the load in its anode circuit. Reduce this load, and all sorts of nasty things occur, the aural effect being not only loss of power but distortion.

### WHY NOT?

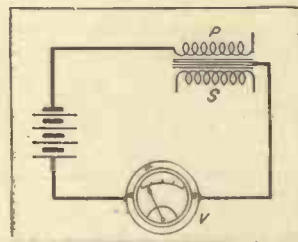
B. N. C. (Plumstead).—*Why is the autodyne arrangement of the short-wave superhel oscillator supposed to be inferior to the separate valve scheme?*

For the simple reason that in order to get the heterodyne effect it is necessary for the autodyne valve to oscillate at a frequency which is somewhat away from that of the received signal, and that frequency can only be obtained by detuning the valve away from the frequency of the received signal.

That means that the valve cannot possibly be as good a detector as it should be.

### MORE COPIES, PLEASE

A. H. Simmons, Holmwood, 8, Salisbury Avenue, St. Albans, Herts, wants a copy of "The Wireless Constructor" for March, 1934. Any offers? J. Parker, 348, Evesham Road, Astwood Bank, Redditch, Worcester, is after a diagram of the "Simplex" Two. This appeared in "P.W.," July 6th, 1935, which is now out of print. Can any reader help?



★ ★  
Fig. 2.—Checking a transformer for leakage between primary and core.  
★ ★

### PORTABLE ELECTRIC GRAMOPHONE

N. B. (Reading).—*Can I build a portable electric gramophone for a small puppet theatre? Have you any back numbers of "P.W." showing how to build one?*

I am afraid I have no such back numbers, though we did a small power portable gramophone some time ago. For a large room—such as indicated—you will want about 5 watts output. This can easily be obtained from a push-pull circuit, using universal valves.

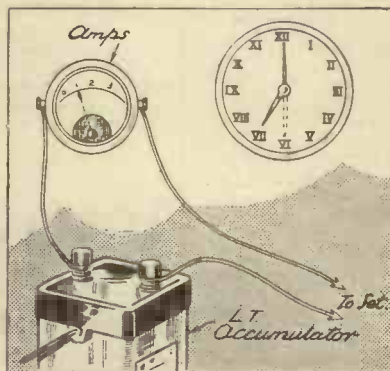
I should use a perfectly straight circuit with a screen pentode for input and a couple of large pentodes for the output.

I take it that you are going to use a speaker that is not incorporated in the actual amplifier and turntable unit. As regards the speaker, that should be placed so that the field winding is used as one of the main smoothing chokes, being the one that is situated farthest away from the rectifier. In other words, you have the rectifier, then a smoothing choke and condenser, and then the field winding of the speaker with another condenser.

The valves I suggest are the Cosor, 13V.P.A., two 40P.P.A. output valves and a 40 S.U.A. rectifier. This combination will give you about 5 watts output.

## TECHNICALITIES EXPLAINED—No. 38

### Ampere Hour



This is a term which often upsets beginners in radio and electricity. It is a combination of the amount or rate of flow of an electric current with the unit of time. Thus we have a current of one ampere flowing in a circuit. If that ampere flows for one hour we say that the unit of one ampere hour has been used.

This type of unit is employed in calculating the capacity of an accumulator. Thus we say that a battery has a capacity of 20 ampere hours. What we mean is that it contains enough electricity to provide one ampere for twenty hours, or two amperes for ten hours, and so on.

The ampere hour is a measurement obtained by the simple multiplication of amperes and time.

## 1936 BROADCASTING REVIEWED

### The work of the Midland Region

ON the technical side the principal developments during the year were the introduction of ribbon microphones throughout the Birmingham station, and improvements in the gramophone and gramophone effects departments.

A Midland Music Advisory Committee was formed with Dr. Percy Hull, of Hereford Cathedral, as its chairman.

Bela Bartok played his own works with the B.B.C. Midland Orchestra. Guest conductors of this orchestra have included Rutland Boughton. Purcell's "Dido and Aeneas" was given in the studio, and also two short operas—Mozart's "Bastien and Bastienne" and W. H. Bell's "Hatsuyuki."

An interesting new series—"Question Time"—was begun in the autumn. Listeners' queries about orchestral matters were answered by Leslie Heward, who used the B.B.C. Midland Orchestra to illustrate his replies.

For the first time the Shakespeare Memorial Theatre Company visited a Birmingham studio.

Plays with a Midland interest included "The Furnace," by Francis Brett Young and William Armstrong; "Mr. Man," a story of a doctor's life, by a Birmingham medical student; and Masefield's "The Tragedy of Nan," given by a company drawn from the Cotswolds. "The Nailers," a Black Country dialect play by H. W. Small, a Wolverhampton journalist, dealing with events in Black Country industrial history and acted by players from that area, was revived for Midland listeners and also broadcast in the National programme.

### Outside Variety Broadcasts

For the first time a Midland studio performance of a West End success—"The Boy"—was broadcast, with two West End stars in the principal parts. Three burlesques with music—two by the Melluish Brothers and one by Moore Raymond—were notable; and there was a musical comedy about football by two Birmingham journalists.

Theatres from which Variety was taken included Coventry Hippodrome, Aston Hippodrome, Leicester Opera House, Nottingham Empire, Cheltenham Opera House, Worcester Theatre Royal, Bedford Royal County Theatre, Peterborough Empire, Northampton New Theatre, Oxford New Theatre, Derby Grand Theatre, Hanley Theatre Royal.

As the Working Men's Club movement is very strong, examples of variety entertainment were heard from clubs in Birmingham, Leicester and Derby.

Greatly increased use was made of the B.B.C. mobile recording unit. It was used, for instance, for "Music of the Hours," a series of mechanical chime-tunes in the Midlands; for a mass-production programme from a motor-car works; for Leighton point-to-point meeting; and for a Children's Hour programme from Castle Bromwich aerodrome on "How an aeroplane flies."

The Shropshire town of Market Drayton was the subject of a special programme in the "Microphone at Large" series. There were feature programmes about Malvern on the eve of the Drama Festival there; and about Hereford on the eve of the Three Choirs Festival. Mass production of motor cars was represented in a programme recorded at a Midland motor works. Midland and North collaborated in a programme called "Legends of the Peak" given from Bakewell; and to the National programme Midland contributed a programme about three Nottinghamshire villages entitled "Manor to Mine."

An interesting development was the use of outside broadcasts for the Children's Hour. There were three of these—one from Birmingham General Post Office, one from Birmingham Mint, and one from the Warwickshire County Cricket Ground. In August Miss Ruth Field was succeeded by Miss Enid Maxwell as Children's Hour Organiser.

"Midland Parliament" continued to meet monthly, except in the summer, to discuss industrial topics. Notable guest speakers included Miss Margaret Bondfield, Miss Ellen Wilkinson, and Mr. Austin Hopkinson, M.P.

Frank Foster, Sydney Barnes, R. E. S. Wyatt, Larry Gains, Jack Hood, and Mercedes Gleitze were among the prominent sporting folk brought to the microphone for interview. A series giving the story of all the Midland football clubs in the first three divisions of the League was begun in the autumn. Speakers usually included the chairman of the club and a notable player.

(To be continued.)

## RADIO IN THE FAR NORTH

(Continued from page 576.)

upwards in steps of 0.1 mc./s. About 600 such records were made by the expedition in the course of the eleven months during which the apparatus was working. Many new and interesting data have been obtained.

Wireless has indeed broken the isolation of the lonely places of the earth. A telegram sent from the base, via Bear Island, with the first weather report at 7.30 a.m., was delivered the same afternoon in England; the voice of the B.B.C. announcer, or the strains of Henry Hall, can be heard as clearly in the Arctic as they can be by the fireside at home. None the less, it was a great thrill to the members of the expedition to hear the wishes of good cheer sent out to them on Christmas Day, and perhaps even more exciting to hear the announcer read out, on Boxing Day, the message of thanks that they had sent to the B.B.C. and all good friends at home: "Thank you for your messages, perfectly received and greatly appreciated. We wish all a Happy New Year."

### Help From Professional Operators

This narrative would not be complete without mention of the unfailing kindness and courtesy of the professional operators with whom the writer had to work. The operator at Bear Island, Lindberg by name, would always go out of his way to give the expedition every assistance. He spoke very good English, and since we were working to each other three times a day throughout the winter, we soon became firm friends. Many a happy hour have I spent "cycling," yarning with Lindberg about the state of the ice, or the chances of the Norwegian Olympic Skiing team, or any of the hundred and one things that interested us.

Up there, in North-East Land, perpetual night once more holds sway. The curtains of Aurora sweep across the sky, casting their feeble glimmer on the desolate expanses of rock and snow, and the base hut stands deserted. No slender aerials cut dark lines against the sky, no voice proclaims "This is the National Programme." For the expedition has returned to England and left the little white foxes, the bears, the reindeer and the seals the solitude which has been theirs from time immemorial.

# PETO-SCOTT S.T. 800 BATTERY VERSION

**KIT "A" YOURS FOR 7/-** down and 11 monthly payments of 8/4. Complete Kit of Components exactly as FIRST specified and used by Mr. John Scott-Taggart, with Konectakit (Gratis with Complete Kit) but less wandler plugs, accumulator connectors, valves, Extractor Kit, Cabinet and Speaker. Cash or C.O.D. Carriage Paid £3.10.0.

**KIT "B" YOURS FOR 9/-** Balance in 11 monthly payments of 8/10. As for Kit "A," but including set of 4 FIRST specified valves, only, less cabinet and speaker, etc. Cash or C.O.D. Carriage Paid £4.16/6.

**KIT "CT"** As for Kit "A," but with valves and Peto-Scott S.T.800 Table Cabinet only, less speaker, etc. Cash or C.O.D. Carriage Paid £5.14/0, or 10/6 down and 11 monthly payments of 10/6.

**KIT "CC"** As for Kit "A," but with valves and speaker baffle and battery shelf, less speaker, etc. Cash or C.O.D. Carriage Paid £6.11/6, or 12/3 down and 11 monthly payments of 12/-.

**KIT "CLL"** As for Kit "A," but with valves and "LL" only, with speaker baffle, less speaker, etc. Cash or C.O.D. Carriage Paid £6.14/0, or 12/3 down and 11 monthly payments of 12/3.

### S.T.800 EXTRACTOR

The S.T.800 Extractor is available either as a kit of parts or ready built up at the same price, £21/4/0. Cash or C.O.D., or add 2/3 to deposit, and each monthly payment. Please state which is required when ordering.

## S.T.800 BATTERY VERSION FINISHED INSTRUMENT



**CONSOLETYPE MODEL**  
Exact to specification. Complete with FIRST SPECIFIED valves. Peto-Scott Type 101 matched speaker and walnut console cabinet with Australian walnut veneered front and wings. Dimensions 20 in. wide, 24 in. high, 12 1/2 in. deep (illustrated on left), less batteries. Cash or C.O.D. Carriage Paid £9/2/0. Yours for 16/9. Balance in 11 monthly payments of 16/8.

**CABINET ONLY**, with speaker baffle, battery shelf, and extension spindle. Cash or C.O.D. 35/- Carr. & pkg. 2/6 extra.

## Peto-Scott BANDSPREAD SHORT-WAVE SUPER 3

COVERING 12-94 METRES

- Maximum volume and efficiency.
- Detector and 2 L.F. Circuit.
- Slow-Motion Reaction-Condenser.
- Dual Ratio Slow-Motion Dial.
- Matched and Tested Components.



A simple-to-build and highly efficient short-wave 3 that will give you hours of thrilling entertainment on the short-wave band. Simple but efficient circuit comprising Det. and 2 L.F. valves, ready drilled and enamelled chassis. Bandspread tuning simplifies station finding.

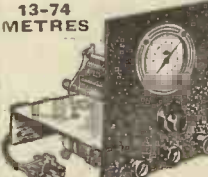
2/6 DOWN

**KIT "A."** Cash or C.O.D. Carriage Paid £2/5/0.

Or 2/6 down and 11 monthly payments of 4/3. Complete kit of parts including 3 coils, 12-94 metres, building instructions and wiring diagram, less valves, speaker and cabinet.

## NEW AND DIFFERENT! PETO-SCOTT 1937 SHORT-WAVE ADAPTOR-CONVERTER KIT

13-74 METRES



Convert your battery Carr. Paid for operation on short waves with this up-to-the-minute unit. No alterations to your set. Two hours to build—a lifetime of world-wide entertainment.

- No coil changing
- Drilled steel chassis.
- Drilled steel panel.

**KIT "A" 29/6** Carr. or C.O.D. Or 2/6 down and 10 monthly payments of 3/-. Comprises all parts for building, with diagram, assembly, and operating instructions, less cabinet.

2/6 DOWN

All Postal Orders should be crossed and made payable to Peto-Scott Co., Ltd. All currency should be registered.

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# SEEN ON THE AIR

News and Views on the Television Programmes by our special radio-screen correspondent

L. MARSLAND GANDER

THERE seems little doubt that the Television Advisory Committee, in camera, has already been discussing a choice between the two systems used at Alexandra Palace.

However, I hear that no step will be taken until after the Coronation, a period of six months from the opening of the £110,000 station. The Coronation is expected to give a stimulus to television, and the committee feel that any change at Alexandra Palace might create unfounded doubts in the public mind prejudicial to receiver sales.

Those who have followed television development from the beginning will think it curious that the committee, after itself recommending the Siamese twin experiment in a £110,000 station, should begin to reconsider the matter so soon.

## Advantages of Single Standard

I understand that the B.B.C. contends that there can be no extension of hours until a decision has been reached on this point. This does not apply, however, to "outside" broadcasts, which must be given when the occasion presents itself—such as the Coronation.

The B.B.C. and the Television Advisory Committee are at one in desiring that a single standard of definition for television should be adopted as soon as possible. This would be a great advantage to manufacturers, chiefly because it would shorten and simplify testing and manufacturing processes. I tried to induce a leading authority to say by how much this would cheapen sets. He declined to be drawn, and would not admit that sets would be cheapened by as much as 20 per cent.

Another point about a single standard is that it would increase public confidence in television. Nevertheless, I must point out that these advantages were apparent before the double standard was adopted.

Apparatus which the B.B.C. has ordered for "outside" television is considerably more elaborate than I have indicated. A fleet of three vans is being built. One will be a control-room on wheels, the second will carry an ultra-short-wave transmitter, and the third the necessary power plant.

Mr. Gerald Cock, the Television Director, said in a recent broadcast that when this new equipment was ready it would be a great day for television. Viewers may be present by proxy at film or theatre foyers on first nights and may see celebrities arrive in London. Mr. Cock obviously did not give his imagination rein, but viewers will agree that the possibilities of the wandering television camera are great.

## An Ideal Television Turn

The fact is that he does not know—nobody knows—what can and what cannot be done with the mobile ultra-short-wave link.

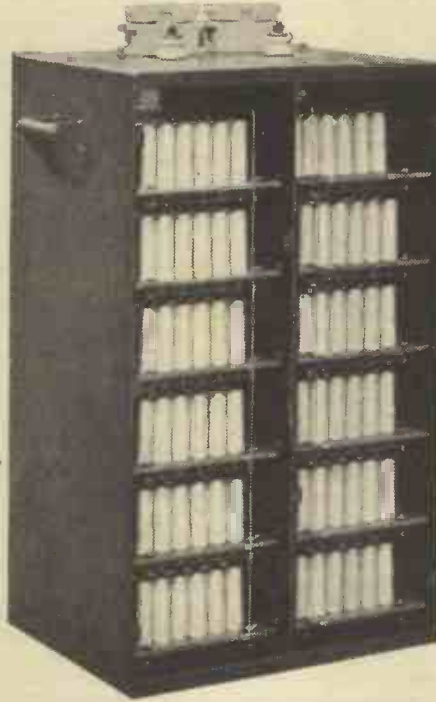
Mr. Cock chose a number of successful television artists whom, he said, they hoped to have in the studio again. He mentioned Gillie Potter, Yvonne Arnaud, Frances Day, George Robey, Billie Houston, Sophie Tucker, Russell Swann, Noni, Lou Holtz, Sherkot, the Western Brothers, Irene Prador, and Hermione Baddeley.

Among these the one who gave me the biggest laugh was Sherkot, because it was the first time I had seen his goal-keeping panto-

mime. With the co-operation of the orchestra this makes the ideal television turn.

I noticed that Mr. Cock in his broadcast was still taken up with the notion that television should be informative, but he has shifted his ground this much: instead of using the word "information" he talks about "general interest." Well, I concede the point because if he makes his information of "general interest" there can be no argument. He did not mention a point which to my mind has emerged clearly in these three months of television programmes. It is that cabaret is obviously and conspicuously the best kind of light entertainment for television.

## A GIANT CONDENSER BANK



A bank of the well-known T.C.C. Surge-Proof Wet Electrolytic Condensers mounted on removable racks and assembled into a steel tank. The total capacity of the unit amounts to 2,500 mfd. and is used for suppressing ripple on D.C. lines. This particular bank was made for use in an electric tramway station.

I welcome his decision to broadcast one-act plays and scenes from Shakespeare, but I do plead for original productions. There has, as far as I know, been only one original television play, and unfortunately I missed it.

Meaningless excerpts from stage plays I condemn. Dialect plays I detest, and for some reason are far more incomprehensible on the television screen than they are on the stage. Carefully sub-edited abridged versions giving an understandable, unutilized version of a good play are very successful on the television screen. I have in mind "Murder in the Cathedral," "The Tiger" and, more recently, "Alice Through the Looking-Glass." But in my view it is no use trying to compress a play by introducing great indigestible chunks of explanation. Television needs original plays.

"Opera and ballet," said Mr. Cock, "have not been too successful on the present small screen." In general I am inclined to agree. But have you forgotten "Façade," Mr. Cock?

I referred above to the television version of Nancy Price's "Alice Through the Looking-Glass." This was the outstanding success of the week. Ursula Hanray made an ideal Alice, mainly Victorian, inquisitive, bewildered, and sometimes indignant with the perverse looking-glass creatures.

## Experimenting With Mirrors

There was an experiment in technique with a revolving mirror which neatly converted Alice's looking-glass world into one of three dimensions. Incidentally, this suggested to the Alexandra Palace producers other "stunts" with mirrors to obtain "infinity" and other effects which may possibly figure in the programmes experimentally sooner or later. Producers might have been seen holding up mirrors to one another and making appropriate faces.

A month-old kitten born in the refreshment bar at the Palace made its first television appearance. Perhaps Humpty Dumpty, played by Esmé Percy, provided the best scene, though Tweedledum and Tweedledee (Ernest Butcher and Andrew Leigh) ran him pretty close.

"The White Coons," dressed in Co-Optimist costumes, made their first television appearance on the Saturday of this week, giving performances both in the afternoon and evening. Concert party shows have a big future in television.

This week I have been using a revised Baird receiver and have been greatly impressed with the brilliance and clarity of the picture. Improvement is particularly noticeable on the Marconi-E.M.I. transmission; the picture now spreads to the full extent of the 12 inches by 9½ inches on the screen, which is the largest on any set I have yet tested.

A number of improvements have been made in the controls. The receiver is permanently tuned to the sound; vision is tuned independently, but there is only a short turn on the condenser. There are still six main and eight subsidiary controls, but the operation of the subsidiary controls (if they need be touched at all) has been considerably simplified.

## RANDOM RADIO REFLECTIONS

(Continued from page 570.)

for he invented a something you must nearly all of you have heard about. It's brought him in a real packet, and the old gent has already got his money back, plus about ten thousand per cent. interest.

Me? On request, I sent in a bill for two hundred guineas, which I thought was reasonable enough in the circumstances. But he didn't pay it. Wrote me in on the company which was formed for a bunch of shares instead. I wasn't pleased at the time, but these shares have since brought me in a regular sum of just over four pounds per week, and it seems as if they will do so for the rest of my life, unless the sum increases, which, judging by the 1936 company report, seems likely. Not bad for one afternoon's work!

But, you see, that lad might have staged a fake demonstration to keep his backer quiet, the while he tried and tried to surmount the snag. Instead of which, he did the right thing: came to your Uncle Vic for advice and guidance. And everybody lived happily ever afterwards.



## TECHNICAL JOTTINGS

Some items of interest

By Dr. J. H. T. Roberts, F.Inst.P.

### Those Measuring Instruments

**M**OST wireless experimenters accumulate, during a period of years, a vast collection of junk comprising odd coils, condensers, transformers, tangled wire, and so on, euphemistically described as the junk box. In spite of its very varied assortment of odds and ends, it very seldom yields up what is required at any particular moment.

One thing which most experimenters seem to lack and which, of course, never turns up even in the best regulated junk boxes, is a measuring instrument, whether a milliammeter, voltmeter, ammeter, or what-not. It is difficult to see how any real experimenting can be done without some sort of measuring instrument.

### What Lord Kelvin Said

I think it was Lord Kelvin who laid it down that measurement was the basis of all scientific work. I have often noticed how many people try to carry on some sort of radio experimental work without any kind of measuring instrument, and I dare say that if you ask some of your friends whether they could lend you a milliammeter or a voltmeter, you would soon find that there was a great dearth of these instruments in the district.

### You Will Take a New Interest

It seems to me a pity that experimenters generally do not take more trouble to provide themselves with a few simple measuring instruments, because not only

will these improve the quality of their work, but also they will soon add very greatly to the interest which is to be derived from it. Working without instruments is like fumbling in the dark, whilst two or three simple instruments will prove a veritable torchlight.

### Try a Combination Instrument

In the old days instruments were apt to be rather expensive, but during the past few years a considerable range of instruments suitable for ordinary radio work have come on the market at prices which should be quite within the reach of the ordinary experimenter. Further than this, there are various "combined" instruments which will do everything you want, act as ammeter, milliammeter, voltmeter, etc., etc., and if you are doing much experimenting one of these combined instruments is a very good investment. There are many parts of the instrument which would have to be duplicated if separate instruments were used, and in this way, by making a combined instrument, a great saving is effected. If you are at all seriously inclined I advise you to provide yourself with such a combined measuring instrument and you will be surprised to find what a new interest your experimental work takes on when you can connect in an instrument and really see what is happening.

### Grid Bias and Hum

If the grid bias applied to an amplifying valve is not of the correct value, you may find that the grid will sometimes become positive and in consequence "hum" will be produced. If there is a conductor, carrying alternating current, very close to one of the conductors of the amplifier, especially if the latter conductor happens to be the grid lead, there will be great danger of hum being set up, owing to the capacity coupling between the grid and the lead which is carrying the alternating current.

### Balancing the Filament

Talking about A.C. hum, a point which is often overlooked relates to the centre-tapping of the filament winding for a triode valve with A.C. heating. As you probably know, the "centre" tapping is made to the "electrical" centre of the secondary of the heating transformer, so as to "balance" the filament. I should mention that the finding of this electrical centre is not a particularly easy matter, owing to the fact that there are only a few turns of wire on the output of the transformer, so that a very small shift in the tapping point will make a good deal of difference to its "electrical" position. The reason why there are only a few turns of wire on the output of the transformer is simply because the voltage which is required to be produced at the terminals of the filament transformer is only a low voltage.

### Finding the Electrical Centre

It may be that you cannot "get at" the centre of the winding, and in such a case a simple method to tap off the electrical centre is to connect a suitable resistance across the terminals of the transformer winding and then, using this resistance as a

(Continued on next page.)

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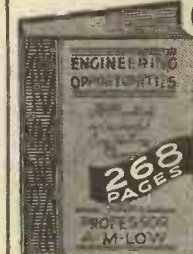
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## TECHNICAL JOTTINGS

(Continued from previous page.)

potentiometer, to move a sliding contact on the resistance until you get the required balance. This is not quite the same thing as the other, and involves an otherwise unnecessary load on the output of the transformer; but, on the other hand, it has the advantage that it can be used with a transformer which is already made up and, furthermore, the tapping point can be shifted whilst the circuit is *actually in operation*, so that you can find out by ear the best position for the slider.

### 'Ware Voltage Drop

The centre tapping is connected to earth, either directly or through a resistance. If it is connected through a resistance there will be a voltage drop in this resistance and consequently, if you connect the end of the resistance nearest to earth to the grid circuit of the valve, through a suitable resistance, you will have a means for the automatic adjustment of the grid bias; the bias will increase automatically with the anode current in the valve.

The grid circuit of the valve should be connected to the other end of the resistance through a decoupling condenser.

### Two Output Valves

What I have just said above refers to a single output valve, but if two output valves are used it will be better to heat the two filaments from two separate heater windings, as in this way you can make the corresponding arrangements for the separate adjustment of each valve, whereas if the two filaments are heated from the one transformer winding, you can only adjust them, by this method, simultaneously.

### Changes in Inductive Value

When you get alternating-current hum in a receiver another possible cause, apart from those discussed above, is lack of sufficient smoothing by the smoothing chokes. Several of the components on the market are, I am sorry to say, rated much too optimistically and will not maintain their specified inductive value, or anything like it, when carrying an appreciable current. It will pay you to go in for good quality chokes and condensers, because if you buy an inferior article you never know whether it is really doing its job, and ten to one you will eventually, after endless trouble, have to throw it out and buy a proper one, which you might better have done in the first instance.

### A Cause of Interaction

There are always some parts of a radio circuit which are common to all the valves, and this is one of the things that leads to interaction between different parts. As you know, interaction is a thing to be avoided, because if it becomes appreciable it will cause the circuit to become unstable and this is how you get the various forms of oscillation, of which motor-boating is one of the best-known.

The way to avoid all this is to decouple the various parts of the circuit which are liable to couple themselves together.

### Use of Decoupling

Decoupling has been defined as the use of various methods for preventing stray

alternating currents getting from one part of a radio circuit to another and sending these currents to earth instead.

There are a number of dodges used in decoupling, generally involving a resistance and condenser, the resistance and capacity of which depend upon the part of the circuit in which they are to be used.

The high-tension battery is usually common to the anodes of all the valves, and consequently it is advisable to decouple separately the different high-tension positive leads.

In some sets the grid circuits need attention, whilst in most mains sets the bias circuit is decoupled.



Up-to-the-minute news concerning the radio industry

### NEW EXIDE DEVELOPMENT

**M**AKERS of high-tension accumulator batteries have always been up against the problem of surface leakage. When a large number of batteries are being charged simultaneously, as, of course, happens in the average charging station, the atmosphere surrounding the batteries contains a fine acid spray, some of which settles on the sealing compound covering the tops of the batteries. When the water in the acid film thus formed evaporates, there is left a concentrated film of acid which provides a small leakage path for current. As high-tension batteries are usually only charged at infrequent intervals the continuous slight drain across this leakage path reduces the useful working capacity of the battery.



An Exide H.T. unit showing the leakage shields fitted round positive and negative terminals.

Exides have overcome the trouble in an ingenious manner by providing their latest 10-volt wet high-tension units with a leakage current shield fitted round each of the battery terminals. The shield consists of a porcelain collar embracing the terminal post and an air gap is left between the terminal and the shield. Tests by the makers have proved that batteries equipped with these shields have a longer useful working life than other batteries of similar capacity not so equipped.

### S.T.800 COIL UNIT

Messrs. British Television Supplies announce that owing to the increase in the price of raw materials they have been reluctantly compelled to increase the price of the B.T.S. "Quadwave" Tuner for the S.T.800 to 23s. 6d. This price change takes effect as from January 18th. We are informed, however, that all orders sent to Messrs. B.T.S. prior to that date will be executed at the old price of 21s. 0d.

### INDIAN BROADCASTING EXPANDS

Four 10-kilowatt short-wave transmitters are to be supplied by Philips Radio for the

All India Radio Organisation. When completed these new stations will work on a wavelength between 30-90 metres.

There are already in India five medium-wave stations and four short-wavers, in addition to a number of local relay transmitters.

### NIVEX TIME SWITCH

The knowledge that your radio set can be switched on quite automatically at a pre-determined time so as not to miss some specially desired programme is an attractive one.

It can be readily achieved with the aid of one of the special time switches made by the Nivex Instrument and Gauge Company, of 280, Deansgate, Manchester.

The Nivex switch costs 19s. 6d. and, in addition to switching on the radio, it can be used for a variety of other purposes, such as controlling lights, switching on an electric kettle at a given time for the morning cup of tea, and for heating the shaving water with the aid of an immersion heater at exactly the right time.

Further details are available from the address given.

### LATEST MURPHY RELEASES

This week there is a fairly big batch of set releases to announce.

The first of the new 1937 Murphy models are now available. These are two battery sets and a table mains model (available for A.C. or A.C./D.C. use).

The less expensive of the battery models is the B31, which costs £6 10s. 0d., without batteries. This is a straight H.F. receiver utilising a three-valve circuit in the order—variable mu H.F. pentode, leaky grid detector, and output pentode.

There is automatic grid bias and special constant reaction circuit. The H.T. consumption at 120 volts is approximately 7 milliamps., and the L.T. consumption half an ampere.

Next there is the B33, priced at £10 15s. 0d. without batteries. This is a superhet incorporating a triode pentode frequency changer, variable-mu I.F. pentode, double-diode-triode, and Q.P.P. pentode-output valve.

Here again automatic grid bias is employed, and the H.T. consumption is approximately 8.5 milliamps. at 120 volts, and normal output. The L.T. consumption is 1 ampere.

A new tuning scale is fitted to this model and has 60 station names in alphabetical order on an open dial specially designed for convenience and legibility. Simplified tuning is a feature of this new dial.

The mains receiver costs £11 10s. 0d., and is known as the A34. It is an A.C. set embodying a superhet circuit.

There is a cathode-ray tuning indicator, and an inter-station noise suppression circuit. Heterodyne whistles and side-band splash are eliminated by the use of a new type of whistle filter, and the new alphabetical dial, which is used in the B33 model, is also fitted.

An alternative set for those who desire a universal mains model is the D34, which also costs £11 10s. 0d. This is of the same general design and appearance as the A34.

The A34, D34 and B33 models have cabinets with slightly sloping fronts.

### PYE "Q" SERIES

In the Pye range there are four new releases. These are the first of the "Q" series. All the models introduced during this year are to have the prefix Q. Letters A.C., B (battery) or U (universal), and a numeral to denote the number of wavebands are also used.

The first set is the Q.AC5, which means, of course, that this model is an A.C. set covering

(Continued on next page.)

## THE RADIO BULLETIN

(Continued from previous page.)

five wavebands. It is a six-valve superhet (including rectifier) for use with an outside aerial and, in addition to the medium and long waves, covers the wavebands of 6-11 and 11-25 metres and 24-70 metres, thus embracing the television sound broadcasts.

It is a set having many refinements, such as quiet delayed A.V.C., illuminated tuning and overloading indicator, a four-position tone control, and a flywheel drive tuning control. It costs 18 guineas.

Then there is the Q.AC3, a five-valve superhet (including rectifier) covering the 16.5-52 metres waveband, in addition to the usual medium and long wavebands. This model has an electric-eye tuning indicator and a line-light station indicator, among other special features.

Also, the moving coil loudspeaker is of the oval type, and is claimed to give exceptional fidelity on speech and music. The price of this set is 13 guineas and it is interesting to note that the cabinet design of this model is due to Michael Dawn, one of the leading furniture designers of to-day.

This particular cabinet is available in two different styles of wood and finish, namely, figured walnut with satin finish, and Australian walnut veneer with wax finish.

Next, there is the Q.TRF, a tuned radio-frequency battery set, covering the short waves as well as the normal broadcast bands. A Droitwich filter is incorporated and the pentode output gives 200 milliwatts of undistorted power. This set, complete with batteries and accumulators, costs £8 5s. 0d.

Last, but by no means least, there is Q.AC2, a five-valve superhet (including rectifier) covering the normal broadcast wavebands and costing only 8 guineas.

It is fitted with full delayed A.V.C., an illuminated tuning dial and three-point tone control. There is provision for an external speaker and the undistorted output is 2½ watts.

\* \* \*

## NEW BURNDIPT MODEL

Burndipts have just released a luxury eight-valve all-wave A.C. superhet costing 18 guineas. The output of this set is 3½ watts and it is fitted with variable tone control, inter-station noise suppression, an illuminated scale calibrated on all wavebands in wavelengths and cycles.

Special Litz wound iron-core coils are used in the tuning circuits and the seven tuned stages are operative on all wavebands. This set is known as the Model 259.

\* \* \*

## LISSEN TRANSPORTABLE

From Lissens we learn of a new A.C. mains transportable. This is a four-valve set (including rectifier) and, of course, relies for its reception on a self-contained frame aerial.

It has a moving-coil speaker and provision for a pick-up and external aerial and earth. The price is 10 guineas.

\* \* \*

## A 60-WATT AMPLIFIER

Public address work is now a very important branch of entertainment. Correx amplifiers of Brixton, London, are marketing a new P.A. unit, giving an output of 60 watts.

The amplifier is supplied in two forms, either as an amplifier and fading and mixing control panel, with provision for four separate inputs, or as a complete gramophone amplifying equipment built into a robust oak cabinet with turntable and pick-up combined.

Class A/B amplification is employed and provision is made for the use of a pre-amplifier if desired.

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**S.T.800 A.C. Receiver** portion only, less valves, 30/-.

—T. Thorne, 28, Clovelly Avenue, Hendon, N.W.9.

## MISCELLANEOUS

**GRAMOPHONE Attachments** for Radio, electric motors, 25/-; Pick-ups, 9/6; **Portable Gramophones,** 12/-; **spring motors,** 4/6, dozen, 36/-, 100, £12/10, 1,000, £100; **walnut pedestal Anexagram,** £5. Soundboxes, tonearms, horns, cabinets, needles, gears, springs, accessories cheapest. Lower prices for quantity buyers. Catalogue free.—Regentpop, 120, Old Street, London, E.C.1.

**HIGH CLASS Radio Cabinets** made to order. C. Mostyn, Ltd. (Cabinet Manufacturers), 8-9, French Place, London, E.1. (Bishopsgate 8784.)

**BESTERTH Patent Earthing System** is best for long or short waves. For particulars write John Holmes & Sons, 16, Isleworth Drive, Chorley, Lancs.

## SITUATIONS VACANT

**WANTED** Young Man for sales counter Wireless and Electrical Sundries. Write, stating experience and salary required, to Box A.493, c/o Jackson's, 45, Fenchurch Street, E.C.3.

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**B.I.E.T. (Dept. 568),** 17-19, Stratford Place, London, W.

**WHEN replying** to Advertisements, please be sure to mention "Popular Wireless." Thanks!

## ADVERTISEMENTS

As far as possible all advertisements appearing in "Popular Wireless" are subject to careful scrutiny before publication, but should any reader experience delay or difficulty in getting orders fulfilled, or should the goods supplied not be as advertised, information should be sent to the Advertisement Manager, "Popular Wireless," John Carpenter House, John Carpenter Street; London, E.C.4.

## "P.W." LIST OF EUROPEAN BROADCASTERS

This list contains the more important European medium and long-wave stations which are likely to be received in this country. There are some relay stations working on very low power and sharing common wavelengths. These have been omitted because their programmes are usually too weak or badly interfered with to be of value to British listeners.

WAVE-LENGTH.	STATION. MEDIUM WAVEBAND.	COUNTRY.	POWER KW.	WAVE-LENGTH.	STATION. MEDIUM WAVEBAND.	COUNTRY.	POWER KW.
203.5	Plymouth .. ..	Gt. Britain ..	0.3	356.7	Berlin .. ..	Germany ..	100
203.5	Bournemouth ..	" .. ..	1	360.6	Kiev .. ..	U.S.S.R. ..	35
206	Eiffel Tower (Paris) ..	France .. ..	5	364.5	Bucharest ..	Rumania ..	12
215.4	Radio-Lyons .. ..	" .. ..	25	368.6	Milan (No. 1) ..	Italy .. ..	50
233.5	Aberdeen .. ..	Gt. Britain ..	1	373.1	West Regional ..	Gt. Britain ..	70
236.8	Nürnberg .. ..	Germany .. ..	2	377.4	Lwów .. ..	Poland .. ..	50
238.5	Riga .. ..	Latvia .. ..	10	382.2	Leipzig .. ..	Germany ..	120
240.2	Saarbrücken .. ..	Germany .. ..	17	386.6	Toulouse (P T T) ..	France .. ..	120
241.9	Cork .. ..	Irish Free State ..	1	391.1	Scottish Regional ..	Gt. Britain ..	70
243.7	Gleiwitz .. ..	Germany .. ..	5		Burghead .. ..	" .. ..	60
245.5	Radio Marconi (Bologna) .. ..	Italy .. ..	50	395.8	Katowice .. ..	Poland .. ..	12
247.3	Lille (Radio P T T Nord) .. ..	France .. ..	60	400.5	Marseilles (P T T) ..	France .. ..	90
251	Frankfurt .. ..	Germany .. ..	25	405.4	Munich .. ..	Germany ..	100
253.2	Nice-Corse .. ..	France .. ..	60	410.4	Tallinn .. ..	Estonia .. ..	20
255.1	Copenhagen .. ..	Denmark .. ..	10	415.4	Kharkov (No. 1) ..	U.S.S.R. ..	10
257.1	Monte Ceneri .. ..	Switzerland .. ..	15	420.8	Rome (No. 1) .. ..	Italy .. ..	50
259.1	Kosice .. ..	Czechoslovakia ..	10	426.1	Stockholm .. ..	Sweden .. ..	55
	West National ..	Gt. Britain ..	20	431.7	Paris (P T T) .. ..	France .. ..	120
261.1	North National ..	" .. ..	20	443.1	Sottens .. ..	Switzerland ..	100
	London National ..	" .. ..	20	449.1	North Regional ..	Gt. Britain ..	70
263.2	Trieste .. ..	Italy .. ..	10	455.9	Cologne .. ..	Germany ..	100
265.3	Hörby .. ..	Sweden .. ..	10	463	Lyons (P T T) .. ..	France .. ..	100
267.4	Newcastle .. ..	Gt. Britain ..	1	470.2	Prague (No. 1) ..	Czechoslovakia ..	120
269.5	Radio Normandie (Fécamp) .. ..	France .. ..	10	476.9	Lisbon .. ..	Portugal ..	15
269.5	Moravska-Ostrava ..	Czechoslovakia ..	11.2	476.9	Trondelag .. ..	Norway .. ..	20
271.7	Kuldiga .. ..	Latvia .. ..	50	483.9	Brussels (No. 1) ..	Belgium ..	15
274	Vinnitsa .. ..	U.S.S.R. .. ..	10	491.8	Florence .. ..	Italy .. ..	20
278.6	Bordeaux-Lafayette ..	France .. ..	12	499.2	Sundsvall .. ..	Sweden .. ..	10
283.3	Bari (No. 1) .. ..	Italy .. ..	20	499.2	Rabat .. ..	Morocco .. ..	25
285.7	Scottish National ..	Gt. Britain ..	50	506.8	Vienna .. ..	Austria .. ..	100
288.5	Rennes-Bretagne ..	France .. ..	120	514.6	Madona .. ..	Latvia .. ..	50
291	Königsberg (No. 1) ..	Germany .. ..	100	522.6	Stuttgart .. ..	Germany ..	100
296.2	Midland Regional ..	Gt. Britain ..	70	531	Athlone .. ..	Irish Free State ..	60
298.8	Bratislava .. ..	Czechoslovakia ..	13.5	539.6	Beromunster .. ..	Switzerland ..	100
301.5	Hilversum (No. 2) ..	Holland .. ..	60	549.5	Budapest (No. 1) ..	Hungary .. ..	120
304.3	Torun .. ..	Poland .. ..	24	559.7	Wilno .. ..	Poland .. ..	16
304.3	Genoa .. ..	Italy .. ..	10	569.3	Viipuri .. ..	Finland .. ..	10
307.1	Northern Ireland Regional .. ..	Northern Ireland ..	100				
312.8	Poste Parisien .. ..	France .. ..	60	1107	Moscow (No. 2) ..	U.S.S.R. ..	100
315.8	Breslau .. ..	Germany .. ..	100	1153.8	Oslo .. ..	Norway .. ..	60
318.8	Goteborg .. ..	Sweden .. ..	10	1250	Kalundborg .. ..	Denmark ..	60
321.9	Brussels (No. 2) ..	Belgium .. ..	15	1293	Luxembourg .. ..	Luxembourg ..	150
325.4	Brno .. ..	Czechoslovakia ..	32	1339	Warsaw (No. 1) ..	Poland .. ..	120
328.6	Toulouse .. ..	France .. ..	60	1379	Novosibirsk .. ..	U.S.S.R. ..	100
331.9	Hamburg .. ..	Germany .. ..	100	1389	Motala .. ..	Sweden .. ..	150
335.2	Helsinki .. ..	Finland .. ..	10	1500	Droitwich .. ..	Gt. Britain ..	150
338.6	Linz .. ..	Austria .. ..	15	1571	Deutschlandsender ..	Germany ..	60
342.1	London Regional ..	Gt. Britain ..	70	1744	Radio-Paris .. ..	France .. ..	80
345.6	Poznan .. ..	Poland .. ..	16	1807	Moscow (No. 1) ..	U.S.S.R. ..	500
349.2	Strasbourg .. ..	France .. ..	100	1875	Lahti .. ..	Finland .. ..	150
				1875	Radio-Rumania ..	Rumania ..	150
					Hilversum (No. 1) ..	Holland .. ..	100

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TRIPLE EXTRACTOR  
COIL UNIT

Complete  
as shown

PRICE **7'6**

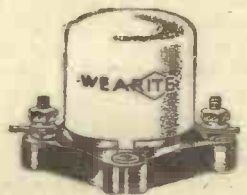
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Complete to original specification;  
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H.F. CHOKE  
TYPE H.F.J.

H.F.J. Totally Screened.  
Range 100 to 2,000 metres.  
Self capacity 7 mmf. Induc-  
tance 220,000 mh. D.C.  
Resistance 770 ohms approx.

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● Send for New Wearite Fully Illustrated Catalogue,  
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ARABIAN NIGHTS  
NIGG-LING  
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THE SUPER CENTURION-OVERLEAF



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It is an old saying that you pay for what you get, and this no doubt applies to a very large number of products, but I am not at all sure that price is a reliable criterion of a wireless receiver. We all have our suspicions, sometimes, that some of the low-priced commercial sets are just as good as the same firm's more expensive models and that the extra price is calculated to rope in snobbish people who feel that they must have the best at literally all costs. Of course, there may be a few modifications as regards the cabinet and insignificant details, but frequently the same circuit and perhaps even the same chassis is incorporated.

### Choosing a Set

The designer's attitude towards his prospective set is governed by the requirements of the public for which he is catering. The lazy thinker may imagine that price considerations are almost entirely the only ones in radio receiver design. As regards the majority of commercial sets, I think price is almost entirely the governing factor; very few people who buy a ready-made wireless set know anything about its features. They buy on the strength of the name, the publicity (which is often the same thing), and the price. A higher priced set must, they think, be a better set. All this is rather deplorable. I should like to see people buying ready-made wireless sets for special purposes, as no set can provide all the best features unless it is really expen-

## THE SUPER

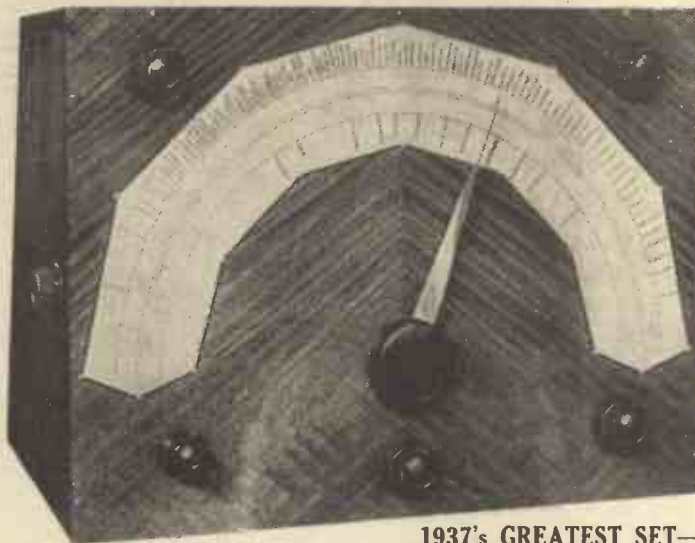
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sive. A receiver designed to give superlative quality on the main stations and where very large volume is desired is almost essentially a special job. On the other hand, a receiver for the reception of short waves is a more highly specialised piece of work. Sets which will receive only the medium and the long waves and sets which are so-called all-wave models involve considerable differences in design and, given a certain amount of money to spend, a better set could be produced for simply the two wave-

bands. There are one or two firms who go in for particularly high-grade quality, and think nothing of sticking on another twenty pounds for this feature.

### Special Features

The home constructor is a much more shrewd person. He knows what to look for even if he doesn't know quite what he wants. If I leave out audio reaction on the S.T.800—a feature which was so praised and starred in the S.T.700—he wants to know why. If high-frequency reaction is used on two circuits in the



**1937's GREATEST SET—**  
By the introduction of aerial reaction, enormous amplification is achieved without the expense of an extra valve.

S.T.600 but not in the S.T.700 or S.T.800 he again wants to know why. What about reaction equalisation—which was a feature of the S.T.400—although I honestly do not believe that anyone got it to work. The fact that if it didn't work the set could still give good results, is perhaps the best argument in favour of leaving it off in later sets, although I still think that it is a valuable feature.

Here we have to consider the difference between essential features and those which add to the convenience of operation or are in the form of luxury additions. Now, obviously, if I sat down and planned to give you

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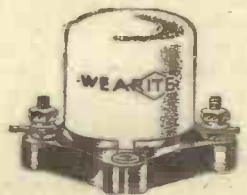
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# MY CORONATION SET



THE question: "How many valves should a set have?" is as old as broadcasting itself. This may be a useful opportunity for considering the pros and cons of the various types of receivers. The Super Centurion has three valves, while the S.T.800 has four. Why should there be a difference in the two sets? The obvious reply is that they are intended to cater for different publics, and different performances. But the detailed reply is by no means as simple as all this, and in any case no one wants to feel that he is getting poorer results because he is paying less. Unless the receiver were frankly a local station set, and this were made very clear at the time, I should not offer a receiver with poor performance as regards foreign stations merely because there was a public which did not want to pay the full price of a good set.

It is an old saying that you pay for what you get, and this no doubt applies to a very large number of products, but I am not at all sure that price is a reliable criterion of a wireless receiver. We all have our suspicions, sometimes, that some of the low-priced commercial sets are just as good as the same firm's more expensive models and that the extra price is calculated to rope in snobbish people who feel that they must have the best at literally all costs. Of course, there may be a few modifications as regards the cabinet and insignificant details, but frequently the same circuit and perhaps even the same chassis is incorporated.

### Choosing a Set

The designer's attitude towards his prospective set is governed by the requirements of the public for which he is catering. The lazy thinker may imagine that price considerations are almost entirely the only ones in radio receiver design. As regards the majority of commercial sets, I think price is almost entirely the governing factor; very few people who buy a ready-made wireless set know anything about its features. They buy on the strength of the name, the publicity (which is often the same thing), and the price. A higher priced set must, they think, be a better set. All this is rather deplorable. I should like to see people buying ready-made wireless sets for special purposes, as no set can provide all the best features unless it is really expen-

## THE SUPER

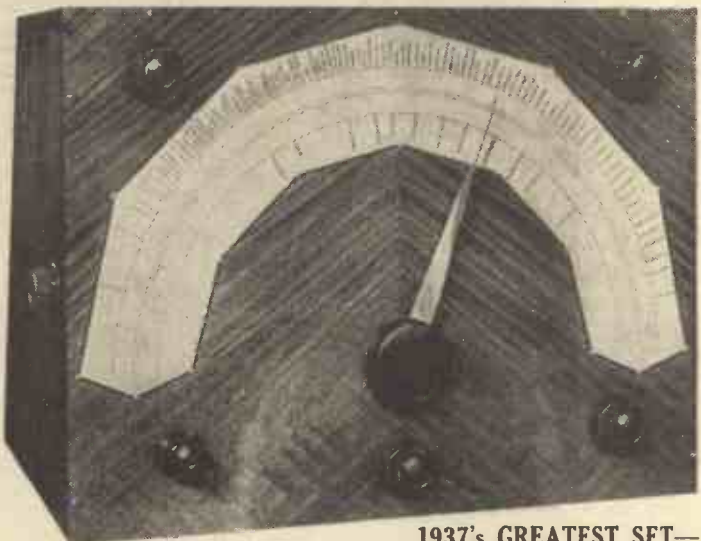
REMEMBER THE TERRIFIC SUCCESS OF THE FIRST CENTURION? WELL, HERE IS AN ENTIRELY NEW VERSION, JUST AS ECONOMICAL AND EASY TO BUILD AND USE, BUT EVEN MORE WONDERFUL IN ITS PERFORMANCE

sive. A receiver designed to give superlative quality on the main stations and where very large volume is desired is almost essentially a special job. On the other hand, a receiver for the reception of short waves is a more highly specialised piece of work. Sets which will receive only the medium and the long waves and sets which are so-called all-wave models involve considerable differences in design and, given a certain amount of money to spend, a better set could be produced for simply the two wave-

bands. There are one or two firms who go in for particularly high-grade quality, and think nothing of sticking on another twenty pounds for this feature.

### Special Features

The home constructor is a much more shrewd person. He knows what to look for even if he doesn't know quite what he wants. If I leave out audio reaction on the S.T.800—a feature which was so praised and starred in the S.T.700—he wants to know why. If high-frequency reaction is used on two circuits in the



**1937's GREATEST SET—**  
By the introduction of aerial reaction, enormous amplification is achieved without the expense of an extra valve.

S.T.600 but not in the S.T.700 or S.T.800 he again wants to know why. What about reaction equalisation—which was a feature of the S.T.400—although I honestly do not believe that anyone got it to work. The fact that if it didn't work the set could still give good results, is perhaps the best argument in favour of leaving it off in later sets, although I still think that it is a valuable feature.

Here we have to consider the difference between essential features and those which add to the convenience of operation or are in the form of luxury additions. Now, obviously, if I sat down and planned to give you

!!! A TRIUMPH OF ECONOMY AND SIMPLICITY !!!

# by JOHN SCOTT-TAGGART

## CENTURION

IT HAS DOUBLE REACTION GIVING IT EXTREMELY HIGH SENSITIVITY AND UNIPANE CONSTRUCTION AND AN EASY-CABINET, AND AN AUTO-DIAL—THE BIGGEST AND BEST DIAL EVER INVENTED

what I thought was the set de luxe, you would have a score of gadgets. Each would add to the price and some would add to the perplexity of operation. There are seven knobs on the average television set and they are all necessary. The squealers about complexity of operation have simply got to lump the seven adjustments, whether they like them or not. I experience a certain amount of malicious glee at the thought of the ignorant general public having to twiddle seven knobs instead of one, but at the same time there is in all these matters a sensible mean.

### Simplifying Construction

Although I have made no attempt to produce a set having one knob intended for construction on a large scale, yet I have definitely moved in the direction of simpler construction and without sacrificing performance. It is always a very astonishing thing to me that perhaps the most popular of all my sets—the S.T.400—was (or rather is, because there are huge numbers still giving good service) the most difficult of all my sets to operate.

The fact that there must be a limit to the adjustments on a set prevents the designing of the ideal receiver. My own idea of the best simple straight set with luxury attachments would be the S.T.600 circuit with a triple extractor, audio reaction and reaction equalisation. And how many people do you think would build it? About a dozen. People's tastes are comparatively simple in these matters, and just as a royal guest at a banquet may consume twelve courses without batting an eyelid, although he would really much prefer steak and chips, so the average constructor is willing to sacrifice certain features. What feature does the average listener regard as superfluous and tending to complicate the construction and operation of a set? No one can say, because each man has different ideas. The result is that one year I will try to appeal to one class and another year to another.



—BRITAIN'S LEADING DESIGNER  
John Scott-Taggart, M.I.E.E., F.Inst. P., M.Am.I.E.E.  
M.Am.S.Mech.E., Fel.I.R.E.

Frankly, as regards the main set of the year, I try to please as many people as possible. Some readers have asked me why, if I used Class B output on the S.T.500, did I not employ it on all subsequent sets. Well, here again the reply is simply that Class B adds to the number of valves required, gives unnecessarily loud volume for the average listener, and in general is not worth the expense.

There are three main classes of receiver. Those that concern themselves with selectivity, those with sensitivity, and those with output volume. The first question I have to ask myself is what am I to give constructors in each department? Only in one set, the Super-Gram De Luxe, did I go "full out" under all these headings—and the cost was somewhere around £75. It is, of course, no use asking the public what it wants. The answer always is "everything." This highly intelligent reply puts designers on their mettle. They know they cannot give everything to the full, but they have a very good try. But the best solution is not to give as much as you can afford under each of these headings, because requirements are so different, even though the individual is inclined to ask for everything.

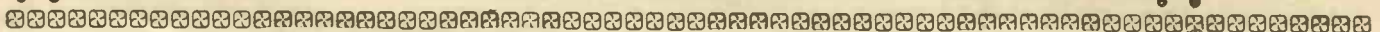
### The Question of Volume

A large section of the public likes to have very loud signals. I do for one, provided the quality is as near perfect as doesn't matter. But such a high grade of quality costs a lot of money to produce, and so we are concerned, especially in battery sets, to give good quality at a much lower volume. Amongst the noise merchants, we have those who want a great output and want it not only on the local stations, but on practically every other station as well. Now that really does cost a lot of money if it is to be done well, and is outside the scope of the average constructor's ability and pocket. Another more reasonable section of the public likes to have the local station loud, specially for brass bands and symphony concerts, for example,

but is quite content to receive foreign stations at moderate volume. This calls for a very much simpler set, because sensitivity is not nearly so great. It may take two stages of push-pull amplification to give good quality, and this involves four valves. How many constructors are willing to pay for the extra valves and components when a single output valve will give them all they want? That therefore brings us to the third class of listener, the man who does not want a large output, either on a foreigner or the home station. He is content with good room-strength signals which will not cause the



!! A MIRACLE OF EASE AND EFFECTIVENESS !!





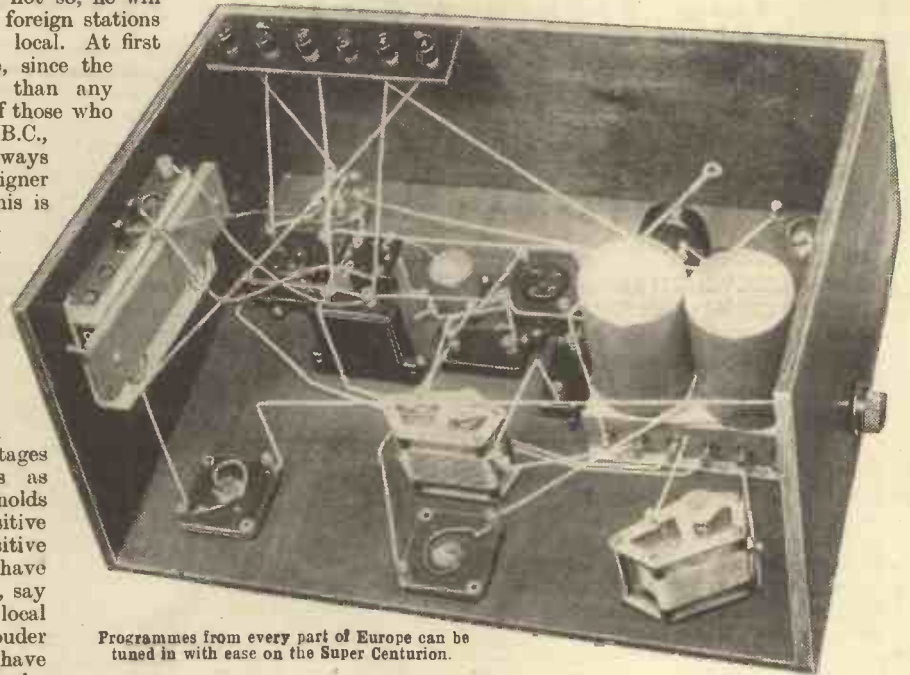
neighbours to knock on his wall. But he likes the quality of reproduction to be good, and since he is content with a low output volume, this can be given to him at low cost. Nearly all sets distort due to over-loading, and therefore the man with modest ideas of output strength enjoys better quality of reproduction.

The question of sensitivity is not such an easy one to decide. The constructor rightly feels that his set should be sensitive because if it is not so, he will be unable to receive many foreign stations at the same output as his local. At first thought one might imagine, since the local is so much stronger than any foreign station in the case of those who live fairly near to the B.B.C., that the B.B.C. should always be very loud and the foreigner never able to compete. This is utterly erroneous. On a good set scores of foreign stations will load up the last valve of your set and so give excellent signals. The local station cannot do more because if it did it would be distorted. Therefore, though the local signal may be very much stronger in the aerial, it has no advantages over any foreign stations as regards loudness. This only holds good if you have a sensitive receiver or rather a sensitive receiver-cum-aerial. If you have an insignificant size of aerial, say six inches of wire, your local station may certainly be louder than a foreigner, but if you have a fairly good outside aerial the chances are that on quite a medium-sensitivity set a large number of foreign stations will give you all that the set can handle as regards loudness. If you want still louder signals, you have to go in for a bigger output valve, at the same time increasing no doubt the size of the aerial or the sensitivity of the set by the addition of, say, an extra stage of low-frequency or high-frequency amplification.

**No Compromise Possible**

As regards selectivity, no compromise is really possible here. There are probably only two grades of selectivity, namely, good and exceptional. No one wants less than good selectivity, even if the set is given away with a pound of tea. This did not used to be the case. The astonishing number of very simple det. and two L.F. receivers bears witness to the low standard of selectivity which once satisfied the listening public. But I should like to say here that good selectivity does not mean good under all circumstances. The real test of selectivity is where one station is coming in very loudly while the desired station is considerably weaker. If the position is reversed, selectivity may become extremely good. Good selectivity may therefore mean that you get exceptionally good selectivity on the main stations, British and foreign, and rather poor selectivity where a weak foreign station is to be received in the face of a very powerful neighbour. The selectivity may be called "good," but in one direction this may flatter the set, while in the other direction it does not do justice to the excellent results that may be

obtained. There is a very sensible body of listeners who argue that very weak stations are not really worth listening to anyway, but that the main foreign stations which come in at good strength should certainly be received clear of interference. It is therefore hardly fair to judge a set by its performance under the most difficult conditions of reception. It is better to decide whether it performs the duties which its constructor asks of it.



Programmes from every part of Europe can be tuned in with ease on the Super Centurion.

If we agree that a medium output of good quality is satisfactory, we can do surprising things with only three simple valves. Obviously four valves will be more sensitive than three, provided the same systems of reception are employed. Where only very small indoor aerials can be arranged, four valves are obviously desirable. But where a reasonable aerial can be put up, a good three-

**FOUR STAR FEATURES**

- 1. AMAZINGLY SIMPLE CONSTRUCTION GIVEN BY THE UNI-PLANE SYSTEM
- 2. CHEAP TO BUILD, COUPLED WITH VERY LOW RUNNING COSTS
- 3. ADJUSTABLE SELECTIVITY CONTROLLED BY SWITCH
- 4. AERIAL REACTION, SAVING COST OF EXTRA VALVE

valve set can perform prodigies of sensitivity. Every year brings the three-valve set more into its own. There have been annual increases in power of a large proportion of the broadcasting stations of Europe and this has made sensitivity a less important ingredient in a receiver. Here the three-valve man greatly scores. This increase in power has greatly lessened the need for four valves; where a couple of years ago I should have hesitated to recommend a three-valve set at all, I can now do so wholeheartedly knowing that a large number of stations can be received. On the Super Centurion it is possible to get excellent results on a hundred stations, which is the reason for the name "Centurion."

This assumes an outdoor aerial of average proportions. Half this number can be received on very poor aerials, while a score at the very least should be capable of being received with only a couple of feet of wire as aerial. This astonishing sensitivity is attributable to the use of "double reaction," a system to which I am enthusiastically committed. The difficulty of incorporating the short waves on the S.T.800 is the only reason why this system was omitted on that set, although, of course, double reaction

**SUPER CENTURION—THE SET**

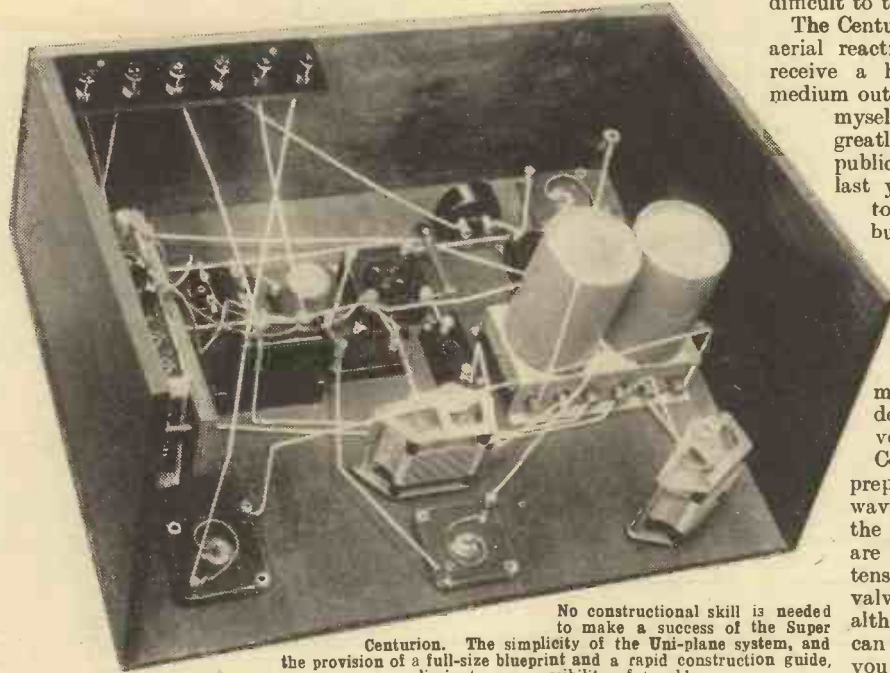
is not so spectacular in the case of a receiver which has four valves, as in the case of one which has only three valves.

The Super Centurion is a truly remarkable combination for only three valves, and there are three reasons. One is the extremely sensitive detector valve, the other is the sensitive output valve, and the third, and easily the most important, is the reaction applied to the aerial

But in the S.T.800 there is more low-frequency amplification. There is, however, not the full advantage of an extra valve in the case of the S.T.800 because the output valve is less sensitive than that in the Super Centurion. We can therefore regard the Super Centurion as really a three-and-a-quarter valve set. For very weak signals it may even exceed the S.T.800 in sensitivity, but actual measurements under these conditions of double reaction are difficult to take.

The Centurion of last year did not use aerial reaction but, nevertheless, it would receive a hundred stations on quite a medium outdoor aerial. I was astonished myself at its performance, which greatly pleased the constructing public. The success of the Centurion last year was not, of course, equal to that of the S.T.700 or S.T.800 but it came a very good second.

This year there are added reasons why the Super Centurion should prove a great success. It may not have the spectacular appeal of the S.T.800, but to the man who makes more moderate demands as regards output volume, I think that the Super Centurion is (provided one is prepared to do without the short waves) a better proposition than the S.T.800. The running costs are much lower if you use high-tension batteries, because the output valve takes much less current, although, of course, four-valve sets can be run very economically if you increase the negative bias; but then, you cannot have the full



No constructional skill is needed to make a success of the Super Centurion. The simplicity of the Uni-plane system, and the provision of a full-size blueprint and a rapid construction guide, eliminate any possibility of trouble.

circuit, as well as the anode circuit of the receiver. The output valve is of the small power type, which will give very pleasing room-strength of signals. In return for the choice of this valve you get a more sensitive output stage than if you used the larger valves such as have been used in the S.T.400, S.T.600, S.T.700 and S.T.800. In these four sets the output stage is not seriously treated from the sensitivity point of view, but more with a view to handling a large output which the great overall sensitivity of the set can produce on nearly all stations.

**Enormous Amplification**

The Super Centurion should use the valves specified. The second valve is certainly the most important, while the small power output valve will give louder results on weaker signals than a bigger valve, but will not give quite such a large output volume on very strong signals. The aerial reaction system provides an enormous amplification at the expense of no extra valve. The full value of this aerial reaction will be explained later, but from your own experience of ordinary reaction you will know how greatly signals may be increased in strength by this system. Multiple reaction was introduced by myself round about 1923, but the use of H.F. pentodes has certainly greatly extended its field of application.

The high-frequency amplification side of the Super Centurion is better than that of the S.T.800 since reaction is used twice, and therefore, stronger signals will be applied to the detector than in the case of the S.T.800.

output volume that you will sometimes want.

Those who are content always to receive signals at good room strength—that is to say, loud but not deafening—will find in the Super Centurion a set that will run for months without costing much in the way of upkeep. In fact, a single high-tension battery of the 120-volt type will last months and, moreover, you can use the five- or six-shilling type, which would not be recommended for the S.T.800, for example.

**MORE STAR FEATURES**

- 5. COMPLETE FREEDOM FROM MEDIUM-WAVE BREAK-THROUGH ON LONG WAVES
- 6. DOUBLE REACTION, GIVING UNUSUALLY HIGH SENSITIVITY
- 7. SPECIAL INEXPENSIVE EASY-CABINET
- 8. POSITIVE STATION IDENTIFICATION, PROVIDED BY AUTO-DIAL

**Ideal for the Novice**

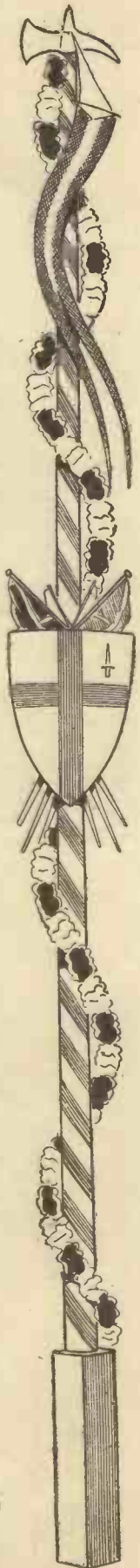
As regards selectivity I think that the Super Centurion is on the whole better than the S.T.800, due to the use of aerial reaction. When there is severe swamping, however, from the B.B.C., a Triple Extractor is an infallible cure right up to a distance of one mile from the B.B.C. medium-wave station and about ten miles from Droitwich, or possibly less.

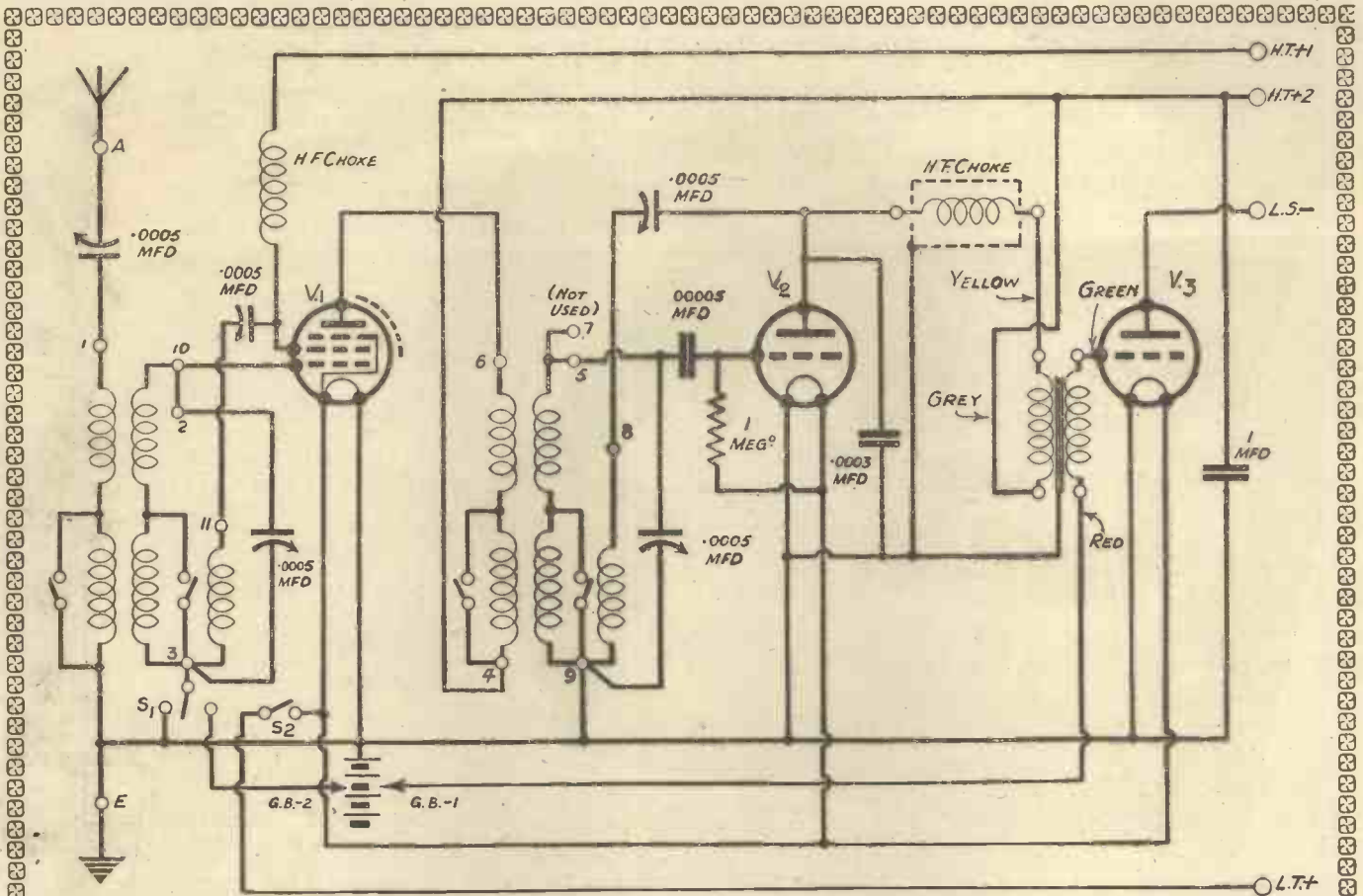
An indication of my own enthusiasm to this receiver may be gauged by the fact that I have provided a rapid construction guide which will enable a complete novice to go straight ahead and build the set with the aid of the blue print given

with this issue. The editorial presentation of the Super Centurion is not as spectacular and flamboyant as in the case of the main annual set, but this need not deter you.

The Super Centurion is emphatically far and away the best three-valve set I have ever designed and, except for the fact that the output volume is a little but not much less, the performance of this receiver is well above the average of my last few annual numbered sets.

**THAT RECEIVES 100 STATIONS**

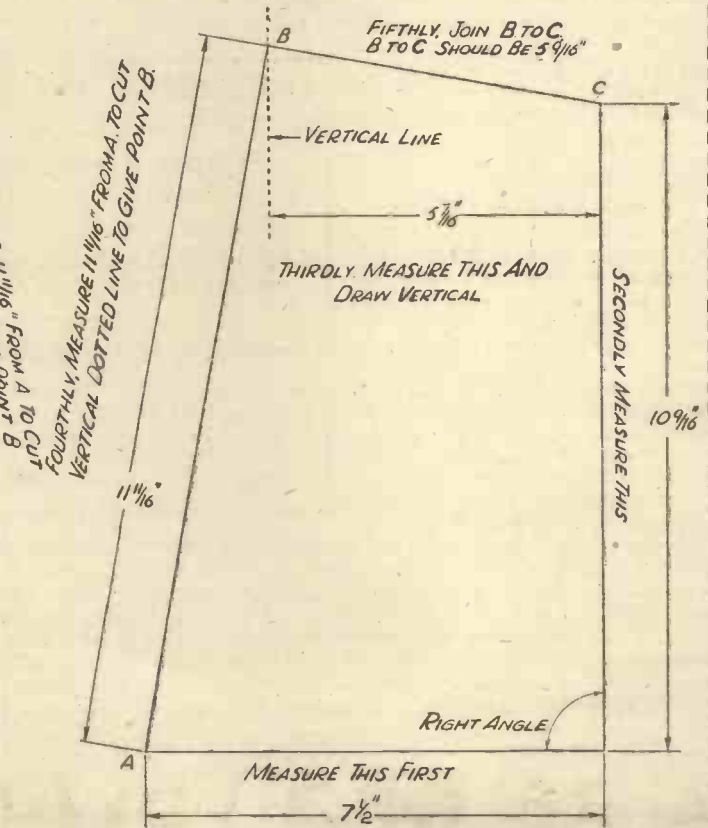
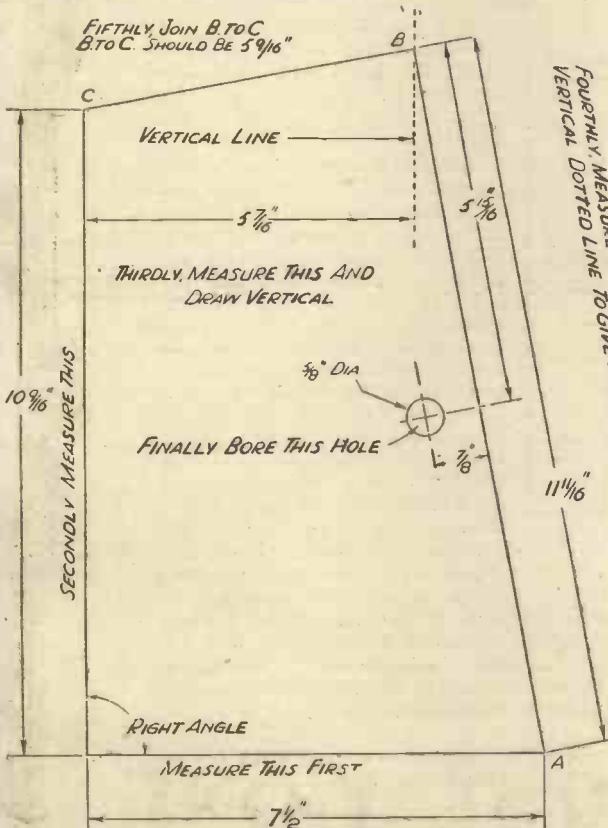




The theoretical arrangement of John Scott-Taggart's Coronation Set. Remarkable sensitivity is given by the Double-Reaction scheme, the use of aerial reaction saving the cost of an extra valve. Below are the details of the two sides of the Easy-Cabinet. These two pieces of wood, together with the top (see page 598), form an inexpensive and attractive design.

**LEFT SIDE - PIECE**  
(FOR WAVE-CHANGE SWITCH SIDE)

**RIGHT SIDE - PIECE**





As regards simplicity of construction, the Uni-plane system which I have introduced makes it possible to put all the components on one sheet of wood, while the Easy-Cabinet system gives you nearly everything that an ordinary cabinet does at a cost of 3s. . . , as against nearly £1 for a cabinet which is really quite unnecessary and not recommended. Any constructor who buys the Easy-Cabinet and also a normal cabinet is certainly duplicating matters and spending money unnecessarily. The set as it stands is a handsome job, and I certainly do not advise spending money on more conventional cabinets.

The price of the Super Centurion is very low, and it must be remembered that the valves used—certainly the

aerial reaction winding has been provided. The calibration of the coil is similar to that of the S.T.700, so the S.T.700 celluloid dial may be used with it. There are one or two stations which have changed position or altered their names, but otherwise the celluloid dial would be quite in order to use. The paper dial in the middle pages of this issue of POPULAR WIRELESS may be affixed to the front of the panel, either as it stands or, preferably, pasted on cardboard. Extra copies may be obtained by the simple process of buying extra copies of POPULAR WIRELESS.

The calibration of the receiver is child's play and extremely accurate. The system has been used on the S.T.700 and the S.T.800, and consists in having "dot lines" for both

medium and long waves. When you identify a station, you simply put a dot under the long pointer where the pointer crosses the line, and this dot is then joined to the end of the station name. The inner dot line is for putting dots which are subsequently connected to the names of the long-wave stations.

The operation of the set is again very simple. There is an aerial coupler which governs the selectivity of the first of the two tuned circuits. The selectivity of this tuned circuit is governed by the aerial coupler which, if turned to the left (anti-clockwise), weakens signals but improves selectivity on that circuit. This aerial coupler is also used as a volume control. It is an old but extremely important rule that you should never apply reaction to a signal which is already strong because you will not improve selectivity, and you will only get distortion. When requiring maximum selectivity you should have the aerial coupler turned as far left as possible, so that signals are weak, and, when the normal anode reaction and the aerial reaction are applied, full but not unnecessarily large loudspeaker signals are obtained.

**Tuning-In the Stations**

A separate article on operation will be given next week, but it may be stated here that there are two tuning controls, one with the long pointer, which is the main tuning control, and the aerial balancer, which is a variable condenser which tunes the aerial circuit. The method of operation, once you have picked up a station and logged it by placing a dot on the dot line, is to turn the main pointer to that dot and then, having applied anode reaction, turn the aerial balancer knob until the desired station is heard. It is all extremely simple, and has proved itself as the best method of getting one-knob two-knob accuracy of tuning and good



**KEEP STRICTLY TO THESE PARTS**

Component	Make used by Designer
1 Coil Unit	Colvern—specify for "Super Centurion."
1 Main Tuning Condenser, .0005 mfd.	J.B.—as for S.T.800, but with S.T.700 knob and pointer.
1 Aerial Balancer Condenser, .0005 mfd.	J.B.—as for S.T.800 but with small knob.
1 .0005-mfd. solid dielectric Variable Condenser (Vol. control)	Graham Farish Litlos log mid-line as used in S.T.800.
1 .0005-mfd. Anode Reaction Condenser	Graham Farish Litlos log mid-line as used in S.T.800.
1 .0005-mfd. Aerial Reaction Condenser	Graham Farish Litlos log mid-line as used in S.T.800.
1 On/Off and Change-over Switch	Graham Farish Turret (with flanged nut as used in S.T.800).
1 Anode Reaction Choke	Wearite type HFJ.
1 Aerial Reaction Choke	Lissen type LN 5092.
1 .00005-mfd. Grid Condenser	Lissen mica.
1 .0003-mfd. By-Pass Condenser	Lissen mica.
1 1-mfd. Condenser	T.C.C. type 50.
1 1-meg. Grid Leak	Erie 1-watt.
1 L.F. Transformer	B.T.S. Midget.
3 4-pin Valveholders	Benjamin "Clearer Tone" (or "Vibrolders.")
6 Terminals ("A," "E," "H.T.+1," "H.T.+2," "L.S.—," "L.T.—")	Belling-Lee type R.
1 Panel (plywood) 16 in. x 12 in. x 7 mm.	Peto-Scott.
1 Easy-Cabinet, with G.B. battery spar.	Peto-Scott.
2 Aluminium Brackets	Peto-Scott.
1 Ebonite Terminal Strip 6 in. x 1 1/2 in.	Peto-Scott.
3 Wander Plugs ("Grid+," "Grid-1," "Grid-2")	Belling-Lee Midget 1019.
"Maxamp" Wire, Screws, Flex, etc.	Peto-Scott.
VALVES. V1, Hivac VP 215. V2, Gossor 210 RC. V3, Gossor 220 PA.	

**COMPONENTS FOR THE TRIPLE EXTRACTOR.**

1 Triple Extractor Iron-core Coil	Wearite.
3 .0005-mfd. Air Variable Condensers	Polar No. 4 with knob (mention S.T.800). J.B. "Popular Log" (without dial or slow motion, but with small knob). Ormond R.483 (log condenser) with small knob.
1 Wooden Box—5 wood pieces	Peto-Scott.
2 Terminals, A1, A2	Belling-Lee type R. Clix. Bulgin.

For constructional details of the Triple Extractor, readers are referred to "Popular Wireless" dated November 14th, 1936.

NOTE: Wearite supply the complete Triple Extractor, wired-up, for 24/-, the cost of the individual parts.

last two valves—are very cheap. In addition, there is the low upkeep cost, both as regards accumulator and H.T. and the very much greater certainty of good performance. In this connection experience has shown that the simpler the set the more certain it is to work well in all cases. It is certainly our experience that the three-valve set is almost entirely trouble-free as regards construction. The coil unit is of excellent make and completely free from any break-through on the long waves. Constructors in the North of England may therefore build the set with every confidence. Of course, the Triple Extractor will in any set cure all break-through, but a large number of people will not want to use the Triple Extractor, and may, in fact, not need it.

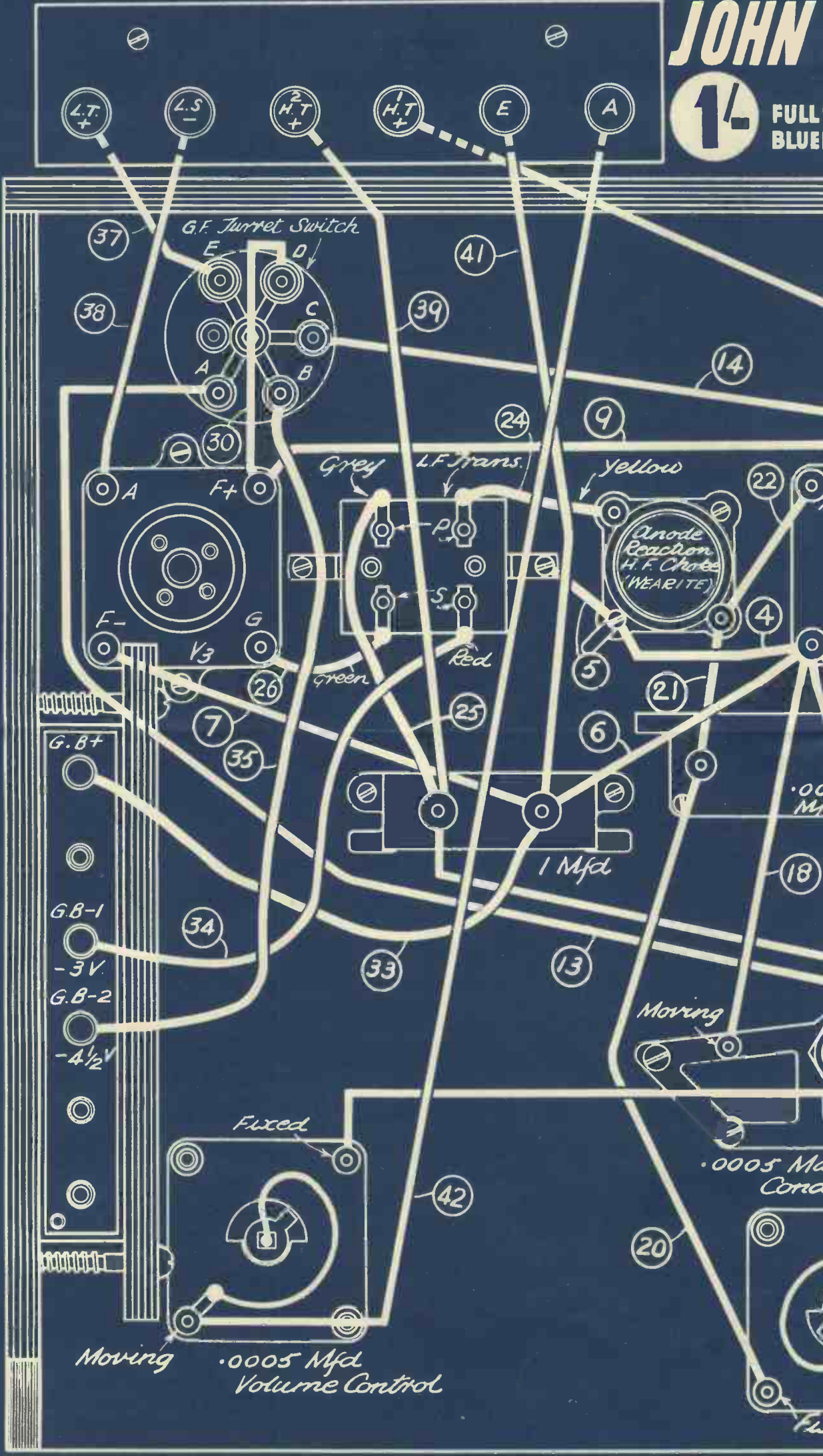
The coil unit is similar to the S.T.700, except that an

simplicity with selectivity.

The aerial reaction is truly miraculous in its improvement of the whole set but, of course, you can use the knob turned fully to the left so that very little aerial reaction is applied, and the set then becomes quite a normal three-valve receiver of good type. But aerial reaction enables one to use more aerial coupler, and therefore use the set in a more sensitive condition. This is a point very often overlooked. In order to get selectivity on the aerial circuit (even in the case of the S.T.800) you have to reduce the aerial coupler to reduce the losses inflicted on the first tuned circuit. In the case of the Super Centurion, however, the losses are wiped out

(Please turn to page 620.)

**A RECORD LOW-COST THREE**



G.B+  
-3V  
G.B-2  
-4 1/2 V

G.F. Turret Switch

L.F. Trans.

Yellow

Green

Red

1 Mfd

Moving

Fixed

.0005 Mfd  
Volume Control

.0005 Mfd  
Conda

L.T. +  
L.S. -  
2 H.T. +  
1 H.T. +  
E  
A

37

38

41

39

14

24

9

22

4

5

21

6

.00  
Mf

18

7

35

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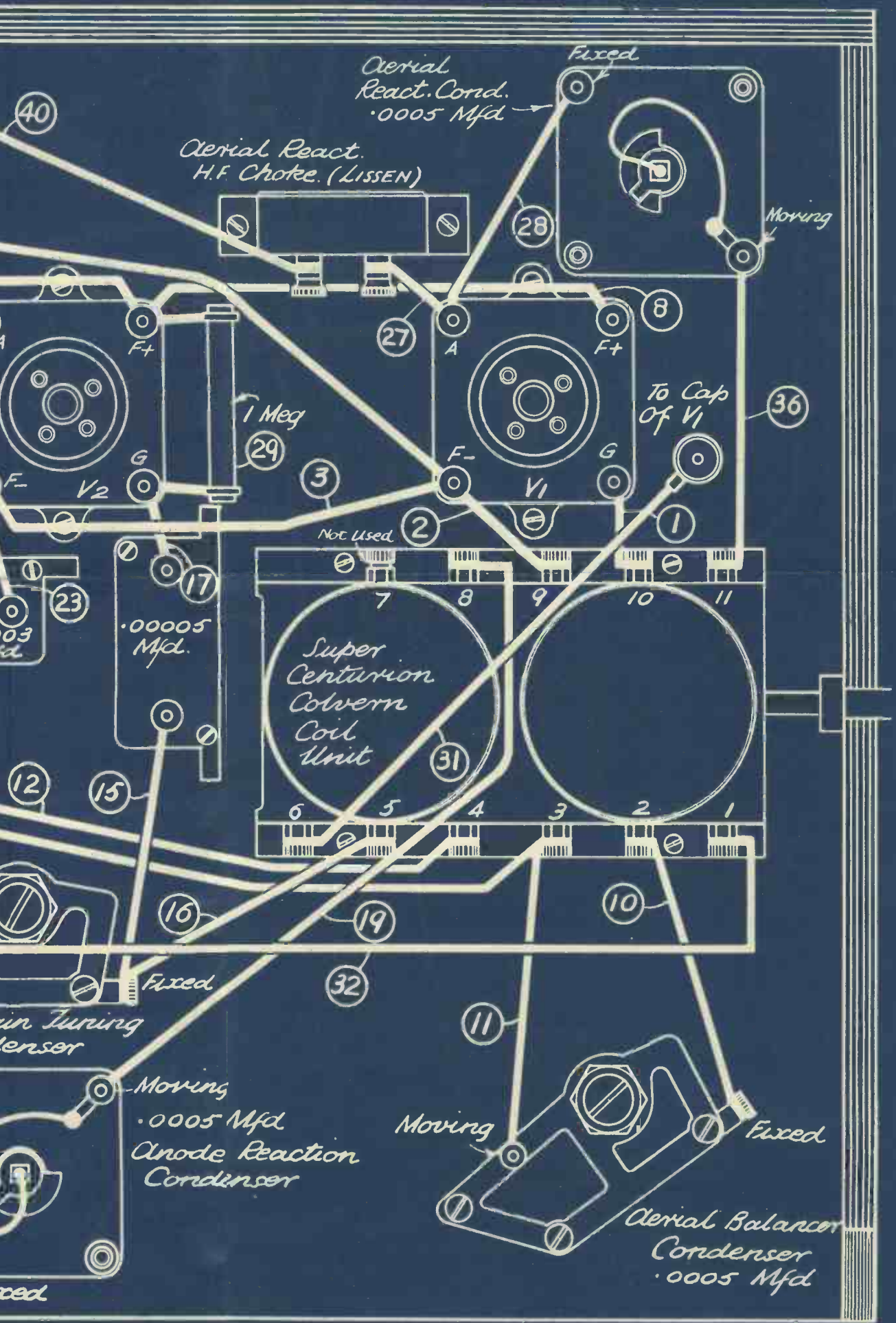
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Moving

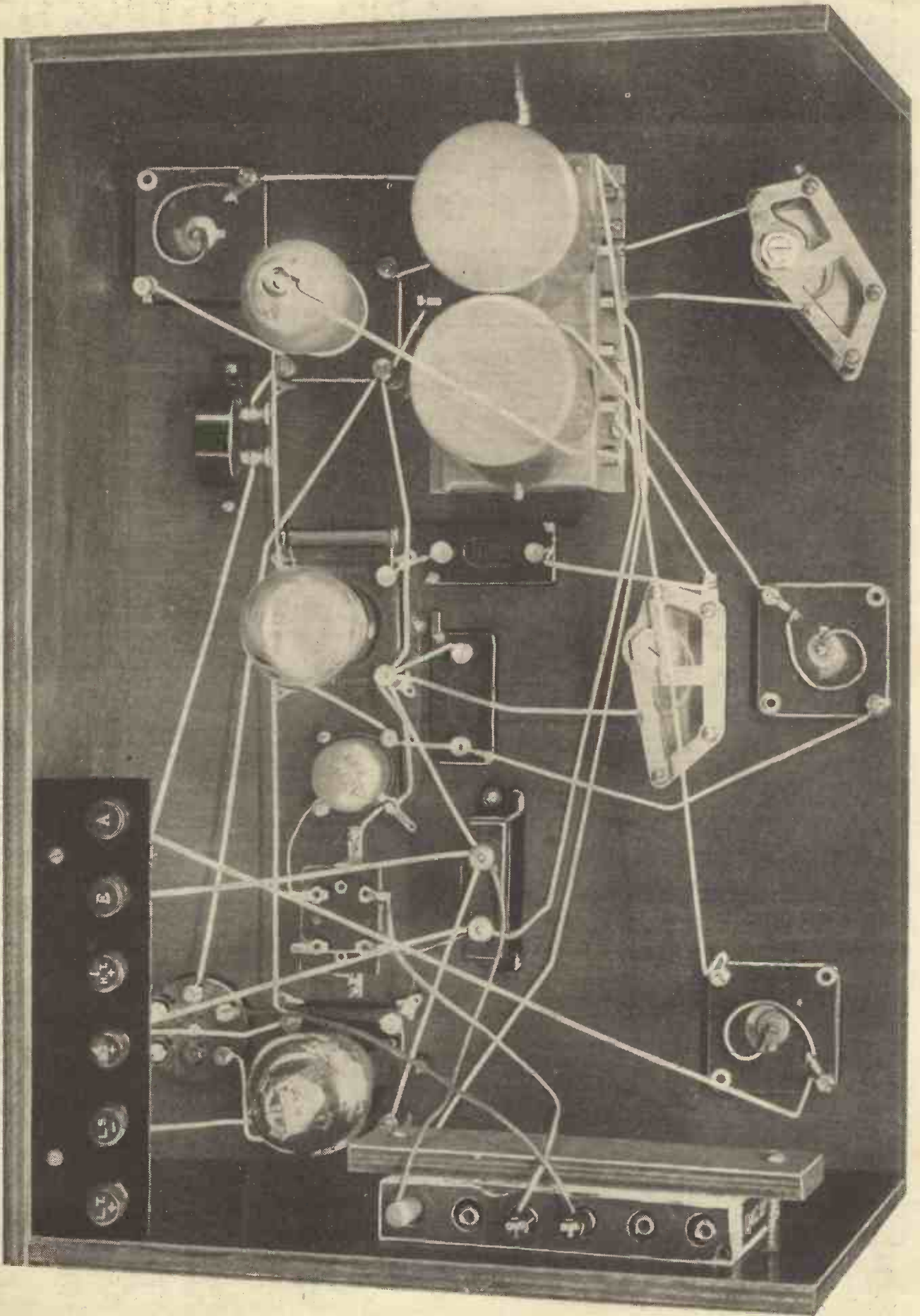
# SCOTT-TAGGART'S CORONATION SET

## Size 1003 PRINT The SUPER CENTURION

POPULAR WIRELESS  
FEBRUARY 13<sup>th</sup> 1937



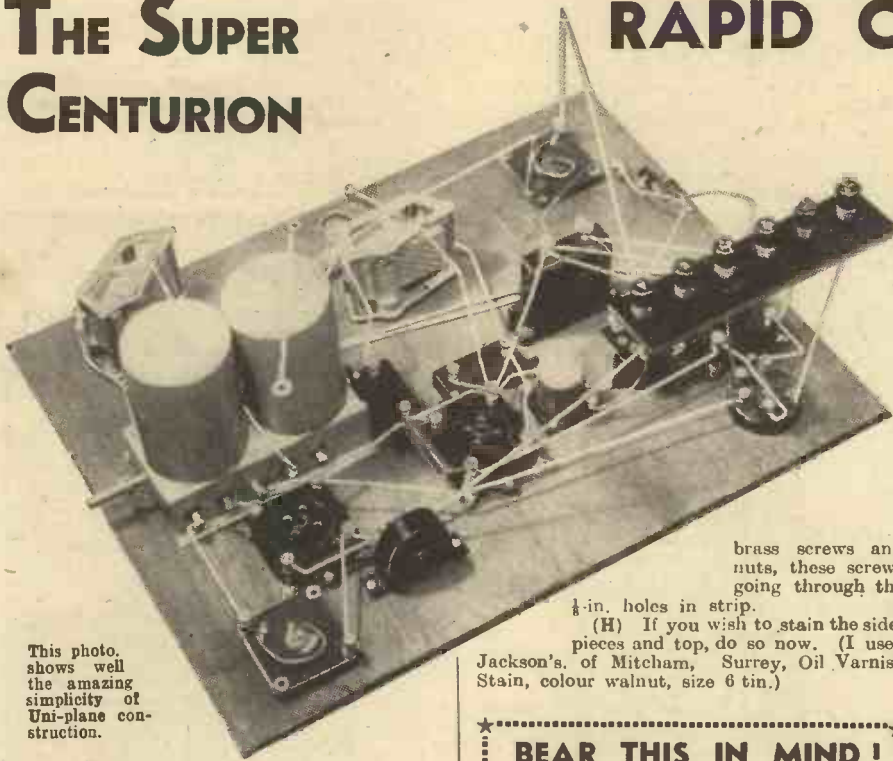
**THE SUPER CENTURION—MAGNIFICENT IN ITS SIMPLICITY!**



# THE SUPER CENTURION

# RAPID CONSTRUCTION GUIDE

## The Easy Way to Certain Success



This photo. shows well the amazing simplicity of Uni-plane construction.

brass screws and nuts, these screws going through the 1/4-in. holes in strip.

(H) If you wish to stain the side-pieces and top, do so now. (I used Jackson's, of Mitcham, Surrey, Oil Varnish Stain, colour walnut, size 6 tin.)

### BEAR THIS IN MIND!

The method of construction used in the Super Centurion is the simplest it is possible to achieve. In the Uni-plane system all components are screwed down on to a single straightforward wooden panel. The blueprint is therefore a true picture of the wires and tells you all you need to know.

You CAN'T go wrong if you follow the blueprint and this Rapid Construction Guide.

(J) Cut out, drill and stain the spar (see Fig. 5), which holds grid-bias battery in place.  
 (K) Lay the panel face downwards on a cloth-covered table (to avoid scratching veneer).

THIS Guide is as detailed as previous ones of mine, although the set is much simpler to construct. The absolute novice is told where to start and what to do, even to the best way of pushing in a pin! If you prefer, YOU CAN BUILD THE "SUPER CENTURION" FROM BLUEPRINT ALONE. But tens of thousands have reported that my Rapid Guides save them time and guarantee success.

If you have bought a complete kit, including my "Easy-Cabinet," cross out sections C, D, F, J, K.

(A) Collect and examine required components. Check each item to see that it corresponds to my list of parts actually used. Handle J.B. tuning condensers with care, keeping moving vanes closed. Bending of vanes would affect calibration of station names.

(B) Tighten terminal securing nuts (not terminal heads) on components where necessary.

(C) Using Fig. 1 mark out on the front (not back) of panel the positions of the holes. With a fine-pointed bradawl prick all the hole positions. Using a 1/8-in. twist-drill, start each 1/8-in. hole carefully, using light pressure and turning the drill in a reverse direction at first: this is to avoid splitting the veneer. Continue drilling these 1/8-in. holes in ordinary way. Centre-bits are recommended for all the remaining larger holes in panel, but twist-drills may be used. Drill these holes.

(D) If you are going to use my Easy-Cabinet system and have not bought the pieces ready prepared, carry out instructions in this section (D). If you have bought the pieces ready prepared, skip this section (D). Cut to size and drill cabinet top (Fig. 2), drilling 1/8-in. holes as advised above. Using the diagram on page 594 and keeping to the order of drawing the lines shown, mark out the cabinet side-pieces on the sides which will show.

(E) Take the left-hand (looking from front) side-piece and top-piece and hold them together and resting on a flat surface. Prick with a bradawl through the prepared holes in the top-piece into the top of the side-piece. Insert two 1/8-in. No. 4 round-head brass screws and screw top-piece to side-piece.

Now do the same with the other side-piece. Lay the assembled top and sides aside.

(F) Mark out and drill the terminal strip as Fig. 3. Prepare two mounting brackets as Fig. 4.

(G) Fit two mounting brackets to inside of the terminal strip using 1/4-in. 6BA round-head

Lay blueprint right way round on back of panel. Keep blueprint steady with a weight. Using bradawl, prick through to panel the fixing holes of all the components that go on the back of the panel. If in doubt about any holes, check by laying component over its picture. Remove the blueprint. Using blueprint as check for their positions, screw down the following in order given: Super Centurion coil unit with extension piece, 1/4-in. No. 4 round-head brass screws being used: three Clearer Tone Valve-holders (get them right way round), using 1/8-in. No. 4 round-head brass screws; two Lissen mica condensers, using 1/8-in. No. 4 round-head brass screws, taking extreme care that the right capacities are put in the right place, as these condensers look alike from the top; B.T.S. Midget transformer (right way round), using 1/4-in. No. 4 round-head brass screws; Wearite screened choke (marked H.F.J. although catalogued H.F.P.J.) with its earthing-tag to correct side as shown in blueprint, using 1/8-in. No. 4 round-head brass screws; Lissen H.F. Choke with 1/8-in. No. 4 round-head brass screws; 1 mfd. (T.C.C.) condenser, using 1/8-in. No. 4 round-head brass screws. Fit turret switch without knob. Fit volume control condenser without knob. Fit anode reaction condenser without knob. Fit aerial balancer condenser without knob. Taking care that the whole panel will not rest on the spindle of the J.B. main tuning condenser (whose moving vanes should be closed), fit the J.B. condenser (without knob and pointer) to panel, putting its bush washer on the front side of panel under fixing nut, which should not be too tight. THIS COMPLETES THE FIXING OF COMPONENTS.

Now you are going to wire the components, and for this you need the blueprint.

Lay panel face downwards resting it on two (Continued overleaf.)

### FRONT VIEW OF PANEL

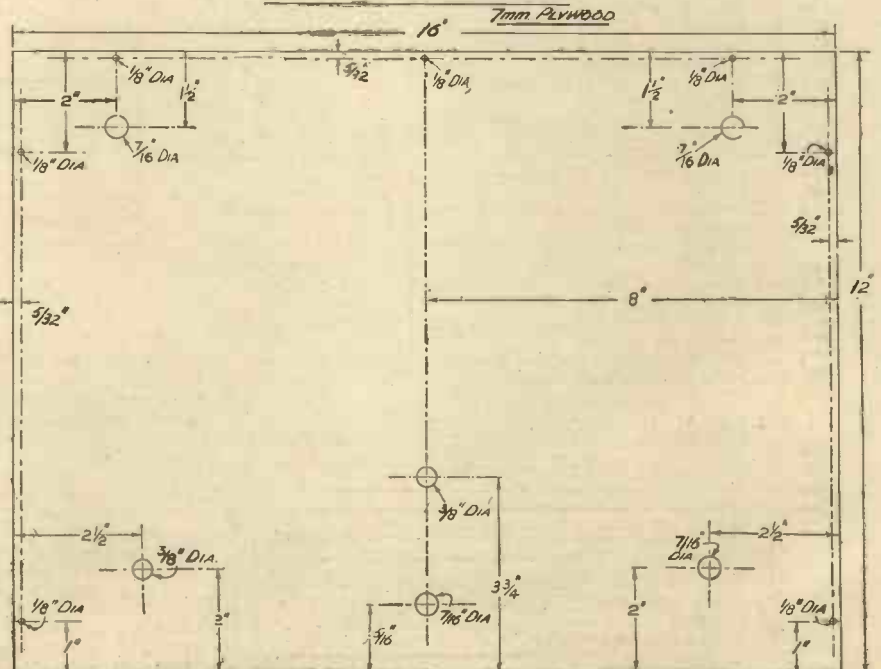


Fig. 1.—With the aid of this diagram, which it will be seen gives sizes of holes as well as their positions, drilling the panel is made as simple as the other constructional work.

(Continued from previous page.)

books or cloth-covered blocks of wood; this is to prevent scratching of veneer and to prevent pressure on control spindles.

The recommended wire is of the kind that permits the insulating covering to be slipped back, revealing the bare end of the wire. "Maxamp" wire by Peto-Scott is about the best I have tried, and is also of suitable thickness. It is strongly recommended as being very much easier to use than bell-wire or similar stiffish wires. My advice is to use it as follows:

Cut off 6-ft. lengths at a time from the coil as required. Push back insulation about 1 in. and, without increasing this inch, slide the bunched-up fullness of the insulating covering well back along the wire. Using only about 1/4-in. of the bared end, connect the wire looping it (preferably clock-wise) round under the terminal-head of the component to be wired up.

Shape wire along route indicated in blueprint with a reference, if desired, to the photographs.

Allow an extra 1/4-in. on the length of the wire for connection to the terminal it is going to. Cut through the insulated wire, slip insulation back 1/4-in. and, without increasing this 1/4-in., work the bunched-up fullness back along the wire, thus covering the bareness at the starting end. Now loop the finishing end (preferably clock-wise) under its terminal-head. This detailed account is of a process which actually takes only a few seconds and will enable you to do the wiring more neatly and in double-quick time.

(L) USING BLUE-PRINT, WIRE UP THE BASEBOARD COMPONENTS. Do not finally tighten any terminals until all the wires are on.

- (1) Coil unit terminal 10 to V1 valveholder terminal G.
- (2) Coil unit terminal 9 to V1 valveholder filament negative terminal.
- (3) V1 valveholder filament negative terminal to V2 valve holder filament negative terminal.
- (4) V2 valveholder filament negative terminal to anode reaction choke screen (fixing screw).
- (5) Anode reaction choke screen (fixing screw) to transformer fixing screw.
- (6) V2 valveholder filament negative terminal to 1-mfd. condenser.
- (7) 1-mfd. condenser to V3 valveholder filament negative terminal.
- (8) V1 valveholder filament positive terminal to V2 filament positive terminal.
- (9) V2 valveholder filament positive terminal to V3 valveholder filament positive terminal.

(10) Coil unit terminal 2 to aerial balancing condenser fixed vanes terminal.

(11) Coil unit terminal 3 to aerial balancing condenser moving vanes terminal.

(12) Coil unit terminal 4 to 1-mfd. condenser.

(13) Coil unit terminal 3 to turret switch terminal A.

(14) Turret switch terminal C to V1 valveholder filament negative terminal.

(15) Main tuning condenser fixed vanes terminal to .0005-mfd. grid condenser.

(16) Coil unit terminal 5 to main tuning condenser fixed vanes terminal.

(17) .0005-mfd. grid condenser to V2 valveholder grid terminal.

(18) Main tuning condenser moving vanes terminal to V2 valveholder filament negative terminal.

(19) Anode reaction condenser moving vanes terminal to coil unit terminal 8.

(20) Anode reaction condenser fixed vanes terminal to .0003-mfd. fixed mica condenser.

(21) .0003-mfd. fixed mica condenser to anode reaction choke.

(22) Anode reaction choke to V2 valveholder anode terminal.

(23) .0003-mfd. fixed mica condenser to V2 valveholder filament negative terminal.

(24) Yellow lead of L.F. transformer to anode reaction choke.

(25) Grey lead of L.F. transformer to 1-mfd. condenser.

(26) Green lead of L.F. transformer to V3 valveholder grid terminal.

(27) V1 valveholder screen-grid terminal marked A to aerial reaction choke.

(28) V1 valveholder screen-grid terminal marked A to aerial reaction condenser fixed vanes terminal.

(29) V2 valveholder grid terminal via 1-megohm to V2 valveholder filament positive terminal.

(30) Turret switch terminal D to V3 valve filament positive terminal.

(31) Coil unit terminal 6 to lead for subsequent connection to anode of H.F. pentode V1.

(32) Volume control fixed vanes terminal to coil unit terminal 1.

Two grid-bias leads are prepared as follows:

Take a suitable length of "Maxamp" wire, and prepare it as usual to have 1/4-in. of bare wire at each end. Bend one of the ends 1/4-in. from the end back on itself and push the loop so formed into the hole in the side of the Belling & Lee Midget wander-plug, having loosened the head of wander-plug. Tighten head of wander-plug. Fit other end of wire to correct component.

(33) An 8-in. lead connected to the 1-mfd. condenser and having at the other end a wander-plug marked Grid +.

(34) Connect red lead of L.F. transformer to G.B. -1 wander-plug.

(35) An 11-in. lead connected at one end to

turret switch terminal B and fitted at the other end with a wander-plug marked Grid -2.

(36) Coil unit terminal 11 to moving vanes terminal of aerial reaction condenser.

(M) If you have built the Easy-Cabinet frame (as I assume), fix the completed panel on the frame as follows:

Slacken grub screw on coil unit switch extension piece. Slip extension piece close to coil unit.

### THE EASY-CABINET

The Super Centurion is built into an "Easy-Cabinet," which consists of three pieces of wood—a top and two sides. All the constructor has to do is to screw these three pieces of wood to the panel, a matter of a few minutes' work, and then he has an absolutely complete receiver.

Take the panel and slip wave-change spindle through hole prepared for it in cabinet side-piece. Screw panel to frame, using 1/4-in. No. 4 round-head brass screws. Slip extension piece into position as shown on blueprint. Tighten the grub screw in the extension piece.

(N) Fit terminals in terminal strip. Fit strip to underside of cabinet top, using two 1/4-in. No. 4 round-head brass screws.

#### (O) COMPLETE WIRING AS FOLLOWS :

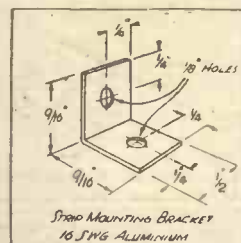


Fig. 4.—Two of these brackets are used to fix the terminal strip to the top of the "Easy-Cabinet."

(37) L.T. + terminal on strip to turret switch terminal E.

(38) L.S. - terminal on strip to V3 valveholder anode terminal.

(39) H.T. +2 terminal on strip to 1-mfd. condenser.

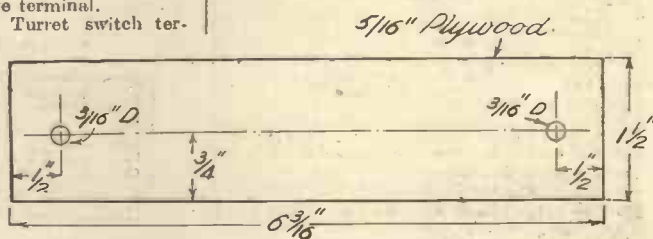
(40) H.T. +1 terminal on strip to aerial reaction choke.

(41) Terminal E on strip to 1-mfd. condenser.

(42) Terminal A on strip to volume control moving vanes terminal.

This completes the wiring.

(P) Mark in following manner the fixing holes for grid-bias battery spar, which clamps the battery to the left side of the Easy-Cabinet looking from the back. (Fig. 6.) Prick with Bradawl the lower-fixing hole, which is 1-in. up from the bottom edge of the side-piece and 2 in. from the back edge (farthest from panel). Slip a



#### G.B. BATTERY CLAMPING SPAR

Fig. 5.—The grid bias battery is held in place against one end of the "Easy-Cabinet" by means of this simple clamping strip.

1 1/4-in. No. 8 round-head brass screw through the hole in one end (either end will do) of the grid-bias battery clamping spar and insert the point of the screw in the fixing hole just pricked. Give the screw one turn to prevent its falling out. Swing the spar round until it is parallel to the back edge of side-piece. Holding spar against side-piece, prick through the other hole (in spar) into cabinet side-piece with Bradawl.

Insert a second 1 1/2-in. No. 8 round-head brass screw through the upper hole in spar into pricked hole in side-piece. Give this screw one turn to prevent its falling out. Slip spar along the screws and insert the 9-volt grid-bias battery between spar and side-piece of cabinet, with the battery sockets facing towards the back (away from panel) and the positive end of battery nearest top of cabinet.

(Please turn to page 620.)

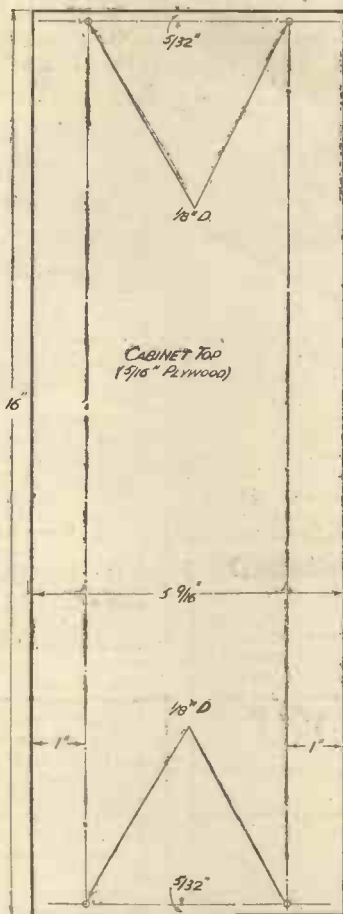


Fig. 2.—Details for preparing the top of the "Easy-Cabinet." Dimensions for the side pieces are given in the diagram on page 594.

#### TERMINAL STRIP (VIEWED FROM EITHER SIDE)

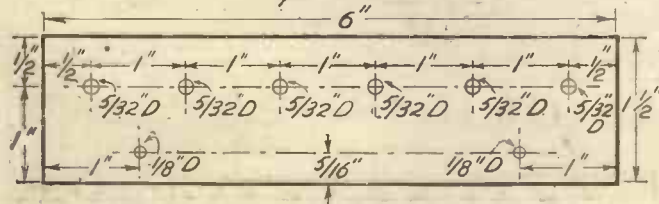


Fig. 3.—The number of terminals is kept to a minimum by making some of the battery-connections direct between the batteries themselves.

**Peto-Scott 1937 ALL-WAVE S.G.3 KIT**  
16-2100 METRES NO COIL CHANGING



World-wide programmes on all wave-lengths. Every constructor should build his own all-wave set and enjoy the thrill of All-Wave listening that will bring programmes from all over the world. Peto-Scott offer you a Kit which is, in the words of a famous designer, "An amazingly efficient yet simple to build Kit set."

**5/- DOWN**  
NO COIL CHANGING. LOW LOSS ROTARY SWITCH. PRESSED STEEL DRILLED CHASSIS. S.G. DETECTOR and PENTODE CIRCUIT. FULL INSTRUCTIONS and DIAGRAMS.

and 11 monthly payments of 7/3  
**KIT "A"** Cash or C.O.D. Carriage Paid **£3. 17. 6**  
Complete Kit of components, less valves and cabinet.

**KIT "B."** As for Kit "A," but with 3 recommended Hivac valves. Cash or C.O.D. Carriage Paid **£5/0/3**, or 9/- deposit and 11 monthly payments of 9/3.

**PETO-SCOTT SUPER SINGLE VALVE SHORT-WAVE KIT**



NO COIL CHANGING  
Wave range 13-74 metres. Easy to Build. Panel and chassis ready drilled.  
Slow motion 100 to Tuning  
Series Condenser eliminates blind spots.  
Plug in a pair of headphones and listen to broadcast programmes and amateur transmissions from all over the world. This splendid little valve short-wave set will delight and entertain you at all hours. Ample room on chassis for converting to a two or three-valve if desired.

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**KIT "A"** comprises complete Kit of parts with ready drilled Crystalline finish steel panel, grey stove enamelled steel chassis and all necessary screws with working drawings and operating instructions. Less valve and cabinet and headphones. Cash or C.O.D. Carriage Paid **£1/15/0**, or 2/6 down and 8 monthly payments of 4/6.  
● If required with valve and headphones **£2/6/3**, or 4/3 down and 11 monthly payments of 4/3.

**CONNECT THIS Peto-Scott SHORT-WAVE A.C./D.C. PRE-SELECTOR**



TO YOUR EXISTING SET and tune-in to America and the whole World on Short Waves. Only a few simple connections necessary and NO ALTERATIONS to your receiver. Incorporates special coil unit covering 13 to 74 metres, and is equipped with an arrangement whereby just a turn of the switch by-passes the Pre-Selector so that your set is then available for reception on normal broadcast wave-lengths. **SUITABLE FOR ALL RECEIVERS, A.C., D.C. OR BATTERY.**  
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● **B.V.A. VALVES.** Complete for A.C. or D.C. only with valves and cabinet illustrated **£4: 17: 6** Cash or C.O.D. Carriage Paid.

**BEAUTIFUL WALNUT VENEER CABINETS**



by Peto-Scott  
**RADIO CONSOLE**  
This latest Peto-Scott production is an outstanding example of the best cabinet craftsmanship, offered at a price that would be impossible but for our huge production and policy of selling direct. The illustration herewith can give but a poor idea of the truly lovely appearance of this exquisite cabinet. The cross banded and contrasting inlaid walnut veneered panels are relieved by narrow ebony inlays. Every cabinet hand French polished. Complete with shelf for receiver, and loudspeaker baffle board. The Cabinet is supplied undrilled. Drilling quoted extra.  
Cash or C.O.D. **57/6**

Overall Dimensions: 31" x 18" wide x 11 1/2" deep. Takes panel 14" x 7" and base-board 14" x 11". Speaker compartment 14" x 14" x 11".  
Or 5/- down and 11 monthly payments of 5/3.  
Carr. & Pkg. 2/6 extra.

**PETO-SCOTT PILOT AUTHOR KITS Exact to Specification**  
**SUPER CENTURION**  
**IMMEDIATE DELIVERY-CASH-C.O.D. or H.P.**

These are the parts SPECIFIED by Mr. JOHN SCOTT-TAGGART and CONTAINED IN KIT "A." Any items supplied separately. Orders over 10/- sent carriage and post charges paid.

- 2 Peto-Scott ready drilled and polished cabinet side pieces, cabinet top and grid bias battery spar with 6 screws ... 3 6
- 1 Peto-Scott ready drilled and polished panel, 16" x 12" with screws ... 3 3
- 1 Peto-Scott drilled terminal strip, 6" x 1 1/2" ... 8 6
- 2 Peto-Scott brackets with nuts and bolts ... 12 6
- 1 Colvern super Centurion Coil Unit ... 5 6
- 1 J.B. main tuning condenser with S.T.700 knob and pointer ... 4 6
- 1 J.B. aerial balancer condenser with small knob ... 5 3
- 3 Graham Farish .0005-mfd. log mid line condensers, S.T.800 type ... 2 0
- 1 Graham Farish turret switch ... 2 0
- 1 Wearite anode reaction choke, type H.F.J. ... 2 0
- 1 Lissen aerial reaction choke, type LN.5092 ... 6 6
- 1 Lissen mica grid condenser. .00005-mfd. ... 6 6
- 1 Lissen mica by-pass condenser, .0003-mfd. ... 2 6
- 1 T.C.C. 1-mfd. condenser, type 50 ... 4 6
- 1 B.T.S. Midget L.F. transformer, skeleton type ... 1 0
- 1 Erie 1-meg 1-watt grid leak ... 4 6
- 3 Benjamin 4-pin valve holders, Clearstone type ... 1 6
- 6 Belling Lee type "R" terminals, A, E, HT+1, HT+2, IS- ... 6 6
- 3 Belling Lee Midget wander plugs, Grid +, Grid-1, Grid-2 ... 1 7
- Maxamp wire, screws and flex ... 2 18 9

**KIT "A"** CASH or C.O.D. Carriage Paid **£2:18:9**

Complete kit of components exactly as specified by Mr. John Scott-Taggart, with ready-drilled panel and Easibuilt cabinet parts, but less valves, cabinet and Extractor Kit.

**5/- DOWN**

or 5/- down and 11 monthly payments of 5/4

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- KIT "CC."** As for Kit "A," but including set of 3 specified valves and S.T.800 type Console cabinet. CASH or C.O.D. Carr. Paid **£5/14/0**, or 10/6 down and 11 monthly payments of 10/6.

**● SUPER CENTURION FINISHED INSTRUMENTS ●**

**TABLE MODEL** Assembled and built by Peto-Scott experts exactly to specification and housed in S.T.800 type table model cabinet (illustrated below). Tested on broadcasting before despatch. Complete, but less batteries and **£5.16.6** speaker. CASH or C.O.D. Carriage Paid **£2 18 9** or 10/9 down and 11 monthly payments of 10/9.

**CONSOLETTA MODEL** Assembled and built by Peto-Scott experts exactly to specification and housed in S.T.800 type Console cabinet (illustrated below). Tested on broadcasting and supplied complete with Peto-Scott model 101 speaker, less batteries. CASH or C.O.D. Carriage Paid **£7.15.0** or 14/3 down and 11 monthly payments of 14/3.

**S.T. 800 KIT "A" CASH or C.O.D. 70/- OR YOURS 7/-**  
Carriage Paid

and 11 monthly payments of 6/4. Complete Kit of Components exactly as FIRST specified and used by Mr. J. Scott-Taggart with Konectakit (Gratis with Complete Kit) but less wander plugs, accumulator connectors, valves, Extractor Kit, Cabinet and Speaker.

- KIT "B."** As Kit "A," but including set of 4 FIRST specified valves only, less cabinet and speaker, etc. Cash or C.O.D. Carr. Pd. **£4/16/6**, or 9/- down and 11 monthly payments of 8/10.
- KIT "CC."** As Kit "A," but with valves and Peto-Scott Console cabinet only, with speaker baffle and battery shelf, less speaker, etc. Cash or C.O.D. Carr. Pd. **£6/11/6**, or 12/3 down and 11 monthly payments of 12/3.
- KIT "CT."** As Kit "A," but with valves and Peto-Scott Table Cabinet only, less speaker, etc. Cash or C.O.D. Carr. Pd. **£5/14/0**, or 10/6 down and 11 monthly payments of 10/6.
- KIT "CLL."** As Kit "A," but with valves and Peto-Scott Type "LL" Console cabinet only, with speaker baffle, less speaker, etc. Cash or C.O.D. Carr. Pd. **£6/14/0**, or 12/3 down and 11 monthly payments of 12/3.

S.T.800 EXTRACTOR is available as a kit of parts or ready built at the same price, £14/0. Cash or C.O.D., or add 2/3 to deposit and each monthly payment. Please state which is required when ordering.

**-S.T.800 FINISHED INSTRUMENTS IMMEDIATE DELIVERY-**

EXACT TO MR. JOHN SCOTT-TAGGART'S SPECIFICATION



**TABLE MODEL**  
Battery Version  
Built by Peto-Scott's expert technicians. Complete with FOUR FIRST SPECIFIED valves and Peto-Scott walnut table cabinet (illustrated on left), less batteries. **OVER-ALL DIMENSIONS:** Width 18 1/2", Height 14", Depth 12".  
Cash or C.O.D. Carriage Paid **£7:5:0**  
Or 13/3 down and 11 monthly payments of 13/3.

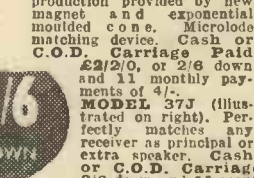


**CONSOLETTA**  
Battery Version  
Complete with FIRST SPECIFIED valves, Peto-Scott Type 101 matched speaker and walnut Console cabinet with Australian walnut-veneered front and wings (illustrated on left). Dimensions: 20in. wide, 24in. high, 12in. deep, less batteries. **Cash or C.O.D. Carr. £9:2:0**  
Paid **£9:2:0**  
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**-W.B. SPEAKERS-**



**MODEL 37SC** (illustrated on left). A cabinet instrument giving superb reproduction, with power handling capacity of up to 5 watts undistorted. The turn of a switch adjusts it to match any set made. With volume control.  
Cash or C.O.D. Carriage Paid **£3/3/0**, or 5/- down and 11 monthly payments of 5/9.



**MODEL 37S.** Amazing reproduction provided by new magnet and exponential moulded cone. Microloade matching device. Cash or C.O.D. Carriage Paid **£2/2/0**, or 2/6 down and 11 monthly payments of 4/-.  
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All Postal Orders should be crossed and made payable to Peto-Scott Co., Ltd. All currency must be registered  
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**Buy by Post-its Quicker-CASH-C.O.D.-EASISWAY**

# £3,000,000 WON'T GO FAR!

Says ALAN HUNTER

Although this sum, representing seventy-five per cent of the total licence revenue, may seem fully adequate for the B.B.C.'s needs it must be remembered that in order to meet the constant expansion and progress, necessitated by the desire to provide a still better broadcasting service, a very large expenditure is called for.

**T**HANKS to Lord Ullswater and his Committee, the B.B.C. now enjoys under its brand-new Charter an income representing 75 per cent of the total licence revenue. When, as will shortly happen, the eight-millionth licence is reached, the B.B.C.'s income will be the almost astronomical sum of £3,000,000!

A lot of money, you will murmur. Surely, with such an income, the programmes MUST get brighter and better! Assuming, of course, that it is lack of money and not lack of showmanship that has so far been the reason for so many dull items.

I have been looking into some of the outstanding commitments of the B.B.C. And as a result, I must confess to a sinking feeling. Even £3,000,000 won't go far on the present basis of expansion.

## Building the Framework

The trouble seems to be that the B.B.C., like the Universe itself, will keep on expanding. While the framework of the system is still being built up, there is precious little time—or money—to fill in the existing structure with the bricks and mortar of sheer programme improvement.

And yet, who shall blame the B.B.C.? Lots of people would blame it—have done so—if it called a halt to expansion. For lots of people, even to-day, are still without the elementary right of a reliable local signal, free from night-time fading.

That is why, on the present engineering schedule, I find so much development work that will have to be paid for during the coming year.

To begin with, there is the North Wales relay. Admittedly, it is only a 5-kilowatt station—but its station building, power supply, anti-near-fading aerial and engineering staff will add up to quite a pretty penny.

Not that I would deny the Welsh a place in the broadcasting sun. On the contrary, they have far too long been ignored, with only a fitful mead of attention from Droitwich National.

## New Short-wave Stations

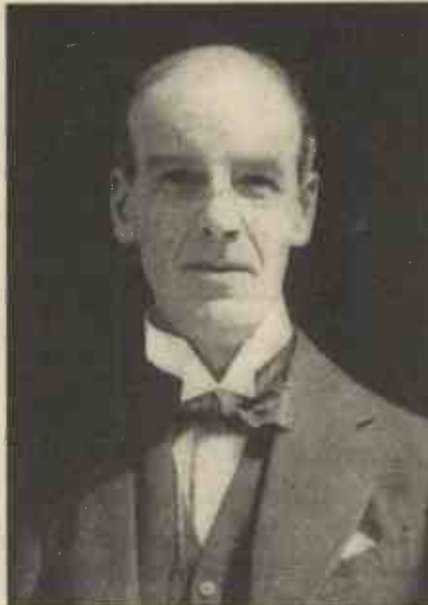
Then, before the Coronation in May, the B.B.C. hopes to open three high-power short-wave stations at Daventry. These, with a vast array of new aerials for semi-beam radiation to all parts of the Empire, will make a big hole in the Corporation's coffers.

We must have a "Voice of Britain," I suppose. Once admit the need for an Imperial broadcasting link, and you must go the whole hog in combating the fearful competition of other more propaganda-conscious countries.

Then, a little later, the B.B.C. will open the North-eastern Regional station at Stagshaw. This is to be a full-blown 50-kilowatt affair, with anti-near-fading

aerial of the mast-radiator type and all the other refinements of modern technique. Again, we must admit that Newcastle and Gateshead and all that highly populous district deserves every kilowatt it is shortly to receive.

## NEW ADVISORY COUNCIL CHAIRMAN



The Rt. Hon. the Lord MacMillan, new Chairman of the B.B.C. General Advisory Council. Lord MacMillan succeeds His Grace the Archbishop of York, who recently intimated that he could no longer continue to serve as chairman. The council's functions are, briefly, to advise the B.B.C. on any matter relating to its programmes, its publications and its general policy, and to promote among listeners a fuller interest in and understanding of the constitutional problems, policy and practice of the B.B.C.

But it represents yet another large capital expenditure, which as usual the B.B.C. will have to meet out of current income. If this were all, perhaps the huge licence revenue would be able to stand the loss. Unfortunately, it is by no means all.

In the current year television will make great encroachments upon the revenue. Exactly how great, no one—not even the B.B.C.—dares to estimate.

Here it might be argued that there is something inequitable in financing a television service for plutocratic Londoners with licence money paid over by millions of listeners who will not—for years, anyway—get the faintest chance to "look-in."

Some people suggest—rather fatuously, I think—that a separate licence should be issued for television. But it is absurd to

suppose that this would produce any immediate revenue for the development of the service. It is putting the cart before the horse, entirely.

Television cannot develop without large financial resources. If these are to come from special television licences it will never develop. No one knows which came first, the chicken or the egg; but it is a moral certainty that finance must come before television.

Besides, just as the B.B.C. has been given the responsibility for conducting the Empire Service, it has been charged with the sole responsibility for setting up a country-wide television service.

## Radio and Television Similarity

For the first years there is bound to be inequity, however rapidly stations for television may spring up. The position is entirely analogous to sound broadcasting, where, as I have said, there are even now listeners who—paying their licence money the same as everyone else—are without a really first-class local signal.

Meanwhile, all these developments are disquieting—not to say disappointing—to those who imagined that the new Charter would mean lots more money to improve the existing service in terms of better programmes.

The technical network is the means to the programme end; and while the network is still in process of construction—as, indeed, it is, after all this time—the means must tend to obscure the ultimate end.

Technical progress has always absorbed a large amount of B.B.C. revenue. It probably always will. Especially as London Regional—the first of the twin centres under the Regional Scheme—is now definitely obsolescent and will have to be replaced within two or three years.

## Lack of Accommodation

Quite apart from such capital expenditure that seems to have continually offset an ever-growing revenue, the B.B.C. has to face a chronic lack of administrative accommodation.

Having bought Broadcasting House lock, stock and barrel from a syndicate that started the phenomenal pile at Portland Place, it now has to envisage the expense of doubling the size of the present building.

Demolition work on the Regency houses adjoining the Big House is almost due to begin. It will take two years, says the B.B.C.'s Civil Engineer, to erect the extensions, which will contain huge suites of offices for the overflowing broadcasting bureaucrats, as well as still more studios.

Taking everything into account, then, it is obvious that the blessing of an increased revenue as bestowed upon the B.B.C. by a benevolent Government is—to say the least of it—a very mixed one.



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# TELEVISION TOPICS—Collected by A. S. Clark

A weekly feature which will keep the reader au fait with all the latest news and developments in television science. It will appeal alike to the newcomer to television and the advanced experimenter.

## "CAUGHT BY TELEVISION"

"CAUGHT by Television" is the name of a film that lives well up to its title. It is one that holds much of appeal to the television enthusiast, for the technicalities of the television apparatus are by no means based on the impossible.

The only point not clear, and it is one that can be forgiven in a film produced for entertainment, is that there are no signs of any aerial being employed either at the transmitter or the receiver. At the same time it is quite evident that a radio link of some sort is presupposed.

The parts in which a television camera is used to pick up scenes from a football match in a crowded sports arena are vividly reminiscent of photographs taken at the Olympic Games in Germany last year, and showing the television camera used then. Whether the "staging" of these parts of the film was inspired by the television at the Olympic Games it is difficult to say without knowing the dates when these scenes were shot.

### A Very Interesting Film

Though the receiver used a small cathode-ray tube, the pictures were produced on a screen somewhere about two feet by one foot six inches. So a cathode-ray projection system could be supposed.

Two comments, one made by the inventor and one by a non-technical director of a broadcasting firm, provided a wonderful satire on inventions as seen from different angles in real life.

The inventor, explaining his apparatus to a

friend, turns to the receiver and remarks: "This is the simplest form of television receiver." And later in the film, at a demonstration, the director just mentioned, casually looking over the gear, comments: "Complicated" in a knowing manner.

On the whole a most interesting film, well worth seeing.

## "TELEFRAMES"

### Items of general interest

#### PIONEER HONOURED.

MR. JOHN LOGIE BAIRD was recently presented with the medal of the international Faculty of Sciences, "in recognition of outstanding contributions to the science of television." He is the first British subject to whom the Faculty's medal has been awarded.

#### THE DIFFERENCE.

A good way of explaining the fundamental difference between ordinary broadcasting and television to the non-technical is to draw a comparison between the eye and the ear.

The latter accepts all sound waves, however complicated, as a single wave, pressure varying on the drum of the ear. The drum is connected to the brain by a single nerve.

In the case of the eye it deals simultaneously with millions of little sections of the picture it sees. Each little section is communicated to the brain by its own nerve, all these nerves together being like a



The final stage in the preparation of G.E.C. television cathode-ray tubes. One is seen being fitted into the metal container which protects it mechanically and also acts as an electrical screen.

multi-wire cable. Scanning has to be introduced into television to make it possible to do away with the multi-cable effect and to transmit a similar effect over one "wire," as in the case of the ear or sound.

#### MULTIPLE CONNECTORS.

Television experimenters will be interested to learn that Messrs. Bulgin have introduced some high-voltage multiple plugs and sockets for joining together the various units.

There is a six-way one for voltages up to 5,000 and a twelve-way one for voltages up to 2,500. The plugs in both cases cost 5s. 9d. each, and the sockets 1s. 9d. Both models are non-reversible.

#### TABLE TENNIS BROADCAST.

Table tennis champions will take part in a television broadcast on February 16th, when there will be an exhibition replay of the finals of the English Open Championships as played at the Empire Pool and Sports Arena, Wembley, a few days before.

In the afternoon, the present holder of the Men's Championship, A. Ehrlich (Poland), will be seen defending the title, and it will be interesting to note whether the same results will be achieved as at Wembley.

Table tennis is particularly suitable for television, it being possible to show the whole action without covering a wide area.

## TELEVISION FOR BEGINNERS

In this article G. Stevens explains in which way a vision receiver differs from an ordinary broadcast receiver.

WHAT is there special about a vision receiver? We might start a little earlier and say in what way does a short-wave receiver differ from a broadcast receiver? In the short-wave sets that you have seen described in "P.W." and elsewhere, there does not appear to be much difference except that the coils have less turns and the whole set looks a little neater than the usual run of "hook-ups." The reason for the coils is, of course, obvious, because the wavelength of a tuned circuit is proportional to the number of turns in the tuning coil, among other things, and you will find that the coil which tunes to about 7 metres has only four or five turns.

The neatness of wiring is an indirect sign of the difficulty in getting satisfactory results with short waves according to the conventional practice. If we wired up a short-wave set in the way that an ordinary receiver is wired without taking a special trouble, the chances are that it wouldn't work, or if it did, the results would be very poor. The reason for this is the extraordinarily high frequency of the radio signal which we are receiving. An ordinary radio broadcast signal of about 300

metres wavelength has a frequency of 1,000 kilocycles, i.e. a million cycles per second. Now a 30-metre signal, which is on what we usually call the short-wave band, has a frequency ten times this, or 10 million cycles, and a 6-metre wavelength on the "ultra-short" band has a frequency of 50 million cycles.

Every receiving set has capacity in it, either in the form of the tuning condenser or in stray capacity, that is, the small condensers which are formed by running a conductor near another with a thickness of insulation between.

#### Capacity Leakage

There are also the capacities between the electrodes of the valves—a very important factor because they are unavoidable and set a limit to the efficiency of the valve as an amplifier. Now you probably know that the "reactance," as it is called, of a condenser is inversely proportional to the frequency of the current through it. Reactance is another name for the effective resistance so far as the flow of current is concerned; and this varies with the frequency in such a way that the higher the frequency the lower the reactance.

Now let us see what happens when a high frequency potential is applied to a condenser. The capacity is, say, '00001 microfarads, a very low figure in ordinary practice. At 1-megacycle frequency the equivalent resistance to this capacity is only 16,000 ohms. But at 10 megacycles the resistance drops to 1,600 ohms, and at 50 megacycles it is only 320 ohms.

Leaving aside the tuning of the circuit, think of a lead running from one condenser to another close to a metal chassis. It is quite possible that the capacity of this length of wire is '00001 mfd., which means that at 50 megacycles we are in effect connecting a resistance of 300 ohms between a live point and earth.

No wonder the wiring of a short-wave set has to be carefully carried out.

Some of these stray capacities can be avoided, but those due to the valve electrodes are inseparable from the valve, and could only be got rid of by taking the valve out. From the practical point of view this means that there is always a lower magnification from a given valve on the short waves, and as the frequency goes up the amplification of the set decreases. This in turn may mean that we shall have to employ more valves to do the job. The only way in which we can make sure that the set is giving reasonable results is to make the connections between the component so short and space them so neatly that the stray capacity is kept down to a minimum. So when you wire up your short-wave set, think, as

you solder a wire in place, "another 100 ohms to earth," and you will remember to keep it short and well clear of the chassis.

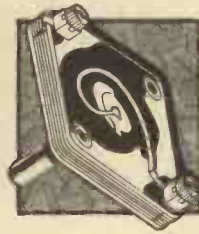
In the case of the vision receiver we have these troubles with us right through the set. In the broadcast receiver it is easy to draw a line between the radio side at fairly high frequency, and the audio side which comes after the detector and which has to handle currents of only a few hundred cycles. In audio frequency amplifiers we do not have to worry much about the losses, but only need concentrate on keeping the valves from oscillating or otherwise misbehaving themselves.

#### All Radio Frequency

Now in the vision receiver it is all radio. The band of frequencies for reproducing the half-tones of the picture requires at least two megacycles, so the radio frequency troubles are with us right up to the tube itself. In other words, the stages after the detector are radio frequency stages at only a slightly lower frequency than the original input stages, and we cannot use the word "audio" correctly. Instead, we usually refer to them as "video" stages, which is rather a neat word. The tuned circuits of the receiver will have to respond to this very wide range of frequency instead of the 10,000 cycles to which we are accustomed, and this will mean a special arrangement of tuner, which we can deal with next time.

# IT'S PERFORMANCE THAT COUNTS!

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been repeatedly specified  
by Mr. Scott Taggart.



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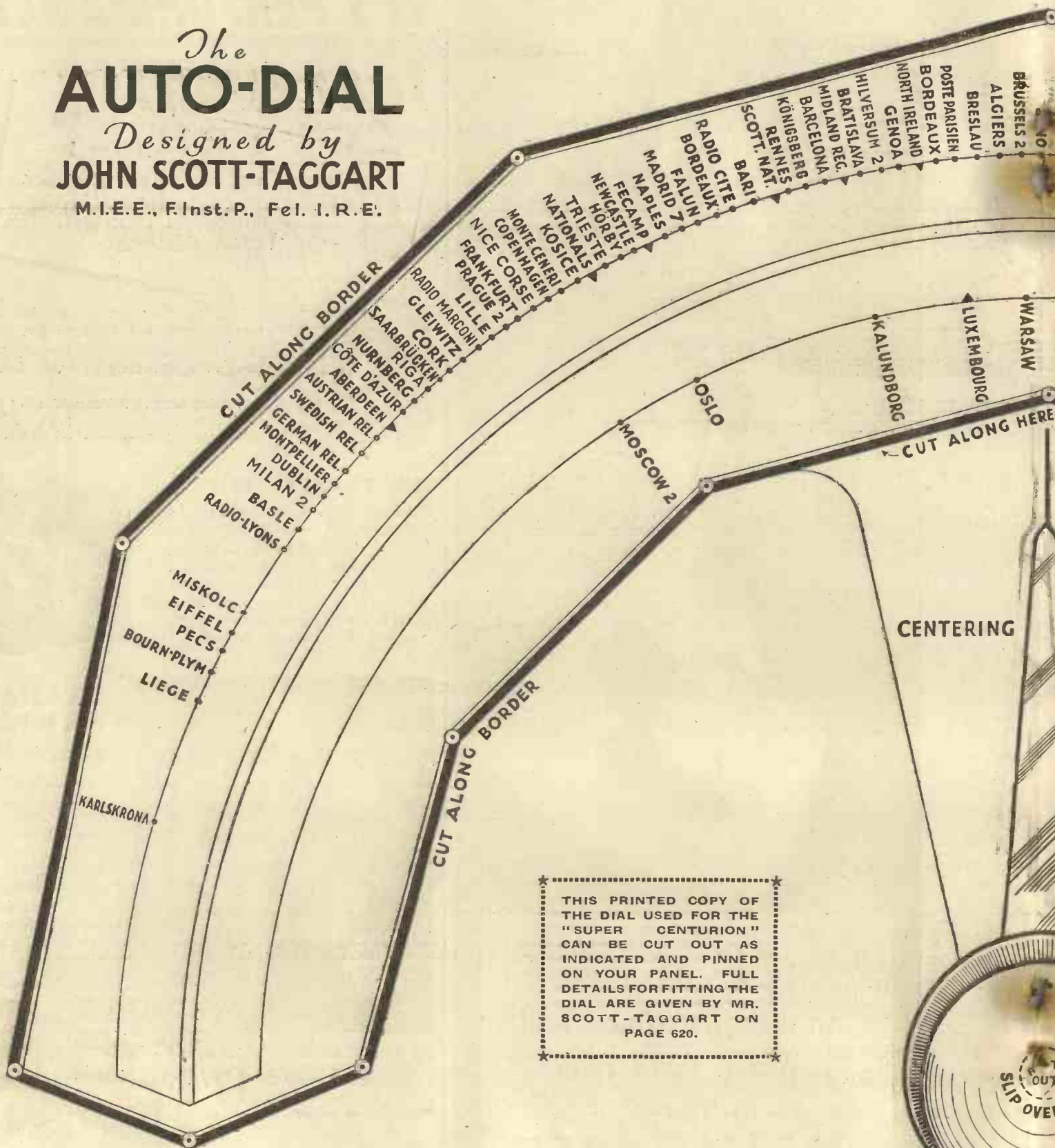


"I said it  
the very first time I had  
a Wills' Gold Flake  
... it's such a  
**CLEAN SMOKE**"

CLEAN AND SMOOTH TO THE PALATE

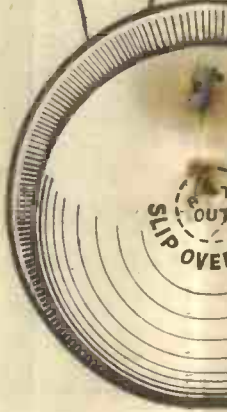
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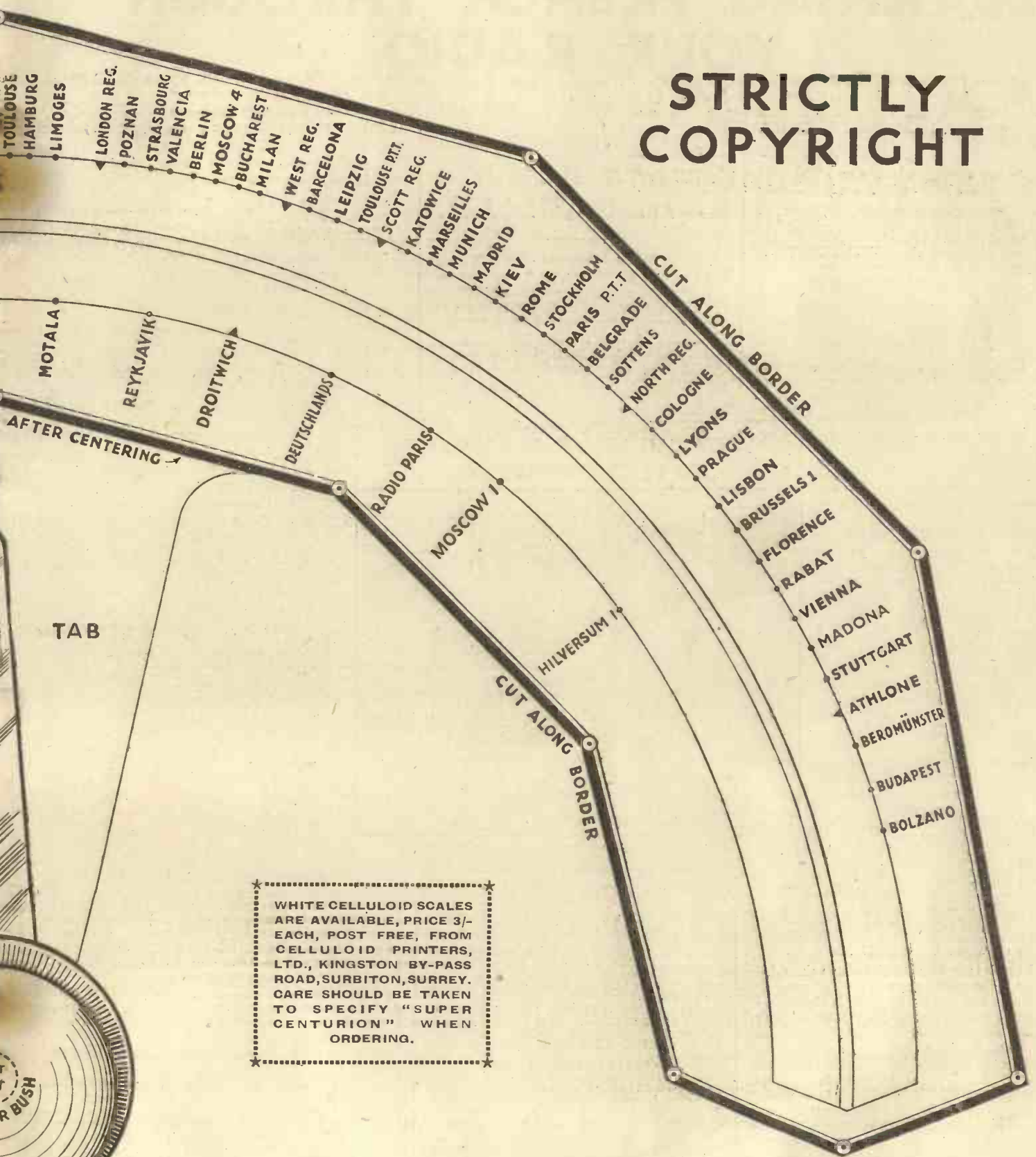


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# LEARNING FRENCH THROUGH YOUR RADIO

WE will begin with DEVOIR. As I told you last week, this verb is conjugated just like RECEVOIR. The difficulty with DEVOIR isn't the French verb itself, but rather the English translation of it. We use so many odd English words here—which could be aptly described as ORPHAN words—that at best they can only be equivalent words and not translations.

I will give you the NINE TENSES of DEVOIR first, and then the English for the same. Remember, DEVOIR is like RECEVOIR.

## PARTICIPLES : DEVANT DÔ

- TENSE No. 1  
dois, dois, doit, devons, devez, doivent
- TENSE No. 2  
devais, devais, devait, devions, deviez, devaient
- TENSE No. 3  
dus, dus, dut, dûmes, dûtes, durent
- TENSES Nos. 4, 5, 6, 7  
J'ai dû, etc.  
J'avais dû, etc.  
J'aurai dû, etc.  
J'aurais dû, etc.
- TENSE No. 8  
devrai, devras, devra, devrons, devrez, devront
- TENSE No. 9  
devrais, devrais, devrait, devrions, devriez, devraient

Now to grapple with the translation question. The first essential, I think, is to give the INFINITIVE the three meanings:

1. To have to
2. To "am to"
3. To "must"

Yes, I know that Nos. 2 and 3 do not exist in English. But we will take the liberty of coining them. Starting off, then, with these 3 English INFINITIVES, we get as adequate translations of:

- TENSE No. 1  
I have to, I am to, I must, etc.
- TENSE No. 2  
I had to, I was to
- TENSE No. 3  
I had to, I was to
- TENSES Nos. 4, 5, 6, 7  
I have had to (I MUST HAVE)  
I had had to  
I will have had to  
I would have had to (I OUGHT TO HAVE)
- TENSE No. 8  
I will have to
- TENSE No. 9  
I would have to (I OUGHT TO)

I think that most of the above should be clear, although the three phrases in brackets will puzzle you. It is these three phrases that make DEVOIR difficult. They are all very common expressions in English, and they are used just as frequently in French. That is why you MUST learn how to translate them. The three TENSES in which I have placed them above are just equivalents—the nearest equivalents. Try to remember this, then:

THERE IS ONLY ONE WAY OF TRANSLATING "I OUGHT" IN FRENCH, NAMELY, TENSE NO. 9 OF DEVOIR, i.e. JE DEVRAIS, etc.

From this it follows that "I OUGHT TO HAVE" IS TENSE NO. 7 of DEVOIR, i.e. J'AURAIS DÛ.

Part 47 of the special language series contributed exclusively to "Popular Wireless" by S. C. Gillard, M.A.

## TENSE NO. 4 IS THE BEST WE CAN DO FOR "I MUST HAVE."

I know from experience that DEVOIR is a terribly puzzling verb, but if you will learn how to translate I MUST HAVE, I OUGHT, I OUGHT TO HAVE, I am certain your main difficulties will vanish.

The next big thing to learn about DEVOIR is that IT IS ALWAYS FOL-

## AMERICAN SINGER BROADCASTS HER FLYING EXPERIENCES



Miss Joan March, the well-known American singer, has been engaged by the N.B.C. to give special broadcasts on flying. She is seen here just about to give one of her microphone talks.

LOWED BY AN INFINITIVE. DON'T LET THE ENGLISH MISLEAD YOU HERE! Look at the following nine sentences:

- Je dois PARLER—I have to speak, I am to speak, I must speak
- Je devais ALLER—I had to go, I was to go
- Je dus PROMETTRE—I had to promise, I was to promise
- J'ai dû PARTIR—I have had to leave, I must have left
- J'avais dû RÉPÉTER—I had had to repeat
- J'aurai dû INFORMER—I will have had to inform
- J'aurais dû INTERROGER—I would have had to question, I ought to have questioned
- Je devrai EXCUSER—I shall have to excuse
- Je devrais ESSAYER—I would have to try, I ought to try

Learn these nine sentences by heart, and APPLY THEM!

Now for the FAIR COPY of the sentences I gave you last week:

1. Je reçois des amis chez moi  
J'ai reçu des amis chez moi  
Je recevrai des amis chez moi

2. Vous ne nous décevez pas  
Vous ne nous avez pas déçus  
Vous ne nous décevrez pas
3. Il aperçoit mon erreur  
Il a aperçu mon erreur  
Il apercevra mon erreur
4. Conçois-tu des espoirs ?  
As-tu conçu des espoirs ?  
Concevras-tu des espoirs ?
5. Les recevons-nous ?  
Les avons-nous reçus ?  
Les recevrons-nous ?
6. Cela nous déçoit  
Cela nous a déçus
7. Ils reçoivent tout mon argent  
Ils ont reçu tout mon argent  
Ils recevront tout mon argent

8. Ne concevez-vous pas d'autres plans ?  
N'avez-vous pas conçu d'autres plans ?  
Ne concevrez-vous pas d'autres plans ?
9. Vous l'apercevez  
Vous l'avez aperçu  
Vous l'apercevrez
10. Le reçoit-il ?  
L'a-t-il reçu ?  
Le recevra-t-il ?

The test this week will be on DEVOIR. Translate into French:

1. You must imitate the pronunciation of the French announcers.
2. We had to listen to the station orchestra till 8 o'clock.
3. She had to do it immediately.
4. I have had to stay at home all day.
5. He had had to repeat it often.
6. They will have had to say it several times.
7. She ought to have isolated the patient.
8. We shall have to leave before midnight.
9. You ought to permit him to do it.

Fair Copy next week.

I am going to give you another list of words and phrases. Let us go for a stroll along a main thoroughfare of a big city. What shall we see ?

- Une grande place—A big square
- Les carrefours—The cross-roads.
- Une grappe de places—A cluster of squares
- Le centre d'animation—The centre of animation
- Le trafic—The traffic
- Une cohue de voitures—A solid mass of traffic
- Les lumières—The lights, illuminations
- Les buildings—The buildings
- De grande taille—Of big dimensions
- De petite taille—Of small dimensions
- D'autres édifices—Other buildings
- Les chefs-d'œuvre de la nouvelle architecture—The masterpieces of the new architecture
- Les silhouettes blanches, le jour—The white silhouettes by day
- Les silhouettes flamboyantes, la nuit—Flaming silhouettes by night
- Les autobus—The buses
- Les tramways—The trams
- Les stations de Métro—The Underground stations
- Toutes sortes de boutiques bordent les trottoirs—All kinds of shops line the pavements
- Les devantures étroites—The narrow shop fronts
- Les badauds qui se garent ou s'attardent—Shop-window-gazers who stand about or loiter
- Les magasins de modes—The milliners' shops
- Les magasins d'accessoires de toilette—Shops for toilet requisites
- Les magasins de beauté—Beauty parlours
- Les chemiseries pour hommes—Men's shirt shops

(Please turn to page 619.)

# PROGRESS IN TELEVISION

Technicians are constantly endeavouring to discover methods of simplifying television transmission and reception. One of the biggest advances would be the elimination of scanning, and below Carden Sheils discusses this problem, describing also a new and very novel scheme.

"TELEVISION," as the schoolboy said, "is much the same as ordinary wireless, except for scanning, which makes it a lot harder." And he certainly said a mouthful.

The difference between wireless for the eye, and wireless for the ear, is that the eye can only look at television signals on a surface having length and breadth, whilst the ear is satisfied to receive broadcast signals as a simple sequence of sounds. This is why in television we have to cut up the picture into small pieces at the transmitting end, and send the fragments one after the other through the ether. At the receiving end they must, of course, be re-assembled in their original order on the viewing screen.

## Doing Without Scanning

Hence, too, the need for transmitting two sets of synchronizing impulses in order to separate the picture signals into "lines" and "frames," as well as the necessity for using filtering-circuits at the receiver to keep all the different kinds of signals where they belong. Finally, it explains why a complicated time-base circuit is required to arrange the picture properly on the viewing screen.

Altogether it is no wonder that inventors have tried their best, ever since television first arrived on the scene, to improve or simplify the process of scanning. Some of them have even tried to get rid of it altogether.

The last idea may seem a bit too good to be true, yet it has, in fact, been tackled by those who are not in the habit of chasing will o' the wisps.

Without using any rotating disc, or rapidly-moving beam of electrons, the picture is first focused, as a whole, on to the flat cathode of a special type of transmitting valve.

## The Transmitting Tube

As shown in Fig. 1, the cathode C is made of photo-sensitive material. The grid G and anode A are also flat, and both are made of wire-mesh, so as to allow an image of the picture P to be focused through the lens L on to the sensitive "cold" cathode.

There are two special features about this valve. In the first place both the grid and anode are set slightly "askew," as shown in cross-section in the figure. Actually they are also inclined to each other in a plane at right-angles to the paper. The result is that for every point on the surface of the cathode C there is a different "spacing" or electrode-distance between itself and the grid G and the anode A.

The second point of interest is that the valve operates as a short-wave oscillator of the Barkhausen-Kurz type. That is to say, a high positive voltage is placed on the grid, and only a low positive (or zero) bias on the plate.

Now a valve biased in this fashion will generate continual oscillations, but—and this is the point—the wavelength it generates is determined chiefly by the spacing between the grid and anode.

Since, as already explained, this distance varies from point to point over the whole cathode, it follows that the valve will produce a band of different wavelengths simultaneously. Further, since the cathode is coated with photo-sensitive material, the number of electrons emitted will also vary from point to point, according to the light-and-shade value of the picture that is focused on it.

## AT THE RECEIVING END

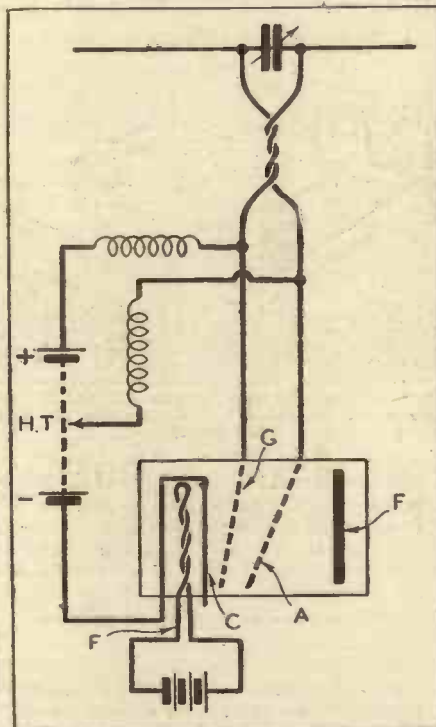


Fig. 2.—The scheme used at the receiving end. The incoming signals are applied across the grid and anode, these being inclined to each other as in the transmitting valve.

In other words, the valve generates a different carrier-wave for each point on the cathode, and at the same time modulates that wave with the appropriate picture signal. The complete picture is, therefore, radiated instantaneously, without any time-interval, however small, between one picture element and the next.

It is true that a wide band of frequencies is required to convey the picture through the ether, but this applies equally to any other system of television.

Fig. 2 shows how the signals are handled at the receiving end. In this case the flat cathode C is indirectly heated by the filament F, so that it normally emits electrons

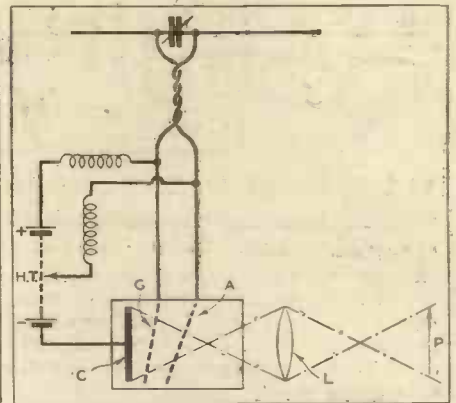


Fig. 1.—In this special transmitting valve the grid and anode are set slightly askew. The cathode is coated with a photo-sensitive material, and the number of electrons emitted varies according to the light and shade value of the picture focused on it.

at a uniform rate over the whole of its surface. The grid G and anode A are inclined to each other in the same way as in the transmitter valve, and the electrodes are similarly biased.

## Building up the Image

The incoming signals are applied across the grid and the anode, and each carrier wave automatically selects the point on the grid where the "spacing" favours its own particular frequency. In this way it controls the cathode emission at each point, in accordance with the received signal strength, with the result that the electrons form an image of the original picture on the fluorescent screen F.

Naturally there are difficulties still to be overcome before we can expect to see "television without scanning" in practical operation. But it is comforting to know that the problem is, at least, being tackled.

The method of projecting the picture, as a whole, on to a photo-sensitive electrode is also a feature of the Iconoscope system of television. There is, of course, no attempt made to radiate all the picture signals at the same time, but a definite advantage is gained by allowing the photo-electric voltage to build up simultaneously, over the whole surface, until it is collected piecemeal by the rapidly-moving electron stream used for scanning.

## An Accumulative Effect

In ordinary "spot-light" scanning, the picture voltage is generated by the swift passage of a single ray of light over the photo-electric cell. Naturally the photo-electric current so liberated is almost fantastically small, and requires enormous amplification. But by letting the picture "stay put" for a comparatively long time on a sensitive surface, and then sweeping up the accumulated charges by a rapidly-moving stream of electrons, a larger amount of signal energy is made available in the same scanning time.

Something of the same idea is also to be found in the latest form of light-valve used for building-up the picture at the receiving end. Instead of throwing each spot of light singly, and in turn, on to the viewing screen, a number are collected and projected together, so that they produce a more intense or brighter picture than is obtained by the ordinary method of scanning. This is one of the features of Scopphony television.

## ON THE SHORT WAVES

## POINTS from the POST-BAG

## W. L. S. Replies to Correspondents

THE whole bag seems to be full of letters on this terrifically important subject of QSL cards! Little did I know what I was doing when I spread myself on that tender subject. It has produced letters of all kinds; some sympathising with the poor amateur transmitter, who is so over-worked answering his mail; some calling me all sorts of names for belittling the craze for the transference of bits of paper from one part of the world to another.

Incidentally, my remarks have evoked from one reader the only really abusive letter that I ever remember to have received through "P.W."—a distinction, indeed. I can't attempt to repeat its contents here, but I will pass them on if you'll come so close that I can whisper in your ear. I imagine the reader in question must be an old seafaring man. If he isn't, he's done pretty well for a land-lubber.

## Four-pin or Six-pin Coils?

K. N. (Castlereas) is buying some short-wave coils in the near future, and asks whether the four-pin or six-pin type are the better investment. Of course, everything depends upon the circuit one decides to use; but the six-pin coils, obviously, will do all that the four-pin variety will do, and the third winding is there if one ever wants to use it for something else. For all-round experimental use and for playing about with different circuits there is no doubt that the six-pin coils give one more scope.

G 5 P B, of Barton-on-Sea, thanks me for "bursting into print about the QSL ramp." G 5 P B puts out phone on 40 and 20 metres, and, candidly, doesn't want reports from British listeners. He used to say so over the air, but, even so, his hall was full of letters every morning. He's been driven off 40 metres in sheer self-defence!

W. R. H. (Cardiff) has a "Simplex" Two to which he has added another resistance-coupled L.F. stage, and he now gets some twenty or thirty stations at full loud-speaker volume. He asks me whether I can recommend a book which explains all about radio, gives hints on fault finding, set construction, and information about components. Candidly, I'm afraid I haven't come across one that fills all his requirements and still can be recommended.

## Adding to The "Simplex" Two

W. J. W. (S.W.8) also has a "Simplex" Two, but he has added a buffer stage and a pentode output stage. He uses a moving-coil speaker for everything, and in the last three months of 1936 he received 177 short-wave broadcast stations from forty-three different countries in six continents. He adds that the set is entirely made up of junk (but I presume that it is "good junk").

To read about some of these superhets nowadays leads one to suppose that the cult of the straight set is dead. But it doesn't look much like it, does it?

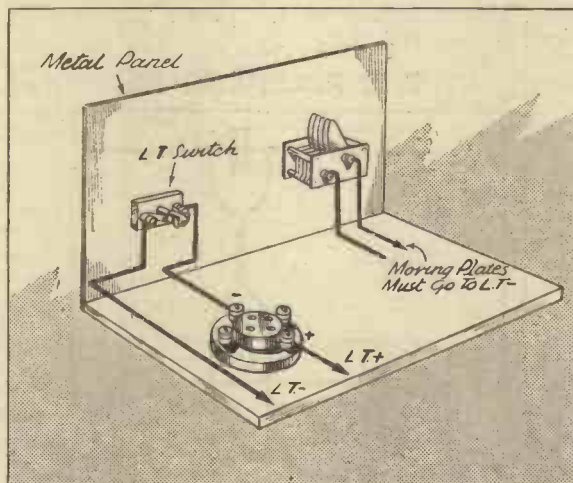
I should be interested to hear from other readers who are still using the "Simplex" Two. We might set about modernising it.

E. R. C. (W.1) tells me about some improvements he has made to his receiver by changing valves and by using a potentiometer return for the grid leak. He gets down to the television band with a straight receiver, and has received over 600 different stations (phone only, I presume). He wants a circuit of an H.F. unit (real 1937 fashion) in the near future.

## A Reader's Hartley Circuit

L. E. C. (Nottingham) has rigged up the Hartley circuit that I described recently, and seems to be properly tied up with it. He has three variable condensers in it; all three of them tune, and two seem to affect

## A SWITCHING TIP



When using a metal panel make sure your L.T. "on-off" switch is connected in the negative L.T. lead, otherwise you may short your battery.

reaction as well! But since one of them is in series with the aerial, and should be left severely alone, once its most suitable value has been decided on, I don't think he can be too badly off. At all events, his circuit values seem correct. I will try and cover this more fully in an early issue.

B. C. (Garstang) reports the old, old phenomenon, which crops up from time to time—two broadcasting stations coming in together when the coil of a short-waver is removed. This only happens when the H.T. is parallel-fed—otherwise the removal of the coil breaks the anode circuit and nothing can get through. With a broken grid circuit, in the old days, we used to hear Rugby piping away on his very long wavelength. Nowadays, with the broadcasting stations using so much more power than they used to, we generally get Droitwich and the nearest of the Regionals, together with any other local transmissions that are strong enough.

It's quite normal, so don't worry! Incidentally, I often get queries about these "quite normal" affairs, such as this: "When I touch the grid terminal of my detector I get an awful hum all mixed up with a kind of musical hum. What is the cure?" Only one cure, my lad—don't touch it!

## Short-Wave News

SO five metres has "broken out" at last! G 5 B Y, of Croydon, who has done so much pioneer work in the past, is reported to have been heard by W 2 H X D of Bronxville, New York. I seem to remember saying, about this time last year, that 5 metres was going to repeat the kind of performance that 10 metres was putting up then. This is the beginning. If there hasn't been a crop of 5-metre Transatlantic contacts by this time next year, I shall be more than surprised.

We are now in the thick of the B.E.R.U. Contest—that annual event that makes the amateur bands in February sound like the parrot-house at the Zoo! Every amateur in the British Empire seemed to be sitting on one weak signal that I was trying to resolve last week-end. Australians galore, a smattering of South Africans, and the usual crop of "Yanks" who think they're in the British Empire and reply to every call, are in evidence as usual.

## D.X. on 40-Metres

The 40-metre band is carrying a surprising volume of the DX traffic. It just shows what an excellent band "40" really is; for most of the year it's cram-full of locals, but when there is a real inducement to try it for DX work, it never fails to turn up trumps.

There's no doubt that 20 metres is the wavelength for all-round long-distance working, though. Ten metres runs it very close, but only when conditions are favourable, and when we are down in the next trough of the sun-spot cycle I have no doubt that "10" will be as dead as a door nail.

The news that W 3 X A L will very soon have a super-efficient beam aerial in action will cheer up European listeners, towards whom the said beam is directed. A tremendous increase in his power over here is anticipated, and this should be particularly noticeable on his 16-87-metre wave. W 2 X A D continues to be stronger and more consistent than W 8 X K; I imagine that the aerial system accounts for this.

## Strong American Amateurs

For real strength from across the Pond, though, we still have to fall back on some of the 10-metre amateurs, who really are fantastically powerful considering their equipment and inputs. Quite a dozen of them produce stronger transmissions in this country than the best of the American broadcast stations. If only someone would start up some high-powered broadcast on about 11 metres we should hear something.

It's rather late to mention it, by the way, but the R.S.G.B.'s 10-metre Trophy, awarded for the best work on the band during 1936, was won by Mr. D. W. Heightman, G 6 D H, of Clacton. G 6 D H was one of the most consistent stations on the band, and his signals could often be heard when there was apparently nothing to work with.

W. L. S.



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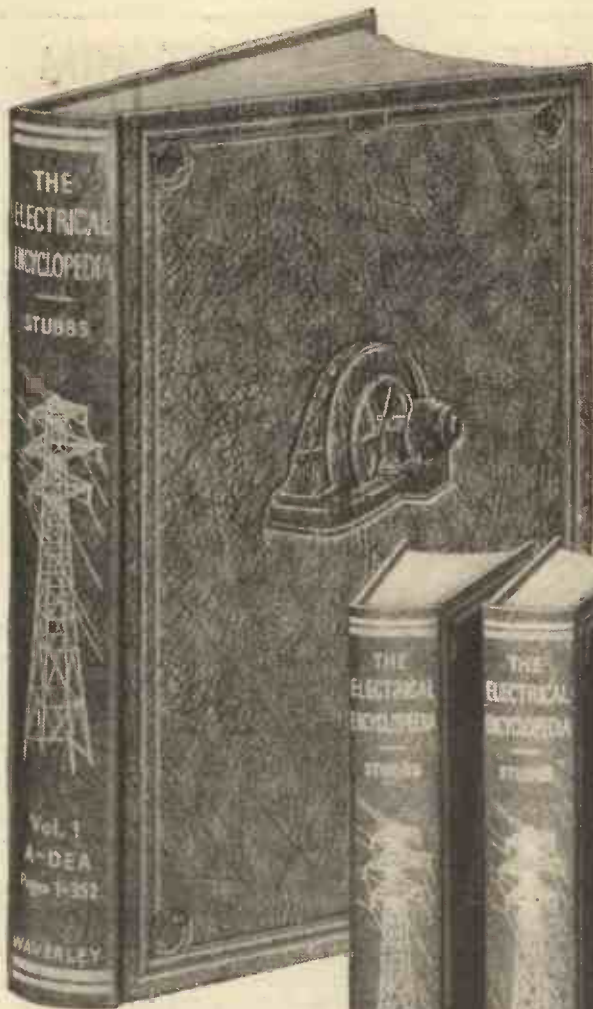
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# THE ANNOUNCER WHO KEPT HIS WITS ABOUT HIM

(Continued from page 589.)

## 600 Radio Sets Given Away

THE Dowager Empress of Japan—to whom be peace—has just made one of the most handsome gifts ever recorded in the list of radio benefactions. With a royal disregard of the cost she has given away 600 radio receivers.



Moreover, with unusual understanding, she has bestowed her bounty in the precise place where it will do most good, for the lucky recipients are all lighthouse keepers.

When he has trimmed the lamp and made his bed, the lighthouse-keeper has few distractions, and a spot of wireless is unto him as balm and honey. No matter how the tornadoes blow or the gales shake his sea-girt rock, he will always be able to hear the weather forecast.

## "P.W." Contributor Joins B.B.C.

THAT popular "P.W." contributor and radio journalist, Mr. Leslie Bailly, who has been Radio Editor and correspondent of many newspapers, has now gravitated to a post which promises well for us, for he has been appointed Assistant in the B.B.C.'s Variety Department.

Leslie Bailly is probably best known to the public for his "Scrapbook" successes, with Charles Brewer, but this is but one of L. B.'s many activities. I always had the feeling that one day we should B-B-see him on the staff, and now that the day has come we listeners can congratulate ourselves as well as him.

Let's hope he finds work congenial—and plays possible! We could do with some more from him pen.

## Band of Hope

SWOPPING experiences with a Surrey enthusiast the other day I nearly made myself promise myself to get myself an ultra-short-waver. For tuning there on the ultra-shorts seems to be the sort that crowds every hour of listening with expectation. It is often an exciting waveband, and always band of hope.



On several occasions the American ultra-short stations

have broken all the rules and arrived in this country, and one chap in the Midlands has reported that he has picked up the Moscow television transmissions on the ultra-shorts.

As Old Moore appears to have overlooked this particular subject I hereby prophesy that before the end of 1937 we shall hear a lot about this waveband, and that there will also be disorders in China. (I'm sure of the last part of my prophecy coming true for I have seen the casual manner in which the Chinese cook slaps up a meal!)

## The Koran From Cairo?

IN some American cities, and especially in Detroit, Mich., there are large communities of Moslems who are eager to hear the Koran read by the holy men of the Old World. For a long time there have been vague hopes, but now a scheme is being considered by the Egyptian Government which promises to fulfil the need.

The proposal is for a station of fifteen kilowatts or so, to be situated at Cairo, and to work on the short waves. It is calculated that reception in America should be reasonably reliable, and the Rector of El Azhar University, Cairo, is interesting himself in the scheme. A 100-kw. long-wave station is also being considered.

## MIKE SLIPS AND QUIPS

During an interview before the "mike":  
And in Hungary do the young people marry early or late in life?

Advertiser speaking of beauty preparation in sponsored programme:  
So remember, ladies, if you want a beautiful face you'll have to step on it.

Australian cricket commentator:  
Farnes played that ball to mid-off, where there was no batsman—er—fieldsmen, and they steal one

During Children's Hour:  
Has anyone got a rocking horse that the children have grown out of?

Just before the beginning of the broadcast of a wrestling bout:  
B—— is wearing no gown at all—just a towel round his head.

Commentator describing an opening ceremony:  
A lot of large—um, a large lot of people have assembled.

During a sponsored programme:  
and if your eyes need the attention of an optimist, you will be well informed of the fact.

## O.K. for Sound

DESPITE the theories and the pessimists the transatlantic route on five metres has now been proved possible for amateur communications.

Honour of being the first across goes to our old friend, H. L. O'Heffernan, who operates station G5 BY at Croydon, Surrey.

His American *vis-à-vis* was Victor Riebhausen, station W2 H X D, of Bronxville, New York, who was using a seven-valve superhet when he nearly fell off his chair on hearing a Britisher chirping away at 3.10 p.m. on December 27th.

Mr. Riebhausen's report tallied in every way with the transmitted programme, the time, the frequency, the matter sent, the method of keying (carrier-keyed) and the tone modulation frequency all checking up correctly. Congratulations to these modern Columbia!

## Radio's Rôle in U.S. Floods

IN the tragic story of the flooded Ohio, the dark record of loss of life was relieved again and again by instances of heroism—often connected with radio.

In communities where all normal means of communication had broken down, the radio link brought assistance again and again. There were some poignant messages to be heard on short waves while the floods swept down relentlessly, and the American

Radio Relay League (A.R.R.L.) has some wonderful new entries on its roll of honour.

May I hereby thank all the readers who sent me particulars of messages heard from the flooded areas? I hope that somebody in America will keep a record of the radio side of the 1937 floods; it would be an inspiring story.

## Nimble-Witted Announcer

IT was a lovely spring day in Havana, Cuba, and the announcer was sitting near the open window getting some of the morning radio advertisements off his chest. He was trying to put some pep into that thankless task, and he had just read out, "This wonderful new tonic is—" when a vagrant breeze whipped the paper from his desk and sailed it round and round the room.



Not having heard of the wretched tonic before, he could not improvise, so he had to retrieve the paper from under a corner piano. A minute later he reached the mike and said, rather breathlessly, "I had to pause a moment, folks, from sheer excitement at finding the very thing I have been looking for. You'll be just as excited when I tell you. This truly wonderful new tonic. . . ." and so on.

It takes an incident like that to prove if an announcer is captain of his fate.

## Look on the Bright Side

WE all know that the glowing impulse of Generosity should be tempered on the anvil of Tact. Remember that, and sort this story out for yourself.

A bedridden invalid was visited by a hearty neighbour, who bawled at the sick man that what he needed was a wireless set to cheer his lonely hours. The invalid, too dazed to protest, smiled wanly, and hoped to hear



no more of the project. Next week-end, however, in came the good neighbour with coils of wire and what-not. He placed a set by the bed, asked the poor bedridden chap to "Hold this aerial wire for a moment," passed the other end of the wire out of the window, and climbed on to the roof.

Somewhere on that roof there must have been a mains lead, for suddenly the invalid, who had not left his bed for years, was capering on the carpet with 240 volts tingling at his fingers!

No, sir. It didn't kill him. On the other hand it gave him a new lease of life. Though he had never expected to stand on his feet again he had actually danced while the juice was on! He is now having electrical treatment, and hopes one day to be able to carry his own batteries to the charging station.

ARIEL

# AN "O.B." IN THE MAKING

Mr. S. J. de Lotbinière, B.B.C. Director of "O.B.'s." reveals some fascinating "behind the mike" facts about this most important branch of broadcasting.

**W**ITHIN a few short weeks Room 251 at Broadcasting House will be exceptionally busy, perhaps the busiest in the whole of the great building. For it is the nerve-centre of broadcasts from the places where things are happening—big fights, the circus, fires, and so on—the office, den and conference room, in fact, of Mr. S. Joly de Lotbinière, Director of Outside Broadcasts; and the Coronation is going to give him and his department extra hard work.

Tall, quiet-voiced, fair-haired "Lobby," as he is to most B.B.C. folk who know him well, discussed in an interview some of the "behind the mike" scenes of an outside broadcast. "Firstly," he said, "it is necessary, and in most cases possible, to have two high-quality land lines from the control point of a big 'O.B.' to Broadcasting House. One of them will convey, in turn, the successive output of anything from 2 to 30 microphones; the other, used for maintaining contact with headquarters, and for cueing purposes, is also a useful reserve line.

## Different Types of Microphones

"On the occasion, for instance, of a Royal wedding, ten to fifteen microphones of types varying to suit conditions are distributed at key-points. One or two are for commentators and the rest for the service itself, or for outside atmosphere and effects. Each is connected by a special line to the control point, usually a hut or a room where the engineer in charge has a control for every 'mike.' One man alone must operate them, mixing and blending the incoming speech and 'atmosphere.' It is expedient, at times, so to synchronise the knobs that one pair of hands can, in fact, do the job. Thus one control knob may become the master of half a dozen, operating the other five. Actually, there is no limit, beyond the human capacity for control, to the number of microphones that could be used simultaneously, or successively. It is simply like adding books to a library.

"Now and again a situation occurs which makes a single outside control point impossible. For the broadcast of the funeral of King George V microphones were used at Westminster, in Hyde Park, at Windsor Castle and elsewhere. It was then essential to take the lines direct from each local control to Broadcasting House for final 'mixing.'

## The Crystal Palace Fire

"Although I should say that ten weeks is the ideal time allowance in which to arrange an outside broadcast, we obviously have often to work to a much 'tighter' schedule. When the Crystal Palace fire was at its height it took just two hours in which to make an 'O.B.' of it from the scene. The engineers tumbled into a taxi with their gear and, once there, they were lucky enough to find someone nearby who allowed them to use a private telephone line. The 'phone was disconnected and amplifiers,

a microphone and other apparatus installed. As a second line was not available for contacting Broadcasting House we had to do our cueing by listening to a radio set.

"Effects play a great part in enabling listeners to picture the scene of such a broadcast. Even the scream of the fire-pumps or, better, the roar of the flames eases the job of the commentator considerably. Sounds easily recognisable like the barking of a dog, the rumble of a train, the tearing crash of a plane propeller help listeners to get a vivid picture of many a feature. A broadcast from an observatory in which an astronomer is studying the moon through a giant telescope is very interesting to watch but difficult to describe so that listeners may enter the scene. Here even the monotonous ticking of the observatory clock, or the hum of the machinery that keeps the telescope trained

on its object, is invaluable 'atmosphere.' "Do people often try to gate-crash on the microphone? No, that very seldom happens. Everyone is very helpful as a rule. Sometimes a person will yell 'Send a message home to mother,' but that is all. No one could intrude for more than the few seconds it takes to realise what's happening.

## Finding Human Ghosts

"I remember that during an outside broadcast from a haunted house one microphone was twenty yards away from the building, and the person listening for 'sounds' suddenly caught faint whisperings. It might be the ghost, he thought. So, with torches, we went to investigate. We found two individuals overcome by curiosity lying full length on the ground. They were as surprised to find the cause of our visit as we were to find them.

"Wind is perhaps the greatest enemy of 'O.B.'s.' On the day before the last Grand National it was dreadful, and during the tests caused an insistent drumming noise. We had various protectors for the 'mike' but their use would have minimised the value of effects. So we were thankful that on the day of the race there was only the lightest of breezes!"



R. Heath Bradley; Principal of T.C.R.C.

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# RANDOM RADIO REFLECTIONS

By VICTOR KING

MINNIE—THE SINGING MOUSE :: THOSE RADIO  
PLAYS WITH MUSIC :: VIOLET RAYS AND INTER-  
FERENCE.

## MICE—AND WHAT NOT

IS it a beautiful thing that a mouse should be able to sing like a canary? Now wait a minute, don't answer that question until I've put forward A Point of View. You will know that all this mouse business started in America and that an ounce of teeth and whiskers in the form of an ordinary rodent with an extraordinary squeak—sorry, voice—is earning £7 a week giving recitals on the films and radio in the United States.

You will also know that an English "Mouse Melba" has been caught, but went all temperamental and wouldn't warble for the be-spatted boys of the B.B.C. (Perhaps she, it or he missed the homely environment of wainscoting and floorboards, or was dazzled into dumbness by such an array of Old School Ties.)

But you may not know that the poor singing Minnie has had all its glamour debunked out of it by a biological gentleman who states that the "singing" is merely a squeak gone wrong—through asthma. Not so good! We should sympathise with the wretched rodent and not admire it.

What about singing humans? May not those crooners and singers popularly held to possess "gifted voices" be regarded as abnormal? May it not be that their eppi glotti, tonsils, larynxes, and other bits and pieces are, I won't say diseased, but *abnormal* or *deformed*? May it not be a cause for congratulation if one's singing tones resemble those horrible noises which float from out of next door's bath-room windows on Saturday night?

I put it to you as an interesting speculation that the tenor, alto, or soprano of the future might find himself or herself in a medical laboratory for scientific investigation instead of receiving the plaudits of a bunch of bow-tied gentlemen in a concert hall.

## JUST SUPPOSE . . .

SOME intriguing fantasy reaches me from Mr. C. R. Jones, of Worthenbury, near Wrexham. He says:

"I have been looking over my old 'P.W.'s' and I came across your note about interplanetary radio in May 9th issue. Then in December 26th issue you told us about the experience with your television receiver. The magnified mothballs. The flashes. The smiling face. (The B.B.C. Drama Dept. should have done those last three sentences all in rising emotion and a crash of cymbals at the end.)

"Just suppose you were the first person on earth to see someone from another world. Very unlikely, certainly—but just suppose.

"Now, long and medium waves (sky waves) are reflected by the Heaviside Layer, and short waves go through that and are reflected by Appleton's Layer. Just suppose the reason that ultra-short waves are only received within a short radius from the transmitter is that the sky wave penetrates Appleton's Layer,

and there being nothing to stop it it wanders off into space, perhaps to be picked up by some other planet. If so, just think what a few thousand (or even million) kilowatts and a specially constructed aerial might do.

"Well, after that I expect you think I should be in the nearest asylum, or that I'm an old crank who gets messing around with dangerously high voltages and what nots. Well, perhaps I am and perhaps I'm not, but it seems to me as though television has brought up to something big at last. If so, won't the B.B.C. be proud? Why, they may not even condescend to broadcast to us at all. At any rate, who cares?"

Quite right, Mr. Jones, who cares? But, I say, *do they* broadcast to us, you and me and old Fred and his missus?

## RADIO PLAYS

ONE of my pet abominations is the average radio play with music. Usually the music is so poor that it isn't worth listening to, and the words just plain piffle. Apparently the way they are made (I can't use any other word) is that an idea is thought of, one man writes the "book" and someone else is brought in to compose the music.

But really good musical comedies cannot be built to order in such a way. The result is bound to be second-rate—unless first-rate writers and composers are employed. And, in my opinion, the B.B.C. hasn't got any.

If we have got to have musical comedy on the air (but I don't see why we should) then past stage successes should be used. But it isn't the right sort of material for broadcasting. Stage settings and choruses mean so much in musical comedy. O.K. for television, but not O.K. for sound only—unless it is good enough to hold by its music and words alone, and only masterpieces reach those heights.

Remember "Money For Jam," and "Mariana"? Crikey! Them was musical comedy, them *wasn't*. I'd rather listen to singing mice—providing they didn't sing.

## ROOM FOR THE DOCTOR

I HAVE just heard the details of an ELECTRICAL INTERFERENCE adventure. A listener in West London suffered simply horribly with burbs and burps. His neighbour did likewise, thought it must be his set and so sold it and bought a new one. The new set, being more sensitive, had the burbs and burps even worse.

Listener No. 1 wrote to Uncle P.M.G., who at once sent a squad of sleuths to investigate. And what did they find? They found a doctor plying violet ray,



Here is Herbert Geusch signing the radio contract for Minnie—whom you see in her glass-fronted case—while Robert Kendall of the N.B.C. looks on.

X-ray, and all sorts of things. So they managed to get the doctor to buy himself a metal-shielded room in which to conduct his necromancies. And they all lived happily ever afterwards. Moral: A sleuth in time saves nine pounds (or more) for a new set.

## WHAT AN ADVERTISEMENT!

THE quality of that telephony from an R.A.F. plane which was put on the air in a recent broadcast horrified me, as I expect it did many others. It showed up particularly badly against the first-class B.B.C. quality, and should never have been heard. One can only hope that some fault had occurred, for it seemed too bad to be true.

## WHAT'S THE IDEA?

EVERY day for over a week I have received an anonymous letter bearing a London postmark and containing nothing but a piece of paper inscribed "DD" in large block letters. Seems a foolish waste of pence and paper on the part of someone.

## THE TELEVISION TRANSMISSIONS

ISN'T it about time the B.B.C. let us have some official details about their television transmissions? I mean the way they are getting over. You may remember that in the earlier days of broadcasting they used to publish very full technical information about the radiations of the various stations.

Well, they ought to do that for Alexandra Palace. We should then know how these ultra-short waves are behaving. I fear that the absence of information is rather symptomatic of the present-day policies of the B.B.C. Engineering Department. It is drawing into its shell. Going all aloof from the public it is supposed to serve.

At one time it used to maintain a much closer contact with listeners by means of frequent talks on the air and friendly little publications. For an all-too-brief period the relations it preserved were almost ideal. I refer to the time when Capt. P. P. Eckersley was in charge.

It was a great loss to British broadcasting when P. P. E. left the Big House, for he is not only a first-class engineer but also a great personality.

FROM OUR READERS

LET THEM SAY  
WHAT THEY LIKE!

An opinion on the question of  
the censorship of talks.

The Editor, POPULAR WIRELESS.

Dear Sir,—As a nation we have always boasted of our right of free speech. Why is it, then, that directly someone broadcasts his own opinions from the B.B.C. there is immediately an outcry from a certain section of the Press because his speech has not been sufficiently censored?

The sermon broadcast by the Archbishop of Canterbury on December 13th last is a case in point. I am not concerned here with what the Archbishop said or whether he was right or wrong, but apparently it is considered by many people, and quite a large section of the Press, that even the head of the Church in this country must have his sermon "vetted" before we are allowed to hear it. To my mind this is an intolerable attitude to adopt. Surely we are capable of judging what is right and what is wrong, and if we do not agree with the speaker—well, there is the end of the matter.

Every newspaper I pick up contains quite a quantity of matter that gives me a pain in the neck, altogether apart from political opinions. Am I then to be an advocate for a censorship of the Press?

The fact of the matter is that we are spoon-fed far too much by the B.B.C. Why on earth should we not be allowed to listen to controversial subjects? It is only by hearing every side to a question that we are able to form our own opinions, but evidently it is considered that we should not have opinions of our own and should be treated as if we were a lot of infants.

The same papers that are making such a to-do about the Archbishop's speech not being censored, a short time ago were making a fuss because a Socialist's speech was said not to be his own because it had been censored. Do the Press really think they voice the opinion of the public? The man in the street doesn't really care twopence what the speaker's views are. He wants to judge them for himself. Evidently the Press think that nothing should be broadcast unless it is acceptable to everybody, which, of course, is the height of absurdity.

Yours faithfully,

A. H. SIMPSON.

Ward No. 4, Essex County Hospital, Colchester, Essex.

A GUINEA FOR  
SOMEONE

Each week we present a guinea to the reader who, in the Editor's opinion, sends us the best letter on any radio subject. So why not drop us a line?

Mr. A. H. Simpson, gets the guinea this week.

THE "BOW BELLS" RECORD

The Editor, "Popular Wireless."

Dear Sir,—The statement made by your correspondent, Mr. A. H. Barram, in his letter ("P.W." January 16th) concerning the "Bow Bells" record is correct. The B.B.C. inform me that the original recording, i.e., Columbia 4082, is still in use as the interval signal, but the Central Record Information Bureau say that this disc has now been withdrawn from the Columbia catalogue, and is replaced by Columbia DB.1637. Therefore, the original disc is no longer obtainable by the general public.

Yours faithfully,

D. W. ALDOUS.

Ilford, Essex.

AMERICA ON MEDIUM-WAVE TWO

The Editor, POPULAR WIRELESS.

Dear Sir,—I have recently become a reader of your excellent paper.

A short while ago I made a simple two-valver for the medium waves, winding my own coils and using my own layout. My aerial consists of about 15 feet of wire running diagonally across my bedroom. My earth, which runs about 25 feet, is attached to an upstairs portion of the water pipe.

About two weeks ago, I happened to wake up about 1 a.m., and, as the set was by my bed, I thought I would see if there were any stations still broadcasting. To my surprise I got several stations, and on two of these the announcer was speaking English with a very strong American accent. I heard these at moderate strength through the speaker, which is a W.B. Stentorian "Baby" (1935 model). I concluded that these must be American stations, and my belief was proved correct when the announcer

said something, which I did not completely catch, about the N.B.C. network.

I am, yours faithfully,

West End, Bruton, Somerset. A. QUINEY.

HOW LONG IS A RESISTANCE?

The Editor, "Popular Wireless."

Dear Sir,—Although I am only a baby as far as experience is concerned a rather amusing incident occurred in the local radio shop. I entered the shop to ask if the owner would oblige me by measuring a resistance which was causing a considerable amount of trouble in a set. The young man in charge took the resistance, straightened the ends to about at right angles to the body, placed it along a ruler and measured it. I know that it sounds a bit tall but it is perfectly true.

Incidentally I noticed that in a one-valver, connecting the 'phone lead remote from the anode to L.T.+ makes a little one-valver that works quite well without any H.T.

Yours truly,

A. L. GRAY.

26, Eaglesfield Road,  
Shooter's Hill, S.E.18.



Although of course some are keener on listening than others, of this you may be sure—the proud 1937 Stentorian owner can be lured from his radio only with the greatest difficulty. The new Stentorian (it is new—and remarkably better) gives the radio artist a better chance than ever before; for it brings his voice or instrument alive in the listener's home. Yet this triumph of technique costs no more than its predecessors.\* From 23/6 to 42/- for the chassis (or 29/6 to 63/- for the Cabinet Model) brings you a new radio delight and a new source of pride. Ask your dealer —to-day.

\* Models from 39/6 are available on hire purchase through your dealer — from 7/6 down.

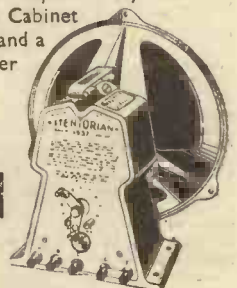


The designers of the 'Super Centurion', following the new universal practice, have exclusively specified a "Stentorian."

1937 STENTORIAN

The NEW Speaker

With the NEW realism



WHITELEY ELECTRICAL RADIO CO., LTD. (Information Dept.), RADIO WORKS, MANSFIELD, NOTTS.

## QUESTIONS AND ANSWERS

By K. D. ROGERS

# "SINGING ROUND THE RING" —A COMMON MICROPHONE TROUBLE

## MUSIC GOES ROUND AND ROUND

E. G. (Tottenham).—We wish to use a microphone and two loudspeakers in the same room. So far we have only succeeded in getting a howl, though the scheme works when the "mike" is taken into another room. We can get it to work if we turn down the volume control of the microphone to such a degree that we have to shout into it. How can we cure the trouble—it is an ordinary carbon "mike"?

That's a nasty one. You are asking for singing round the ring, as it is called, by having the microphone in the same room as the speakers. This is a very difficult thing to arrange, especially when the microphone is of the carbon variety.

Still, we will have a go at curing the trouble. Try fixing the microphone on elastic inside a box which is packed with cotton wool and covered with thick felt. It may make the "mike" sound a little dead, or even woolly, but it may also stop the trouble.

You could also try placing the speakers in the room so that some portion of the room is a dead spot, but this will be a difficult matter to carry out and will need a lot of experiment. The microphone would then be placed at the dead spot—still in its box, of course.

I won't ask what you want the microphone in the same room as the speakers for—that is your business. But it does not make sense to me unless you want to hear for yourself what your voice sounds like on the speaker. In that case, why not have one speaker instead of two, and so assist in the problem?

What you have got to do is to block the sound waves from the microphone as far as possible. If you yourself want to hear the speaker while you are speaking into the "mike," you are certainly giving yourself a problem.

## CUTTING OUT HETERODYNES

L. G. F. (Liverpool).—I am troubled with heterodynes on my set since I bought a new speaker. It is obviously better in the high notes than my previous make. How can I cut out the heterodynes without upsetting the rest of the high notes?

It is very difficult to do so without reducing the other adjacent high notes to some considerable extent. Personally, I prefer the type of heterodyne filter that can be tuned and is inserted in the anode circuit of one of the L.F. valves of the set. I assume that one of the valves in your set is resistance-coupled? If it is the filter will probably be more efficient, though it can be used in a transformer-coupled circuit.

The method I suggest is to join a .001 variable condenser and a .5 henry choke in series, and connect them across one of the L.F. valve anode resistances. Most of the trouble you mention will probably be found to be round about 5,000 cycles. If it is higher you will have to alter the series condenser or the value of choke.

Any good make of choke will do, but it should have as low a D.C. resistance as possible, and the condenser should be of good, reliable make. A mica preset will be quite satisfactory, and the capacity is adjusted until the whistle disappears or is reduced to a minimum. If it is very strong you may not be able to make it go completely, though you should be able to reduce it to such an extent that it no longer spoils reception.

## TOO MUCH HUM

J. W. (Sheffield).—I built the Paraphase Amplifier which you published last May. It

is an excellent amplifier and the quality is very fine. I find, however, that there is rather too much hum when the volume is turned up towards maximum. How can that be eliminated?

In the first place, I hope you are using a screened input lead to the amplifier. That, I have found, is necessary. Twisted flex does not do the trick anywhere near so well, and the input leads should be kept as short as possible—don't let them be more than 18 inches.

You can attack the hum from another angle, too. Try the effect of inserting a good, low resistance choke in series with the pot of the loudspeaker. The choke should be inserted on the rectifier side of the speaker feed in the positive lead and should be accompanied by a large condenser—4 to 8 mfd.

Make sure that you have the amplifier properly balanced by means of the resistance on the chassis. The control is critical and the rotation of the resistance, or potentiometer rather, is very small. You quickly go into and past the silent point when adjusting. If the amplifier is not adjusted properly you may get quite a lot of hum.

As regards your other question, I am afraid the issue of "P.W." you mention is not now

available. We have, however, other designs in mind which would suit your purpose, though it is not yet decided when they will be published.

You can attach practically any set to the amplifier by using a resistance shunt-feed method after the detector, but do not forget the importance of the screen leads into the amplifier.

Re the list of parts for the power pack you mention, you can obtain them by writing into the Query Editor of "P.W.," though he may not be able to provide you with the circuit and wiring diagram.

## HOME CHARGING

P. J. H. (Salisbury).—I run my set from the D.C. through an H.T. power pack. I have an accumulator for the L.T., keeping a spare one at the charging station. Could I insert this spare accumulator in series with the H.T. feed to the set and so keep it fully charged? Would this entail any damage? Would it run down by discharging through the eliminator? If I use a charger in series with

the electric light mains, will it cut down the light?

I am afraid you would not derive any benefit from placing the accumulator in series with the H.T. feed. The current passing in that feed is so small—perhaps only 20 milliamps, or at the most about 50—that it would not make any difference to the state of charge of the battery under a matter of several weeks or even months.

Just think of this. Suppose your battery is of the 30-ampere-hour type. It takes about 25 to 30 hours to bring it up to charge at one amp. Now place it in a circuit passing 50 milliamps or 50 thousandths of one amp. It will take one thousand divided by fifty times as long, or a matter of 500 hours at least!

It would not do any damage to itself or to the power pack, and it could be connected with the positive pole of the battery towards the H.T. + on the pack, but as you will see, it would be quite a useless thing to do.

The better plan is to have fitted a charging switch and fuse in the mains input to the house, on the house side of the meter, and to insert your battery there. It will reduce the voltage of the mains for house use by the maximum voltage of 2, so it will not make the slightest difference to the lights, except in theory of course.

That is why the scheme is called "free" charging. The reduction of electricity power for household purposes is so small that it is negligible—you cannot see any reduction of light, and you cannot detect any reduction of power as supplied to things like vacuum cleaners, sewing machines, electric irons and so forth.

Yet the whole of the electric current consumed in the house by these things has to go through the battery and so charges it up. But before you fit it make sure that you are not infringing any rules of the electricity supply people, and get an experienced electrician to carry out the fitting, making sure that it is quite safe.

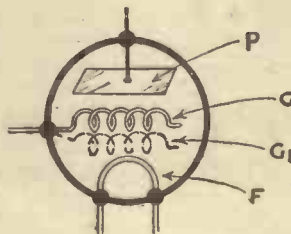
## THOSE AMERICAN VALVES

I seem to have raised quite a lot of interest by my recent paragraph concerning the efficiency of American valves. So far the majority of my correspondents agree with the statement that British valves are more efficient than American ones, valve for valve. But only one writer has pointed out the price discrepancy in the two makes of valves, and how that difference in price evens things up.

This is what he says: "There is no doubt about it, that valve for valve British valves are more efficient, but this may be a mixed blessing. On average it takes three American valves to do the work of two British, but since the American ones cost about half the price of the British ones the American valves are the more efficient. The actual amplification per stage is however less, and this is probably why the Americans manage to make their midget receivers reasonably stable."

## TECHNICALITIES EXPLAINED—No. 39

### Microphony



The term usually used to denote a noise being produced by a valve, the noise being in the form of a howl or buzz. It is due to slight movement of the electrodes of the valve, mechanical movements caused sometimes by vibration from external sources such as trams passing the house, or to the sound waves from the loudspeaker impinging on the valve.

Microphony is not nearly so prevalent to-day as it was years ago when the electrodes of the valves were not so rigidly fixed.

The sketch shows the main cause of microphony—movement of the grid G in relation to its spacing between filament F and anode P. Such movement causes a mechanical control of the electrons in the valve, for the grid's influence on the electron stream is dependent on the position of the electrodes in relation to the anode and filament. The nearer the grid to the space charge in the valve—round the filament—the more control has the grid on the electrons. G1 shows position (in exaggerated form) during one limit of the mechanical vibration.

**FOR YOUR BOOKSHELF**

A Valuable Guide for the Service Man—Wireless Engineering: An Authoritative Work — Nativity Plays.

HERE are two recently published radio works.

First, the "Wireless Servicing Manual," by W. T. Cocking, of "THE WIRELESS WORLD." This is a well-written handbook covering all aspects of fault-finding and the adjustment of wireless receivers.

The book commences with a chapter on testing equipment without which no service man can hope to carry out the necessary fault-locating tests expeditiously and logically.

Following on this is a comprehensive treatment of the methods of procedure for tracking down all the troubles likely to be met with in practice.

There is a chapter on the adjustment of ganging—a most useful feature in a book of this nature, and another chapter on short-wave receivers as well as valuable information on loudspeaker faults.

The "Wireless Servicing Manual" is published by "The Wireless World," Dorset House, Stamford Street, London, S.E.1, and costs 5s. It is a reliable guide which will be found of great value by both amateur and professional.

"Wireless Engineering," by L. S. Palmer, D.Sc., Ph.D., F.Inst.P., M.I.E.E., is the title of a revised and enlarged edition of "Wireless Principles and Practice," by the same author. It is intended mainly to meet the requirements of electrical engineers who wish to become conversant with wireless and also to cover the ground required by students preparing for university degrees and for the wireless examinations held under the auspices of the City and Guilds Institute.

As is only to be expected, in a work of this nature a certain amount of mathematical treatment is included. Generally speaking, the standard of mathematical knowledge required is that which would be attained by a third-year engineering student.

There are over 500 pages of reading in this authoritative work, and the theory of radio is covered in a very thorough manner.

For those who have had some initial training in the basic principles of electrical engineering this text-book is excellent. It must be understood that this is a book on wireless in its broadest sense, and this includes directional wireless and beam transmission.

The price of "Wireless Engineering" is 21s., and it is published by Longmans, Green & Co., 39, Paternoster Row, London, E.C.4.

**THE INN AT THE END OF THE WORLD** and Other Plays of the Nativity. By J. Howard Whitehouse (Humphrey Milford, 5s. net.)

This volume comes from the Warden of Bembridge School, and is the crystallisation of an interesting experiment. Four years ago he wrote a Nativity Play for the boys of his school to perform at Christmas. Each year since, he has written another play, and four of them are now published.

In the stage production of each play he invited the collaboration of the head boy of the school. The Warden's object was to encourage interest in the drama and to give the boys practical experience in the writing of plays.

With the publication of this book, which is tastefully printed and includes certain carols, and woodcuts as illustrations, the experiment may now have a wider scope. Other headmasters and teachers, seeing this review, may resolve to buy a copy of the book, and either use these plays for production at their own schools or make them the basis and inspiration of other and original plays.

Throughout, the little dramas are couched in simple but vigorous Anglo-Saxon, and the treatment is imaginative, the author having filled in the historical background

with details which if they are not history might easily be so.

There is a picturisation of the journey of Mary and Joseph to Bethlehem and events that befell them as wayfarers. There is colourful treatment of the innkeeper, the shepherds and the wise men in relation to the birth of the Christ Child in the stable. The book is a reverent, imaginative and artistic piece of work.

**NEXT WEEK**

Another article by

**JOHN SCOTT-TAGGART**

on the

**SUPER CENTURION**

# HIVAC

**VP215  
(4-Pin)**

*Chosen by Mr. J. Scott-Taggart*

**FOR THE "SUPER CENTURION"**



This is the valve which was specially developed for S.T. Receivers. It is unquestionably the most perfectly shielded valve of its type on the market. Thousands are in use in the "S.T.600," "S.T.700," "S.T.800" and the "Centurion."

Ample stocks of the HIVAC VP215 are available for all builders of Scott-Taggart's "Super Centurion." Dealers can secure additional stocks from us by return of post.



**THE SIGN OF A GOOD VALVE**

Have you had particulars of these types?

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Details of all Hivac types free for postcard.

HIVAC VP215

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Obtainable from all dealers; if any delay, order direct.

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# SEEN ON THE AIR

News and Views on the Television Programmes by our special radio-screen correspondent

L. MARSLAND GANDER

A READER of these notes challenged me the other day. "You constantly criticise the television programmes," he said. "What constructive ideas have you to offer?"

He went on to observe that a great deal of listeners' money was being spent on these programmes which were at present for the delectation of the few. Listeners in Yorkshire, Scotland, and Lancashire were, in fact, contributing to the cost of an entertainment which they could not share.

In any case, he said, television is a rich man's hobby, with sets costing £100 each. Why should the artisan be mulcted to provide further delights for the jaded palates of the wealthy classes? And so on.

Well, to take the last point first, I well remember the day when a good 8-valve superheterodyne, with its innumerable knobs, cost from £80 to £100. To-day a far better instrument with one main control covering a wavelength range, short, medium, and long, costs about twelve guineas. But if we had never had the £80 to £100 curiosities of 1922-26, we should never have had the twelve-guinea marvels of to-day.

## Evolution Cannot Be Skipped

Television cannot skip any of the stages of evolution.

The £100 set of to-day is beyond doubt the forerunner of a £12 set of the future. We cannot see how this is to be done. But neither could we see way back in 1926 how the £80 sets could possibly come to be sold for £12.

If the artisan of a few years hence is to have his cheap set the programmes must be made sufficiently attractive to keep the wheels of the industry turning, to create a demand which in turn will lead to mass production and lower prices. The artisan listener, the listener in Scotland, Yorkshire and Lancashire is, in fact, investing for the future.

Is television worth all this money and effort? I can only say that when I have a television set to hand and an ordinary radio set alongside I never dream of looking in the programmes to see "what is on the radio." My first mental question is always: "What is on television?" Watching television, like many other occupations, is a habit. It will be slower to establish itself than the listening habit, but that it will in the end be stronger, I have no shadow of doubt. A television programme is already 50 per cent more entertaining than a sound programme. In a year or two it will be 100 per cent better value.

## Price Fall Will Be Gradual

I do not, by the way, wish to encourage the idea that television prices are going to drop with a bump. This is not so; they will fall gradually over a period of years.

I see that Mr. J. L. Baird has been reported as stating that the prices of sets would fall in a very short time. He tells me that the sense of his speech was that they will fall in "not too long a time." He did not mean that they would decline in the immediate future. So that on this point I find myself in agreement with the most prominent figure in the television world.

And now for the constructive ideas. I admit it is not easy to devise the ideal tele-

vision programme. But it happened that the other day I saw one. It was a film, the American feature "The March of Time." Here was a topical magazine of absorbing interest. Take two of the items—one told the story of King Zog and his little country, Albania, of his financial difficulties and how he solved them. The other concerned the growth in Britain of the football betting pool system until it reached the dimensions of a national problem. The subjects do not sound enthralling but they were handled so adroitly that the film became a human document holding my attention more firmly than many an "all star" romance.

## Cabaret Features Are Good

I have already said that in my view the bright cabaret entertainment with star performers is the best studio feature, and that one-act plays must be sought. Tod Slaughter in "Heard in Camera" made an excellent transmission.

The B.B.C. must exploit to the full the "outside" television broadcast. I am aware that Mr. Gerald Cock is already alive to these possibilities. My hope is that he will not only use television for the obvious occasions such as sport and the Coronation procession, but that he will also take the television camera to show viewers "This London" in the many original and unexpected ways that may suggest themselves.

I demonstrated television the other day to a fellow journalist, and on the screen appeared the figures of John Piper and Serge Chermayoff discussing the picture in the modern home. The discussion was interesting to a point, but on the whole too long-winded and slow. My friend's criticism was that there was not enough movement

in the programmes. That is one fundamental error which the programme producers at the Alexandra Palace are making. Still objects could be conveyed by still photographs. These are moving pictures. Well, let them move!

These *objets d'art* are not sufficiently well defined to be appreciated fully. The glowing colours do not show. Art exhibition programmes, frankly, are not a success as now presented. Some new method must be found. The programmes should be shortened and speeded-up.

## An Enjoyable Item

I enjoyed the ice hockey programme in which two British Olympic players appeared, chiefly because a length of film was included with a commentary by Bob Bowman who still remains for me the finest exponent of this elusive art. What a grand, gay inconsequential babble flows from him! No time to talk about "square 8"—on with the game, on with the commentary. He is one of the few commentators I know who seems actually to enjoy himself while giving a full flowing description of every phase of the game.

Strange, but I did not even recognise Claire Luce in the "Starlight" programme, although I saw her twice in her last Cochran show. My wife and I are still discussing reasons for our curious joint failure to identify this attractive star—without, I fear, arriving at any very satisfactory conclusion.

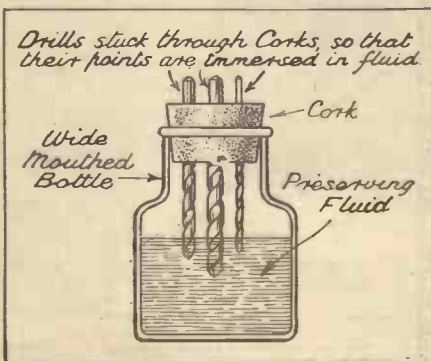
Howard Rogers was an outstanding success in the Thursday cabaret programme. His impersonations in the one-man sketch "P. c. Hoppitt's Retirement" were most suitable for close-up work, and consequently made effective television material. Like the irritating character in so many current anecdotes I laughed and laughed; there's no more!

Russell Swann, the American conjurer, gets better and better. I rather wish that he wouldn't say "Isn't that silly?" quite so frequently, but apart from that, I sincerely endorse the view of Mr. Gerald Cock that he is a first-class television artist with the friendly, intimate and amusing style that suits the home screen so well.

## A DRILL PRESERVER

IT pays to keep drills and similar cutting tools in good condition, not only on account of the expense of procuring replacements, but also on account of the valuable time which is saved by having

## PROTECTS CUTTING EDGES



The cutting edges of the drills are protected from corrosion effects due to the atmosphere.

such tools at hand in first-class working condition.

The following preparation will be found to be an excellent one for keeping the keen edge of a chisel or the business end of a drill in good order when it is not in use.

Mix well together in some convenient bottle which can be easily shaken the following ingredients:

Castor oil,  $\frac{1}{4}$  oz.; pure soft soap, 1 oz.; methylated spirits,  $\frac{1}{2}$  pint. Shake the bottle well until the ingredients have dissolved in the methylated spirits.

Drills which are not in use should be immersed in the above liquid.

## Simple to Arrange

A convenient way of effecting this is to pour the liquid into a wide-necked bottle, and to slip the drills through the cork so that their tips are continually immersed in the fluid in the manner shown in the diagram.

Similarly the cutting edges of chisels should also be immersed in the liquid when such tools are not in use. The liquid, on account of its nature, preserves the cutting edges of these tools from atmospheric deterioration, and it thus prolongs their working life. No longer need you find tools spoilt by rust after a longish period of non-use.



**TECHNICAL JOTTINGS**

Some items of interest

By Dr. J. H. T. Roberts, F.Inst.P.

**A Curious Fault**

A READER tells me of a fault which he had with a valve, which was very puzzling at first, but which fortunately is comparatively rare. What happened was something like this: When the set was first switched on everything went quite all right, but after a few minutes the efficiency would gradually go off and distortion begin to make its appearance, these two effects getting rapidly worse and worse until conditions were quite hopeless. But if the set was switched off and left for a few minutes and then switched on again, it worked properly, but the same cycle of events was gone through.

**Comes on Gradually**

The fact that what took place was gradual, suggested the heating-up of something or other and, in fact, this was exactly what was happening, the "something or other" in this case being the grid of one of the valves. In the ordinary way the grid is so spaced in relation to the filament that although, of course, it gets fairly warm, it never gets to a temperature anything like that which is necessary to cause it to act as an electron emitter. It is, as I say, very unusual for the spacing of the electrodes to be such that the grid gets overheated and begins to emit; when it does happen it is probably due to some accident, or to the relative positions of the electrodes having got out of adjustment in some way.

You can see now why it was that the valve acted quite all right when first switched on and gradually went wrong, and also why it was that on being switched off for a few minutes it recovered its composure and acted normally again.

**Replace the Valve**

If you should experience this trouble there is really nothing that you can do to put it right except to take out the defective valve and replace it by another one. Should it occur, however, it is worth while to return the valve to the makers with the request that they should try it out, and I am sure that any reputable valve manufacturer would not hesitate to replace such a valve. It is, however, as I say, a very unusual fault but when it does occur it is so mysterious that those who suffer from it are generally quite mystified.

**Short-Wave Reception**

Interest in short-wave reception continues to increase, and a great filip has been given to it by the advent, at last, of television. People often ask me what sort of aerial is necessary to receive very short or ultra-short waves as low as, say, seven metres or less. Some people actually receive waves of these short lengths on more-or-less ordinary outside aerials of as much as thirty feet long, whilst others prefer a very short aerial of only a few feet in length, which is sometimes more efficient for receiving these very high frequencies.

(Continued overleaf.)

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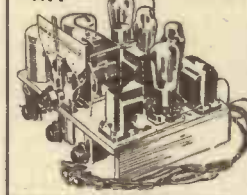
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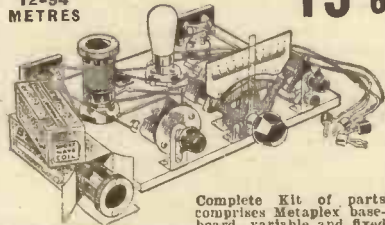
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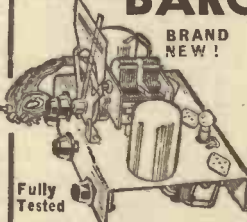
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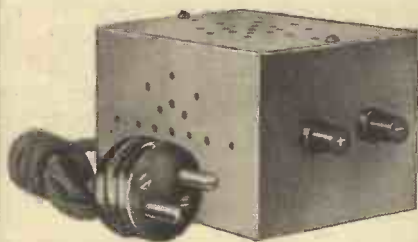
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## TECHNICAL JOTTINGS

(Continued from previous page.)

The point with regard to an ordinary aerial used for medium-wave reception is that if you want to use it for very short-wave reception you will have to reduce the capacity; this can be done by inserting a small condenser in series with it.

### Employing Rough Tuning

This condenser, by the way, may be a fixed one, but it is very much preferable to have a variable condenser so as to give a rough tuning to the aerial. The capacity of the condenser, that is the maximum capacity, may be 0.0005-microfarad, and it is a simple matter to calibrate this condenser for different wavelengths. But, as I say, most people prefer a separate short aerial for short-wave or ultra-short-wave reception, of suitable capacity.

### Special Short-Wave Aerial

With regard to the condenser used in series with the aerial, as mentioned above, if you are using an ordinary type of aerial it is a simple matter to arrange so that this condenser can be put in or out of circuit.

The special short aerial for ultra-short-wave reception may consist of a few feet of wire rigged up indoors, so that really there is very little point in going to the trouble of making one aerial serve both purposes.

### Receiver Range

The range of a receiving set, what is rather vaguely called its "sensitivity," depends a good deal upon the amount of high-frequency amplification which is provided before the detector. Of course, the sensitivity or range of the set does not depend entirely upon this; it depends upon other things, upon the efficiency of the receiving aerial and various other factors, but generally speaking the amount of high-frequency amplification is the predominating factor.

It is easy to see why this should be so, because the detector can only deal with what is delivered to it, and although there is often a small amount of amplification taking place in the detector stage itself, the detector has to rely practically—almost entirely—upon the incoming signal strength being boosted up before it arrives there.

### H.F. Amplification

Some people think that the high-frequency amplifying stages are mainly concerned with the loudness of the reproduction. Well, naturally anything which increases the signal strength delivered to the detector will, other things remaining the same, increase the volume of reproduction, but when you are searching for weak stations (or for powerful stations which are so far away that the signals are weak by the time they reach your aerial) you are not likely to overdo it in any way in regard to the strength of signals actually delivered to the detector. In other words, the primary purpose of the high-frequency amplifying stages is to bring up the signals to a value which the detector can adequately and efficiently deal with. After that, it remains for the low-frequency stages to do all the real boosting up of the sound volume.

### Properly Designed Couplings

In order to get really efficient high-frequency amplification it is necessary that properly designed couplings should be used between stages, and also that properly adjusted tuned circuits should be employed.

If a number of tuned circuits are used, not only does this improve the *sensitivity*, but also it has a very marked influence on the *selectivity*.

### How Tuned Circuits Work

People sometimes wonder why there should be this effect on the selectivity, but you can easily understand it if you think about it in the following way: The first tuned circuit rejects frequencies at either side of a comparatively small band or, if you like, confines itself to a comparatively small region around the actual resonance frequency; the second tuned circuit does the same sort of thing and so the chances of a signal beside the wanted signal getting through two tuned circuits are very much smaller—very much less than half the chance of getting through the first circuit. The same thing applies in increasing degree to further tuned circuits.

### Doing Away With Reaction

Another advantage of high-frequency amplification, altogether apart from the question of the selectivity or sharpness of tuning, is that it is generally possible to dispense with reaction. We know that reaction is a very good servant, but is also a very bad master, and although it has served us in good stead for many years now, I think you will agree that if it can be done away with, and the same result obtained without it, so much the better, because in getting rid of reaction you also get rid of the great liability to distortion.

### The Time Base

Many people who understand broadly the *modus operandi* of television reception are a bit confused as to what is meant by the term "time-base."

As a matter of fact this is really very simple and it refers to the "scanning" of the receiving screen of the cathode-ray tube. In order to explain what it means, let me just run over what actually happens in a cathode-ray television tube. As you know, a beam of electrons shoots through a very fine hole and passes on to hit a fluorescent screen, but in the early stages of its journey it travels between two pairs of parallel metal plates, the plane of one pair being set at right angles to that of the other. Electrical potentials are applied across these two pairs of plates and the stream is deflected and made to traverse the screen by means of the variations in these electrical potentials.

### Deflecting the Beam

Now one pair of plates has the effect of shifting the spot where the beam hits the screen up and down (or left to right, it doesn't matter for the moment) whilst the other pair of plates shifts the beam across the screen. The result of the combination of these two types of motion is that the spot of light covers the whole area of the screen in much the same way that your eyes scan a column of type. The time-base is the arrangement by which the potentials of these plates are controlled so as to make the spot traverse the screen in the desired way.

**FOR THE  
CONSTRUCTOR**

Two practical hints worth knowing.

**A SOLDERING TIP**

**T**HE greatest bugbear in soldering is the dirty condition into which the copper bit gets every time it is heated.

A piece of block sal-ammoniac, with a small hollow scooped out and filled with solder, will be found to be the best cleanser that one could wish for. It keeps the iron thoroughly clean and coated with solder, and has the additional advantage that when it becomes slightly charred the solder is easily removable from its bed, which a moment's work with a knife will restore to a fine whiteness.

This will not, unfortunately, prevent the formation of the ugly black scale which is bound to appear on the iron before it is in use very long. A piece of old file, which has been softened and screwed to the bench, is very useful for removing scale, as a light rub along the rough surface will take off the hardest deposit. To soften the file, heat it to a cherry red and allow it to cool.

**ACCUMULATOR POLARITY**

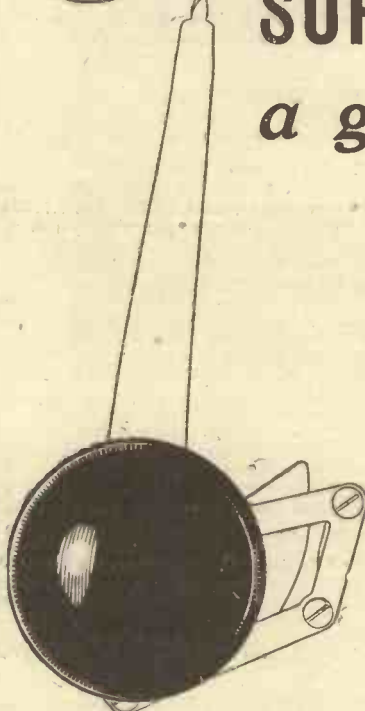
**I**F you are ever in any difficulty in the determination of the polarity of the plates of an accumulator, it is well to remember the fact that the positive plates in a healthy accumulator are generally of a dark-brown colour, whilst the negative plates of the accumulator have a greyish appearance.

It is easily possible to tell which is the positive and which is the negative plate grouping of an ordinary accumulator, provided that more than two plates are present in the cell. In such cases, the positive group of the accumulator has always one plate less than the negative group.

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(Continued from page 606.)

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## THE SUPER CENTURION RAPID CONSTRUCTION GUIDE

(Continued from page 598.)

Taking care that the voltage figures on side of battery remain in view, screw up spar fixing screws until battery is firmly clamped into position. (If you have used screws that are too long, you will need to put cardboard or a wad of paper between spar and battery, otherwise screws would go right through cabinet side-piece.) Fit G.B. + plug in positive (plus) socket, G.B. - 1 in 3 V. socket, G.B. - 2 in 4 1/2 V. socket.

(Q) The dial (or scale, as it is often called) may be of paper, card, or white celluloid, and is similar to that used on the S.T.700. The S.T.700 celluloid scales (which are very slightly out of date as regards station names), are obtainable for 3s. post free from Celluloid Printers, Ltd., Kingston By-Pass Road, Surbiton, Surrey.

The following applies to the fitting of the paper dial. Leaving the centering tab attached, cut out dial along borders. Cut out (razor blade essential) the hole for slipping over bush, where marked on the tab. Stand the set up in its normal position, front of panel facing you. The moving vanes of the main tuning condenser should be "closed." Put your left hand round the back of the set and gently hold the rear end framework of main tuning condenser. Do not touch the vanes. Remove the fixing nut and washer from the main tuning condenser's spindle portion, which can be seen from the front of the panel.

Slip the hole in the centering tab over the spindle bush (the threaded brass collar), and hold centering tab against panel by fitting washer

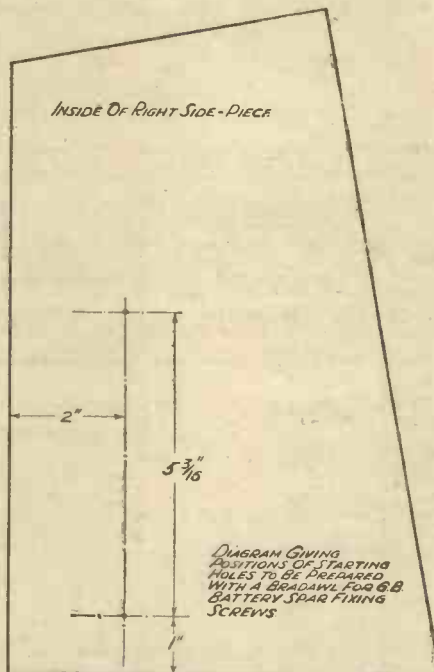


Fig. 6. The G.B. battery clamping spar is screwed into the position shown here.

and then nut loosely. Lay set (in Easy-Cabinet) on its back, front of panel uppermost. Centre the dial into its correct general position; as a guide it may be noted that the top point should come opposite the middle fixing screw of panel (i.e. half-way along top edge).

Ensure dial is in correct position by measuring the distance from the lowest point on the left-hand end of dial to the bottom edge of panel; this distance should be the same as that from the right-hand end of dial to bottom edge of panel.

(R) Prepare 16 ordinary plated brass pins (if a pin is of a type that could be bent, it can be used) by cutting them diagonally with wire-cutters or pinners about 1/4-in. from their heads. You now have 16 very short and pointed pins. Any other type of very short miniature nails may be used.

There are 16 small circles with white centres along the border of dial. Keeping dial flat on panel, start with the top circle and prick through centre of circle with some thin pointed instrument (I used a drawing-pin) for about 1-16 in. Insert a prepared pin into this hole and push home with any hard, flatish-headed instrument (I used the handle of a screwdriver). Carry out the rest of the fastening-down of dial in following order: Circle between pin just inserted and condenser spindle; the two circles (on outer border) on each side of top circle; the two circles (on inner border) between last-inserted two pins and spindle. Carry on in this way, working towards the ends, keeping dial flat.

(S) CUT CENTERING TAB OFF WITH SAFETY-RAZOR BLADE by cutting along inner border where indicated (where tab is

## SUPER CENTURION

### THE POWER SUPPLY

Batteries: H.T. 120 v.—Drydex, G.E.C., Milnes H.T. Unit, Fuller, Marconiphone, Ediswan. G.B. 9 v.—Drydex. L.T. 2 v.—Exide, Fuller.

### SUITABLE LOUDSPEAKERS

W.B., British Rola, Blue Spot, Wharfedale. (No significance attaches to the order of makes.) J. S.-T.

joined on). Tear away the tab from the condenser bush; there is really no need to remove the fixing nut to do this. Tighten up the fixing nut on bush of main tuning condenser.

STAND SET IN ITS NORMAL POSITION WITH DIAL FACING YOU.

(T) Turn projecting spindle of main tuning condenser fully anti-clockwise (fully left). Slip the large J.B. knob and long pointer on to end of spindle with the pointer pointing exactly horizontally to the left. Tighten grub-screw, which is the little screw which fits into edge of knob and is on opposite side to pointer. (Do not touch screw which secures the pointer.)

(U) Turn spindles of volume control, turret switch, anode reaction condenser, aerial reaction condenser, and aerial balancing condenser fully anti-clockwise (fully to left). Fit their knobs with their white spots or pointers exactly in a horizontal direction to the left. Tighten up their grub-screws.

(V) Fit knob on wavechange switch spindle (no special direction).

YOUR SET IS NOW COMPLETE. (See separate article next week on installation and operation.)

J. S.-T.

## MY CORONATION SET

(Continued from page 595.)

by the application of reaction, and there is no need to reduce the aerial coupler. This in itself adds enormously to signal strength on weak stations, while preserving good selectivity. The whole matter has been discussed at great length in connection with the S.T.600. I am more than ever delighted with aerial reaction as being a means of greatly increasing both sensitivity and selectivity.

Selectivity on the anode circuit is obtained partly by reaction and partly by reducing the load of the anode circuit of the first valve. This is done by applying a negative potential to the grid. This is done by a two-way switch which is a Graham-Farish turret switch. In one position the set is switched off. In the next position, half-way, the set is in its most selective condition, with negative bias applied to the grid of the first valve. In the third position, the set is working at full sensitivity, but selectivity is rather less.

J. S.-T.

# 1936 BROADCASTING REVIEWED

The work of the West Region

THE West of England regional headquarters were greatly extended during 1936. Studio accommodation, which proved a problem during the early part of the year, was extended by the construction of a new studio.

Under the title "Western Salon" a new experiment was tried. Chamber Music was played to an audience gathered round the players so that a more intimate atmosphere might be created than in the concert hall. Broadcasts in this series included the Griller Quartet from Dartington Hall, the Grinke Trio from Marston Court, and the Bristol Chamber Music Players from the studio.

Broadcasts from public concerts included the opening concert of the Torquay Musical Festival and the concert to mark the reopening of the Colston Hall.

Outstanding dramatic and feature programmes of the year included "Barnet's Polly," by Jan Stewer; "Treasure Island," by Robert Louis Stevenson, adapted by E. M. Delafield; "Towers and Sheep-bells," a programme about Ponthill, by Norah Richardson; and "Countrymen Afield," to celebrate the birthday of Richard Jefferies.

A new series entitled "Crowded Moments" was introduced and comprised visits to some important centres by a commentator, who described the scenes and his impressions. These "Moments" have ranged from Plymouth Hoe on a Saturday night to the Tramways Centre, Bristol. A broadcast was taken from the Royal Show at Ashton Park, Bristol.

Programmes made with the aid of the mobile recording unit included "May Games," a composite picture of the traditional customs for bringing in summer in the West; Barnstaple Great Fair; and Sherborne Pack Monday Fair.

## Wales

Plans were completed during the year for the conversion into studios of the Public Assistance Offices, Alexandra Road, Swansea. The new accommodation includes a large music studio, a talks studio, a dramatic studio, and an effects studio, in addition to offices.

Twenty-five plays were broadcast up to November, 1936, and of these, the most outstanding were "Flood," by W. Evan Williams, a realistic drama of the pit; and "Y Llaw Gudd," a murder play adapted by John Ellis Williams from the novel by E. Morgan Humphreys.

The chief outside broadcast in the period under review was a programme entitled "Old King Cole." This took the form of a microphone tour of the Wyndham Colliery, Ogmere Vale.

Nineteen religious services in the English language were broadcast during 1936, and twenty-four religious services in the Welsh language. There were nineteen appeals.

The Welsh Interludes which brought leading figures in Welsh life to the microphone were continued. Other series in the programmes of Welsh talks included "Discovering Wales" and "For Welsh Farmers." Two discussions have been outstanding—"The Drift of Employment," a joint discussion with Midland Regional (the Welsh speakers were Lady Rhys Williams and Arthur Jenkins, M.P.), and "Conflict or Conciliation in the Coalfield."

The News Service in the Welsh language continued as a nightly service until the autumn of 1936, when a new bi-weekly service was inaugurated.

(To be continued.)

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**SOUTHERN RADIO,** 323, Euston Road, London, N.W.4 (Near Warren St. Tube). Phone: Euston 3775.

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(Continued)

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# Popular Wireless & TELEVISION TIMES

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By J. C. JEVONS

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No. 768.  
Vol. XXX.  
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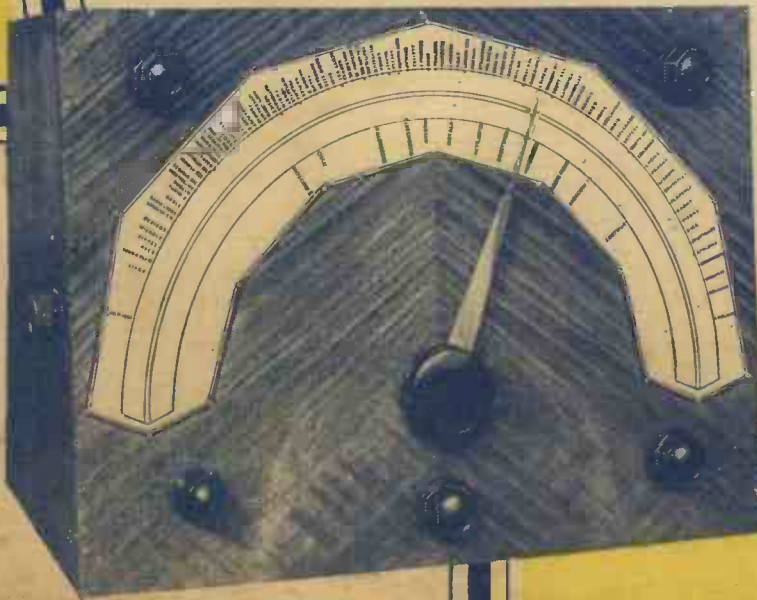
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## JOHN SCOTT-TAGGART'S CORONATION SET

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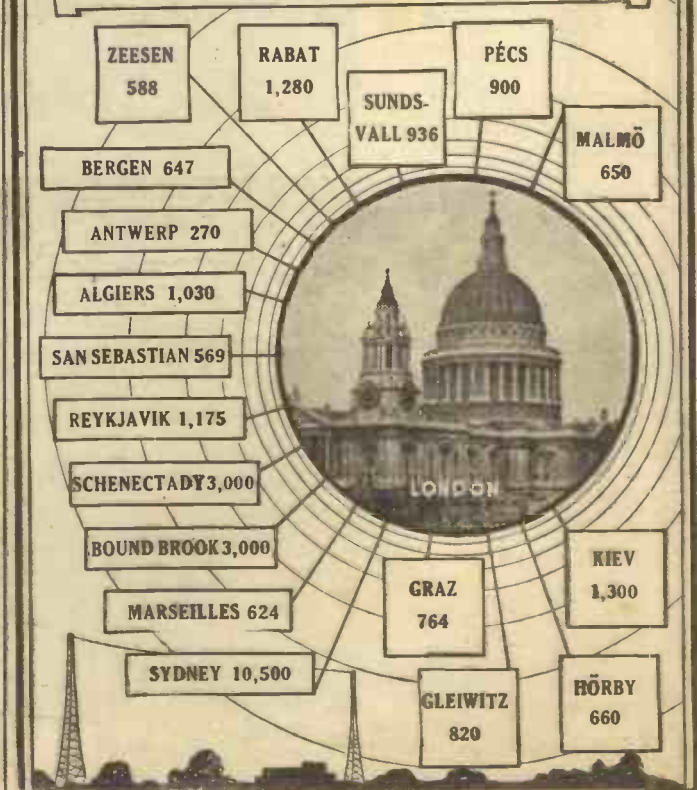
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P.A. 52B

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Distances from London of Foreign Stations You Have Heard



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Editor: G. V. Dowding.

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RADIO IN ASIA  
SWING ALONG  
DEFENCE OFFER

## RADIO NOTES & NEWS

SMALL WONDER  
NIGHT SKY  
FRIENDLY ACT

### France Forges Ahead

**D**ESPITE occasional setbacks France is forging ahead with her radio plans, and some of the promised 1937 improvements are already taking shape.

The Lyons (P.T.T.) station is having its spring-clean, and extra polish on the floor is being accompanied by extra kilowatts in the aerial—which is why the engineers have been using the low-powered transmitter on Monday evenings recently.

Radio-Normandie's new station has been delayed by the blight of recent French strikes, but the new building at Louvetot (near Havre) is finished, and should be in action shortly, superseding Fécamp.

Algiers, also, is in the hands of the specialists, who are performing an operation for removing old junk and grafting on extra punch and better quality. The convalescent Algiers resumes duty again on February 17th, so give him a few days to settle down, and then see what your set thinks of the recent doctoring.

### Asia Takes to Radio

**R**ADIO appears to be destined to do for Asia what printing did for the civilisation of the West.

Serious attempts are now being made to educate the 200,000,000 people in China who cannot read, through radio lectures and loudspeaker-equipped vans; and since moving pictures are used as an additional attraction, there is no difficulty in getting attentive audiences. In remote districts the vans are known as Chah-Lee, and "Clap hands, here comes Chah-Lee," is the brightest spot of the week.

Afghanistan, also, has got the radio craze, and it is expected that a 20-kilowatt station will be calling from Kabul before the end of this year.

During 1936, Palestine nearly doubled the size of its 1935 radio audience of

12,000. India I have already told you about, and more news of progress there comes in nearly every week.

### A Good Time When Doing Time

**W**HEN Mr. E. M. Hanlon, Minister for Health and Home Affairs, recently switched on a powerful wireless set in Brisbane Gaol, he inaugurated a new era in prison control in Queensland. The set is an 11-valve dual-wave instrument, and is connected with nine loudspeakers in the different prison blocks.

Hitherto lights have been switched off at 8 p.m., but now an extra hour is granted,

that risk if some poor devil's reason is saved, now and then.

### Swing Along

**A**FTER months of spirited differences of opinion, the leaders of the big dance orchestras and the B.B.C. have reached financial agreement on the always-vital question of "How much?"

The answer is now £2 per player for 25-35 minutes; £2 10s. per player for 40-50 minutes; and £3 per player for 55-65 minutes.

Probably you feel that at these rates the boys should be able to swing along very nicely; but the leaders point out that by the time they have rehearsed, transported the players to and from the studio, and paid up to, say, £8 a tune for special orchestras, the above-mentioned minimum rates are none too rosy. So a joint committee has been formed in order to facilitate smooth working in the future.

### BETTER SERVICE FOR WALES



The station building and aerial mast at the new North Wales B.B.C. station at Penmon. The mast is 250 feet high and is surmounted by a red aircraft-warning light. Some interesting facts about the station are given on page 633.

### Radio and Defence

**T**HE Government has had an offer from the Radio Manufacturers' Association to place the resources of member firms at the disposal of the Government for national defence purposes.

Plans for the co-ordination of the industry in the event of a national emergency have been discussed, and the fact that huge supplies of wireless apparatus would become necessary immediately has been faced. The Navy, Army and Air Force are all radio-minded these days. And, however much

and radio programmes are available during that period. The hope is that men serving long sentences will benefit, and will endeavour to gain the good-conduct privilege of hearing the radio programmes.

Whenever prison radio is mentioned, some people talk a lot of rot about "making prison life attractive." It's worth taking

one deplors the necessity for thinking of these contingencies, it is the Government's plain duty to keep an eye on our reserves of radio equipment, and also on the machinery available for the production of special apparatus such as that used by the forces.

(Continued overleaf.)

# NEXT WEEK: THE S.T.800 AGAIN

## A FRIENDLY ACT BUT AN UNFRIENDLY GIFT

### Somewhere a Voice is Calling . . .

**H**IGH above the waving palm trees of Singapore there rise the Minarets of the great Masjid Sultan Mosque—the largest mosque in the country.



In accordance with age-old custom a muezzin, at certain hours, calls the faithful to prayer from the minarets of the mosque.

Departing from the age-old custom, the enterprising authorities have now installed G.E.C.

power amplifying equipment to magnify the muezzin's voice. There are two speakers in one of the Minarets to call the faithful to prayer and two more speakers in the body of the Mosque for amplifying services and lectures.

The equipment is a great success, and when it comes into action daily at 4.30 a.m. it effectually cuts through Singapore's Serenade of the Night, for the loudspeakers on the Minaret have a range of about one mile.

### Leeds Looking Up

**T**HE Leeds and District Radio Society has moved to more central premises, and their H.Q. is now in the Y.W.C.A., Cookridge Street.

Main interest lies at the moment in the Morse classes, lectures, demonstrations, and in the club receiver, which is in the course of construction.

Among the attractive trips planned for the near future is a visit to the North Regional station.

Anyone interested is cordially invited to write for particulars of the Society to the Secretary, Mr. J. Kavanagh, 63, Dawlish Avenue, Leeds.

### Scare for Scotland

**T**HERE was a wagging of sporans and a flutter along the banks and braes recently when it was rumoured that Glasgow was moving westwards, at the rate of several feet



a year. Back in 1865 the Glasgow longitude had been fixed by time-signals over a telegraph line to Greenwich, and that was (supposedly) that. But recent observations from radio time-signals

appeared to indicate that the whole city had moved a couple of hundred yards westwards since the longitude was first fixed.

When this became known inquiries were immediately put through to Greenwich Observatory, to know whether the whole country was pivoting round, or what? Pausing a moment from the mass production of Six Pips, the Greenwich stargazers smiled tolerantly, and explained; it would probably be found, they said, that this Westward Ho! business was just moon-

shine, and that the discrepancy was due to a mistake having been made in the first instance when the longitude was fixed.

Jock MacPherson, however, tells a different story. He swears that when returning from the New Year celebrations at 3 a.m., he actually saw the whole city move—not only westwards, but up and down!

### Small Wonder

**A**FTER writing my recent Note on the little Danish portable that could be carried in the handbag, I saw an account of an Irish midget that will want a lot of beating.

## BROADCASTING BREVITIES

### THE LINCOLNSHIRE HANDICAP: Regional, March 17.

It is now possible to announce definitely that for the first time the microphone will visit the Carlholme, Lincoln, to broadcast that thrilling race, the Lincolnshire Handicap. It is rather a surprising fact that this famous sprint has never been broadcast. Enormous interest exists in the double event of the Lincoln and Nations. In addition, the Lincoln opens the flat-racing season and British listeners will welcome the broadcast of the result of this famous mile of the year.

### DANCE BAND AND VARIETY ACT: Midland, February 25.

George Hames and his Band are to broadcast for the first time on February 25th. The Band began six years ago. All the fourteen members are natives of Nottingham. The Clayton Sisters, who will give their double act as an interlude, are appearing at the Birmingham Alexandra Theatre pantomime. They began in the chorus at the same theatre and after several years in leading pantomimes in Scotland and in variety, returned to their home town as principals in "Mother Goose." They have broadcast on a number of occasions, but this is their first visit to a Birmingham studio.

### ONCE A GIPSY: Northern, February 21.

Freer and his Gipsy Band, who are to broadcast from the Manchester studios on February 21, are proud of being an all-British combination. After War service Horace Freer, a Birmingham man, joined a genuine Hungarian tzigane band. At first he hated the lilting gipsy music, and his inability to adapt his playing to this specialised form produced much criticism from his foreign colleagues. Gradually, however, the music grew on him; he came to play it "as to the manner born," and in course of time he formed his own gipsy band of thirteen players, which performs regularly at a Manchester store. Dressed in colourful costumes, the band are often mistaken for real gipsies, and on one occasion an old lady, having listened to their performance, stepped on to the platform and handed the leader sixpence, saying "It's always lucky to cross a gipsy's palm with silver."

Constructed by Mr. Reid, a telegraph clerk on the Great Northern Railway at Enniskillen, it measures 7 in.  $\times$  4½ in.  $\times$  1½ in., all in. There are three valves, and they pick up the British programmes, as they fly through the air, with the greatest of ease.

Mr. Reid is an ex-Naval man, who spent three of the war years in spotting submarines and Zeppelins. And if my information is correct, he can do as much with a pair of round-nosed pliers as some fellows will ever manage with their fancy ball-bearing, all-tearing electrical lathes.

### Personalia

**M**R. C. A. L. CLIFFE, who was appointed Empire News Editor of the B.B.C. in 1935, has now been made Assistant Director of Empire Broadcasting. Before joining the B.B.C. he was in the Colonial Office,

### Night Sky

**V**ERSATILITY is one of the strong points of the Eiffel Tower. It is known to you and me as a radio station, but it also tells Parisians what make of car to buy, what the temperature is doing, and what the time is, besides which it has served as a war telegraph station and an observatory.

Now they are proposing to turn it into a giant flag, by using millions of electric lamps to blaze the Tricolour across the night sky of Paris. Then the whole Tower will become a Cathedral of Light, flashing every colour of the rainbow in unparalleled illuminations.

Frenchmen are getting wildly excited by this unique prospect—with just one exception. He is a fellow who keeps a radio shop in the very shadow of the foot of the Tower. He can't help wondering what his quality demonstrations will be like when the world's biggest flashing sign is in full swing just across the road!



### A U.S.A. Radio Record

John Listener of the United States had a boom year in 1936, according to returns now made available. Some 1,400,000 new houses were provided with radio equipment, while the trade's entire sales for the year came out (including the exports) at the remarkable total of £86,000,000. This was about thirty per cent higher than the previous record.

### Friendly Act

**A**MONG the queerest gifts ever received by a radio artist is the one sent to the chap who runs "The Friendly Act"—a broadcast talk of uplift nature, which is a daily reminder of the power of a kind word, a smile, and a good turn. A dear old lady, much moved by these worthy sentiments, thought she would give the broadcaster a small token of appreciation.



So she sent him a big box of tricks, with a covering letter to say it was an invention of her late brother's—nobody knew just what, but the inventor had entertained great hopes of it. Somehow that covering letter got lost, so the recipient opened the case to find out what was in it.

He must have touched off a spring somewhere for there was a roar like twelve thunderclaps in series, bells rang, sirens hooted, and a big stick came out and smote the new owner a Carnera-like crack on the cranium.

It was not the end of the world, as he supposed; but an ambitiously-planned burglar alarm!

ARIEL.

# OPERATING THE SUPER CENTURION

By JOHN SCOTT-TAGGART

Britain's Leading Designer discusses the circuit of his Coronation Set and tells you how to get the best results from this magnificent 1937 star design. Remember that this splendid receiver utilises the famous Uni-plane system and can be easily constructed by the veriest novice.

**T**HERE has been in all my more popular receivers a certain similarity of operation. That similarity when analysed lies in the fact that two tuned circuits are employed, the selectivity of each being made adjustable. The idea of adjustable selectivity is now being boosted in connection with many commercial receivers, but actually the desirability of such adjustability was stressed by myself as long ago as the S.T.300, and it has been used in every important set since.

It is the question of adjustable selectivity which makes it necessary to have extra controls, and for the user of the set to understand the effect of each of the knobs. Selectivity is, of course, tied up with the question of signal strength. A change in selectivity will nearly always alter the strength of signals. The simplest method of obtaining selectivity consists in the reduction of losses in one or more tuned circuits, and the reduction of these losses may or may not cause a decrease in signal strength.

### A Simple Tuned Circuit

This matter is so important that it is well worth while to understand how selectivity is obtainable. A simple tuned circuit consists of an inductance coil with a condenser connected across it. Such a simple circuit will pick up oscillations of a given frequency. Put in another way, wireless signals of a given wavelength can be picked up by such a circuit. When these oscillations are produced in the circuit you get voltages set up across it, and these are usually passed on to a valve to be amplified and are subsequently detected. The object of the high-frequency part of the receiver is simply to get the desired signals as strongly as possible, and signals of other wavelengths not at all.

An ordinary tuned circuit will respond not only to the wavelength to which it is tuned (i.e. the one which will produce the maximum voltages across the tuned circuit), but will also pick up wavelengths above and below. The voltages produced will certainly be weaker than those produced by the desired station, assuming that all the stations influence the aerial to the same degree. Interference is thus experienced and our object in improving selectivity is to make the tuned circuit (or several of them) more selective. This word

simply means that the circuit or the set selects the desired station while rejecting signals of differing wavelength.

If the tuned circuit is made more efficient by using a better quality inductance and a better condenser, two desirable effects are obtained: one is that the signals desired are increased in strength, and the other is that the undesired signals are decreased in strength.

### The Effect of Aerial Losses

A given tuned circuit may be efficient or inefficient, but it will certainly be made worse by connecting it to the source of the oscillations; this source, in the case of the first tuned circuit of a set, will be nearly always the aerial which feeds the incoming oscillations into the tuned circuit. This feeding process may be through a small condenser connected between the lead-in and the tuned circuit or by means of transformer action, a coil being connected between aerial and earth, this coil being coupled to the inductance of the tuned circuit, so that any oscillations in the aerial circuit will be transferred to the tuned circuit.

Unfortunately losses in the aerial circuit will also be transferred, so that the tuned circuit is no longer as efficient as it was "on its own." It is as though we had inserted a resistance in the tuned circuit, thus increasing its "damping." This automatically has the effect of worsening the selectivity and permitting waves of other wavelengths to influence the tuned circuit.

To overcome or rather lessen the effect of aerial damping on the tuned circuit we can insert a small condenser in the aerial circuit and by adjusting its value control the selectivity of the tuned circuit. When the condenser is large the signal strength will be increased, while if the condenser is very

small it will be decreased. This is the usual rule and will be found to apply to practically all designs. Meanwhile the selectivity is altering; as the condenser is made large and more energy is fed to the tuned circuit so will the selectivity become worse, while when there is very little energy fed to the tuned circuit the selectivity improves as the aerial losses are not communicated to the same extent to the tuned circuit. The ideal state of affairs from a selectivity point of view would be for the aerial connection to be severed, but obviously this would result in no signals coming through. If the coupling is made very loose, i.e. if the connection between aerial and tuned circuit is slight, the signals will be weak but selectivity will be good. Here we see why it is an advantage to have a sensitive set because we can afford to have the couplings weak and, therefore, get better selectivity while maintaining adequate signal strength. In general, the fewer the valves the worse the selectivity.

### Striking A Balance

This, of course, presumes that similar circuits are used in both cases. The mere fact that a set has more valves does not in any way imply that the selectivity is better. There is actually nothing magical about the use of coupler condensers. You cannot improve the selectivity by them beyond that of the simple tuned circuit by itself. But as we cannot use a tuned circuit by itself but must have some means of feeding it with signals, a coupler condenser is an admirable method of giving us that balance between signal strength and selectivity which we desire. This balance is not always the same. For example, the selectivity varies according to the wavelength to which the set is tuned. The coupler will

at a given setting introduce more losses as we go down in wavelength, so that it is desirable to alter the aerial coupler to give the same degree of selectivity. As we go down in wavelength the aerial coupler should be reduced while as we go up in wavelength the aerial coupler requires to be increased in value. We can explain this roughly by saying that the aerial coupler condenser offers more and more of an obstacle as the wavelength increases. Hence, by altering the main tuning condenser to a higher wavelength without altering the aerial coupler we shall



GIVES  
YOU  
100  
STATIONS

automatically have lessened the "coupling" between the aerial and the tuned circuit, this resulting in greater selectivity and weaker signals. To keep the balance right we must, therefore, increase the capacity of the aerial coupler. At any given wavelength selectivity will be improved by reducing the capacity of the aerial coupler (i.e. turning it to the left), while if we want greater signal strength we shall increase the aerial coupler capacity by turning the knob to the right.

Sometimes selectivity is not a matter of great importance. For example, during daylight hours one frequently gets no interference at all on certain stations, and under these conditions it may be desirable to increase the coupler so that the signals are made louder.

#### Improving Selectivity

Selectivity can be improved not only by improving the quality of a single tuned circuit and arranging for the coupling to be as slight as possible, but also by the connection of one or more extra tuned circuits. Provided the design is correct the addition of every extra tuned circuit will improve selectivity. But each circuit requires to be suitably connected to the preceding circuit, and this is commonly done by interposing a high-frequency amplifying valve. Each circuit requires to be accurately tuned, and this means either a separate condenser correctly adjusted or a correctly ganged arrangement. Ganging calls for great accuracy in the tuning condenser and in the coils, and the adjustment is beyond the capability of the average constructor who has not the required instruments, even if the component manufacturers obliged with suitably matched coils or condensers, which is by no means certain.

The difficulty of ganging has ruled out the use of more than two tuned circuits except in special sets which are invariably more expensive. If we are only using two tuned circuits we have obviously got to make the most of them, and their selectivity must be capable of being increased as far as possible.

#### The Second Tuned Circuit

The use of an aerial coupler has already been described for the first tuned circuit. The second tuned circuit will ordinarily be in the anode circuit of a high-frequency amplifying valve, say an H.F. pentode. Here, again, we have the old problem of feeding the second tuned circuit with oscillations. It is very desirable to be able to control the strength of these oscillations, and we can alter the connection, so to speak, between the valve and the tuned circuit. This can be done in various ways, and in the case of the S.T.300 and S.T.400 a differential condenser was used to feed the second circuit with amplified oscillations. The development of the variable- $\mu$  amplifying valve enabled a simpler system to be adopted. By increasing the negative bias on the grid of the variable- $\mu$  valve the degree of amplification given by the valve is decreased as also is the damping effect of the anode circuit of the valve. Here, then, we get a repetition of the aerial coupler effect: as the amplification in the valve is reduced so will signal strength in the second tuned circuit also be reduced, but selectivity will be improved. Similarly, if we increase the amplification given by the

## INCORPORATES DOUBLE REACTION

★ .....

valve by reducing the negative bias we increase the signal strength but reduce the selectivity.

A correct balance is obviously desirable, and this is obtained by adjusting the voltage. How far we should be able to adjust this voltage is a matter of argument. In the S.T.600 I used a potentiometer so that it was possible to get every possible variation of bias, but in practice it was found that one really only needed two settings, one with the grid voltage at zero and the other at, say,  $-4\frac{1}{2}$  volts. The first setting gave maximum signal strength with ordinary selectivity, while the negative bias gave high selectivity with a weakening of signals.

Instead of a potentiometer I have used on several sets (including the Super Centurion) a switch which gives three positions. In the first position the set is switched

### TERMINAL CONNECTIONS FOR SUPER CENTURION

There are six terminals on the Super Centurion, viz., A, E, H.T. + 1, H.T. + 2, L.S. - and L.T. +. Certain of these terminals are used for the L.T. -, H.T. - and L.S. + connections, to save providing additional terminals.

The connection from the minus socket of the high-tension battery is taken to the E terminal on the strip.

The negative terminal of the L.T. accumulator is also connected by a wire to terminal E.

The positive lead of the loudspeaker (if not marked, it is simply the other lead) is connected to the terminal H.T. + 2 on the strip.

The full set of connections to the receiver are therefore as follows:

- A .. Aerial wire.
- E .. Earth lead; wire from negative of H.T. battery; wire from negative of accumulator.
- H.T. + 1 Wire going to wander-plug inserted at about 72 volts in H.T. battery.
- H.T. + 2 Wire going to 120 volts on H.T. battery; one lead from loudspeaker (positive, if marked).
- L.S. - One (negative, if marked) lead from loudspeaker.
- L.T. + Wire going to positive of accumulator.

off, while in the middle position a bias is given to the grid of the H.F. valve, this bias being usually  $-4\frac{1}{2}$  volts, but the constructor can himself alter this on the grid-bias battery. In the third position maximum signal strength is obtained, but with only ordinary selectivity.

In the case of the Super Centurion—as, in fact, in the case of the S.T.800 and other of my sets—you must always think of two tuned circuits, each of which may be improved in selectivity by an extra knob. The first circuit is tuned by means of the aerial balancer condenser whose knob is on the bottom left-hand corner of the panel. The aerial coupler knob controls the selectivity of that circuit, so you should always associate the two together in your mind. Do not think of the various knobs on the panel as being completely independent, because they are not. The second tuned circuit is controlled by the main knob with the long pointer and from a tuning point of view this is the most important circuit as it is calibrated and its calibration remains fixed. This tuned circuit has a selectivity "control" by means of the selectivity switch. If, therefore, we want to get selectivity we can get it either on the aerial circuit

by means of reducing the aerial coupler (turning the knob to the left), or on the second circuit by turning the selectivity switch to the middle position. Usually we shall improve the selectivity of both circuits.

So far regard has been given only of the method of connecting the tuned circuit to the source of oscillations which in the first case is the aerial and in the second case is the amplifying valve. We now come to an extremely important additional method of obtaining selectivity, and that is reaction. Reaction consists in amplifying the oscillations and feeding them back on to the original source, i.e. the tuned circuit. The amount of "feed-back" must be carefully adjusted so that, while signal strength is increased, the set does not become unstable through the valve oscillating. A variable reaction control is, therefore, essential.

#### What Reaction Does

Reaction was originally used as a means of increasing signal strength, and its merits as a means of improving selectivity were not widely appreciated, probably because selectivity has only been appraised at its true value since the ether became congested. Frankly, I doubt whether the proper use of reaction is understood by more than half the people who operate sets using this device. Although I have explained this matter a dozen times, a further reiteration will not be amiss. Reaction will increase the strength of a desired station, but will not reduce interference. It, therefore, differs from methods of obtaining selectivity by the use of several tuned circuits. Several tuned circuits will weaken interference and perhaps cut it out entirely, while the desired signal will itself be weakened to some extent unless valves are used between the circuits to increase signal strength.

Applying reaction, therefore, does not automatically produce selectivity. If on a given wireless set you are hearing interference from a nearby station (nearby as regards wavelength) the application of reaction may make the desired station louder but it will probably leave the interference exactly as it was and, therefore, still a nuisance. But it may not even increase the strength of the desired station. If this is already very loud, increasing reaction will not make any difference, or, at any rate, certainly no difference of a beneficial nature. You can only get a certain signal strength out of a wireless receiver, this depending upon the output of one or other of the valves in the set. When any one of these valves becomes overloaded, the application of stronger signals to it will not result in louder signals from the speaker. What probably happens is that severe distortion occurs. The application of reaction to a strong signal should never be attempted for this reason. This advice is disregarded in tens of thousands of cases, and is the result of all kinds of complaints of lack of selectivity and in other cases of break-through on the long waves.

#### Reduce Signal Strength First

Reaction is really a means of increasing the disparity between desired signals and interference. We thus have a means of producing an artificial kind of selectivity which is of extreme value. The secret of the proper use of reaction lies in reducing signal strength until the interference can no longer be heard. It may actually

be there, but cannot be detected by the ear. Having reduced the interference to inaudibility, we naturally have also reduced the strength of the desired station, but on applying reaction the desired station immediately comes up in strength, while the interference is left in the limbo of inaudibility. The rule, therefore, is always to reduce signal strength before applying reaction. Signal strength may be reduced in various ways, but the usual one would be to reduce the aerial coupler by turning the knob to the left, or in the case of the Super Centurion, also by turning the selectivity switch to the half-way position.

**Three Distinct Operations**

Although everyone accepts reaction as a very simple operation, I am not at all sure that it is as simple as most people think. Far be it from me to suggest that any wireless operation requires special skill, but if you are to get the most out of a receiver you will certainly have to treat a reaction more seriously. The average user may reduce signal strength in accordance with instructions, and then apply reaction. If he then does not get the required sensitivity or selectivity he is inclined to blame the set or the instructions. Actually there are three distinct operations in adjusting reaction. First of all the circuit must be correctly tuned; next, the signal strength heard must be accurately reduced; thirdly, the reaction must be adjusted correctly, which really means, in difficult cases, adjustment to the critical point just before oscillation. A fourth operation is really called for, and this consists in slightly retuning the main tuning control. This slight retuning may be necessitated by the reaction affecting wavelength slightly, but even if this were completely overcome retuning would still become necessary because before reaction was applied it is highly unlikely that the circuit was accurately tuned, and the slight inaccuracy only shows up when reaction is applied.

If we analyse the matter still further we will find that quite a number of slight changes of both reaction and tuning knobs is necessary, but these operations are almost instinctive and only take a matter of a second or two. Certainly the experienced operator of a set hardly realises he is perfecting reception by a process of trial and error.

**Initial Adjustment of Volume**

But apart from this titivating of reaction the initial adjustment of signal strength is the most important. Of course, it is not important if the problem of selectivity does not arise. Then we can apply a little or considerable amount of reaction as we please without any serious disadvantage. But if we are to separate two stations by the use of reaction adjusted critically it becomes vitally important to have the original signals the right strength. What this strength is is a matter of experiment and experience. Perhaps the best way is to make the signal very weak and then to apply critical reaction and listen to the strength.

If the strength is not loud enough you can increase the original signal strength by increasing the coupler, for example.

**EMPLOYS UNI-PLANE CONSTRUCTION**

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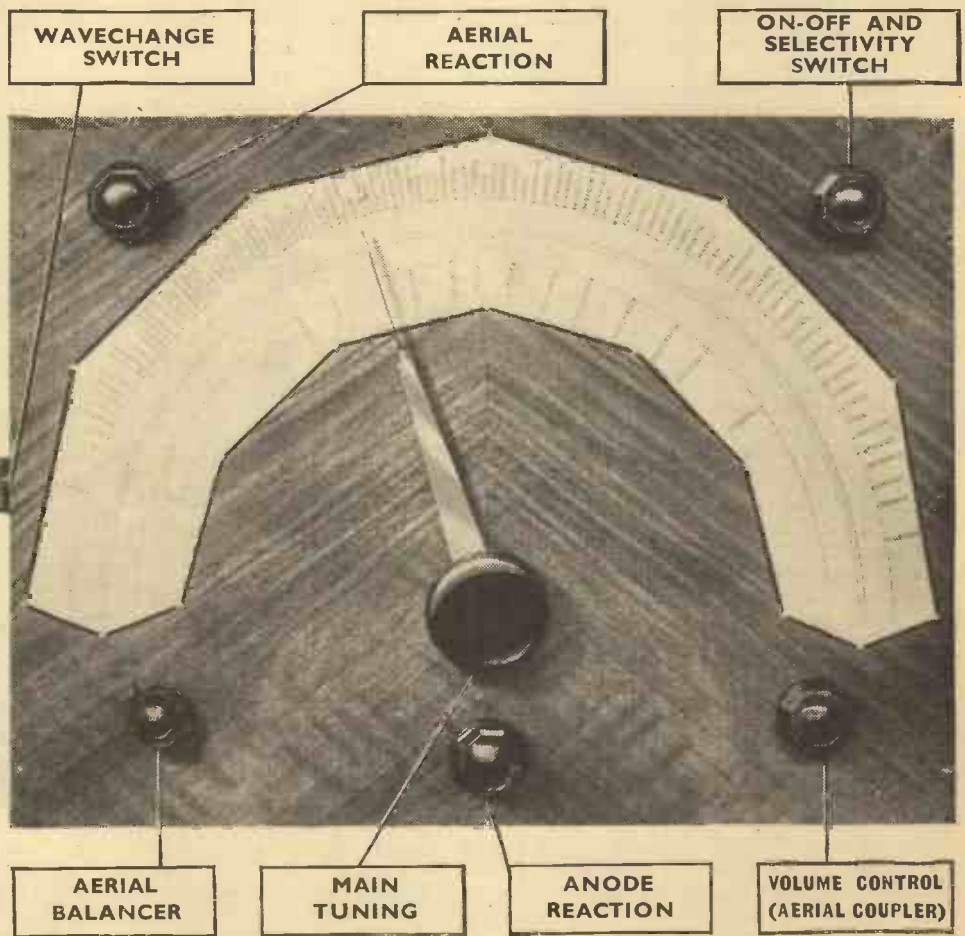
In the Super Centurion you will do it by increasing the aerial coupler slightly. After an adjustment of reaction you would then note how loud the signal was. If satisfactorily loud your difficulties are over. If not loud enough, you should increase the coupler still further and apply critical reaction once more.

This system of starting with the signals too weak is certainly the safest. If you start with signals fairly strong you will do one of two things. You will either increase reaction insufficiently, thereby losing the full benefit of the selectivity it can produce, or you will increase reaction up to the critical point, and your signals will be much too strong and distorted. After every adjustment of reaction the main tuning

published by myself at the very beginning of 1919 in the "Electrical Review." This was the so-called "tuned anode circuit," which emerged from the welter of circuits of 1922 to a position of priority which it held jointly with the S.T.100 circuit for several years. But even at this early date the S.T.100 provided a degree of double reaction, although not deliberately intended. In the S.T.100 there were two tuned circuits, and they were coupled together to produce reaction. This reaction benefited both tuned circuits, but the S.T.400 many years later was the first popular set to introduce separately controlled reactions, while the S.T.600 represented a further big step in the correct use of the double reaction principle.

**A Highly-Effective Scheme**

In the S.T.800—a set already greatly complicated by all-wave additions—the double reaction principle was omitted, but in the Super Centurion it is once more used



circuit should, of course, be carefully readjusted as a slight alteration is almost certain to be necessary.

The benefits of reaction are so startling, and have so long been appreciated, that it is not to be wondered at that a couple of reaction adjustments will give even better results. If you have one circuit and reaction will improve its selectivity, the application of reaction to all the circuits will give even better results. The use of two tuned circuits with reaction applied to the anode circuit is still the most popular arrangement in use to-day, and is commonly employed by commercial battery sets of simple design. The father of all these circuits is that

with great effect. Naturally, on a three-valve set the benefits are correspondingly greater. It has already been explained that the greater the number of valves the looser can the couplings be made and, therefore, the greater the selectivity. This, of course, is a very wasteful system because you are deliberately throwing away signal strength in order to get selectivity. When you use reaction the reverse applies, and you can increase the couplings and also the reaction so that signal strength may be increased at the same time as selectivity, provided always, of course, that you do not make the set sufficiently sensitive to pick up the background of interference.

The increase of an aerial coupler in an ordinary set has the effect of flattening the tuning due to the damping introduced by the aerial circuit. If, however, we now apply reaction to the tuned circuit, we shall sharpen its tuning once more, and the two processes will have resulted in a great increase in the signal strength of the desired station.

The use of double reaction not only greatly increases the sensitivity of the receiver, but also the selectivity since each of two circuits may be made extremely selective. It is within the experience of practically every constructor that the aerial, or rather the first tuned circuit, of most receivers tunes flatly while the second tuned circuit which has reaction applied to it tunes very sharply. Flat tuning means poor selectivity, so that if we can sharpen up the tuning of the first circuit, we are obviously well on the road to greater selectivity and better station separation.

#### Remarkably Sensitive Designs

Both the S.T.600 and the Super Centurion, although widely differing types of sets, are remarkably sensitive in their own class and this is due to the efficient use of double reaction in both receivers. In the Super Centurion dozens of stations may be received with only about three feet of wire connected to the aerial terminal, but only if aerial reaction is employed. It is difficult to give actual figures of improvement where reaction is concerned, because so much depends upon the critical nature of the adjustment, but even with a rough use of aerial reaction, signals may be obtained twenty to fifty times as loud as if this reaction were not incorporated.

In operating the Super Centurion it is best to become accustomed to the use of the set without reaction at all as on the aerial circuit or on the anode circuit. In other words, both reaction knobs can be turned fully to the left. The aerial coupler should always be used as the volume control, as the selectivity switch only gives two big changes in sensitivity and is, therefore, useless as a means of giving gradually adjustable volume.

The effect of the aerial coupler on selectivity may also be noted and likewise the effect of the selectivity switch. Having become accustomed to these, you can try serious tuning using anode reaction which, of course, affects the circuit tuned by the main tuning control with the long pointer. It is important to calibrate the main dial as soon as possible, but you should never regard a station as properly tuned-in unless a movement of the main pointer to either side will reduce the signal strength. This is an extremely important rule which should never be broken. Whichever way the pointer is turned signals should become weaker, even though the movement is only small. If signals remain the same strength or are stronger as you move the pointer one way from the position you thought was best, you are incorrectly tuned and probably not tuned to the station to which you think you are tuned.

## SIMPLE OPERATION BUT SUPER RESULTS

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The aerial-balancer condenser, although less prominent than the main tuning condenser with its long knob, must nevertheless be accurately tuned, and those who have been accustomed to two calibrated tuning knobs may find it a little strange for the first half-hour operating a set with an uncalibrated aerial balancer. This strangeness soon passes off and the success of the scheme is proved by the popularity of the S.T.700, the Centurion of last year, and the S.T.800 of this season. The special method of calibrating the main tuning condenser makes everything very simple. You first of all pick up strong stations that you can easily recognise, such as your own local Regional station. This should be received weakly by reducing the aerial coupler and applying anode reaction in order to obtain a sharp tuning point. The aerial-balancer knob will always point approximately in the same direction as the main tuning pointer. Having got the recognised station accurately tuned-in, you should make a dot with a pencil or pen on the upper of the two lines drawn between the two sets

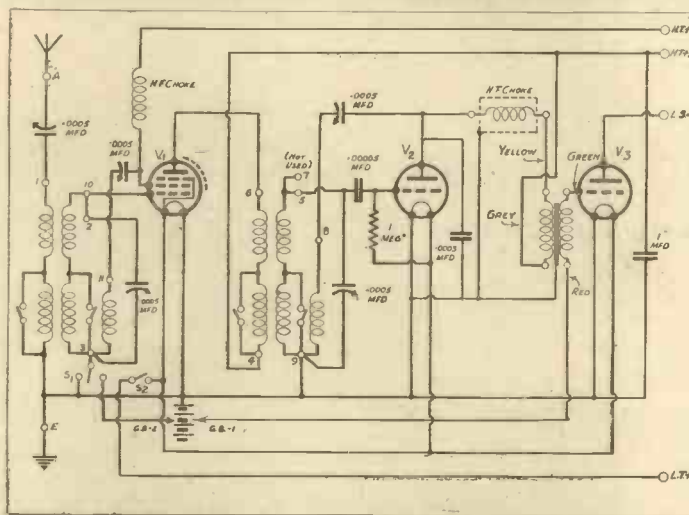
When the chief stations are logged the others fall into place and will easily be recognised. When searching for a station which has already been logged, you simply set the pointer to the dot which is connected to the station name and then adjust the aerial balancer until the station comes in. Sometimes you may get a different station. A very likely effect is that when your main pointer is pointing to a foreign station and your aerial balancer is not correctly adjusted, the local station will come in, or some other powerful station. This will merely be due to having set the aerial balancer to the wrong position. An absolute test is a slight movement either way of the main tuning pointer. If you are on the desired station signals will become weaker. If, however, they do not become weaker the probability is that you are picking up a different station on the aerial balancer. It is always advisable to have reaction applied when picking up a station, and the aerial coupler should preferably be as low a value as is consistent with good signal strength. Under these conditions the tuning on the first circuit will be sharper and the same applies to the second circuit. A chance of picking up the wrong station by mistake will, therefore, be greatly reduced. For picking up a weak signal you can make the set oscillate with reaction. Move the main pointer until the whistle is heard, and then turn the aerial-balancer knob until a sudden change in the whistle is noted. Under these conditions the aerial circuit will be correctly tuned and you can reduce the reaction and titivate the signal till it comes through perfectly.

#### A Point to Note

A final note with regard to double reaction may be made here. The two sets of reaction are very largely independent, but there is a slight coupling effect between the two tuned circuits. This means that if you have one of the tuned circuits with reaction very critically applied, an increase in reaction on the other circuit may make the set oscillate. In practice, therefore, you would never have the reaction on one circuit extremely critically adjusted and no reaction on the other circuit. What you would do would be to apply some reaction with the anode-reaction knob and then to apply reaction to the aerial circuit. Reaction on either of the circuits may then be made critical, or, if desired, you could increase each a little at a time until the set was on the verge of oscillation. Under these conditions very selective results indeed are obtainable.

The Super Centurion, in spite of its low cost, will be found extraordinarily effective in operation, and I can very strongly recommend it to all constructors. A considerable number of enthusiastic letters were received in connection with the Centurion of last year, but the great improvement effected by aerial reaction is bound to cause a still larger number of constructors to be delighted with the results obtained. J. S.-T.

## SWITCH-CONTROLLED VARIABLE SELECTIVITY



The on-off switch has three positions. One is OFF, and the other two give alternative degrees of selectivity by varying the grid-bias on the H.F. valve.

of station names. This dot is then joined by a pencil line to the end of the name of the station which has been recognised. This line may be an inclined one, but as long as the inclination is not much this will not make any difference. In fact, it does not really matter except from the point of view of convenience whether the line is greatly inclined or not. But if the dot is very widely off the end of the station name the pointer position relative to the spindle of the condenser should be shifted accordingly by forcing the knob at one end or other of its travel.

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NEXT WEEK

S.T.800 AGAIN!

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# ON THE SHORT WAVES



**SUPERHETS—  
THE FIRST STAGES**  
Some practical information  
by W. L. S.

I HAVE already said a little about the superhet and its layout, but my advice concerning details has been rather vague. I have simply suggested that the output stage and power-pack should be mounted on a second chassis, leaving the first free for the H.F. and I.F. portions of the set.

Now I want to come down to brass tacks still more, and have a look at the H.F. side of the "super"—which is, without a manner of doubt, its most important section.

So many people who build superhets seem to think that all they need is some sort of detector and some sort of oscillator to beat with it. After that, by some magic property, the wonderful I.F. amplifier (the operation of which is wrapped in mystery) will clear everything up for them and give them a set that is just too, too marvellous.

It seems a funny way of going on! But I have met it so many times that I feel sure that it is a wide-spread disease.

Let's leave queer ideas alone and come down to facts. The first detector of a superhet should be just as carefully planned and laid out as the detector of a two-valve receiver—or even of a "single." No superhet is better than its first detector; if that is flatly tuned and brings in all manner of interference, the sharpest tuning I.F. amplifier ever made isn't going to be capable of sorting it out.

The oscillator which beats with the detector, too, must be almost as carefully built as the ordinary oscillating detector. Above all, it must be stable; and it must oscillate smoothly and evenly over the whole range through which it tunes.

### A Superhet Worth Having

If we use an H.F. stage before the detector—and most modern superhets that work really well do—that must also be a good one. In short, if we build the whole thing up on the unit principle, making sure that each section is pulling its weight as we do so, we shall have a superhet that is worth having.

I recently made one in a series of units, and though it was a most unwieldy beast, it gave such terrific results that I tolerated the appearance of the thing. It really

opened my eyes and showed me how hopelessly bad some of these modern, compact superhets (especially of the home-brew variety) really are. Of the commercial jobs I cannot say much, except that they vary tremendously in their efficiency. Some are really excellent, and others, while doing reasonably well what they set out to do, might be much better for a little "titivation."

Fig. 1, on this page, shows a straight H.F., detector and oscillator for the early part

from interaction if you connect, across two parts of it, tuned circuits that are beautifully coupled to one another by all sorts of stray capacities and inductances?

I have drawn Fig. 2 to show you the kind of precautions that you really should take if you want to get the best out of a frequency changer. The rear coil and condenser are on the "detector" side of the valve, and the foremost pair serve for the oscillator part of the works. The condensers are screened from one another; but the coils are not only screened, but also are separated, deliberately, as far away from one another as the layout will allow.

If a tuned H.F. stage, as in Fig. 1, is in use, a three-gang condenser and three sets of coils are necessary, and another "wiggler" must be added to the screen, allowing you to mount the H.F. coil at the back, and on the left.

Now for some circuit details. The usual values of grid leak and condenser are suitable for the detector part of the circuit; but the oscillator, which is like an oscillating detector with no reaction control, must be dealt with in a different way.

With the conventional values of grid condenser and leak it will probably howl at audio-frequency in one part of the tuning range, and pack up completely in another. That is what the average oscillating detector would do if one set the reaction control at a predetermined value and left it alone.

### H.F. AND COMBINED DETECTOR-OSCILLATOR

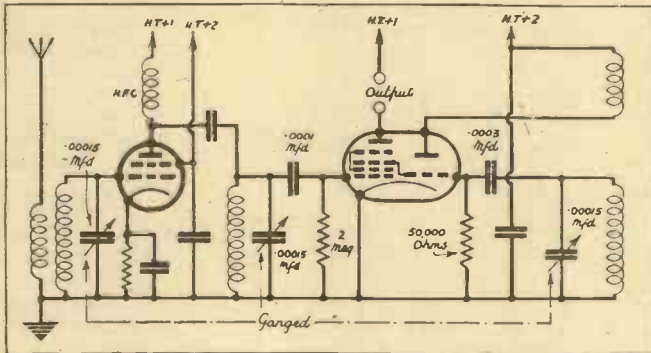
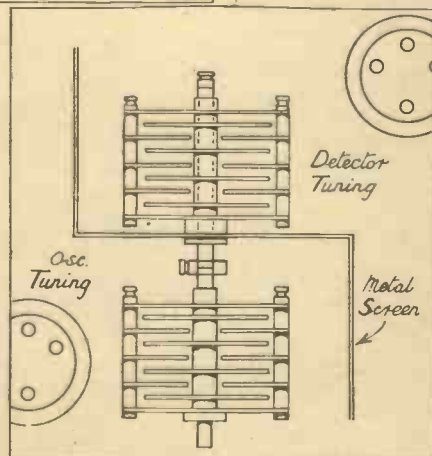


Fig. 1. A straight H.F. detector and oscillator for a superhet. The detector and oscillator are combined, a triode-hexode being used. Fig. 2 (right) shows how the screening should be arranged between the detector and oscillator tuning condensers.

of a superhet. Nowadays it is the fashion to combine the detector and oscillator, and to call the combined unit a "frequency changer." This is all very well, if we don't start imagining that frequency changing is the only thing that it has to do.

The modern triode-hexode is really excellent for the purpose. The two sections of the valve are well separated, and one does not get that awful "pulling" effect that was so often present with the older types of valve.

Don't forget, however, that you can completely ruin any advantage obtained from this excellent valve by giving your tuned circuits a bad layout. What's the use of designing a valve that gives freedom



The output is taken from the anode circuit of the hexode section and the two terminals shown in the circuit diagram normally take the I.F. primary connections.

The I.F. amplifier is a very straightforward business, but I will deal with one or two possible snags in a later article. It is advisable to use a separate H.T. tapping for the oscillator section, as shown, and then the voltage that gives the most even operation can be chosen and left alone.

### Gridleak Value

Such a state of affairs is normally righted quite easily by giving it a very low value of gridleak. I have shown a grid condenser of .0003, and a gridleak of 50,000 ohms, which is what the makers of the triode-hexode generally recommend.

ON THE SHORT WAVES—Page 2

## POINTS from the POST-BAG

W. L. S. Replies to Correspondents

R. C. F. (Streatham) is building a transmitter, and tells me that the circuit he wants to use employs two .00016 variable condensers. He wants to know how to make the best use of one .00025 and one .00015 for the job. As I don't even know what the circuit is, however, I can't possibly say—except to make the obvious remark that whatever can be done by a .00016 can also be done by a .00025, except that part of the scale won't be used.

R. C. F. also wants to know the address of the nearest amateur transmitter to him, but I think he would be better advised to approach either the R.S.G.B. (53, Victoria Street, S.W.1) or the South London and District Transmitters' Society. The address of the secretary of the latter society is 144, West Hill, Putney, S.W.

### A Spot of Bother

B. E. G. (Worcester Park) has built the ultra-short-wave two-valver that I sketched in the issue of October 24th, but complains that he can only get it to "super" half-way round the dial. And it only does that with a low-impedance valve which seems unsuitable for the job. I can't suggest a cure here, but it's almost certain to be in the wiring and the layout of the coils. Loosen the aerial coupling, tighten the coupling between the coils, increase the H.T. But you know all those dodges as well as I do.

A. W. (Banbury) sends a diagram of his set and a list of components, and complains that he can only receive distant stations at very poor strengths. What can I suggest? Well, A. W., this seems to be the complaint of everyone who has made a short-waver that doesn't go properly, for one of a thousand different reasons.

The set uses a screened-grid detector, followed by a resistance-coupled triode, followed by a transformer-coupled pentode, and if the detector is working properly there should be sufficient amplification to blow anyone's head off.

These troubles are *always* in the detector stage. Either the coils are inefficient or the H.F. choke is not suitable, or the aerial coupling is wrong, or the layout is bad, or — One simply can't finish the list!

Connect your phones across the anode resistance in the detector circuit, A. W., and see if you can hear anything at all. Play about with the detector arrangements until you can get nice readable signals from a single valve, and then reinstate your L.F. amplifiers—and I guarantee that you will be able to bend the walls and rattle the windows.

### Explaining a Report

C. R. H. (Bristol) wants to know if a blue print of my H.F. unit is available. I'm afraid there isn't such a thing in existence, but I intend to give the practical diagram of its layout as soon as possible.

He also asks for explanation of reports given on these lines: 21.30, 19.72 m., R7/N/N. Being duly translated into

English, that means 9.30 p.m., 19.72 metres, R7 (strength 7), no atmospherics, no fading.

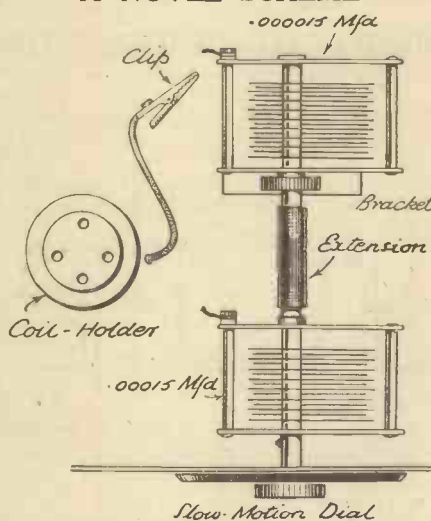
Atmospherics and fading are designated X and F. XX means "much plenty atmospherics" and FF means "severe fading." "N" means "no"—and after it the X's and F's can be left out.

The diagram on this page represents a particular kind of band-spreading scheme. Two tuning condensers—one large and one small—are used, and a crocodile clip makes provision for changing over from one to the other. The coils are so arranged that when they are tuned with the little condenser only they cover the desired waveband. Thus they might be so cut that the wave-ranges covered with the two condensers would be 21–44 metres or 20.5–22 metres. Naturally, the smaller condenser will also have a smaller *minimum* capacity than the other one, and the band will thus start a little lower when it is in use.

This scheme is useful, but you need patience in getting the coils cut just right.

Here's a query about the "Simplex" Two. B. P. T. (Bath) says, "I notice in your list of parts a .25 megohm grid leak for the L.F. valve; my dealer supplied the

### A NOVEL SCHEME



A novel band-spreading scheme. Two tuning condensers are ganged, by means of an insulated extension piece, to a single control knob. One condenser is of much smaller capacity than the other and the change over is effected with a crocodile clip.

kit with a 250,000 ohms resistor instead." Seeing that a megohm is a million ohms, that seems all right to me! B. P. T. says that he can't control reaction nicely—it's better when the negative G.B. plug is removed. Perhaps he tries to use too much grid-bias—especially if his valves are ancient. Try about 1½ volts and see what happens, B. P. T.

Regarding your band-spread query—yes, a band-spreading condenser would definitely improve the "Simplex" Two. But as it was designed as a *simple* and cheap set I didn't include one in the original.

A. B. (no address) wants to know how to start on short waves, and particularly if the two-valve A.C. converter described in the issue of October 10th, 1936, is suitable. It certainly is, and he would be well advised to use it as a starting-point. It should go well with any modern all-mains receiver.

But no "point-to-point" wiring diagram has been published.

## HEARD ON THE AIR

LOOKING back over some of the few hundred thousand words that I have written in this section, I was rather amazed to find how the character of the stuff has changed in the last year or so. Readers used to love a column or so of "station news," and they frequently wrote in to tell me of all the nice, new short-wave broadcasters that they had been logging.

All this kind of interest seems to have disappeared. People take short-wave broadcast for granted now, and their interests are confined to the sets they make and how they work, or to the amateur wavebands, which seem to have aroused more interest during the past year than ever before.

### First Hand News via Short Waves

History is repeating itself. Before there was much regular broadcasting the amateurs were the chief centre of interest; now that there is so much broadcasting that it is taken for granted, the amateurs have slipped back into focus again!

All the interesting things that readers have told me about lately have happened on the amateur bands. To-night I have been listening to a conversation between a French amateur and one of the Spanish rebel stations—each telling the other to get off the air. (Incidentally, why these Spanish stations should plank themselves right in the amateur bands is a mystery to me.)

Last week I heard first-hand news of the flood conditions in the U.S.A. from more than a dozen amateurs using telephony on the 10- and 20-metre bands, as well as thirty or forty emergency stations handling rush traffic as hard as they could go.

The amateur certainly has opportunities of keeping himself in the public eye in the States. In each of the afflicted towns there seemed to be at least one station that was independent of public power supplies, and in one instance the station I heard was the only link between the flooded town and the rest of the world, for the time being.

### The Resourceful Amateur

I heard one of these emergency stations operating with dry batteries only—and putting in quite a fair signal over here, more than three thousand miles away. Another reported that the town's mains were "dissed," and that he was using a small petrol engine driving a generator.

Once again the American amateur has proved himself a resourceful and ingenious fellow, and the total effect of all these emergency stations must have been tremendous. Hats off to the American "ham" once more. He has done it again.

How many readers have noticed an improvement in the strength and quality of the Empire programmes from Daventry of late? I don't know whether it's just "conditions," but I have been receiving them much better than ever before—and that is at a distance of 100 miles or so, possibly the least favourable distance one could imagine.

W. L. S.



# A SHORT-WAVE FORECAST By J. C. JEVONS

IF coming events cast their shadows before, then it is safe to say that the ultra-short waves will be responsible for many surprising developments in the not-far-distant future. Last year the "all-wave" receiver made its first big bid for popularity, and this year it is likely to sweep the field at Radio Olympia.

But with television on 6 or 7 metres already in operation, we have to face a new situation. The ordinary listener, having once made contact with the short-waves—say between 14 and 70 metres—will not like the idea of being left high and dry when it comes to the new television service. He will naturally want to get down below the 10-metre mark, even if, at first, it is only a question of "hearing" what is going on there. "Seeing" will no doubt come later, but meanwhile we may take it that most of this year's short-wave radio sets will tune down to at least 5 metres.

## Utilising "Dwarf" Waves

Acquaintance with the "digit" waves—between 1 and 10 metres—will, in turn, prepare the way for making contact with the so-called "dwarf" waves, which are measured in centimetres instead of metres. Perhaps this is looking rather far ahead, but, on the other hand, the ether is already chock-a-block on the long and medium waves for broadcasting. We cannot stagnate, and if we are to find room for further developments we must prepare for them at the short-wave end of the scale.

It is not as though this part of the ether were unknown territory. Whilst the B.B.C. have been preparing the way for transmitting sound and picture programmes between 6 and 7 metres, the Post Office and other big concerns have been opening up commercial point-to-point radio services for telegraphy and telephony on 15, 18, and 26 centimetres.

## A Lot to be Learnt

It may be argued that these very short waves are only used at present for "beam" working over comparatively short distances, and that they are, therefore, not suitable for broadcasting, where the object is to supply programmes to the largest number of listeners over as wide an area as possible. To some extent this is true, but it is only a part of the whole story.

We are only at the threshold of the modern short-wave era in wireless, and have still a lot to learn about the behaviour of these waves in actual practice. Many of us can recall how the early amateurs, using ultra-short waves and very low power, secured results which gave a distinct "jolt" to the professional radio engineer. In the same way, it is quite on the cards that we may all have to face similar surprises in the future.

Expert opinion, for instance, puts a limit of twenty-five miles on the new television service, but we now know that excellent

Our contributor, in looking ahead at the development of ultra-short waves suggests that quite soon a large number of commercial receivers will go down below 10 metres. He also anticipates the use in the future of ultra-short waves for broadcasting activities

reception is being secured at places located well over forty miles away, and at various points of the compass from Alexandra Palace.

At the same time, we must admit that "dud" reception areas occur, even inside a ten-mile radius—but that is beside the point. What is remarkable, for the moment, is the practical proof that 7-metre radiation will reach out far beyond the so-called "optical" range. And, in view of this, who will venture to say what may be done in the future with even shorter waves—once we understand how to ensure the proper conditions for transmission and reception?

One advantage of working with short waves, as distinct from long waves, lies in the comparative simple form of aerial that is required. Perhaps "simple" is scarcely the right word to use, since a certain amount of skill is required to get the correct coupling for maximum efficiency. But in

particularly well to directional working. Half a dozen dipole wires set up side by side, and backed by similar reflectors, will give a clear-cut beam of radiation—a result which it is impossible to produce on the medium and long waves without enormous cost.

## Cutting Out Vertical Radiation

It is true that "beam" wireless is not required for broadcasting—except possibly as a relay-link between one transmitter and another—to replace the usual telephone trunk line. But the directional action of the aerial is not necessarily limited to producing horizontal beams for point-to-point working. Short-wave aeriols can also be used to give a directional effect vertically. In other words they can be made to radiate uniformly, in all directions, in the horizontal plane, without radiating any energy at all in the vertical plane. This, of course, is just what is wanted for broadcasting.

Cut out the "sky wave," and keep all the radiation where it is wanted, pointing circularly outwards and downwards, like the ribs of an open umbrella.

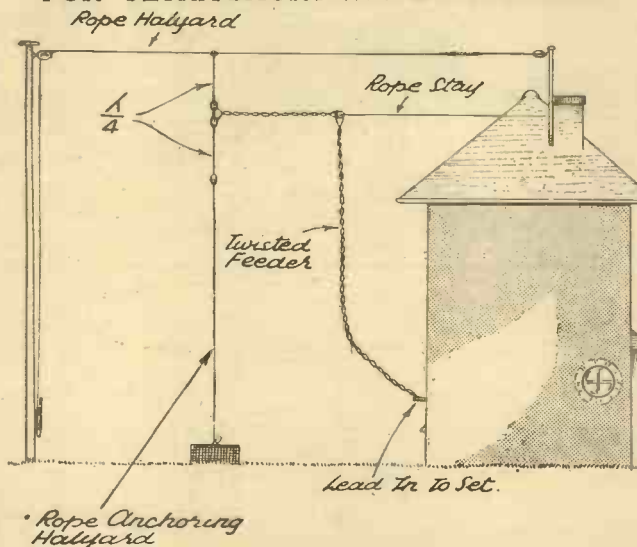
Here we get a glimpse of the short-wave broadcast system of the future. Imagine a large number of short-wave transmitters arranged in groups, each group, say of three or four, operating on different wave-lengths and catering for the needs of a comparatively small area. In this way they will supply that area with a wider variety of programmes than at present, and at less cost. Because of their limited "spread" the local programmes will not overlap with any of the "outside" transmissions, thus giving local listeners a choice of from three to four different stations on quite a simple type of receiver. The various groups of transmitters over the whole country will be linked up through short-wave "beam" relays to half a dozen separate studios, so as to "ring the changes" at will from

studio to studio.

## Television—The Touchstone

This is where the future of short-wave broadcasting appears to lie. Television is, in a sense, the touchstone. If it proves to be the success we all anticipate, now that it is backed with the prestige of the British radio industry, and the experience of the B.B.C., we may look forward to the time when the wave-band below 10 metres will carry more broadcast traffic—both sound and picture—than any other part of the ether. How long it will be before the short waves become the main traffic roads of the ether one cannot predict. But we do know that radio is a rapidly progressive science.

## FOR ULTRA-SHORT-WAVE RECEPTION



A typical aerial of the type which provides an efficient pick-up of energy in ultra-short-wave reception.

practice the ordinary listener will buy his dipole aerial and down-lead as a matched unit from the manufacturer, just as he now buys his valves already fitted with electrodes.

The point is that short-wave aeriols are extremely compact, and relatively inexpensive to erect—a distinction which is just as important in the case of transmission as in reception. It means, for instance, that thirty or forty ultra-short-wave stations can be erected for the cost of one medium-wave transmitter—a factor which is bound to make itself felt when the time comes, as it must before long, for recasting the present broadcast service.

Because of the compactness of the aerial system, ultra-short waves lend themselves

# LEARNING FRENCH THROUGH YOUR RADIO

**T**HIS week I propose to deal with what is perhaps the most-used verb in French, namely, FAIRE (to make, to do). Its uses are threefold. It is used (1) alone, (2) with an INFINITIVE, (3) REFLEXIVELY, and with an INFINITIVE. That is:

- (1) FAIRE. To make, to do.
- (2) FAIRE ENTRER. To make to enter — i.e. to show in.
- (3) SE FAIRE COMPRENDRE. To make oneself understood.

But first of all let me give you the NINE TENSES of FAIRE. It is an IRREGULAR VERB, but for all that not difficult to learn.

- PARTICIPLES. FAISANT FAIT**
- T. No. 1 (I make, I do)  
fais, fais, fait, faisons, faites, font.
  - T. No. 2 (I was making, etc.)  
faisais, faisais, faisait, faisons, faisiez, faisaient.
  - T. No. 3 (I did, etc.)  
fis, fis, fit, fimes, fîtes, firent.
  - T. Nos. 4, 5, 6, 7  
J'ai fais (I have made, done)  
J'avais fait (I had made, done)  
J'aurai fait (I will have made, done)  
J'aurais fait (I would have made, done)
  - T. No. 8. (I will make, do)  
ferai, feras, fera, ferons, ferez, feront.
  - T. No. 9. (I would make, do)  
ferais, ferais, ferait, ferions, feriez, feraient.

Please learn these TENSES thoroughly. Now for some examples of FAIRE.

Tout ce que je fais est nécessaire et important  
*All that I do is necessary and important.*

Si je faisais cela je serais heureux.  
*If I did that I would be happy.*

Il le fit sans penser aux conséquences.  
*He did it without thinking of the consequences.*

Il a fait son devoir.  
*He has done his duty.*

Nous avons fait de notre mieux.  
*We had done our best.*

Quand vous l'aurez fait venez me voir.  
*When you have done it come and see me.*

Ils l'auraient fait s'ils en avaient eu l'occasion.  
*They would have done it if they had had the opportunity.*

Il le fera sans difficulté.  
*He will do it without difficulty.*

Je le ferais maintenant si l'occasion se présentait.  
*I would do it now if the opportunity arose.*

All this is quite straightforward and should present little difficulty.

FAIRE plus AN INFINITIVE isn't quite so straightforward, and requires some explanation. I can best explain this use of FAIRE by taking an example. Let us consider the expression FAIRE BÂTIR (to build, to cause to build, to get somebody else to build for you).

Now, in English, I, like many others, say unblushingly, "I am building a house in such-and-such a street." Rather comic, isn't it, when you come to think of it? What a house it would be! I don't think the borough surveyor would think much of it when he saw it. In fact, I am certain he would never pass the plans in the first place. No! I am not building the house, because professionally I am not a builder. But what I am doing is this: I am commissioning a builder to do it for me. That is, I am getting it done for me. I am making it to be built. Consequently, when I wish to say in French that I am building a house I mustn't say:

JE BÂTIS UNE MAISON *but* JE FAIS BÂTIR UNE MAISON.

There are scores of similar expressions in French. Let me give you a few. First

*This week we reach Part 48 of our special easy-way language series*

By S. C. GILLARD, M.A.

of all, there are those to be found in a recipe.

- FAIRE CUIRE (to cook)  
Faites cuire les soles dans cette sauce  
*Cook the soles in this sauce*
- FAIRE FONDRE (to melt, dissolve)  
Faites fondre le beurre;  
*Dissolve the butter*
- FAIRE JETER  
Faites jeter quelques bouillons  
*Bring it to the boil several times*

Il nous a fait venir  
*He sent for us*  
Faites-le entrer  
*Show him in*  
La fumée l'a fait tousser  
*The smoke made him cough*  
Le bruit fit aboyer le chien  
*The noise set the dog barking*  
Allez-vous faire manger le chien?  
*Are you going to feed the dog?*  
Ne me faites pas attendre!  
*Don't keep me waiting!*

And study the following, which I got from a NEWS BULLETIN:

Le président de la Reichsbank a fait savoir, il y a huit jours, que ses obligations de service ne lui permettent pas malheureusement d'assister à la réunion.  
*The president of the Reichsbank announced a week ago that his duties do not permit him, unfortunately, to be present at the meeting.*

Le gouverneur de M. a fait envoyer 1,500 hommes de la Garde Nationale à Flynt.

*The governor of M. has ordered 1,500 men of the National Guard to be sent to Flynt.*

Sa mère l'a fait inscrire sur le registre avec les prénoms français de Jean Jacques.

*His mother had him registered with the French christian names of J. J.*

Pour faire trancher la question le Crédit municipal de B. a pris l'offensif et...

*To get the question settled the Credit municipal has taken the offensive and...*

Nous avons le regret de vous faire part du décès de Monsieur X.

*We regret to announce the death of Monsieur X.*

Business letters in French often begin with:

Monsieur,  
J'ai l'honneur de vous faire savoir que...

*Sir, I have the honour to inform you that...*

And lastly, SE FAIRE plus the INFINITIVE.

Learn the following:

- Se faire peser To get oneself weighed
- Se faire photographier To get oneself photographed
- Se faire connaître To get oneself known

- Se faire entendre To make oneself heard
- Se faire comprendre To make oneself understood
- Se faire prier To have to be asked
- Se faire couper To get cut
- Se faire lire To have oneself read to

Study these sentences now. Notice particularly the INFINITIVE:

Je viens de me faire peser  
*I have just had myself weighed*  
Il peut à peine se faire comprendre.  
*He can hardly make himself understood*  
Ne vous faites pas tant prier!  
*Don't take so much asking!*  
Je vais me faire couper les cheveux  
*I am going to get my hair cut*  
Elle se faisait lire le journal par sa mère  
*She used to get her mother to read the newspaper to her*  
Un bruit se fit entendre  
*A noise was heard*  
Je vais me faire photographier demain  
*I am going to have my photograph taken to-morrow*

Now a short reading test consisting of typical News Bulletin sentences.

Le commissaire a fait une suggestion extraordinaire. L'équipage du navire "M-J," fait prisonnier par le croiseur allemand "K," a été remis sain et sauf aux autorités espagnoles.

F.M. a décidé de faire un film sur la vie intime des artistes d'Hollywood.

Elle cherche à se faire connaître des magnats d'Hollywood.

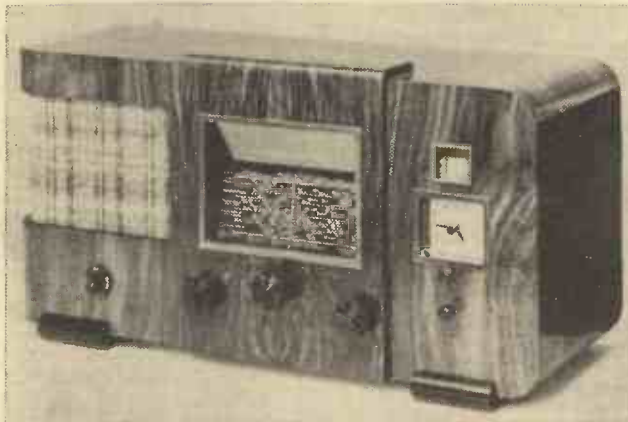
Il ne veut plus travailler autant qu'il l'a fait ces deux dernières années.

C'est cet après-midi que Monsieur R., le juge d'instruction dijonnais a fait subir le premier interrogatoire sur cette catastrophe.

Monsieur Alfred Cortot fera, à 14h. 45, une conférence sur César Frank.

Il fait appel à tous ceux qui s'intéressent à ses initiatives.  
[Note: Fair copy of last week's test is on Page 643. Ed.]

## AUTOMATIC PROGRAMME SWITCHING



One of the new German Telefunken sets. A novel feature is the clock, seen on the right, which can be pre-set so as automatically to switch the receiver on and off at times to suit the listener's requirements.

- FAIRE FRIRE (to fry)  
Il faut faire frire les pommes de terre  
*It is necessary to fry the potatoes*
- FAIRE BOUILLIR (to boil)  
Cela fera bouillir la marmite  
*That will keep the pot boiling*  
Faites bouillir le lait  
*Bring the milk to the boil*  
And don't forget the famous Persil advertisement:  
Je fais simplement bouillir mes rideaux pendant vingt minutes dans la solution de Persil  
*I just boil my curtains for twenty minutes in the solution of Persil*
- And another Persil advertisement says:  
Un lavage ordinaire est incapable de FAIRE DISPARAITRE les impuretés  
*Ordinary washing is incapable of getting rid of (making to disappear) dirt.*

Learn also the following FAIRE plus INFINITIVE expressions:

- Faire savoir to inform
- Faire envoyer to cause to be sent
- Faire inscrire to have inscribed
- Faire part to inform
- Faire trancher to settle
- Faire venir to send for
- Faire entrer to show in
- Faire tousser to make to cough
- Faire aboyer to set barking
- Faire manger to feed
- Faire attendre to keep waiting
- Faire monter to bring up
- Faire remarquer to remark
- Faire voir to show

Here are a few sentences to illustrate the verbs above:

- Le soleil fait fondre la neige  
*The sun melts the snow*
- Le soleil fait sécher le linge  
*The sun dries the washing*
- Il fait venir le médecin  
*He sends for the doctor*

FROM OUR READERS

# A TIMELY WORD FOR QSL HUNTERS

The Editor, POPULAR WIRELESS.

Dear Sir,—Queries about QSLs from S.W. stations having appeared from time to time in your paper, perhaps many readers will be interested to hear of my own experiences in this sphere. I must say, right away, that the whole QSL business is grossly overdone, and probably the only people who benefit from it are the P.O. authorities. A year or two ago I was bitten by the craze myself, and for a long time spent a small fortune on postage stamps, QSL cards, and postal reply coupons. I will give you some figures covering a period of twelve months, so that readers may form their own opinions of the "QSL racket."

Reports sent during a period of twelve months, 186.

Verifications received, 54.

Percentage of reports acknowledged, 29.

A few details will also prove interesting, and will probably save intending "QSLers" a fair amount of time and money. Note the following:

Reports to U.S.A. (districts 5, 6, and 7) . . . . .	28
Veri's received . . . . .	4
Reports to Argentine . . . . .	12
Veri's received . . . . .	2
Reports to Brazil . . . . .	15
Veri's received . . . . .	0
Reports to Australia . . . . .	28
Veri's received . . . . .	5
Reports to Canal Zone . . . . .	6
Veri's received . . . . .	0
Reports to Peru . . . . .	7
Veri's received . . . . .	0

No comment is needed on the above figures, except, possibly, a few trite remarks anent the incurable optimism of *homo sapiens!*

Many people imagine that the inclusion of a postal reply coupon is a guarantee of a reply, but such, unfortunately, is very far from being the case. I sent coupons to all the really interesting stations, but the only response was less than a dozen cards. Among the quite uncommon countries which failed to acknowledge my reports, were Siam, Curacao, Paraguay, Surinam, Bahamas, Nicaragua, Cook Islands, Alaska, British Solomon Islands, and New Caledonia.

The best advice I can give to interested readers is this: "If you intend, in the future, to send out a considerable number of reports to short-wave amateur stations, join a radio society that conducts a free QSL bureau (such as the R.S.G.B.), and save yourselves a great deal of time and a large number of stamps."

Yours faithfully,

R. B. WEBSTER.

Launt House, Carlton Road, Worksop.

## OLD SCHOOL TIES THAT FADED.

The Editor, "Popular Wireless."

Dear Sir,—The series of articles called "1936 Broadcasting Reviewed," now running in "P.W.," make very imposing reading; but the "review" is not so good when some of the items are taken for individual analysis. The outside broadcasts, for instance. The pre-

Interesting facts and figures from a reader who has sent reception reports to all parts of the world



dominant impression is that, while the established features were, as usual, put over more or less successfully, the promise was not wholly fulfilled in the most important events of 1936 owing to the B.B.C. commentators failing to rise to the heights the occasions demanded.

The departure and maiden voyage of the R.M.S. "Queen Mary" was a broadcasting event looked forward to with pleasurable anticipation and from which great things were expected. We certainly weren't disappointed in so far as her departure from England and subsequent transatlantic voyage were concerned.

There is an outstanding fact concerning the Aldershot Tattoo which remains vividly in mind—namely, that the commentator's sense of timing was stupendous. The massed bands—piece-de-resistance of the programme from the listener's point of view—never managed to blow more than a few notes round and around before the B.B.C. interrupter came in strong with a few chatty remarks about the weather and the enormous crowds present; and it was almost uncannily the way he contrived to dry up exactly as the music ceased to come out here. One redeeming bright spot, however, in an otherwise decidedly scrappy exhibition was provided by a Canadian's impromptu comments on the British attitude to the Abyssinian question in view of our own early colonising efforts. Very refreshing. (And I'll bet he was soundly ticked off by the powers that be for being enterprising enough to say something almost original down a B.B.C. microphone.)

The height of fatuity, however, was reached at the broadcast opening ceremony of the Olympic Games. The B.B.C. commentator found everything frightfully boring and amusing, and his abysmal ignorance about what was going on was astounding—even for a B.B.C.-ite!

Thousands of pigeons were released from the Stadium—our commentator, there for the express purpose of telling us all about it, mind you—"didn't quite know why"; some veteran Olympian presented Herr Hitler with an olive branch—he "didn't know who the fellow was." Then the German Sports Minister made a welcoming speech to the contestants which bored our commentator to tears almost, and he was so darned intent upon inanely explaining that he "didn't know what it was all about" that we very nearly missed Herr Hitler's declaration that the Games were on.

"Comparisons are odious," said some disillusioned wise-cracker, who had been compared to his disadvantage; and to compare the B.B.C.'s anæmic attempts to visualise a scene for its listeners with the racy, informative, quickfiring commentaries of the American "Masters of Commentary"—well, as Snuzzle puts it: Are we mortified?

I am all for introducing fresh blood into broadcasting, but if the new so-styled "specialists" can do no better than this, let us, until such time as television enables us to see for ourselves, stick to the old gang—Howard Marshall, H. T. B. Wakelam and Co.

Yours truly, A. E. ROSE.

75, Brendon Street, Long Eaton, Notts.

## LIZARD SAVES 'PHONES

The Editor, POPULAR WIRELESS.

Dear Sir,—It was whilst I was winning the big bust in the M.E.F., 1916.

The "aerial" to Headquarters (20-gauge enamelled) came through the top of the tent and down the pole to the 'phones.

We had rigged up a cut-out to earth the sparks when the atmospherics were bad, and on one occasion an extra big spark caught one of the lizards (which used to climb the pole after flies, etc.), and he dropped, hitting the cut-out with his head. This earthed the spark and he spun round and his tail hit the cut-out and switched it in again.

(Please turn to page 637.)

## NEW B.B.C. STATION MACHINE-ROOM



The filament and G.B. generators in the machine-room at Penmon, Anglesey. Both machines are duplicated in case of breakdown. On the right are pumps for water cooling the anodes of the transmitting valves.

The anti-climax came when the American and British commentators joined forces at the ship's berthing in New York.

The air was pregnant with anticipation when the American commentator invited the B.B.C. man to tell the world how many radio transmitters they were using on board (a question any twelve-year-old schoolboy passenger could have answered with complete details, I'll wager), and—ye gods!—the best the world-representative of British broadcasting could do was to stutter that "he didn't know"! Was his face red?

I'm afraid that a good many old school ties lost their brightness in that sad and awful moment; and many a Pukka Sahib, struggling valiantly to uphold British prestige in the far-flung Outposts of Empire, hung his head in silent humiliation before his coolies at this inglorious demonstration that the Old Country wasn't what she was, by gad, sir! (It is reported that Colonel Ginswiler, late Poona Militia, in a moment of mental aberration brought on by this letting down of the Old Flag, refused a drink, and, on being afterwards informed of this lapse, took to his bed and has never since been the same.)

## WIN A GUINEA

Each week a guinea is awarded to the sender of the letter which, in the opinion of the Editor, is the best one. This week it goes to Mr. R. B. Webster. Now what about you? Other readers will be interested in what you have to say, and you may be one of the lucky prize winners.

# AERIALS FOR PLANES

A new automatic trailing aerial, introduced in America, which is immediately adjustable for various wavelengths.

A SUITABLE transmitting antenna for airplanes has been the subject of much consideration and research. There are three main types of antennæ—the fixed type; fixed trailing wire and reel type weighted trailing wire.

The fixed type, owing to its short length, its low effective height and its high capacity, is relatively inefficient and used only on aircraft where limited range or extremely high-frequency transmission is desired.

The airlines have found it advisable to use a fixed trailing wire type of antenna. However, the disadvantage of this type is that constant whipping and abrasion shortens their length and they require frequent replacement. The necessity for replacement is so prevalent that TWA has developed an auxiliary antenna which can be released by remote control when the main trailing wire antenna becomes broken or lost.

## The Normal Reel Type

The reel type weighted trailing wire antenna has proved to be very reliable and considerably more efficient than the other two types, which, reduced to simple language, means greater transmitting range for a given transmitter output. However, it too has certain disadvantages, the main one being that the hand reel upon which the wire is wound must be placed in a position where the pilot

can operate it. In most cases the transmitter has to be located in the back of the airplane, which necessitates running a connection from the antenna hand reel back to the transmitter. The disadvantage in this is that there is always considerable loss due to radiation within the frame of the ship from this long-lead wire. There is also the disadvantage that it requires considerable physical effort on the part of the pilot to reel the antenna in and out, and it is difficult for him to judge exactly the length of wire he has extended. In an emergency it is sometimes necessary to land the ship promptly, in which case there is no time for the pilot to reach over and reel in the extended antenna, should it be out at the time.



The aerial winch and control panel. The 'phone on the right gives an idea of their small size.

For the private pilot, as well as for the airline, the problem of satisfactory transmitting antennæ has been solved by the new Learadio Motoreel which provides a variable length weighted trailing wire antenna with all the advantages of all three types of antennæ mentioned above and none of their disadvantages. The reel itself may be located alongside the transmitter and the fairlead protruding from it arranged to emerge directly below and out of the belly of the ship. This practically eliminates radiation losses within the ship and makes the whole length of antenna effective for transmission.

## Power in the Aerial

The rated power of a transmitter means very little. The amount of power in the antenna means a great deal. The Motoreel allows accurate matching of the antenna load to the output impedance of the transmitter, which insures radiation of practically all the power the transmitter is able to deliver. In many cases 50-watt transmitters are delivering only 5 watts to

the antenna because of mismatch. It is obvious that in these cases it would be far better to have a 10-watt transmitter putting 10 watts actually into the antenna, which would result in greater transmitting range and considerable saving in weight and payload, not to mention decreased battery drain and lower first and operating cost.

One of the greatest advantages of the Learadio Motoreel is that it allows the pilot to match properly his antenna for a number of different transmitting frequencies. Pilots are more and more realising the necessity for multiple frequency transmission. The

(Please turn to page 641.)

THE development of broadcasting is of special interest at the present time. This is, no doubt, the most formidable instrument at the service of international propaganda. The number of receiving sets in use in each country is increasing rapidly. A voice reaching the listener through space strikes his imagination and claims his attention.

In this field Italy made a late start as compared to other countries, but thanks to the work accomplished in 1934 and 1935, the technical and political equipment of our broadcasting system has risen to a rank which places it at least on a level with that of radio organisations of countries which were formerly at the vanguard of all others.

## Concerning Political Aspects

In due course I shall deal with the artistic aspect of broadcasting, but I first wish to dwell upon the journalistic and political side of the matter. Thanks to our excellent wireless equipment, we can address the world in 18 languages, among them being: Albanian, Bulgarian, Arab, German, Hungarian, English, Croatian, French, Greek, Spanish, Portuguese, Esperanto, Hebrew, etc. Our news bulletins are listened to with the keenest interest everywhere. No less than 59,084 letters received from radio listeners last year

## RADIO IN ITALY

By His Excellency Galeazzo Ciano

You may grumble at the B.B.C. now and then and think their attitude somewhat "schoolmasterish," but would you like our broadcasting to be run on a similar plan, or with a similar guiding spirit as that which is behind Italian radio? Or would you?

bear witness to this statement, and each one has been answered. Whoever applied for information or explanation on some point was given it. 24,008 requests for publications and data on Fascism were met by the shipment of 124,546 publications and pamphlets.

A new feature was introduced in broadcasting by the institution of courses of lessons in the Italian language, with the distribution of free papers on grammar especially prepared for students in Germany, Great Britain, France, Spain, Hungary, Greece and Rumania. The total number of students following these courses exceeds 35,000, and thousands of requests for the institution of new ones are reaching us constantly from countries for which we have not held them so far. These requests will be complied with as soon as the new ultra-powerful station of Santa Palomba, to be opened shortly, relieves the other stations of their present double programmes for home and foreign con-

sumption, and enables us to develop our propaganda on a vaster scale.

A certain amount of control already performed over musical and other broadcasts connected with the stage, effected with the co-operation of a Special Committee to which Senator Corbino and Senator Visconti have contributed their

knowledge and experience, will become increasingly more discriminating in order that our radio programmes may achieve the standard and quality which befit our national traditions. Radio programmes have received some criticism, but one must not forget the many difficulties encountered in putting together no less than 34,229 hours of transmission every year, and one must also consider that the audience is a large and varied one, where widely differing tastes and requirements have to be met.

## Self-Criticism Common

A survey of polemics and discussions held in the Press of every country on the subject of broadcasts shows that every nation criticises its own broadcasts and quotes the neighbour as an example. As a matter of fact our organisation is among the most frequently quoted, and at the last Congress of the *Union Radiophonique* held in Paris, the highest praise was expressed for the artistic part of our programmes.

# PENMON: THE NEW NORTH WALES TRANSMITTER

On February 1st, the B.B.C. brought into operation their plan for serving the densely populated area in North Wales by the opening of a new 5 kw. station near Beaumaris.



The transmitter and programme control desk at Penmon.

**T**HE opening of the newly-constructed transmitting station at Penmon in Anglesey marks another step in the development of broadcasting in Great Britain. More particularly, it is a step towards the carrying into effect of the B.B.C.'s intention to provide a Welsh programme to as many listeners in Wales as possible. The power of the station, although only 5 kw., will enable it to serve the north of Wales which, next to the extreme south, is the most densely populated area.

### Use of a Common Wave

Recent progress in the operation of two or more transmitters on a single wavelength makes it possible to synchronise the new transmitter with the West Regional transmitter at Washford on the latter's wavelength of 373.1 metres. This is a fortunate circumstance in view of the extremely limited number of wavelength channels available for broadcasting in Great Britain. The two transmitters will at all times radiate the same programme. From July, 1937, when arrangements for providing a separate service to the west of England come into force, this programme will become one catering exclusively for the interests of Welsh listeners, and will be known as the Welsh Regional programme.

The Penmon station is the first of the 5-kw. type to be built by the B.B.C. Although in some respects it is a miniature of the transmitters recently erected at Lisnagarvey, Northern Ireland, and at Burghhead, North Scotland, there are many points of difference in detail.

\* \* \*

Careful consideration was given to the choice of an appropriate site for the new station, having regard to the distribution of population in the area which it was desired to serve. The site chosen, which is two miles N.N.E. of Beaumaris, was only decided upon after a number of tests had been made from various possible sites in the district, a mobile transmitter being used to obtain the necessary data.

\* \* \*

The transmitter building has a single storey, and its dimensions are 68 feet by 45 feet. The building contains a transmitter room, machine room, control room, and other subsidiary rooms.

### Single-Unit Transmitter

In the transmitter room is the transmitter, built as a single unit, and a desk at which the programme is controlled. This differs from the practice at previous stations, where the programme control desk is in the control room.

In the machine room are motor-generators providing the filament-heating and grid-bias supplies, together with pumps for circulating cooling water to the high-power valves.

The control room contains amplifiers, a wireless check-receiver, and general testing apparatus on one side, whilst on the other

### B.B.C. WELSH SERVICE



This map gives a good idea of the population density of Wales. The south is served by the West Regional transmitter at Washford in Somerset, and the north by the new Penmon station.

is apparatus associated with the synchronising of Penmon with the West Regional transmitter at Washford.

\* \* \*

The high-frequency energy is conveyed by a tubular feeder from the transmitter to a small building near the base of the mast in which are the necessary coupling circuits for transferring the energy to the mast itself.

At Penmon, as at Lisnagarvey and Burghhead, a single mast acts as the aerial. The mast is 250 feet high, having at the top a capacity ring (actually a number of turns of wire, supported by eight radial rods).

The power supply is taken from the 11,000-volt mains of the North Wales Power Company, Ltd., and is transformed down to 400 volts, at which pressure it is used in the building.

\* \* \*

The new transmitter, as already indicated, is designed to provide to listeners in North Wales a service of a Welsh programme. The anticipated area of the station is roughly that to the north-west of a line joining Mostyn on the estuary of the Dee and Nevin on the Caernarvonshire coast.

### RECORDS BROKEN

Listeners' splendid response to broadcast appeals

**T**HE B.B.C. announces that the broadcast appeals broke several records during 1936, when a total amount just exceeding £200,000 was subscribed to the Week's Good Causes, the Christmas Wireless for the Blind appeal and the Children's Hour appeals. For the first time the £200,000 mark has been reached in a year, and the sum is greater by £75,000 than the total for 1935, which was itself a record.

### Appeal for Red-Cross Work

The response to the appeal for funds for Red-Cross work in Abyssinia, which was broadcast on January 5th, 1936, realised £27,408, the largest amount ever subscribed as the result of a single broadcast. The two best Regional appeals also constituted a record, listeners contributing £7,783 to Nottingham General Hospital following an appeal by Sir Louis Pearson in the Midland Region, and £5,362 to the Tower Hill Improvement after an appeal by Lord Wakefield from London Regional. The best Children's Hour result was obtained by Derek McCulloch's Christmas appeal in the London Children's Hour, from which Poor Children on London's Housing Estates benefited by more than £1,330.

Christmas 1936 also brought the largest response to the Wireless for the Blind appeal, when over £18,000 was received. The Wireless for the Blind appeal was one of four appeals for different causes broadcast during the year by Mr. Christopher Stone, the contributions to which are only a few hundred pounds short of £50,000.

# "OVER THERE"

A feature devoted to various aspects of American radio, giving interesting sidelights on the artists and microphone methods of that country

## WHAT MEN LIKE

**ELEANOR HOWE**, famous C.B.S. home economist, recently made a survey from coast to coast and from Maine to Mexico to determine the favourite dish of America's menfolk, and she found that fried chicken holds first place, with apple pie and griddle cakes running a close second and third.

## SWING MUSIC WON'T LAST

**AL GOODMAN**, N.B.C.'s Show Boat maestro, predicts swing music will pass out of the picture in a year.

"We've had fads before, and we'll have them after swing is forgotten. But while it's here, we might just as well make the most of it. And band leaders are doing just that. I don't believe the history of popular music can match this era for giving musicians opportunities to show ingenuity, individuality and inventiveness."

As fruits of this ingenuity, Goodman points to the various new styles: sweep music, slide music, swing music and sweet music.

In all these types, Goodman explains, the rhythm of the dance number is exaggerated. That is why he predicts swing music won't last. The nation's dancers are melody lovers, and when they've had enough of exaggerated rhythm, they will insist upon having melody back.

## DID HE KNOW THEM?

**WHEN** the New York Post's Ted Thackrey, formerly of the Shanghai Evening Post, spoke over C.B.S. on the situation arising out of Dictator Chiang's kidnapping, Frank Gallop, announcer, drew him out before air-time.

"Did you know any people named Gallop in Shanghai?" Frank asked him.

"You bet I did," said Thackrey. "I often played squash with Herb Gallop and his brother. Do you know them?"

"They're my brothers," said the announcer.

## CATCHING MELODY

**TWELVE** microphones are spotted in the Metropolitan Opera House, in New York City, for Saturday afternoon opera broadcasts. Instruments in the footlights pick up the voices of the actors and singers, and others high in the wings catch the melodies of the orchestra during the performance.

## MORE FILM STARS BROADCASTING

**HOLLYWOOD** has its movies galore, and now it's annexing radio programmes right and left; maybe looking to the time when it will be a twin centre to New York in microphone productions. Many broadcast features are being switched to the West Coast—about twenty major networks are originating from there—for two reasons: 1, there is a tendency to use talent from the movies; 2, because radio entertainers are attracted by what the movies have to offer.

## ANNA STEN BROADCASTS

**AN** infrequent radio performer, Anna Sten, exotic screen star, was recently heard with a most frequent performer, Ben Bernie, when he and all the lads entertained on the American Can Co. programme over the N.B.C.-Blue Network.

Miss Sten became a film celebrity in Russia and Germany before she was taken to Hollywood by Sam Goldwyn.

## STAR FROM JAPAN

**THE** first Japanese actress to be starred regularly on a network broadcast is believed to be pretty Elizabeth Ito, twenty-three-year-old graduate student at the University of Chicago.

## ANOTHER RADIO SOCIETY

**A** SOCIETY, known as the National Association for the Prevention of Radio Interference, has been formed to suppress man-made noise throughout the United States. From now on telephone dials, elevators, electric fans and washing machines will be closely scrutinised. Utilities operating street cars, buses and trains are advised to start an inspection service of their equipment.

## IS AMERICA GOING Highbrow?

**FRANK BLACK**, general music director of N.B.C., reports that during 1936 there was a 45.7 per cent increase in the quantity of classical music presented over the N.B.C. networks.

## WILD WEST LISTENERS

**MEXICO** now has 250,000 radio receivers, 10 per cent of which are battery operated, according to a report to the Department of Commerce.

## SIX ARRANGERS FOR ONE BAND

**REX CHANDLER**, brilliant conductor of the Universal Rhythm programme of the Ford Dealers of America, brings a colourful background to his direction of one of the largest dance orchestras in radio. In addition to being a top-ranking musician, he is an aviation enthusiast and a world traveller.

The Universal Rhythm orchestra is made up of forty-three pieces. Usually, dance bands average from eighteen to twenty men. The reason for the large Chandler band is the intricate arrangements. It takes a permanent staff of six arrangers to prepare the orchestrations.

## LITTLE THINGS

### ABOUT BIG PEOPLE

*Helen Pickens, of the Pickens Sisters, sleeps with a pillow over her head, not under.*

*Helen Marshall, soprano, collects fans and has one with a bullet hole that figured in a murder case.*

*Don Bestor matches his ties—with his spats!*

*Howard White of the Landt Trio and White, can play the piano with gloves on.*

*Edith Dick, warbler, eats a quart of ice-cream every day.*

*Emil Coleman is writing a history of dance music in all its forms, in collaboration with J. Fred Cooz, prominent composer.*

*Ed Wynn owns and uses several of the comic hats that he wore early in his career. Charlie Chaplin would not part with those big, flapping shoes for a fortune.*



Miss Beverley Roberts, N.B.C. star, who recently won first prize in a competition for the most beautiful voice in Hollywood.

## NEW USE FOR TOMATOES

**WHEN** the dot for your 'i' lands in your lap instead of the cheque-book, the ink-stain may be removed by soaking with tomato-juice and then washing it in the regular way—provided you're wearing linen, silk, or cotton.—Allen Prescott ("Wife Saver" on C.B.S.).

## WHERE'S THAT FLEA?

**PLEASE** feed Oscar." This message was lettered anonymously on a box which had holes punched in it. A sound of scratching gave a sign of life within. C.B.S. mail-room attendant peeked cautiously; saw that Eddie Cantor was the recipient of a small white rat; forwarded it to the comedian in Hollywood. Eddie has also received a dozen fleas and a preserved frog since he began his search for his lost trained flea, Oscar.

## PARIS IN THE SPRING

**A** MERICAN listeners heard of Paris Spring and Summer fashion trends even before the Parisians themselves, when Captain Edward Molyneux went on-the-air recently. The world-famous English couturier, speaking direct from Paris, discussed forthcoming styles almost a week before the first of the most important Paris openings.

## WORDS DON'T FAIL HER!

**THOSE** champion long-distance novels—Hervey Allen's epic story "Anthony-Adverse," and Margaret Mitchell's best seller, "Gone With the Wind," are just handbooks compared to the writings of Myrtle Vail, author, and "Myrt," of the C.B.S. "Myrt and Marge" serial.

She has just passed the 1,500,000-word mark in writing her popular series.

With this enormous collection of words, "Myrt" has written enough material to fill ten books the size of "Gone With the Wind," since she first conceived the idea for the "Myrt and Marge" programme. Script by script, Miss Vail has written 775 fifteen-minute episodes since she has made her C.B.S. debut in the double rôle of script writer and co-star on the broadcasts in 1930.

# TELEVISION TOPICS—Collected by A. S. Clark

## “TELEFRAMES” Items of general interest

AN often overlooked point about the high cost of apparatus for modern high-definition television is the loss of practical participation by a large number of television enthusiasts. There were many enthusiasts who could afford the simple apparatus required for 30-line television reception with the aid of their radio receivers.

But POPULAR WIRELESS still remembers them as it did in the past, when a special feature was run in POPULAR WIRELESS for them. All developments are watched by our technicians from the point of view of the ordinary constructor, and we feel the future holds much to justify a hopeful outlook.

### A CELEBRITY STUDIO

The plans for the extension building of the B.B.C.'s headquarters includes among the underground studios a special one for television. We understand this is to be a celebrity studio. It will be reserved especially for cabinet ministers and other distinguished people to save the tiresome journey to the Alexandra Palace. Television certainly needs the appearance of more celebrities.

### THE CORONATION BAN

It spite of rumours that all chances of the Coronation being televised from inside the Abbey were gone, there is still plenty of hope at the time of writing. We feel sure the B.B.C. will do everything possible to provide inside scenes.

### DUBLIN TELEVISION

The Corinthian, a cinema in Dublin that is being rebuilt, is to be equipped with television apparatus.

It is stated that if the experiment is successful, other Dublin theatres will follow suit; but it is difficult to see what they will receive in order to prove the success of the scheme.

### TELEVISION REFLECTIONS

The National Physical Laboratory reports the discovery of new electrified layers above the earth. These are such that they will reflect waves of the length used at present for television.

That such would one day be discovered we never doubted, for ranges covered by 5 metres have indicated that something of the sort must be happening. It is suggested that the layers are responsible for double pictures on certain television receivers.

Echoes that would not be heard on sound broadcasting can easily be seen on a cathode-ray screen. In fact the cathode-ray tube has long been used for the measurement of radio echoes.

### ONE SYSTEM NOW

Marconi-E.M.I. is now the only system

of television being used at the Alexandra Palace. The choice was certainly right, but bearing in mind that in many quarters the Baird film transmissions were considered the better, it must by no means be assumed that the present method of film transmission is necessarily the last word.

*A weekly feature which will keep the reader au fait with all the latest news and developments in television science. It will appeal alike to the newcomer to television and the advanced experimenter.*

### MONEY BACK.

Those who bought H.M.V. and Marconi-phone television receivers when they first came out can now congratulate themselves that they were right in not waiting for prices to fall. The prices of the television receivers made by these firms were recently dropped by approximately a third, and those who bought before this drop are to be reim-

## THE SCOPHONY LIGHT CELL

ALTHOUGH it is yet to be proved that mechanical systems can hold their own with cathode-ray television receivers, there are many extremely interesting things about mechanical systems.

For instance, one of the very puzzling things about Scophony is the statement that it is able to deal with a number of the light points which make up the picture, simultaneously. At first thought this would appear to require a separate complete channel for each of the extra points dealt with simultaneously.

Actually, nothing of the sort applies. It is due to the ingenious light cell used at the receiver that this is possible.

### LIKE WAVES IN WATER

A beam of light passes through a cell containing a certain liquid, and is then scanned to cover the face of the viewing frame. The liquid in the cell is such that waves set up by varying electrical voltages applied to it alter the amount of light it will pass.

The waves, like waves in water, travel along the liquid in the same sequence as that in which they are originally produced by the electrical voltages.

Suppose now that the light passing through the cell is in the form of a slot equal in thickness to one line of the picture and as long as, say, ten picture points. The waves at one end of this slot represent the picture point being dealt with at any moment.

The speed at which the waves travel along the liquid is made exactly equal to the speed at which the spot moves across the screen. The result is that by the time the spot has moved along one picture unit the vibrations produced by the preceding unit will have moved exactly the same amount in the opposite direction.

The result is that the light shining through the cell at the point the waves have then reached will fall on the picture at the same spot as that when they were originally produced. The light value for a given picture spot thus can remain on the screen for a time equal to that taken to produce ten picture spots or until the waves in the fluid of the cell have died out.

A considerably brighter picture is thus obtained than by normal methods.

## A BATCH OF COSSOR TUBES



Cathode-ray tubes awaiting their connecting caps in the Cossor factory. The girl in the background is fitting a cap to the tube in front of her.

bursed with the difference, a matter of £30-£40.

At 60 guineas, the price of a television receiver is beginning to approach the value-for-money class of present-day ordinary radio receivers. Large scale mass production, keen competition and nationwide demand will probably all have to come before prices will again be subject to any further substantial revision.

## HENRY HALL : SOLO PIANIST

Henry Hall, Director of the B.B.C. Dance Orchestra, appears in the, for him, unusual rôle of solo pianist in the evening television transmission on February 26th. The programme is one of the "Composer at the Piano" series.

Henry Hall originally trained as a concert pianist, but he also mastered the groundwork of composition by scoring for orchestras, brass and military bands. In recent years he has composed many popular songs, some of which have served as signature tunes. A notable example was "Come ye Back to Bonnie Scotland," which he adopted as a signature tune for his Glenegles Hotel Band. "Here's to the Next Time," the closing-down tune of the B.B.C. Dance Orchestra, is his, and he also composed a tune used by bands and variety artists in many parts of the world—"It's Time to Say Good-Night."

# TELEVISION TOPICS—Continued

## WHAT WOULD YOU?

I AM anxious that these "Television Topics" should carry just the kind of information in which readers are interested, or need for their experimental work.

Correspondence we receive, whether in the nature of letters of enquiry or letters of comment, is a considerable help in enabling us to gauge the requirements of readers. Let's have even more of them.

At the same time, there must be many who refrain from taking an interest, practical or otherwise, in television because it is so new and therefore they find themselves "all at sea." If these or any other readers will write to me about their television troubles or puzzles, I will be personally responsible for their replies either by post or by the provision of articles when the items are of sufficient general interest to warrant the latter.

Even if the information required is not immediately to hand, steps will be taken to obtain it.

So just drop a line to say what you want and we will see that the supply meets the demand.

Manufacturers are invited to send in information about their television products so that this may be passed on to readers at the earliest opportunity. Readers will thus have an opportunity to learn about new lines of which they might otherwise not even know the existence.

A. S. CLARK

## THE HOME-CONSTRUCTION POSITION

WHAT is the position of home construction of television receivers?

When will it reach the stage where the average set builder can tackle the job?

Although there is more of it, the actual constructional work of a television receiver is no more difficult than that of an ordinary receiver. It is built up in sections, and the hardest part, the vision receiver, is on a par with the normal superhet from a constructional point of view.

### Those Final Adjustments

Where, you may ask then, does the difficulty come in?

It is in the final adjustments after the units have all been joined together. Balancing up a triple-gang condenser and intermediate stages is almost easy compared with making a television assembly work. Very small points can completely upset the obtaining of pictures altogether.

And it requires considerable experience to decide, from what is seen on the screen, which part of the apparatus is at fault.

From the constructor's point of view,



The new Belgian Broadcasting House which is nearing completion in Brussels. It will be ready by the end of this year and will contain the world's largest studio. The tower is to carry a television aerial at the top of the mast.

developments are required which will permit copies of a design to be made that will work without tedious adjustment after completion.

## TELEVISION FOR BEGINNERS

MORE ABOUT THE VISION RECEIVER

BY G. STEVENS

VISION receivers can be either "superhets" or "straight" sets, like ordinary broadcast receivers. It will be easier for us to consider straight sets first and then talk about the superhet, because a lot of the components are common to both and have much the same job in life. Don't forget, though, that the "audio" frequency stages of a vision receiver have become "radio" frequency stages on account of the enormous band of frequencies which we have to accommodate.

### Question of Band-width

Assuming that we have the proper type of aerial (and this is another special job that we can talk about later), the first thing is the tuning of the input to the receiver. The normal arrangement of a broadcast receiver of the simplest type is usually like this:

Band-pass tuner—H.F. valves—detector—L.F. valves, with another tuned circuit before the detector. Occasionally we may vary the arrangement and use a diode detector, or something like

that, but the main lay-out is always on these lines.

Now if we follow this convention on the lay-out of a vision receiver, the first thing we find is that the band-pass tuner arrangement is not at all suitable, as it is specifically designed to narrow the response of the H.F. circuit to incoming frequencies. The normal band-width, i.e. the range of frequency covered by the tuned circuit, is 10,000 cycles in ordinary medium-wave receivers. We want a band width of 2 megacycles for reproducing pictures in detail, and it would therefore be of no use at all to put in a circuit designed deliberately to limit the frequency response of the receiver to 10,000 cycles or a little more. In fact, the problem in designing television receivers is to accommodate the wide frequency band without loss at the higher frequencies, and to do this we have to specially "broaden" the tuning of the H.F. stages.

A favourite way of doing this is to introduce resistance into the circuit with the condenser and

inductance of the tuning system. A tuned circuit having extra resistance has a much wider frequency response on either side of the normal wavelength than a tuned circuit in which the resistance is kept to a minimum. The majority of "straight" television receivers have a plain tuned circuit for the first valve, followed by a tuned circuit in the anode or grid circuit of the H.F. valve, in which the tuning has been "broadened" by some arrangement like extra resistance or its equivalent.

If the very highest frequencies are not amplified sufficiently, due to stray capacities in the circuit (see last article), they can be given a boost by putting a choke in the circuit to produce an increased voltage across it at high frequencies.

Then the valves themselves. The amplification obtained from a valve stage, i.e. the valve plus all its resistances, chokes and what-not, is never the same as the magnification factor of the valve, which may be taken to represent the 100 per cent. ideal amplification. For example, a valve with a magnification factor of 100 may, if you are lucky, give a stage gain of 80, which in turn means that if you put 1 millivolt signal on to the grid, you get '08 volts change in the anode voltage.

Now, when we use valves in high-frequency circuits, the stage gain comes down with a run, owing to the effect of the stray capacities which we talked about last time, and the overall gain of a high-magnification valve at television frequencies may be only 4 or 5. This means that we shall want a much greater number of valves to give a certain magnification than in the case of medium-wave signals. Alternatively—and this is an important point—we can try to put up the gain by reducing the stray capacities as much as possible, and this is where the special types of valves such as the "acorn" come in.

### Low Capacity Valves

They have been specially designed to have the very lowest stray capacity, and should give a much higher gain than ordinary valves. Unfortunately, the fly in the ointment is that their characteristics are, in general, not as good as those of ordinary valves, and what we gain on the roundabouts we tend to lose on the swings. You will probably find that you can get quite sufficient gain with ordinary H.F. valves, provided that you take care in the wiring, and that the special types are only worth including in certain cases.



# MY MUSIC HALL PROBLEMS

By JOHN SHARMAN

*Listeners often criticise the B.B.C. Music Hall programmes from St. George's Hall. "Why don't you give us better turns?" they say. The desire to hear the tip-top variety artists is, of course, readily understandable; but, unfortunately, it isn't so easy to put an all-star show on the air as you might think. Let John Sharman tell you of his difficulties.*

IN the old days, before the B.B.C. leased St. George's Hall, it was famous as a theatre of mystery where, on the stage, masters of legerdemain convinced astonished audiences that the impossible could happen.

To-day its mystery is a private "back stage" affair, its puzzles and riddles devised by artists, agents and "acts"—and John Sharman, producer of Music Hall, has to solve them. He has an office above the foyer. Three phones are on his desk and one or the other is invariably ringing. Before him is a large sheet of paper divided into 52 squares after the fashion of a crossword puzzle. Each square represents a Saturday night; each must be filled with the names of five or six good "names."

## 30 Years In the Show Business

You would not think it possible that this dapper well-groomed man with the twinkling eyes and the inevitable cigarette between his lips could have been in the show business for more than 30 years. Yet, that perhaps is why he knows everyone else in it; why he can fix up contracts months ahead, or, what is more, find a deputy-act two hours before the curtain goes up. In short, it is why he knows the clues and the answers to his crossword puzzle.

But let him, in his own way, tell you something of the humour and difficulty of fixing up Music Hall for each Saturday throughout the year.

"The other day," he said, "someone came to me after the show and said: 'It was dreadful. Why don't you get the best acts in the country?' I invited the person to compile an ideal programme. Afterwards I had to point out that two of the star turns were abroad, two were on tour, and the remaining one was too expensive.

## Dashing From the Suburbs

"One cannot expect the public to know of these difficulties; there is no reason why they should. It must be remembered, however, that those who take part in Music Hall must be in London and must be free at the time of the broadcast. Frequently those who are engaged have to dash by car to St. George's Hall from a suburban town during the interval between appearances in a twice-nightly show. It is not a question of money; sometimes Music Hall costs quite a bit less than the allowance, though listeners really do usually hear the best artists available at the time.

"Things have changed a lot since the million-licence days. First there was a quiet type of studio entertainment; then it was decided to broaden out in method.

From that time Music Hall has never looked back. After running once a week it became a monthly performance for a time, but there was such an outcry we were compelled to resume the weekly show.

"My whole aim is to put on an honest-to-goodness variety bill. But this is the kind of thing that sometimes makes it a little nerve-wracking." And John Sharman smiled.

"A week or so ago the usual final rehearsal was taking place on the morning of one of the acts phoned: 'Cut the act,' he said, 'the boys can't go on. They have a prior booking.' So I had to go on to the stage and tell the boys. I felt completely sunk. However, I made a list of five other 'acts' and started phoning them. Three were already appearing in programmes in the next week or so; that cancelled them out. One other was on tour. I traced the agent of the fifth. He said: 'The boys are filming at Elstree till four o'clock!' I said 'Get them here by seven.' The show began at 9.20. The boys arrived at 8.15, rehearsed, and went into the bill. That kind of thing happens quite often."

## Suiting the Greatest Number

Mr. Sharman answered a couple of questions that listeners often ask.

"Why do we have a Music Hall at 8.0 p.m. one Saturday and at 9.20 p.m. the next? To suit the greatest number of listeners. Shopkeepers, for instance, complain that they can never hear the earlier show.

"Do artists 'make up' as usual for microphone shows? Yes, many of them do. Will Fyffe—to give an example—always wears his 'costume,' Alexander and Mose always black their faces. It is the same with many other artists who without their trappings and make-up would lack the essential atmosphere. I remember the time when a famous comedian, whose walrus moustache I regarded as a vital part of his stock-in-trade, made his first broadcast. To my horror his moustache was missing, but I said nothing. Afterwards he came to me and said: 'I don't think I "got across" well; what was the reason?' I knew he hadn't done too well, so I said: 'Well, you hadn't got your moustache.' On his next broadcast he wore it. The act was a great success.

"It is necessary, too, to have an audience.



Mantovani, leader of the well-known Tipica Orchestra, plays a "number" to his sister, Stella Roberta, who sings with the orchestra. Mantovani made one of his welcome appearances on the radio last week.

We usually have 200 people in St. George's Hall for Music Hall so that the artists get 'applause-reaction' and 'laughter-reaction.' It's a hard job to joke without knowing if you're getting the laughs."

## FROM OUR READERS

(Continued from page 631.)

Had it not been for the lizard our 'phones would have been burnt out.

"Believe it or not!"

Yours faithfully,

C. G. STALLWOOD.

10, Warwick Road, Sidecup.

## PRESENTING ARMS

The Editor, "Popular Wireless."

Dear Sir,—Ref. your inquiry in your R.R.R. on page 532 of "P.W." Line regiments present arms from the slope; rifle regiments present from the "order" (i.e. "attention position"), though, of course, I am no authority on arms drill as performed by the Pantomime Army.

Yours faithfully,

Eastbourne. G. BURBERRY. Lt.-Col.

## OVERHEARD TELEPHONE CONVERSATIONS

The Editor, POPULAR WIRELESS.

Dear Sir,—I read with interest the letter from Mr. Halls, regarding the telephone conversations he accidentally overheard when in Canada.

I also came across the same effect just after the war.

A friend of mine was living near a solitary telephone cable running to the local post-office, and he discovered that when his detector grid circuit was opened he could hear the telephone conversations quite clearly. There was no telephone fitted to his house or his neighbours' houses either. I know in this case that only one wire was used to the post-office, the return being through the earth, and I think it can be stated that it is the earth currents that are being received.

I suggest that why Mr. Halls received it a mile away from the telephone cable, was that either the earth current was taking the shortest path, which happened to be near his farm, or that the conductivity of the earth was better at his farm than near the cable.

I believe that earth signalling was used during the war. It would be interesting to know what range was obtained. It was done with heavy-duty buzzers on Morse code. Perhaps some of your readers can oblige with a few details?

Yours faithfully,

H. G. COLLIN (G 2 D Q).

"Don Que," Rectory Grove, Wickfor, Essex.

# RANDOM RADIO REFLECTIONS

By VICTOR KING

PUT MORE PEP IN THE TELEVISION PROGRAMMES! :: A LOSS TO "P.W." :: THE EUROPEAN ETHER WAR

## THOSE TELEVISION PROGRAMMES

THE other day I met a friend a few minutes after he had witnessed a television programme. I asked him what he thought of it. And he told me that he was very greatly impressed indeed—with television as such. But he thought the programme material was poor and that its presentation lacked "life."

"Television progress will be slow unless they pep up the programmes," he said.

Now this man is the editor-in-chief of an important group of magazines which includes a film paper—just the kind of individual who could help television tremendously.

And the B.B.C. should realise that it is men like him who are the very ones that are making a point of seeing these early television programmes. In effect, they are scouts for the man in the street. It is they, not "ordinary viewers," who will expedite or retard television progress—not by conscious propaganda one way or another, but by their implicit acceptance or rejection of this new thing; their recognition of it as a vital force or their lukewarm interest in it as something that may be scientifically interesting but lacking entertainment.

Therefore, I urge upon the B.B.C. to recognise the existence of these early investigators, and to make special arrangements for them to see television programmes in comfort and in good reception conditions and, above all, to flog into the programmes—to get some life and go into them. Enthusiasm can offset poorness of material. At present programme presentation at Alexandra Palace is painfully lacking in enthusiasm and "life."

The announcers all seem so condescending and bored. They should clear the whole lot out and get some Brian Michie's and "Bill" Hanson's on the job. What if they are not "telegenic"? Hanson is as handsome does, I say, and whatever the beauty of their faces the present bunch will never put television over unless they stop acting like bored members of a too-too-dull-my-dear cocktail party and get some life and "hail-fellow-well-met" spirit into their work.

## A GOOD FELLOW GONE

THAT was a shock—to call in at the "P.W." Research Dept. and find that since my last visit, only a week or so ago, one of its most popular members had died. It was all the more of a shock because he had seemed to be in such excellent health, except that he was puzzled by a slight stiffness of the jaw.

"You've been talking too much," I said playfully, little realising that the dread tetanus from which he died was already developing.

Yes, J. R. Wheatley was a grand chap. I remember when he joined the staff of "P.W." as a lad of nineteen, some twelve years ago. He worked his way up from the position of junior mechanic to that of Chief of Technical Queries.

But he also advanced in ability as a practical mechanic, and was ever willing to apply his skill in order to help others. He was so good-natured that I am afraid one tended to take advantage of the fact. I owe him a considerable personal debt of gratitude, for he voluntarily assisted me on innumerable occasions, and much of my experimental gear bears the hall-mark of his painstaking and skilful work. Mostly done in his spare time, too.

J. R. W.'s empty chair in the "P.W." Research Dept. is a poignant reminder of a good fellow who'll be sorely missed.

## THAT JAMMING

THE European war in the ether has been slowly increasing in intensity during the past few weeks. And when I say "war" I mean war and not only that local affair in Spain with the Government and Insurgent radio stations dodging each other's deliberate heterodynes all day long.

There are German stations shouting insults at Russia and Russia replying in kind—but German citizens are sent to prison if they are caught listening to it. And Russia slanging Japan and Italy slanging Russia and Germany having ether cracks at Czechoslovakia, and so on and so on.

The other phase is the attempts of the various protagonists to blot out each other's stations. I hear a whisper that this is causing a certain amount of feverish activity through "diplomatic channels." Some of that jamming is getting so ferocious that it is butting into ship and other commercial stuff.

You may remember that the nations most intimately concerned were brought together at Geneva in an effort to obtain ether peace. That failed, or has so far failed, and meanwhile the ether becomes more and more chaotic.

Yes, you were quite right in thinking that there was something funny about those loud signals which suddenly break through and stop you getting any change out of a carefully tuned-in distant station. Of course, accidental jamming *does* occur—sometimes!



JOSEPH SEAL, organist of the Lonsdale Cinema, Carlisle, whom listeners recently heard at the console of the B.B.C. theatre organ.

## SPOT OF INFLUENCE

COMPLETE impartiality is very hard to achieve. Even in a (now) rigidly regimented organism like the B.B.C. tiny loop-holes will keep forming. Knowing a good bit about "the other side of the 'mike,'" I can, of course, spot them much easier than the average listener.

But I bet most of you spotted that little lapse in a recent "Songs You Might Never Have Heard" programme. All these songs are supposed to be presented anonymously. So they were—with one exception. In this case the announcer introduced a song with a direct and unconcealed clue as to the person who was responsible for it. And when it came to the rapid repeat of all the numbers he slipped in an encouraging comment regarding it, whereas all the others merely had their titles given. Was it accidental?

Reminds me of an interesting racket. One day a smartly dressed gentleman presented himself to me and carefully leading up to it asked me if I'd like to be able to call myself "Doctor" Victor King. I was sufficiently curious to ask for details, and he told me that if I were prepared to pass over one hundred pounds he could arrange for me to be given an honorary degree at a university. A British one, too!

But as I turned down the proposition I can't say for certain that it wasn't a confidence trick. However, there are all kinds of titles and degrees which can be quite readily purchased—particularly in America. A confession! When visiting a certain country a few years ago I paid the equivalent of fifty pounds for a grand-sounding order. It was all *most* discreetly arranged. I must add, however, that if I hadn't parted with my cash for this noble decoration I probably wouldn't have got away with the spot of business upon which I was engaged. It's a palm-greased world, my brothers.

# CURING PLOPPY REACTION ON A SHORT-WAVE SET

A. G. B. (Ashford) wants to know if it is usual for the connection of the grid leak to the negative filament of the detector in a short-wave set to cure ploppy reaction.

Yes, A. G. B., it is. That is one of the peculiarities of the detector valve. It is wrapped up with the working impedance of the valve which is increased when the grid is given a small negative bias—as is the case when you connect the leak to L.T. — You will probably not get quite such sensitive detection with the leak connected in this way, but you will certainly get smoother reaction simply because the valve will oscillate more readily when it has a negative bias on the grid—provided that bias is not too great, of course.

Many short-wave designs make use of a 300-ohm potentiometer across the L.T. of the detector valve, and the grid leak is connected to the slider of this potentiometer. Then the slider can be moved along until a point is reached where the reaction is not ploppy. A point is usually found with the slider not fully across to the negative side, so that the full negative bias that can be applied by connecting the leak to L.T.—is not present. This potentiometer scheme gives a better result theoretically than the method of using the leak direct on the negative L.T. of the valve. It enables a compromise between smooth reaction and rectifying efficiency to be obtained.

## A PECULIAR FAULT

Do you remember a query in "P.W." of January 23rd, regarding a fading fault? It was sent by "W. H. S. (Devon)." What do you think the trouble was? The cure has been found by W. H. S., who has raced you all except one to the post. That one suggested a high resistance H.F. path in the long-wave circuits. He will be interested in the following:

"I have cured the complaint," says W. H. S., "but even so am stumped for an all-round completely satisfying explanation. The H.T. fuse in negative lead consists of a 2-volt bulb in a porcelain holder. Vibration, I presume, had caused it to slacken considerably, so much so that three partial turns were needed to screw the bulb tight in its holder. Therefore, the contact must have been poor. Anyhow, tightening has cured the fading, but don't ask me why."

"There was never any diminution of current flow, or stuttering caused by the make-and-break of contact which occurs when fuses work loose. Just a gradual fading of reception, with no current drop, the fading being temporarily cured by detaching the earth lead from the set. Would the potential difference between H.T.—and the earth proper caused by the 'wonky' fuse cause this?"

Well, there you are! What have you got to say? Frankly, it beats me. I cannot see that the potential difference is going to build up so much as all that without the bad contact becoming so bad that the anode current of the set would drop. Apparently that did not take place, so we are still faced with the problem. If that fuse had been in an H.F. circuit things might be more readily understood, but it was harmlessly tucked away in the H.T. negative feed to earth and to L.T. — So, as the Americans say—What?

## THE BIG VOICE

M. L. (Malvern).—I have a five-valve straight set with frame aerial. Unfortunately, when Droitwich is on I can hear him on the medium waves blotting out the Midland Regional. I have been told to try a .00005-

mfd. grid condenser instead of the .0003-mfd. in the set. Will this cure it?

Probably not. It may help a little, but I expect that most of the trouble is the fact that as Droitwich is only about twenty miles away from you you are getting him injected right into the wiring and components of the set. Try enclosing the whole thing except aerial in an iron box and earth the box. That may help matters a bit.

There is a possibility that the H.F. chokes in the set are tuning roughly to Droitwich, and that they are also causing trouble. You could put further H.F. chokes in series with them to see if this assisted. But I should try the metal box first, making it of comparatively thick iron or tin, and be sure it is well earthed. Sounds a bit cumbersome, perhaps, but I really think it is your best chance.

## HANDS UP!

I have had a short but very generous letter from a reader. He is E. D. Barrett, of Moat Farm, Buckland, Aylesbury, Bucks. He is willing to help readers out with blue prints and copies of "P.W." giving details of the S.T.600, S.T.700, S.T.800, the "Centurion" and the "Silver King."

But please do not forget that postage must be refunded for any of these books or blue prints that are desired.

If you would like one or other of these, please do not send off right away with the postage money. Mr. Barrett will be flooded with "orders" if that is done. Drop him a line first, and I am going to suggest to him that he refuses to supply anyone who does not write first, asking if he can supply the copy and how much the postage will be. Furthermore, to avoid Mr. Barrett having to reply to hundreds of letters and cards, do not expect any reply. If unanswered, take it that Mr. Barrett has written to someone else, and arranged with him to have the particular book. He cannot write to all of you, and must obviously pick one to answer and to send his book to later on when he has received the postage.

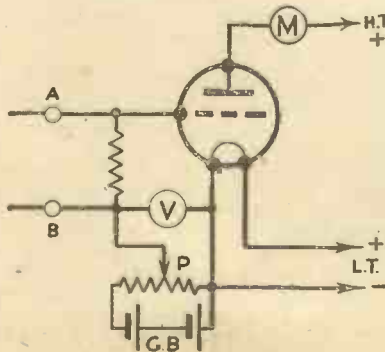
Hands up, readers! Who wants a copy? Don't all write at once.

## SOS

Can anyone supply a copy of "P.W." giving details of the Skyhawk? It is wanted by

## TECHNICALITIES EXPLAINED—No. 40

### Valve Voltmeter



How can a valve be used as a voltmeter? In the manner which is roughly shown in the sketch. The valve is placed in a circuit as shown, and is set by grid bias to the anode bend point. The anode current is measured by the meter M. The source of voltage to be measured is connected across A and B. Then the potentiometer P is moved until the anode current of the valve becomes exactly what it was before the voltage across A and B was applied. The voltmeter V shows the amount of additional grid bias voltage that has had to be used to get the anode current back to its original point—in other words, the amount of voltage that has had to be used to counteract the applied voltage. Thus we know what static voltage is equivalent to the applied voltage. This is a rather rough form of valve voltmeter, but it shows the basis of the more delicate instruments, and is certainly a very useful form for general comparison work.

E. J. Tyler, 6, Grove Road, Dunstable, Beds. Don't forget, write a card first if you can help this reader. Thank you.

## HOW SHALL I USE THEM?

D. L. T. (Isle of Man).—Re the efficiency of American valves, I want to use a group of D.C. American types in a set. Four of the valves take .3 amp. and the remaining valve .7 amp. How can I use this combination?

It is not an easy thing to balance up currents, but it can be done in two ways. You can provide a series feed for the .3 amp. valves and a separate heater feed for the .7 valve, or you can by-pass the three .3 amp. heaters by a resistance that will allow a TOTAL of .7 amp. to flow, the whole of that current flowing through the .7 amp. valve.

The resistance will have to be of such a value that it passes 4/7ths of the current, while the .3 amp. heaters (three of them in series) pass the remaining 3/7ths of the current. Then the whole lot is connected in series with the .7 amp. valve heater. If you know the resistance of the .3 amp. valves or the voltage across them you will be able to calculate the total resistance provided by the three series heaters, and then to work out a resistance to go in parallel which will be capable of passing 4/7ths of the current.

For the sake of argument, suppose that the resistance of each .3 amp. valve was 20 ohms. You would then have a total of 60 ohms in series in that part of the heater circuit. That 60 ohms is supposed to pass .3 amp. Therefore the voltage across it is 18 volts.

Now you want a resistance in parallel with that 60 ohms, and across which the same 18 volts is to be applied, but of such a value that it will pass .4 amp.

Going back to the old formula, we have the value of resistance equal to voltage divided by current.

In other words  $R = E/C$ . That is  $R = 18/.4$  or 180/4. The answer is therefore 45 ohms.

Now, having done that, you have a resistance bank of 45 ohms in parallel with 60 ohms. In series with that you have the resistance of the .7 amp. valves. That fact must be remembered when you decide on the resistance that you are going to put in series with the set and the mains in order to limit the current flowing through the heaters. Don't go and consider that you have the 60 ohms still there from the heaters of the .3 amp. valves you have only approximately 25.7 ohms. Your mains resistance will have to be adjusted accordingly.

I have taken only a very rough set of figures here. The best plan is to have an adjustable parallel resistance and an adjustable mains resistance and to vary them under meter measurements of current until you get the right current flowing, always starting far too high in resistance so that there is no danger of burning out the valves.

# SEEN ON THE AIR

*News and Views on the Television Programmes  
by our special radio-screen correspondent*

L. MARSLAND GANDER

THE great television decision, which I have referred to in these notes during the last few weeks as imminent, has been made. Acting on the recommendation of the Television Advisory Committee the Postmaster-General has adopted the single standard of 405 lines and 50 pictures per second for all future transmissions from Alexandra Palace, until the end of 1938.

The B.B.C. followed this with an announcement that transmissions from the Alexandra Palace would be on the Marconi-E.M.I. system only. Though, as I have revealed in these notes, the committee has been considering the matter carefully in recent weeks it came as a big surprise that a decision was made so soon. It is only four months since transmissions on the double standard in alternate weeks began.

At first it was generally assumed that the side-by-side trial of the two systems would last for two years. Lately it had been reported that the period would be curtailed to six months, until just after the Coronation. Now the experimental period has been cut shorter still. What is the reason for this sudden revision of policy?

There is no doubt that until this moment the public have been a little shy of television. The use of the word "experimental" has not given prospective purchasers the fullest confidence.

## Big Price Reductions

It has also now been demonstrated that on a single standard of transmission receivers can be marketed at cheaper prices. As I write Marconiphone and H.M.V. have announced slashing cuts in the prices of their sets, reducing the purchaser's outlay by about 33½ per cent. Sets which cost 95 guineas may now be bought for 60 guineas.

Other manufacturers may be expected to follow this example. It must be strongly emphasised that Baird sets and those of other manufacturers are already also able to pick up the 405-line transmission.

The next move is expected to be concerted action by manufacturers and the B.B.C. to popularise television thoroughly in the London area. Consistently brighter programmes and an extension of hours will be obvious contributions from the B.B.C. In reducing prices and concentrating experimental work on enlargement of the screen the manufacturers are doing their share. Hire-purchase terms have now made television sets available for an outlay of only £1 a week.

The B.B.C. is considering the broadcast of an additional hour's television daily between 6 and 7 p.m. Choice of this hour is governed by a desire to show television to home-going city workers who can pop into shops at this time. Sunday transmissions are also a distinct possibility of the near future.

Considerable speculation has been aroused by the committee attaching the description "London standard" to the 405-line definition at 50 pictures a second. Does this mean, may well be asked, that a different standard might be adopted for, say, a Birmingham station?

I have no authoritative information on the subject at the time of writing, but I regard it as unlikely that the committee will adopt any different standards for the provinces at present. But if, for the sake of argument, Firm XYZ

came along with a marvellous system of 600-line scanning better than anything we have yet seen, it is not inconceivable that the Advisory Committee might propose a second station in the provinces on that definition while London continued with its 405-line scanning. However, I am looking far into the future.

It is interesting that America has accepted the nation-wide standard of 441 lines at 50 pictures a second, which cannot be very different in its results from the new London standard. Most people agree, too, that we have not yet seen the best that 405 lines can produce.

The new decision is important because it will bring other systems of optical and mechanical reception on the market. I have not yet heard the intentions of Ekco and Scophony, but some time ago I was informed



Cracow's interval signal is a guitar, the strings of which are plucked by a special mechanism operated by an electric motor.

One of the most exciting and successful television broadcasts yet given was that on the England v. Ireland amateur boxing contests from the concert hall of Alexandra Palace. This was the first television broadcast from a public boxing show, virtually a rehearsal of the big fight transmissions of the future.

I am not a boxing enthusiast, but I keenly felt the appeal and promise of this programme. Clean hitting, swift movement, the roars of an excited crowd—all these factors contributed to a real live sporting entertainment. An anti-television journalist watching with me grudgingly admitted that it was the best television show he had seen.

## A Good View of the Fight

The B.B.C. technicians had a field day in connection with this transmission. A special platform was slung from the roof at a short distance from the ring and a height of about a dozen feet from the ground. On it, suspended over the audience, were accommodated the cameras and the camera man. I give the camera man full marks for his manipulation. We saw the combatants in their corners, we followed them round the ring, telescopic lenses showing us close-ups as good as any seen from a ringside seat.

Now compare this vivid transmission with the demonstrations of physical exercises, the first-aid lessons, and the instruction in cooking which we had during the same week. All these items are very interesting to some people, but do realise, Mr. Cock, that they are minority items. I have said before, and find virtue in repetition, that they are the sort of transmissions which should be introduced when we have television all day long, and there is plenty of time.

Personally, I was intrigued with Stephen Thomas's production of Lewis Carroll's "Hunting of the Snark." But I wondered what sort of an impression it was making on the passing throng at demonstration theatres. Weird figures posturing in hideous masks—I cannot imagine the 1937 hedonist rushing off to buy a television set after a "basin full" of that.

I was charmed with Frances Day in the floor-show "Hokey." Her piquant personality is admirably suited to the home screen. The Saturday night cabaret was, I thought, somewhat overdressed. I wondered if it had been influenced by the purity campaign said to be on foot in Broadcasting House. "Tour de Paris" thus belied its title in my opinion.

## The Copyright Question

The following letter has been received from the Secretary-Treasurer of the International Federation of the Phonographic Industry.

The Editor, POPULAR WIRELESS.

Dear Sir,—My attention has been drawn to an article by your legal expert which appears in your issue of January 23rd, under the title "Why Copyright?"

Dealing with the performances of artists, the author makes the definite statement that copyright subsists in such performances and that they are covered by the copyright law.

With all respect to your legal expert, I must profoundly disagree with his opinion, which, in my view, is an entirely erroneous exposition of the copyright law as affecting artists' performances, the truth being, of course, that performances, as such, receive no protection whatever under the Copyright Act, 1911.

Possibly the writer of the article has in mind the Dramatic and Musical Performers' Protection Act, 1925, which Act, however, is not founded on copyright at all, and, in fact, confers no proprietary rights upon the artist.

As artists are likely to be seriously misled by the article referred to, I would suggest that a correction is advisable.

Yours faithfully,

BRIAN BRAMALL.

Gramophone Buildings, Hayes,  
Middlesex, England.

by Mr. E. H. Traub, co-inventor of the Mihaly-Traub receiver, that the firm would not market the set until a single standard of definition had been adopted.

## Prospects of Bigger Screens

These systems are interesting because, of course, they hold out prospects of a bigger screen, and a flat screen. But I am not going to be drawn on to the treacherous ground of set comparison.

I said earlier that one of the B.B.C.'s most useful contributions to a campaign for the popularising of television would be consistently brighter programmes. Some recent programmes have been in the highest degree entertaining and full of rosy promise for the future of television. Others have slid back to the dull old standards of birds, beasts and fishes and still life.

## INTERFERENCE SERIAL (PART I)

WOO-O-F!

"Oh, heck!" I mutter. "He's at it again!"

You, gentle reader, may have met with the same sort of thing. It goes like this: you switch on the set, adjust the volume nicely, and then sit back in your arm-chair to listen to Music Hall, say.

Everything's just right for the moment, when up comes the volume with a terrific blare, sometimes a bit distorted, sometimes just too loud to listen to. At first you dash to the set and cut down the strength a little, but you soon learn better. You see, the sudden increase in volume is not due to the set at all, but to some outside bloke whom I call Mephistopheles. But I must go back some months when I had just moved into a new house and installed "Gertie." Gertie is 1937 "all-singing, all-talking" superhet, and when she first took up her position in one corner of the sitting-room was as near perfection as could be.

Then, to my chagrin, a nasty buzz suddenly arrived—the kind of buzz that cuts out everything and makes you switch off.

"Ha," said I, "Gertie has developed a cold! I must cure that."

But, being cautious, I removed the aerial and earth leads, and discovered that the buzz no longer existed.

### Making Doubly Sure

To make doubly sure, I got a first-class service-man to come along and give Gertie the once-over. He said: "O.K. Nothing wrong there."

So I put this horrid buzz down to outside interference—possibly a refrig. or some sort of high-frequency apparatus in a nearby house.

And then—suffering snakes!—along came Mephistopheles with his terrific howls and up-and-down effects on Gertie's volume. Nearly every time I switch on to a decent variety show or, in fact, any programme of the popular type I have to shut down. And I believe there is a definite connection between the buzz and the other fiendish interference. It seems curious to me that the buzz appears immediately to precede or follow on the oscillation and silent-point-tuning effects of Mephistopheles, and always that beastly buzz arrives just when there is a worth-while programme on.

Can both forms of interference be caused by the same nearby set? I wish I knew. Anyhow, I'm fed-up, and I am going to do something I have never done before—write to the P.M.G. about it. I'll let you know what happens, chaps.

A. J. R.

## AERIALS FOR PLANES

(Continued from page 632.)

engineering problem involved in matching a given length of antenna to various frequencies is quite difficult to solve. Being able to vary the length of the antenna to get maximum radiation eliminates this problem and insures putting all of the transmitter's power to work without waste.

With the Learadio Motoreel it is possible to pre-select any given length of antenna, turn the "operate" switch to the "out" position, and the Motoreel will automatically reel out the length of antenna selected and stop. Warning lights on the remote control indicate when the antenna is extended. These lights remain on until the antenna has been retracted. They are a constant warning to the pilot when the antenna is out. Complete retraction of the antenna is obtained by turning the control handle on the remote unit to the "in" position. When the antenna is all the way in and the weighted swivel fish is in its proper position against the fairlead, the warning lights go out.

The use of an antenna current meter in conjunction with the remote control unit

enables the pilot to select a length of antenna giving maximum current circulation. It is only necessary for him to note that length and reset the antenna accordingly each time he wishes to use his transmitter on that particular frequency.

### Ground Communication

The swivel fish is so arranged that when the antenna is completely retracted there is a short flexible piece of wire still extended for short-range communication when approaching airports for a landing and for communicating with the control tower when the ship is on the ground.

The weight of the Motoreel, together with its wire, swivel fish, remote control, flexible connecting cables, fairlead, etc., is less than 10 lb. complete.

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2/6

DOWN

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- Drilled steel panel

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- Maximum volume and efficiency.
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# The RADIO Bulletin

Up-to-the-minute news concerning the radio industry

**A** NEW all-wave model has just been released by Invicta Radio. This set, which costs £10 15s., is a consolette and embodies a superhet circuit. There are four valves (plus rectifier), and the short-wave range is 16.5 to 52 metres.

Among the special features of this set are delayed A.V.C.; a Magnavox elliptical cone speaker; a sloping dial which is illuminated, and marked in metres and has station names on the medium and long waves; manual volume control operating on pick-up and radio; and tone control.

The standard model is designed for A.C. mains of 200-250 volts, 40/100 cycles. A non standard model for 100-250-volt mains is available for an extra 10s. 6d.

## BURGOYNE "DRAGONETTE"

Burgoyne Radio have introduced a new four-valve superhet for A.C. mains. Known as the "Dragonette," this set has a triple stage automatic volume control and is equipped with Litz wound coils. A three-colour "neon style" tuning dial is engraved in both station names and metres.

There is also a variable tone control and the undistorted output is 2½ watts. The "Dragonette" is housed in a highly polished walnut cabinet and costs 9½ guineas.

## Robbing the Anode

**T**HE resistance value to be used for a decoupling resistance depends upon the voltage which is to be used and the current taken by each valve. Subject to the condition that the necessary amount of current must reach the valve, it is desirable to make the value of the decoupling resistance as high as possible. If the decoupling resistance is too high, however, you will be robbing the anode of too much voltage; you will easily understand this when you remember, for example, that if a resistance of 1,000 ohms is incorporated in a circuit in which 1 milliamp. is passing, the 1,000 ohms resistance will be responsible for doing away with 1 volt of electromotive force.

The value of the decoupling condenser generally varies from about 0.1 microfarad to 0.5 microfarad for high-frequency circuits, whilst for low-frequency circuits a decoupling condenser may have a value of 1 to 2 microfarads. There is no very hard-and-fast rule with regard to the value either of the decoupling resistance or of the decoupling condenser, and in point of fact the value of the one depends to some extent upon the value of the other.

## Superhet Pointers

The superheterodyne set has come greatly into favour in the last three or four years, and for this there are a number of factors responsible. For one thing the very great selectivity obtainable with this type of circuit is particularly suited to modern conditions, whilst for another thing the

## WEARITES AT THE B.I.F.

Power transformers, smoothing chokes, radio-frequency tuning coils and switches are among the apparatus on the Wright & Weaire stand at the British Industries Fair, which is now being held at Olympia.

Another exhibit is a group of specialised radio instruments intended for checking the performance of receivers and accessories. The group includes:

1. A metre unit with a total of twenty different ranges for A.C. or D.C. voltages, resistance, capacity and inductance.

2. An all-wave oscillator unit providing a source of radio and audio-frequency voltage at known frequencies.

3. An A.C. mains operated valve tester suitable for testing British and American valves.

4. A condenser tester operating on the Wien bridge principle, giving capacities from 2 microfarads to 50 microfarads on a direct reading scale.

Typical examples of press work, small bakelite mouldings, capstan and precision lathe turned parts are also on view.

## BRIMAR AMERICAN TYPE VALVES

It is estimated that approximately one and a half million sets in Great Britain are equipped with American type valves and

that during 1936 half a million replacement valves for these sets were sold.

In view of this it is interesting to note that **Standard Telephones and Cables, Limited**, have introduced a range of valves suitable for replacement purposes in the American type of set.

These valves are all manufactured in Great Britain at the Brimar Valve Factory,

Foots Cray, Sidcup, Kent, and the makers state that they are equivalent in all respects to American products bearing the same type numbers. The prices are in accordance with those fixed by the B.V.A., and the type numbers available are as follows: 6A7, 6B5, 6B7, 6C6, 6D6, 25Z5, 42, 43, 75, 78, 80 and 89.

## TAIL PIECE

This is a true story. Prospective purchaser enters a West Country radio store and requests a demonstration of an American all-wave receiver in the window. The salesman duly demonstrates on direct

transmission from a trans-atlantic station. Prospective purchaser says she dislikes set because it "talks too much like an American." The salesman explains that the set was actually manufactured in the United States, whereupon prospective purchaser decides that that probably accounts for it, turns set down and buys a Pye T10 instead!



The Burgoyne "Dragonette."

## TECHNICAL JOTTINGS

Some Items of Interest

By Dr. J. H. T. Roberts, F.Inst.P.

difficulty of manipulation which characterised the superhet receiver of ten years ago has been entirely done away with.

### Second Channel

Another important improvement in the superhet is the cutting out of second-channel interference, which used formerly to be a great drawback. When second-channel interference is present you get double settings at all different positions on the dial, whilst a powerful station will be received at even more than two positions. With the suppression of the second-channel interference, however, this has been done away with, and this is one more of the important factors which contributes to the increasing use of the superheterodyne principle in modern receiving sets.

### A New Electron Tube

A very interesting new type of electron tube, working on lines somewhat similar to the Zworykin image tube, has been developed and was lately demonstrated in Germany by Von Ardenne.

This new type of tube uses a translucent photo-electric cathode at one end, which converts light rays into an electron beam, this latter striking a fluorescent screen at

the other end of the tube and so producing a visible image. One of the principal advantages claimed for this Ardenne tube over the Zworykin tube is that it has no complicated anode-focusing rings. Optical correction is brought about by means of a spiral of resistance-material which is coated, by a special process, on to the neck of the tube.

This coating acts as a simple potentiometer and produces a strong static field with an intensity-gradient increasing towards the image end of the tube. It is claimed that this spiral resistance coating has the effect of making a more gradual intensity gradient than the metal rings used in the Zworykin tube, and so produces better image correction.

Amongst the many applications of this new type of electron tube two important ones are seeing through fog and the examination of microscopic specimens.

### Improving Loudspeakers

A new system for extending the frequency-response of a loudspeaker has been developed by a German inventor and was recently demonstrated in Berlin. This system is adjustable over the entire frequency range so as to supply any desired frequency characteristic. The main speaker unit is mounted at the back, and in front of the cone are three deflectors, two of which hinge from the bottom so that their positions in relation to the cone can be varied. The third deflector is pierced with a large number of holes of various sizes,

(Continued on next page.)

## TECHNICAL JOTTINGS

(Continued from previous page.)

the deflector being hinged at the top. These deflectors serve to change the projecting efficiency of the sound chamber.

### Variable Shutters

At the front of the sound compartment is a variable shutter which serves to reduce the opening of the sound compartment.

As well as the main speaker unit there are two subsidiary ones which are fitted with baffle plates, forming resonant chambers to increase the frequency range over which they will respond.

At the back of the main unit is a compartment stuffed with glass wool, which suppresses any back wave.

### Speaker Developments From Paris

Another interesting loudspeaker development comes from Paris and deals with an arrangement for correcting the natural defects in reproduction of the loudspeaker cone diaphragm by the use of corrugations, special shapes, special materials, and so on. A new cone of French design, actually used in commercial speakers, is made with an exponential taper, the idea being to combine the actions of an air column and piston-type unit.

It is claimed that with these new cones a much greater region can be covered and that also much improved frequency-response is obtainable.

### A Car Aerial

One of the important points in car radio (which incidentally is very much more popular in America than it is here) is a suitable form of aerial. In the States a number of different types of car aerial have made their appearance on the market. One particularly ingenious one is secured along the length of the roof of the car, outside, by means of a number of short rubber pillars, each provided with a rubber suction-cup at the lower end by which it is secured to the car roof. The aerial itself consists of a length of pure copper tubing, about  $\frac{3}{8}$  in. diameter, cadmium or chromium plated, with a shielded lead-in, connection being made so that there is no possibility of corrosion. The rubber mounting is claimed to do away almost entirely with the effects of vibration in the aerial, as well as being very convenient for attachment and detachment. The "stickage" of the rubber suction cups depends, of course, upon the nature of the surface of the car roof. The makers of the aerial say that the rubber cups will stick to practically any type of roof and that rain or moisture only has the effect of making it stick all the more securely.

### Is a Moving-Coil Better?

Many people think that you have only got to have a moving-coil speaker and you will have a first-class frequency-response. But you want to remember that there may be as much difference between one moving-coil speaker and another as there is between the average moving-coil speaker and the average speaker of any other type. Simply because the speaker is a moving-coil, that does not of itself convey any guarantee of efficiency as regards frequency-response, reproduction, or anything else.

### It Has a Reputation

I suppose this idea has arisen because, when the moving-coil speaker was introduced a few years ago, it was hailed as so much superior to any of its predecessors that it gained a reputation quite irrespective of the variations in the merits of individual members of the type.

The principal advantage of the moving-coil speaker is the fact that the armature or moving part, which is attached to the reproducing diaphragm, is very light in weight. This armature consists almost entirely of a small coil of wire into which the speech-currents are fed, the coil of wire itself being positioned in a powerful magnetic field in the gap of a permanent magnet or, in some cases, a magnet which is energised by means of a field-current.

### Compare With Moving-Iron

The essential point, however, as compared with a loudspeaker of the ordinary moving-iron type, is that the moving element is so light in weight that it can more faithfully follow the variations in the magnetic strength brought about by the speech currents. In other words, it can more faithfully reproduce what is passed into the speaker.

### A Matter of Opinion

A really good moving-coil speaker is no doubt much better for all-round purposes than a good speaker of any other type (although here, again, this is a matter which is often the subject of heated controversy), but the mere fact that it is

### LEARNING FRENCH THROUGH YOUR RADIO

A fair copy of last week's test :

1. Vous devez imiter la prononciation des speakers français.
2. Nous devions écouter l'orchestre de la station jusqu'à 8h.
3. Elle dut le faire immédiatement.
4. J'ai dû rester tout le jour chez moi.
5. Il avait dû le répéter souvent.
6. Ils auront dû le dire plusieurs fois.
7. Elle aurait dû isoler le malade.
8. Nous devrons partir avant minuit.
9. Vous devriez lui permettre de le faire.

a moving-coil speaker tells you little or nothing. You want to be quite sure that you have got hold of a good moving-coil speaker, as an indifferent or poor one may not serve you nearly as well as a good example of, say, a moving-iron type of speaker.

### To Get You Out of a Difficulty

A screwdriver which, like the music, goes round and around has now been invented to get you out of that difficulty with a screw which you just can't get at because something gets in the way. This new screwdriver consists really of the "end" of an ordinary screwdriver and the "handle," but with the rigid shaft knocked out and a piece of flexible shafting instead (that sort of coiled-wire arrangement used for grinding-tools and in dentists' drilling machines). If a screw is in a very awkward position and things are in the way, you insert the small end in the slot of the screw, bend the shaft of the screwdriver into a suitable position and then, holding the end of the screwdriver against the screw with one hand, turn the handle with the other.

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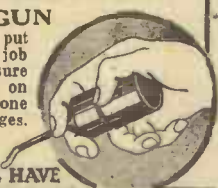
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## RED-HOT NEWS

How the short waves give you up-to-the-minute details of happenings in all parts of the world.

NEWS of the American flood tragedy creeps over here into our broadcast bulletins and our daily newspapers, but it takes radio—direct radio—to bring home to one the full force of that disaster which, even as I write, is still being worked out by Fate in the stricken areas of the Ohio and Mississippi rivers.

Over here we get the bare bones of the details of the floods. By listening direct to the American short-wave stations, you hear the whole story put over, hour by hour, in vivid description, word-pictures that are not easily forgotten.

Listeners who have no means of tuning in the short waves miss a great deal of interest in their radio. I am not suggesting that a disaster such as the floods should be regarded as radio entertainment, but it is of interest to all listeners to be able to tune-in America and get not only such news direct and in full, but all the other fascinating bits and pieces the American stations are so fond of dishing up.

I, for one, would not be without a set that can cover the short waves. Many of you will have built the S.T. 800, and so have brought these wavelengths into the scope of your listening. But there are others among you and your friends who even now still dally by the wayside, not realising what benefits in interest and entertainment can be obtained from short waves. To you and them, I say, do not hesitate any longer. Set to work to build a set, or to buy a unit that can be attached to your present receiver, enabling you to tune down to the wavelengths on which such interesting material is being broadcast.

### A Neat and Inexpensive Unit

These units are legion, some good, some bad and some indifferent. Many seem to be expensive, others remarkably cheap. But nearly all of them will work well enough to enable you to get American broadcasts on your set, no matter what the receiver is that you are using.

One of the neatest and least expensive that I have tried recently is the Ridco "Ranger." It costs a mere 27s. 6d., without valve, or ten shillings more with the valve. It works from the ordinary broadcast receiver power supply, and can be obtained either in battery or A.C. form. In either case, there is no difficulty in fixing the unit, and when once fixed you do not have to disconnect it when you have finished on the short waves. You just operate a switch and the unit is cut out of circuit, and your broadcast set goes on as before.

The system on which the Ridco works is that of the superhet frequency changer. It is actually a single-valve superhet frequency changer which converts your own receiver into a short-wave super. If the set is already a super on broadcast wavelengths, that does not matter; it becomes a double super, with all the sensitivity that accrues from that fact.

To fix the unit, all you have to do is to plug-in a valve adaptor in a suitable stage in your set—preferably the output stage if a pentode output is used, or an H.F. stage if the output valve is a triode. I am speaking now of the mains model. In the battery model the valve adaptor method does not have to be used; the power is obtained from the batteries of the set.

Thus adaptor, in the case of the A.C. unit, merely draws the power from the mains portion of the set for the operation of the valve in the unit. If the power is not sufficient when the adaptor is plugged into the H.F. stage of the set, then a special adaptor can be obtained with complete smoothing unit, so that the power can be obtained direct from the rectifier valve in the mains receiver.

It is all made very simple for the operator of the unit, and I cannot see how he can possibly go wrong, unless he is a complete nut.

### Simple Changeover Switching

The outside aerial is disconnected from the broadcast set and connected to the unit, and the unit is connected to the aerial terminal of the set via a screened lead. This feeds into the set the short-wave "superhetted" output from the unit.

Finally, there is an earth connection, and the whole thing is ready.

If you don't want the short waves, you operate a switch on the unit; that cuts it out and switches it off. When the short waves are required, you merely switch the unit on, switch to the short-wave band you require (either 15-33 or 30-85 metres) and tune in by the single dial on the panel of the unit.

There is only one adjustment that has to be carried out on the main receiver other than the control of volume, which is done in the usual way, as it is when you are listening on broadcast wavelengths. That adjustment is to tune the broadcast set to a wavelength between 1,800 and 2,000 metres. That is because the intermediate superhet frequency to which the short-wave unit is tuned lies between those wavelengths.

The best setting for the receiver tuning is found by tuning in a short-wave station and then tuning

the broadcast set until the station and the background are at their loudest. More accurate tuning adjustment can be obtained by listening to the background than to a station, for this gives a more sensitive indication.

With the set tuned, you merely turn the dial on the unit and the short-wave stations roll in. They do come in well, too, on the unit I tested. There is no difficulty in getting a good bag of the most useful American stations, and from about midday to well after midnight, by changing the wavelengths on which I was listening, I could be sure of American programmes.

Naturally, the power with which they come in is to a large extent governed by the type of broadcast receiver with which the unit is used. If it is an insensitive set, you cannot expect that the stations will be very loud, except in particularly favourable conditions. But if the set is a superhet or a one- or two-stage H.F. receiver, the stations come in very well indeed. With a superhet I found it necessary to reduce the volume on many stations.

The special type of short-wave coils in the unit certainly seem to operate well, and I had no kick against the efficiency of the model I tested. A high-gain intermediate frequency output transformer is used to couple the octode frequency changer valve to the input to the ordinary broadcast receiver, and this transformer seemed to be well up to scratch.

K. D. R.

## RADIO WANTS QUALIFIED MEN

TO anyone seeking to improve his position and embark on a career at once interesting and profitable, there is none offering wider scope for advancement than that which entails a practical knowledge of radio. At the present time, with Television becoming daily a more practical reality, the need for qualified men becomes more and more urgent.

Radio manufacturers, with their factories, offices, laboratories, servicing and sales departments, require men with a practical knowledge of radio in all its branches. In many other directions—wholesalers, retailers, the Press, etc.—a knowledge of radio technique is important and a means of securing a well-paid post. Readers who are interested can obtain full information as to how this knowledge may easily be acquired in their spare time by means of postal tuition. Write to the Principal, Technical & Commercial Radio College (Dept. P.W.86), Fairfax House, High Holborn, London, W.C.1, for a free copy of their book entitled "Radio As a Career."

## 1936 BROADCASTING REVIEWED

### The Northern Region

THE year 1936 saw a further expansion of the broadcasting organisation in the North.

Six new appointments were created and filled on the Regional programme staff. Structural improvements were carried out at Manchester and Newcastle, studios at both of which establishments were equipped with ribbon microphones and apparatus capable of playing Watts discs as well as ordinary gramophone records. The premises occupied by the B.B.C. in Sheffield since 1923 were closed at the end of August, other studio accommodation having been taken in the city. Work on the construction of the North-East transmitting station at Stagshaw, Northumberland, was continued.

These changes were reflected in the programmes, the increased power having been applied not only to stimulate the output, but also to improve the quality of programmes. Particularly noticeable was the increase in the number of specially produced programmes: programmes which might generically be played,

(Continued on next page.)



## 1936 BROADCASTING REVIEWED

(Continued from previous page.)

talks, concerts or outside broadcasts, but which in view of the nature of their presentation could only be described as "feature programmes." While the output was increased, the amount of work involved in connection with each individual programme was increased to an even greater extent. More attention was given to programme research and reconnaissance. In addition to the regular studio auditions—thousands of which are given every year—sections of the Region were systematically combed for talent. In particular, Francis Bolton made a special tour of ten big Northern towns in the early autumn, giving auditions to over a thousand aspirants "on their own ground."

During the autumn and winter seasons, the Northern programme included regular concerts by the leading orchestral and choral societies of the Region, such as the Hallé, the Liverpool Philharmonic and the Northern Philharmonic (Leeds) societies, the Leeds Choral Union, the Huddersfield Glee and Madrigal Society, and the Sheffield Musical Union. These concerts were conducted by musicians of international repute, such as Sir Thomas Beecham, Sir Hamilton Harty, Sir Henry Wood, Pierre Monteux, Robert Heger, and Nikolai Malko; while the soloists included Gaspar Cassado, Egon Petri, Mark Hambourg, Mary Jarred, Myra Hess, and Alexander Kipnis. In the sphere of chamber music there were regular concerts by the Manchester Tuesday Midday Concerts Society, concerts by the Rodewald Society of Liverpool, and midday recitals from Leeds and Sheffield Universities.

### Special Programme from Lincoln Cathedral

The B.B.C. Northern Orchestra of thirty-five players gave regular orchestral concerts, and on October 9th the strings of the orchestra went to Lincoln Cathedral to collaborate with the Cathedral Choir in a special programme of the works of William Byrd, some time organist of the Cathedral. There were also regular broadcasts by brass bands, dance bands and cinema organists. The "Swing Low, Sweet Music" concerts of the Revue Orchestra (now known as Tommy Matthews' Concert Orchestra) were a feature of the year's programmes. In the autumn a special "swing" orchestra was formed by Henry Reed and provided a series of concerts.

In addition to numerous sketches, about a dozen plays by north-country authors were heard. Among the most notable were "The Two Brass Men," by Francis Dillon, and "Portrait of a Lady," by James R. Gregson. Of Northern feature programmes, the two broadcasts of D. G. Bridson's "The March of the '45," and the same author's "Harry Hopful" programmes, are worthy of particular mention.

There were regular broadcasts from Northern music-halls, a rota of some fourteen different theatres being drawn on. A composite variety feature from Blackpool—"Top o' th' Tower"—in August, was probably the most ambitious programme of its kind ever undertaken. Perhaps the year's most interesting example of studio variety was provided by a number of young artists, none of them over sixteen, "spotted" during Mr. Bolton's tour. In addition, 1936 saw numerous Northern outside broadcasts, covering events such as the Manx Tynwald Ceremony and the launching of the Orient liner "Orcades" from Barrow-in-Furness. There were also running commentaries on the Manx T.T. Races, the Manchester November Handicap, Northumberland Plate races, and other sporting events.

(To be continued.)

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(Continued)

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—THANKS!

# SILENCE

It must be noted that there are really no degrees to this type of fault. A set either works or does not, if when you make it work by following this chart the results are not satisfactory, turn to the chart which describes the new symptoms experienced

MAINS SETS

Test house fuses and connections to mains

Test all fuses in set

Suspect one of the valves

Remove valves from set and test each one for correct emission

OR

Test in set by substituting one at a time by other similar valves

Look for breaks in aerial or earth system or in speaker connections

(A) Suspect internal disconnection and bang set sharply with fist

Test L.T. voltage. (It should be 2 volts with set switched on)

BATTERY SETS

Test H.T. voltage

Check over all battery connections

If a fault is found in the L.T. connections but there is still silence, re-carry out test indicated by arrow

**INSTRUCTIONS:** To use this chart simply follow the heavy line from point to point. When it divides read notes and follow line which applies in case under consideration

Test for output from all windings of mains transformer (H.T. and L.T.)

1. Run over all wiring, looking for disconnected lead
2. Test filament and anode sockets, etc., of valve-holder(s) for right voltages
3. Test grid circuits for continuity by working from point to point
4. Test all comps. one at a time, either by substitution or by removal and use of meters

THEN

Test for H.T. voltage on set side of smoothing comps. and rectifier

Localise fault by testing with phones in det. and L.F. valve anode circuits

If no clicks are heard as result of "A" test

If clicks are heard as result of "A" test

Push each component and pull each wire until a broken connection or contact is found. (In case of a mains set, do this with an insulated screwdriver or with rubber gloves on)

**POPULAR WIRELESS "SPEEDY-RIGHT" FAULT-FINDING CHARTS.**  
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No. 769.  
Vol. XXX.  
Feb. 27th, 1937.

**JOHN SCOTT-TAGGART**  
**BRITAIN'S LEADING DESIGNER**

with the original model of

## THE S.T.800

Such has been the colossal success of this great all-wave receiver, that manufacturers' complete stocks of components were entirely exhausted. But now, after special efforts, deliveries are becoming normal again and this week we present a summary of the construction of the set together with some appreciations already received from delighted constructors



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THEY SAID IT  
DOUBLE DEALING  
CLOSE SHAVE

# RADIO NOTES & NEWS

SOCIETY NOTE  
COME AND GO  
GOOD WORK

### Youth Must Be Served

DO you remember, you rascal, how at the age of less than ten you could conveniently become stone deaf if your father or mother called you in from play?

The youngster of the future will be debarred from that sort of affliction, I fear, for an American engineer has hit upon a scheme that trumps the youthful ace every time. He has fitted his little daughter's toy truck with a small radio receiver and loudspeaker.

Wherever she is, and however exciting the game, the set is liable to start itself up and "This is daddie calling Jean! Come in now, dear. Dinner-time."

Jean is five years old. A self-possessed young lady, she cannot see why grown-ups should be so interested in her toy truck's vocal eccentricities!

### They Said It . . .

SOME wireless listeners complain that there isn't enough Queen's Hall. Others say there isn't enough Henry Hall.—Mr. Graham White, in the House of Commons.

\* \* \*  
"Criticism is welcomed by us if it is informed and given with an open mind."—Mr. R. C. Norman, Chairman of the Governors of the B.B.C.

\* \* \*  
"They had to bore for water at Broadcasting House, Which talk did they use?"—"Era."

\* \* \*  
"Whether my grandchildren will 'lauf' as they 'dawnce' on the 'grawss' at half-pawst ten, or 'laff' as they dance on the grass at half-past ten doesn't make much difference to me, provided they don't do it through their noses."—Dr. A. Lloyd James, from an N.B.C. studio.

### . . . Where Honour is Due

THERE was one name in the New Year Honours List that appealed with special force to those practical and technical men who normally work without

much public recognition; I refer to the name of Lt.-Col. A. G. Lee, O.B.E., M.C., who received a knighthood.

As Engineer-in-Chief of the Post Office, Lt.-Col. Lee had been very closely associated with radio for years. But, like many another Civil Servant, he was less well known to the public than if he had been connected with private enterprise instead of with State enterprise.

It is fashionable to sneer at State enterprise, but I beg you to remember two facts. It was the British G.P.O. that encouraged Marconi, and enabled him to demonstrate what wireless could do. And it is the British G.P.O. that handles with striking success some of the world's greatest radio

The great thing is that the individual messages can be received separately on the ordinary ship's receiver; they go out on wavelengths separated by about ten kilocycles, and the king pin of the arrangement is a high-speed thermionic switching device.

The laddies in charge will probably lose a lot of hair when faults develop on this apparatus, but there should be much less delay in traffic during rush periods.

### Radio Point Duty

BEFORE the new radio-point-duty station at Baldock, Herts, steals all the thunder, tribute should be paid to the little-known G.P.O. frequency measuring station at Colney Heath, near St. Albans, Herts.

Consisting only of a wooden hut and tall mast, it had the unenviable job of watching wavelengths, to see that the rules of the ether road were obeyed, and that no station crowded another into the kerb.

The G.P.O. is held responsible for seeing that all British stations stick to their allotted frequencies, and complaints of jamming used to pour into the little station at Colney Heath at all hours. Nobody knows how much interference has been untangled in that little wooden hut, and before it fades into forgetfulness, I should like us to slip in a quick "Thankee kindly."

### A Close Shave

WHEN I took on this job of reporting to you fellows the news and human items that struck me as of radio interest, I never in my wildest dreams thought that I should have to keep a watch on the curling whisker. But so it is.

Television has now made it necessary. If our old pal Stuart Hibberd lost his voice I should have to record that fact, shouldn't I? And therefore, with television here, it is equally my bounden duty to place on record the effacement, total loss, banishment

(Continued overleaf.)

**"CONGRATULATIONS ON A VERY FINE SET"**  
Praise from an S.T.800 Builder

Dear Sir,—About a fortnight ago I wrote you feeling pretty fed up about the S.T.800, saying the set was a wash-out. I must now eat my own words. I wrote Messrs. Peto-Scott at the same time and they have now sent me a specially tested Tuner. The set now is perfect. It is 8.30 p.m. and Schenectady, Ma Perkins and the Oxydol Programme are at present coming through just like a local. I haven't troubled to log my stations as they are too numerous. I can get nearly every station on the short and medium side. Being in the Midlands Droitwich swamps and covers a pretty big area on the dial; anyway, I am putting in the Rejector, when I get the parts I have sent for, which I feel sure will knock the big bully off the dial, or at least quieten him down a bit.

I congratulate you on a very fine set. As you say, I think it is by far the best you have turned out for the home constructor. I was O.C. Signals in The Loyal Regiment (North Lancashire), during the War, and having dabbled a bit with the old trench wireless sets in France, amplifiers, etc., I am not exactly a novice. I have still to improve my aerial system, this being a bad locality, as I am screened on all sides, my aerial being only about 20 ft. high.

Anyway, with the present aerial system the S.T.800 will hold her own with any set on the market, and for anyone who doesn't know you and fears to take your word, the set is here for anyone to try out for themselves if they wish. So here's to your next S.T. set.

Wishing you every success.

I remain, Yours truly,  
J. DAVENPORT.

"Grosvenor House," Hermitage Avenue, Mansfield, Notts.

services to-day. The knighthood bestowed on Lt.-Col. Lee is a timely recognition of the debt we all owe to the engineer.

### Double Dealing

THAT is a fine stunt for ship-to-shore radio communication tested recently from Portishead. It enables two distinct messages to be sent, at the same time, from one radio transmitter.

"How come?" says you. Well, I gather it is on the well-known principle of duplex transmission, whereby either circuit appears to send out only its own message, though actually both circuits are pooling the dots, dashes and spaces, and drawing upon each other's as required.

MORE S.T.800 APPRECIATIONS ON PAGE 657

# WHEN SIR JOHN REITH WAS TOLD TO SIT DOWN

ment, and complete disappearance of the handsome and well-known moustache which hitherto has adorned the countenance of Leslie Mitchell, London's television announcer.

Why this deforestation policy was decided on I don't know. But such are the ramifications of science to-day that razors have now acquired radio significance.

### Problem of the Portable

A COMPLETELY self-contained wireless set which is small enough to be carried in a man's pocket, or in a woman's handbag, has been invented in Denmark.



Mass production of the sets, which are about the size of a one-hundred tin of cigarettes, has begun. It is reported that these miniature receivers are capable of giving small-loud-speaker results on

most ordinary-wavelength European broadcasting stations. Married Danish pessimists, however, are not too sure about the advisability of having a set that will go in a man's pocket or in a woman's handbag. They say it will always be in the handbag when it works all right, and the pocket will never get a chance at it except when it is going back to the dealer in town for repairs!

### P.O. Wants Wireless Men

THE coming of the teleprinter and similar instruments which have ousted the Morse telegraphist from the inland telegraph services has caused a shortage of wireless operators in the Post Office.

The position is so serious that the Department has made a special appeal to the Union of Post Office Workers for a conference, to arrange for training young postal workers in sufficient numbers to maintain the necessary recruitment.

Plans have been discussed for the obtaining of candidates from junior sorting clerks and telegraphists, between the ages of seventeen and twenty.

### Too Good to Get the Job

WHEN an accomplished artist applied to the Belgrade radio authorities to hear his imitation of a Hawaiian guitar, he was confident of being given a chance to broadcast, for everyone assured him that the imitation was perfect. But the authorities turned him down flat, and said he would have to apply again when television was available there.



Indignantly, he demanded the reason. They explained that he was *too good*. Listeners, they said, would never believe it was an imitation, but would think he had a real Hawaiian guitar in the studio!

### Society Note

IT was nice to receive the other day a report of the activities of the Southall Radio Society, and to learn that the meetings are going in great style. When G 6 WN spoke on "Ten Metres," he had to answer questions for more than forty minutes at the end of his address. And recent talks on mast construction and on long-distance working have set a high standard of interest.

Visitors to the Southall Library, Osterley Park Road, Southall (near Southall G.W.R. station) will find the Society going strong on Tuesdays at 8.15 p.m. You will be welcome in person, or particulars will be sent to you by the Hon. Sec., Mr. H. F. Reeve, 26, Green Drive, Southall, Middlesex.

### "MIKE" SLIPS AND QUIPS

Australian commentator describing Test Match at Brisbane:

*It looks as if Allen is going to open himself at the northern end.*

Uncle during "Children's Hour":  
*Such a lot of names I'm going to call you all later on!*

Advertising a hair tonic from a sponsored station:  
*To-morrow at this time I will give you a hair by hair description of a satisfied user.*

During a talk on cricket:  
*A fast bowler is an absolute necessity to a team, and a great handicap.*

Announcer:  
*Up till now Scotland has turned out hundreds of pipers, and she's still turning them out. You can't blame her.*

Here's another bright remark during a Test Match commentary:

*A very fine piece of work by Oldfield; he couldn't possibly have seen that ball; he just caught it from memory.*

### 350, Not Out

THE irrepressible Tommy Handley is not only an excellent "Mr. Winterbottom" (playing opposite to the "Mr. Murgatroyd" of Ronald Frankau), but bids fair to throw in an impersonation of Don Bradman as well; for Tommy recently made his 350th appearance before the mike, and I don't think any other British radio star can claim an innings like that.

For twelve years Tommy has averaged thirty broadcasts per annum. And the remarkable thing is that he still hits out as freely and finds the boundary as often as he did when he first came on.

However, Tommy has the true Test Match temperament, and he rises to an occasion like a balloon at a fete. Other artists like working with him, too; and perhaps that is the secret of Tommy's perennial success—he is "a good trouper," which is the highest tribute his profession can pay to its members.

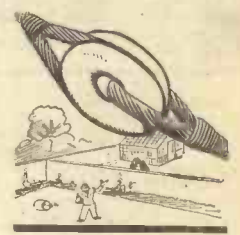
### Come and Go

MR. H. F. HUMPHREYS, engineer-in-charge of the Washford Cross station for three years, is leaving to take up the appointment of engineer-in-charge of Droitwich.

Mr. R. J. Bird, of the Scottish Regional, is going to take over Mr. Humphrey's post at Washford Cross.

### John Listener's Outfit

CONSIDERING the many British homes with two radio sets, and the too-many homes with no licence, the total number of radio receivers in use in Britain probably approaches 10,000,000, calculates that popular writer, Mr. R. W. Hallows.



Since the average price is somewhere in the neighbourhood of £10 each, he estimates that they cost us some £100,000,000; and, reckoning their average weight at only 10 lb., the total weight is well over 40,000 tons.

Undaunted by this, "R. W. H." tots up the total length of aerial wire used, and finds that his total comes out long enough to reach about half-way to the moon.

To which I append the solemn thought that if all the world's insulators were rolled up into one whacker of an insulator, it would be able to hold up the aforesaid aerial. And, oh, boy! what an aerial that would be for the neighbours to be jealous of!

### Good Work

IT was in April, 1930, that the B.B.C. appointed its Director of Music, and the years have proved the wisdom of the choice.

Adrian Cedric Boulton, D.Mus., LL.D., Mus.Doc., F.R.C.M., has achieved some notable successes, and his unswerving faith in British music is now shared by an ever-widening circle of music-lovers.

In the recent Honours List he was created a Knight Bachelor, and I am sure that my readers will wish me to put on record our hearty congratulations.

### Missing from the Scrapbook

STANTON JEFFRIES, once "Uncle Jeff" of 2 L O, was on the air in "Scrapbook for 1922," but there was one story they did not ask him to tell.

As station director, accompanist, piano-shifter, conductor, programme-planner and general bottle-washer, it fell to his lot—says Jonah Barrington, in the "Daily Express"—to interview some Pressmen immediately preceding a broadcast.



Stanton Jeffries pushed them all into their chairs, then rushed out to see that the transmitter was working properly—or that the charlady had been paid. When he returned it was to find a tall man waiting patiently.

"Sit down, sit down!" shouted the distraught Jeff. "What newspaper do you represent?"

The tall one crossed his legs deliberately. "My name," he said, "is John Reith."

ARIEL.

# TELEVISION TOPICS—Collected by A. S. Clark

## THE AMERICAN OUTLOOK

**ACTION** similar to the recent decision of the B.B.C. to scrap television transmission on the Baird system in favour of the alternative Marconi-E.M.I. system was foreseen by officials of Philco Radio and Television Corporation of Great Britain, Ltd., when they declared months ago that they would not market a television set until a single standard of reception had been set for the radio manufacturing industry.

It has always been the policy of Philco Radio that a unified system of receiving would be necessary to popularise television and make it possible for set makers to produce receivers which would be as clear in definition as home motion pictures. Philco has maintained that this could not be done at a popular price as long as it was necessary to plan sets for two systems of reception.

### Mr. Murray's Address

Mr. Albert F. Murray, a leading authority on television in the United States, recently said: "To be forced to design television receivers for the two types of transmission used in Great Britain instead of a single standard planned for the United States, appears to us to be an expensive and unsatisfactory procedure."

In fact, the American outlook on the problems of television broadcasting may be of interest to British readers. Some inside information on the experimental work being done in the States and numerous contrasts between television broadcasting conditions in the United States and the British Isles, were pointed out recently in an address given by Mr. Murray, chief television engineer for Philco, before a meeting of Engineering Alumni of the University of Pennsylvania. Mr. Murray heads the television experimental department of Philco which is not only a pioneer in television research, but the largest wireless set manufacturing company in the world.

"As early as 1907, a cathode-ray receiver was shown by the Russian, Boris Rosing, and in 1911 Campbell-Swinton of England gave to the world an early idea of the cathode-ray camera tube. Now we find that the heart of the television camera is this special camera tube. In the Philco television system the light beam traverses the signal plate in this camera 345 times per picture because at present we are using a 345-line system. Shortly we shall be using 441 lines.

"Television synchronisation must be precise. We are satisfied to have the electric clocks in our homes 'accurate to the one-fifth of a second,' but for the reproduction of a television picture which the critical eye says is acceptable, the synchronisation must be accurate to one two-millionth of a second.

"To reconstruct electrically at the receiver end a television picture requires an immense amount of information reproduced in an extremely short time, for instance, one-thirtieth of a second. Each picture is subdivided into about 120,000 elements or dots. Each of these must be individually transmitted. Television engineers, knowing that they need channels 600 times as broad as those used for sound broadcasting, decided that transmission must take place on ultra-high frequencies far above the present broadcast band, and so for experimental purposes they have, for the past six years, been working on frequencies of 42,000 to 86,000 kilocycles.

### Optical Waves

"The effective range of an ultra-high frequency transmitter is limited to the optical horizon. That means that if a 200-foot antenna tower is constructed, and from its top on a clear day, one can see a distance of 17 miles, then the satisfactory service range would be about this distance. If mountains or other obstacles intervene between transmission and receiving antennae, the signal strength will be greatly reduced because these waves, like light, travel in essentially straight lines. There is practically no static on these frequencies and no fading within the service area.

"In England there are regular

experimental programmes on the air two hours a day. Picture broadcasts on 41,500 kilocycles are scenes from the studio, short films, and a few outdoor scenes. Reports of the early demonstrations of this costly 'adventure' of the British Broadcasting Company can be called satisfactory.

It is reported by the B.B.C. that more than 5,000 television receivers have been sold at prices ranging from 85 to 120 guineas.

"In Germany, commercial television was announced by the German post office many months ago. However, less than a hundred receivers are believed to be in use and none are being sold. One transmitter, at Witzleben, is operating. Other active companies are Telefunken, Fernseh, Loewe, Lorenze, Te-La-De and Philips. Reproduction of the Olympic Games by television was not entirely successful. It is now difficult to get information because the German War Department has taken over television, and it is said that engineers are more interested in it in connection with aviation than with entertainment. The 180-line standard was lately changed to 375 lines interlaced."

## "TELEFRAMES"

Items of general interest

**WE** have received the following statement from Messrs. Scophony Limited.

"Scophony Limited welcome the adoption of a uniform standard for the B.B.C. television transmissions from Alexandra Palace, though without expressing at this stage an opinion as to what the final standard should be. This view was put forward by Scophony Limited before the Television Committee two years ago, and has been stressed since. It is clear that a single standard will prove beneficial to

## AN AMERICAN RECEIVER



This American television receiver, installed in an engineer's home for the N.B.C. tests, is very reminiscent of British receivers.

*A weekly feature which will keep the reader au fait with all the latest news and developments in television science. It will appeal alike to the newcomer to television and the advanced experimenter.*

manufacturers, as it will simplify apparatus and will therefore cheapen production.

"Scophony Limited have from the start aimed at the production of receivers with larger screens than those now available on the market, and recent experience has confirmed this policy to be correct."

## A RAILWAY DEMONSTRATION

Saturday, March 6th, will be "railway day" in television, for the camera is to be taken to Alexandra Palace station in the afternoon to show viewers the latest rolling stock used on the L.N.E.R.

Viewers will be taken through the newest in sleeping cars and Post Office mail vans and will also witness a demonstration of railway signalling. Leslie Mitchell, who is conducting this outside broadcast, will give a commentary.

In the evening there will be a demonstration of railway models in the studio.

## MESSRS. PYE SAY

From the makers of Pye television receivers comes the following announcement:

"Naturally, we welcome the simplification of the television transmission, as in our opinion it was ill-advised to attempt to transmit on two different systems.

"Now that one arrangement has been definitely decided upon it will, of course make the cost of manufacture of Pye television receivers substantially less, although perhaps not so much lower as some people anticipate.

"At the same time it will make their operation definitely simpler and the controls less complicated.

"We consider the chief advantage of the new policy to be that more time will be concentrated on programme production and more space will be available for it.

"With our experience to date the chief difficulty in popularising television has been not so much the price of the receiver as the uncertainty in the mind of the public on matters of continuity, and the experimental nature of the programmes which have been transmitted.

"The Pye Television Policy and prices will be announced in the near future."

It is possible the latter information will already be published by the time this copy reaches readers.

## PRICE ALTERATIONS

Marconiphone, G.E.C., and H.M.V. television receivers have all been considerably reduced to the same level; that is, 60 guineas for the plain television receiver and 80 guineas for the model which incorporates an all-wave broadcast set.

In all cases terms of a small deposit and £1 a week are available. Similarly, installation is included together with free servicing for a considerable period.

A Cossor television receiver is now available for 70 guineas.

# TELEVISION TOPICS—Continued

## MORE ABOUT COLOUR TELEVISION

SINCE writing my article on colour television in the January 16th issue of POPULAR WIRELESS I have received a number of letters from puzzled readers who were under the impression that red, blue, and yellow were the three primary colours. Typical of these are the two following extracts from K. T. H. of Birkenhead:

"Possibly the instruction I received at various art schools was all wrong, but here is the gist of it: The primary colours are red, yellow and blue, from combinations of which all other colours can be obtained. Red and yellow will give us orange. Red and blue, purple (and violet). Blue and yellow, green. Green, orange and purple are the secondary colours."

And, "I really would like Mr. Clark to inform us, out of which of his primary colours, red, green and blue in combination, we can get a yellow mixing. Green can only be obtained by mixing blue and yellow. If green is a mixture of two other colours, how can it be a primary? I trust Mr. Clark will clear up this doubt or ignorance on my own part."

### Fascinating But Rather Complicated

Well, I will do my best. The subject of colour light is rather a complicated one, though extremely fascinating to study.

K. T. H. goes wrong mostly when he ignores my warning that we were not dealing with the mixing of paints, which I stated was a somewhat different matter. This confusion, however, is such a common

★ LAST week we saw that the tuned circuit of a vision receiver had to respond to a much wider band of frequencies than a coil in a corresponding broadcast receiver. To broaden the tuning of a coil there are one or two things we can do, but before stating them we might consider the question of tuning as a whole.

### The Resonant Frequency

The frequency to which a tuned circuit responds (the "resonant" frequency) is that at which the maximum voltage is developed across the combination of condenser and inductance. This frequency is governed by the values of capacity and inductance and these are chosen accordingly. Now, as we alter the value of the capacity the value of resonant frequency alters accordingly and the voltage developed begins to fall off as we get farther from the frequency of the applied signal. You have probably seen the expression, "10 kilocycles off tune," which means that the value of the tuning capacity has been altered until the resonant frequency of the coil and condenser differs by 10 kc. from the frequency of the incoming wave. In an ordinary tuning circuit the voltage developed at this frequency would be very much less than that at the

one, that it will be found specifically dealt with in many technical treatises on light.

The first thing to bear in mind is that scientifically considered light rays are simply ether waves of differing frequencies. They have no colour except in so far as the way the eye interprets them.

Scientifically you cannot combine light

## REDUCED IN PRICE



This G.E.C. television receiver was recently reduced in price from 120 guineas to 80 guineas. It incorporates an all-wave broadcast receiver as well.

rays. If you apply a coloured light to a stroboscope, it will split it up into its component colour bands according to the frequencies concerned. White light is split up into seven bands, red, orange, yellow, green, blue, indigo and violet.

As we understand the eye, it contains three nerves, one most sensitive to the red band, one to the green and one to the blue. There are thus two ways of producing the effect of yellow to the eye.

We can look at the yellow band as separated out by the stroboscope. This affects both the green and the red sensitive nerves and conveys the impression of yellow to the brain.

### Paints Seldom Mono-colours

Or we can apply the right shades of green and red to the eye separately, thus exciting the red and green sensitive nerves in the same way as the yellow light did, and again sending the impression of yellow to the brain. But a stroboscope would not pass this impression of yellow on; it would split the light up into red and green bands.

It must be remembered that the right shades of red and green must be applied to the eye, and some form of scientific instrument is really necessary to obtain these rays and combine them satisfactorily.

Paints and pigments are seldom mono-colours. They generally contain a certain amount of white body.

Red, blue and yellow, can be called the primary paint colours for the purpose of art work most correctly. What happens when blue and yellow are mixed is that the blue absorbs red and yellow rays and the yellow absorbs red and blue rays, so that only the green get reflected.

So you see, we are not combining blue and yellow rays to make a third colour, we are simply reflecting the primary colour of green.

## TELEVISION FOR BEGINNERS

Methods of arranging the tuning on a vision receiver are described by G. Stevens

normal frequency and as a result a signal differing by 10 kc. from the incoming signal would receive very little amplification. This is what you get in a normal broadcast set.

Such a circuit would be said to be sharply tuned because the voltage falls off very rapidly, whereas a broadly-tuned circuit would have its voltage constant over a wide range of frequency on either side of the resonant frequency. In a television circuit we require a broadly-tuned circuit, i.e. the voltage must be practically constant across the coil for a frequency of two million cycles on either side of the signal frequency. Now the sharpness of tuning or otherwise mainly depends on the amount of resistance in series or across the coil. This resistance is not that due to the wire itself but the "high frequency" resistance at the frequency at which the coil is operated, which may be several hundreds of ohms. As we increase the resistance in the circuit the tuning broadens until by overdoing it we stop the coil tuning altogether.

This high frequency resistance is so important that special measurements are taken on short-wave coils to find the ratio of the inductance to the resistance, which is called the "Q" of the coil. In our case we want a coil with a low Q and it might pay us to deliberately wind the coil with resistance wire to increase the value. It is much easier, however, to broaden the tuning by connecting a resistance in series with the coil or across it, and then we can adjust its value until we have the requisite band width for tuning.

### Double-hump Effect

When two coils are coupled together, so that the field from one interacts with the turns of the other like a transformer the simple tuning response of one is altered and we get what we call "double-hump" tuning, i.e. there are two values of frequency at which the voltage developed is a maximum. This property of coupled circuits may also be turned to advantage in television tuning if we make the two humps correspond with the

★ extremes of frequency which we wish to cover. Unfortunately there is a snag in this arrangement in that the voltage output between the humps is less than the maximum and we get the case of a coil developing maximum voltage at two points either side of the main tuning point.

### Adjusting the Coupling

By careful wangling of the coupling between the coils we can smooth out the humps and make a continuous level of voltage over the whole band width, but this is not too easy and requires careful adjustment. However, we need not worry too much about these points because the short-wave coils on the market are already designed to have the correct ratio of resistance to inductance to give us the necessary band width and alteration will only be needed in one or two places when the tuning is altered by stray capacities such as valves.

Remember, of course, that the capacity for tuning short-wave coils is so low that the capacity of the grid and cathode in the valve forms an appreciable fraction of the total capacity and the least bit of extra wire may put the coil completely off tune.

Next time we can reckon up the amplification that we can expect from a television receiver.



FROM OUR READERS

# WOULD-BE LOOKERS IN THE UNITED STATES

The Editor, POPULAR WIRELESS.

Dear Sir,—With the comparative success which has met our television service and the success our neighbours on the Continent have had in their experiments, we are apt to overlook the plight of our cousins across the Atlantic. The following are extracts from letters I have received during the last few weeks, and they tell their own tale: "... I am thoroughly disgusted with N.B.C.'s so-called exhaustive experiments; they are trying to fool the people as they (the people) know so little about television."

That is from Boston; then from Kansas City where a large television station W9XAL is situated, a correspondent writes "... its progress in this country is mighty slow, they are all talk."

Then along with a book from Chicago comes the message, "Read the article on television in the United States; that is the sort of bunkum we are being fed with."

These letters are not alone, I have dozens in the same strain, but they are the views of the people who have radio as a hobby, or if not as a hobby they are in no way connected with a broadcasting company; so for a change of viewpoint let's take a man on the other side of the scales, Mr. David Sarnoff, the president of the Radio Corporation of America.

He says that the next ten years will see "... the addition of sight to sound in the service of radio." (A very good prophecy, but in my opinion about ten years late.)

There has recently been a television demonstration in the famous "Radio City" to the "Gentlemen of the Press." It was to show the progress made in the technique of the programme presentation besides that in the actual transmissions, for the programme department, we are told, is daily experimenting in new methods of make-up, staging and continuity writing. A 12-inch cathode-ray tube was used, making 7½ by 10-inch pictures, claimed to be the largest yet known which is capable of general usage. The receivers for this demonstration were on the sixty-second floor of the N.B.C. building, the transmitter was situated on the top of the Empire State Building about three-quarters of a mile away. The definition used was 343 lines. The programmes were mostly films, and although a little interference was present the pictures were fairly distinct.

But to get back to Mr. Sarnoff, he says: "First we must develop suitable commercial equipment for television and reception; second, we must develop a programme service suitable for network syndication; third, we must also develop a sound economic base to support a television service. Our present facilities for the distribution of sound broadcasting cover the vast area of the United States and serve its 128,000,000 people. Similar coverage for television programmes in the present state of the television art would require a multiplicity of transmitters and network interconnection by wire or radio facilities still to be developed." But in spite of this, he says that in research, technical demonstrations and laboratory development, the United States definitely holds the leadership in television. In his own words: "We lead in the research which is extending the

Remarkable statements on Television in letters to a reader from friends in the United States of America

radio horizon, and in technical developments that have made possible a transmitting and receiving system that meets the highest standards thus far obtainable in field demonstration."

England deserves credit for being the first country to start a public programme service, but the distinction between television in this country and abroad is the distinction between experimental public services undertaken under Government subsidy in countries of vastly smaller extent and the progressive stages of commercial development undertaken by the free initiative, enterprise and capital of those who have pioneered the art in the United States.

So here we have a public wholly disgusted at the futile efforts of their broadcasting company to start a television service, and a broadcasting company who must serve almost as many people with television as they serve at present with sound transmission before they can start with such a service. For their life blood is the advertiser, and unless there are a large number of viewers—and with the present price of television sets so prohibitive it is impossible for this to be so—and as it does not pay an advertiser to sponsor costly programmes to a mere handful of viewers everything is at a deadlock.

In spite of everything I am certain that the United States of America will soon surprise the world and take the lead in television by organising a nation-wide television network.

Yours faithfully,  
W. BREWIN.

13, Ings Road, Leeds, 9.

## METAL RECTIFIERS IN PLACE OF CRYSTALS

The Editor, "Popular Wireless."

Dear Sir,—I note with interest that there are two references to crystal sets in a recent issue of "Popular Wireless." Whilst one of them is in somewhat jocular vein, the "Change-over" set is quite an interesting proposition.

Nowadays, if anyone mentions crystal sets, they are usually looked upon as abnormal or, to say the least, out-of-date.

Personally, I think it is rather a pity that the advent of the valve should have practically eliminated crystal research. Most of those who have experimented with crystal sets know their limitations, difficulties of adjustment and inherent instability.

I would like to ask, however, why, if for any reason someone does not want or cannot use a valve, he should think the only alternative is a crystal? Certain experiments which I have carried out over a long period convince me that a form of "metal rectifier" is far superior. In

some cases full-wave rectification is desirable to produce increased power, and in this instance a metal rectifier is much more adaptable than any crystal.

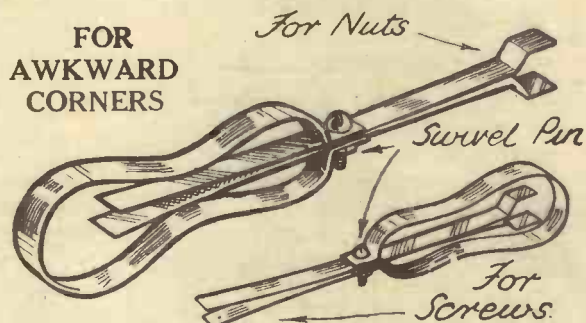
My results seem to show that there is a possibility of actually inducing a metal rectifier to oscillate and perform to a certain degree the function of a "cold valve." I would point out that the small high-frequency metal rectifier sold for use in certain valve circuits are not in themselves a satisfactory substitute for a crystal. To adapt a metal rectifier requires a fair amount of experiment, but it will be found very interesting, and the result, when once set, is for all practical purposes, permanent.

Yours faithfully,  
J. STANLEY JOWITT.  
3, Clifton Square, Lytham.

## RADIO AIDS CRIPPLED OPERATOR

The Editor, POPULAR WIRELESS.

Dear Sir,—Last week some friends and I set out on a "field day." We had three transceivers, and so we split the party up into three—two in each party, and went off to form a kind



This is a copy of the sketch sent by Mr. A. Davidson, with his letter, which is reproduced on this page.

of triangle, the sides of which were about half to one mile long. My friend and I were just arriving at our "post" when he caught his foot in a rabbit hole and strained his foot.

He could not walk, and if we did not get help soon, it would be dark, and so I got into communication with our friends, told them what had happened, and inside half an hour they arrived and helped to get my friend back to his home.

This, I think, is a perfect example of what a help radio can be in such circumstances.

Yours faithfully,  
P. W. McNAUGHTAN.  
Littleton, Newmarket.

## A USEFUL TOOL

The Editor "Popular Wireless."

Dear Sir,—In your issue of December 12th,—"Random Radio Reflections," by Victor King—a gadget is described for inserting screws and nuts in inaccessible places. Several years ago I bought one of the following—I can't remember where—but it is marked, "The Lewis Spring Co., Ltd., Redditch. Regd. No 736014."

One end of the double-swivelling spring is recessed for nuts, and the other—plain ended for screws. (Usual no connection, etc.). The length is about 5 inches.

Yours, etc.,  
A. DAVIDSON.

Brailsford, Heads Nook,  
Carlisle.

## A BIG BIT OFF THE TOP

The Editor, POPULAR WIRELESS.

Dear Sir,—From time to time I have seen remarks in the pages of your excellent journal on that boundless branch of amateur radio, QUALITY. Well, as far as I can see, the majority of people interested in this subject have either misconstrued its definitions or are misinformed. Here's an example:

Some time ago an acquaintance of mine let me hear his broadcast receiver, which he seemed (Please turn to page 668.)

## AN EASY GUINEA

When you've read these letters, sit down and drop us a line about one of your experiences or opinions on radio. Others will enjoy reading it just as you enjoy reading theirs. And you may at the same time win the Guinea which is awarded each week to the sender of the letter which, in the opinion of the Editor, is the best one. This week it goes to Mr. W. Brewin.

## QUESTIONS AND ANSWERS

By K. D. ROGERS

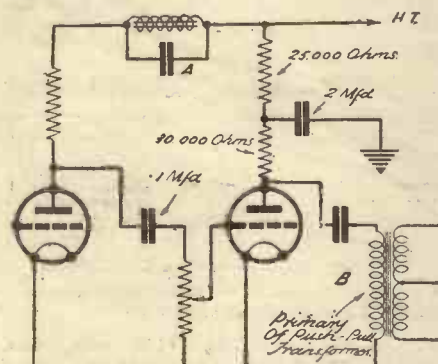
# INCREASING THE BASS IN A PUSH-PULL CIRCUIT

F. S. (Yeovil).—*I use a push-pull arrangement which works perfectly except for one thing; it is rather lacking in bass and I should like to increase the bass response without having to alter the circuit more than is necessary. Can I do that? I don't want to cut treble to do this if I can help it.*

Your best plan is to alter the circuit in the way I have indicated in the sketch. In that way you will not cut the treble to less than it is now, but the bass response should come up.

As I do not know the full details of your circuit, impedances of transformer, etc., I must ask you to try different values of condensers at the point marked B. I should start with a .01-mfd. and increase up to 1-mfd. feeding the transformer.

This condenser will tune the primary of the transformer and allow the bass to be peaked a little. You will note that I have altered the wiring so that the transformer is now shunt-fed. You can try the condenser scheme by connecting it across the primary of the transformer as you have it now—series fed—but that may reduce the treble too much for your liking.



The circuit modifications suggested in the reply to F. S. (Yeovil) are shown here.

As regards point A you should try an ordinary good L.F. choke of about 25-henry size, and tune that with a condenser, trying different values. The high notes will not be amplified as much as the bass notes, but you will get the same amplification of high notes as you do at present from this section of the circuit.

Note that I have put in a decoupling resistance and condenser in the anode of the second valve. That is essential if you use shunt feeding for the push-pull transformer. If you try the scheme of tuning the primary of that transformer without making it shunt-fed you need not bother about the decoupling. It is possible, of course, that you have decoupling in that stage already—your sketch does not show that much of the circuit.

Incidentally, I have also changed the .01-mfd. condenser coupling the first and second valves. You would do better with the .1-mfd. there, or you could try an even bigger capacity, say, 1-mfd.

## A PECULIAR EFFECT

B. E. F. (Manchester).—*I have a three-valve battery set which has been giving good results for some years. Now the valves are getting a bit old. The S.G., for instance, has to be tapped gently sometimes to make it work properly. It has become microphonic. But there is a fault that puzzles me, and perhaps other readers may be able to help.*

On Luxembourg, and on that station only, I get variation of volume in a peculiar manner. It may be quite steady for a time, and then it begins to go up and down at a frequency of about 2 cycles, gradually increasing to about 30 cycles, when it becomes a purr that makes the programme unintelligible.

Probably the trouble is due to the microphonic S.G. valve, and some I.F. effect sets it off. Try another valve there and see if this effect is removed. I should not like to say definitely what is happening,

but I feel that the S.G. valve is the cause of the trouble. It obviously has a bad internal connection somewhere, and for some reason or other this connection starts the trouble when you are listening to Luxembourg. There may be another reason, but I cannot see it at the moment. Other readers may have had similar trouble, but I have never heard of it before. If they have, perhaps they will drop me a line and let me know what experiences they have had.

## "AGONY AD."

*As I am totally unable to lay hands on issues of "P.W." for Nov. 3rd, 10th and 17th, 1934, I should be grateful if as a final effort I could make use of your columns in order to advertise my wants. Could you insert an "agony ad." on my behalf?*

There you are, readers, what about it? The heart-cry comes from G. Bowman, 91, Croydon Road, Newcastle-on-Tyne. Drop him a line, someone, and tell him you have the copies on hand and will either lend them or sell them to him. He is willing to pay postage, etc. Thanks.

## PLAY THE GAME

*I am still getting complaints from "Good Samaritan" readers who have loaned copies of "P.W." and have had neither acknowledgment nor return of their copies. This is the latest letter. (I have deleted the name of the offending person. If he sees this, please will he take steps to remedy matters?)*

"I loaned a copy of 'P.W.' and blue print of the S.T.600 to a reader. I asked for return, but got no answer. That's the last SOS for me. It looks as if I lost a valuable copy and print. When one is out of work and wants to do a good turn, stamp money is scarce. But I would sooner have the return of my copy, etc."—(Signed) G. J. Dowsett, Glynhir, Pontardulais, Swansea.

Will the reader who is concerned please get in touch with Mr. Dowsett and let him have his copy back? It looks as if I shall have to treat you all like a lot of schoolboys and stop the SOS service. I am loath to do this, for it penalises the many because of the sins of the few. So please play the game.

## WILL IT HURT?

H. W. (no address).—*I am at present charging my own accumulator at home. I have the charger installed in the bedroom. I understand that when an accumulator is being charged it gives off some kind of gas. Is this gas dangerous? We sleep in the room where the charging is going on.*

The gas given off is mainly hydrogen. There is also some oxygen. Now, hydrogen is inflammable, though so little comes off that it is doubtful if it would catch fire unless you put a match actually to the vent hole of the battery. But what I do not like about having the battery in the room is that with the gas will also come off a certain amount of acid fumes. These are not healthy and may also affect the furniture in the room if the battery gases freely. Personally, I should not charge the battery in the room where I was sleeping. It may do you no harm, but I don't like the idea.

## TERRIBLE HUM

L. C. D. (Alfreton) has a power unit for H.T. and 2-volt L.T. H.T. works O.K., but the L.T., when on the battery set, lights the valves but causes terrible hum.

I know. I have heard some of these L.T. units. I presume you have a good earth and all that. The only thing you can do is to try a large electrolytic condenser, something of the order of 2,000 mfd. Get one of the 12-volt variety (borrow one, if possible, to try) and connect it across the filaments of the set—that is, across the L.T. terminals.

If this does not help, you might get a special L.F. choke for carrying large current, but I think that you will probably have to have it wound for you. Those chokes have gone out of fashion nowadays. You might get in touch with Messrs. Wingrove & Rogers, who now control Wright & Wearle, the original makers of the chokes. They would tell you what sort to have. It would be placed in series with the L.T. supply from your unit, and the large condenser would also be used.

## ANOTHER SOS

R. H. Hutchings wants blue prints of the S.T.300 and S.T.400. Those who can help please write to him at 33, Lime Grove, New Malden, Surrey. Thank you.

## AN EXCELLENT DETECTOR COIL

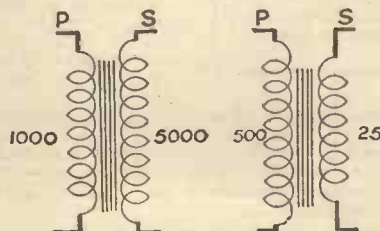
D. B. B. (Leicester).—*I want to use a Colvern T.D. coil in my set. I have the coil, but do not know what the connections are. Can you tell me?*

The sockets marked 1, 2, 4 and 5 are for taps from the aerial, and you use which one of them you like best. In series with the aerial you should have a .001-mfd. preset. The other connections are as follows: No. 3 to moving vanes of tuning condenser and to earth. No. 6 to fixed vanes of tuning condenser and to grid condenser of detector. No. 7 to one point of a three-point shorting waverange switch. No. 8 to another point of this switch, and the remaining point of the switch to earth. Terminal No. 9 goes to E1 on the differential reaction condenser. The reaction is completed internally, so that there is no other reaction connection to the coil.

# TECHNICALITIES EXPLAINED—No. 41

## STEP UP AND DOWN

What is meant by a step-up or a step-down transformer? Just a transformer in which the voltage input is changed by the arrangement of the windings to either a higher or a lower voltage output. If you have a 10-volt input in a 1 to 5 step-up transformer, the output will be 50 volts. If the transformer has a 2 to 1 step down the original 10 volts will be reduced to 5 volts.



It is important to remember that while the voltage is stepped up or down, the current is influenced in the opposite way. Thus a step-up transformer steps down the current (provided it is used in a circuit in which current is taken) and a step-down transformer steps up the current while reducing the voltage. This occurs in loud-speaker transformers where current is taken from the secondary.

# ON THE SHORT WAVES

**RANDOM JOTTINGS**  
By W. L. S.

IT seems a long time since I gave this first page up to talking about nothing in particular; there have been so many subjects to talk about recently. Don't infer from that that I have nothing else worth mentioning now! On the contrary, the examination of the superhet "in slices" will continue next week. Meanwhile, though, various small matters have accumulated, and I want to clear them off.

**Details of the "Simplex" Two**

First and foremost, we have all had so many letters about the "Simplex" Two at the office that I have decided to reprint the wiring and circuit diagrams. You will find the lay-out on this page, and the theoretical circuit overleaf. It is the straightest of straight sets, but it seems to have been more satisfactory to a greater number of readers than any other short-wave set I have turned out.

I am not giving a list of components for this set. Use what you have, if it's not hopeless junk. If you haven't a .00015 or a .00016 tuning condenser, make do with the nearest that you have got. Put band-spreading on it, if you like, just by connecting a smaller condenser—about .000025—in parallel with the actual tuning condenser.

Make the best of it with what you have, and I'll guarantee that the set won't let you down. I'm not given to making fantastic claims for any set I turn out, and this one is no exception. It's just a short-wave two-valver which, if you make it decently, will give you anything that two valves ought to get, and that's saying a heap more than some people realise.

**Young S.-W. Enthusiasts**

The QSL racket continues to fill my post-bag with letters of all kinds, but I don't think I'll refer to it any more. After all, it is a most unimportant subject for a seriously-minded radio paper to give space to! Collect the things if you like them; scrap them if you don't. I won't worry any more about it.

More and more do I notice the rapidly increasing number of very young readers who turn to short waves almost at the start of their interest in radio. I am continually getting pleasant surprises in this way, reading through quite intelligent letters and finding at the end: "I am only 13 (or 14) years of age, but very keen on short waves," etc.

It's a healthy sign and, I suppose, quite the natural development. For a youngster who is really keen on what I call the "mechanical" side of radio (not

necessarily the technical) there isn't a great deal of attraction in the idea of building a receiver for ordinary broadcast. It has to be cheap, and it will have to be very good indeed if it is to rival the family set already occupying the corner of honour.

By turning to short waves, however, one can break new ground, and one can even enhance one's reputation in the family by bringing in stations that the all-purpose set won't get.

The amateur movement gets an enormous backing from these younger listeners. In fact, it recruits all its new blood from them. There is hardly a transmitter getting his licence to-day who wasn't dead-nuts on short waves "when he was a mere kid."

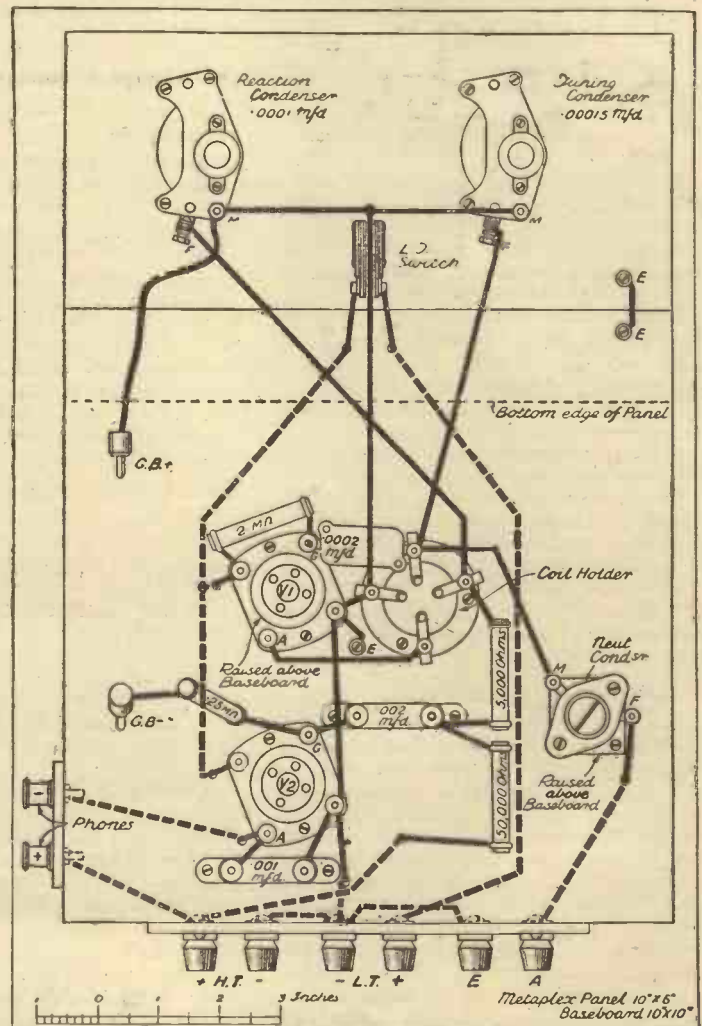
To introduce a personal note, I went completely mad on radio when I was just over fifteen. We didn't start younger in those days, partly because everything cost about ten times as much as it does to-day. From the proceeds of the sale of a fine model railway and a lot of "Meccano," I just about scraped together enough to build a rather indifferent one-valver receiver!

Before I was eighteen I had my full transmitting licence, but short waves were only just "coming" then. We worked on 150-200 metres, except for a few adventurous spirits who, without the slightest encouragement from the G.P.O., worked

on the "unknown" wavelengths of 100 metres and made Transatlantic contacts with surprisingly low powers. I know I worked my first American in 1925 with an input of 3½ watts from flash-lamp batteries (4½d. a time, and about sixty of them strung together with those terrible clips we used to use!).

The youngster of to-day has a much easier path to follow. So much more is known about short waves, and about the (Continued overleaf.)

**A SIMPLE BUT EFFICIENT LAYOUT**



The original layout of the "Simplex" Two, first described by W. L. S. in 1935. It is a perfectly straight two-valve short waver. The dotted wiring is that which goes under the Metaplex covered baseboard. The points marked "E" are connections to the metallising.

ON THE SHORT WAVES—Page 2

## POINTS *from the* POST-BAG

### W. L. S. Replies to Correspondents

E. S. D. (E.1), and others, ask about the best form of short-wave adaptor or converter to use with commercial sets and radio-gramophones. I recommend them to the special adaptor that I described in the Show numbers of "P.W." last year.

E. H. (Ossett, Yorks.) asks me to thank the readers who answered his request for surplus short-wave components some time back. He has been able to build a band-spread three-valver in consequence. He now wants to develop it into something that will cover all the short-wave bands, including 5 metres—although he thinks of using a separate 5-metre receiver and covering the other five amateur bands on one straight set.

If any reader can help E. H. with suitable layouts for these two sets, he would be greatly obliged. His full address is E. Hudson, 26, Springstone Avenue, Ossett, Yorks.

### S.-W. Club Wanted

W. R. B. (Bletchley) wants to know if there is a short-wave club within fifteen miles or so of Bedford and Luton. He wants to join one. If anyone can put him wise, please write to W. R. Baldock, Motor Dept., Woburn Abbey, Woburn, Bletchley, Bucks.

J. B. (Liverpool) has built the "W.L.S." One and added a pentode. He now wants to know how to convert the set to take a screened-grid detector. My advice is the famous tip—"Don't." I have shown conversions recently, and if you like to turn one up and try it, all well and good. But I think most people who have a set going well, and who try to convert to a screened-grid detector, are disappointed with the results. Sets specially designed for S.G. detection are a different tale.

T. K. (Blairgowrie) wants me to reprint full details of the "Q," "R," and "T" codes. I have given them quite recently, but we seem to pick up so many new readers lately it seems advisable to give them again. I will do so as soon as possible. Readers who want them should cut them out and paste them on a sheet of cardboard, which can be stuck on the lid of the receiver cabinet (if it has one!).

### A Reader's Superhet

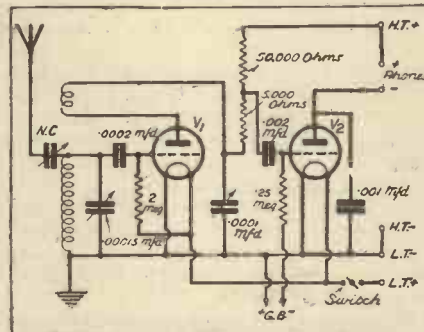
L. C. (London, N.1.) sends in the diagram of a four-valve superhet using a triode-hexode, and wants my comments. It seems very good indeed—including triode-hexode as F/C, H.F. pentode for I.F., triode for second detector, and pentode output. But I think it rather questionable whether a four-valve superhet of this type will really do more than a straight H.F. det. and two L.F.

Incidentally (it is L. C.'s commendably short letter that has reminded me of this), I am receiving more correspondence than ever; and, unfortunately, I'm busier than ever, too. In other words, I regard long, rambling letters as a plague just at present. I can't afford a secretary or a handwriting

expert on my personal staff; which consists of me! So will you please keep letters short, and if your handwriting isn't legible, get someone else to write them for you. Thanks! At present I'm just passing right over the long letters and simply dealing with the short ones.

E. W. J. (London, W.9) reports some mysterious conversations on the short waves from a station calling himself "ISI," and talking about his "9 kc. aerial." Unless it was an amateur, and E. W. J. got the call-sign wrong, I can't solve the mystery without further clues.

### R.C. COUPLED L.F.



The theoretical arrangement of the "Simplex" Two. It will be noticed that the L.F. stage is R.C. coupled and that a resistance of 5,000 ohms is used in place of an H.F. choke in the anode circuit of V1.

### RANDOM JOTTINGS

(Continued from previous page.)

technique of amateur transmission, that he has his way mapped out for him. For this reason, I am afraid that 90 per cent. of the thrill must have gone out of it.

This, however, is just a word in season to young readers. Don't imagine that amateur transmission is something that is going to be beyond you. It will come in time, if you're keen enough. But, for goodness' sake, don't go and spoil your chances by playing about with transmitting gear before you have a licence. You will be caught, sure as anything, and then you will probably never get a licence.

### The Value of Learning Morse

Reception of short-wave broadcasting is so easy nowadays that most of the exclusiveness has gone out of it. I mean, it's a little disheartening to show a neighbour W 2 X A D on your "hot" short-waver and then to go into his house and find the same station considerably louder and clearer on his "ordinary" all-wave broadcast receiver! If you want to make a name for yourself as a short-wave wizard these days, you have to be pretty good at the game.

One way of doing it is to concentrate on amateur work, which means learning Morse if your heart is really in it. Another is to concentrate on something really good in the way of superhets which will beat the commercial all-wavers at their own game. The first way is the easier, believe me!

Lots of readers seem to want a receiver "for amateur bands only." There's not much point to it, as the best receiver of this type has band-spread tuning, and by using the band-setters it is also a good receiver for anything else on the short waves.

## Short-Wave News

MORE long-distance 5-metre reports coming in—G 5 C M heard in French Morocco, two more South Africans in the news with 300-mile contacts on that wave. Also another South African listener getting the London television signals.

Ten metres is full of international DX, including Japs, West Coast Americans, Australasians and an occasional signal from the Philippine Islands.

Numerous reports from readers of reception of Americans in the flood-stricken areas, many of them handling the entire traffic for their city. Some of these contacts have been almost in the category of S O S calls—certainly one of them has been responsible for the saving of many lives.

When the official news comes through from the States, I guarantee to be able to tell you some good stories.

### Using "Beam" Aerials

The American "hams," by the way, are catching the craze of the American broadcast stations—to wit, that of erecting good beam aerials projecting their signals in some pre-determined direction. Needless to say, many of them are "squirting" at Europe, and this accounts for some of the terrific signals heard lately.

I heard from a friend in Essex that the ultra-short-wave craze is intensifying in that part of the world. Two amateurs, not content with the usual week-end rush of 5-metre work, have been doing two-way work not only on 2½ metres, but also on 1½ metres—free from all interference, man-made and otherwise.

Two and a half metres is going to be a recognised "ham band" before long, and I think it's time some of us gave up being content with receivers that will just crawl down to 3 metres or thereabouts. We've got to get lower still, even if we go back to the nefarious practice of "de-basing" valves to do it.

At the other end of the scale, I might mention that quite a lot of real long-distance work is being done on the 160-metre band. Two or three British stations have had good contacts with the States, and, on the other side, transcontinental contacts are becoming quite commonplace.

### Erratic Transatlantic Stations

U.S. broadcasting stations have been erratic of late, but when they do come through, they nearly wrench the speaker off its mountings. W 3 X A L on 16-87 metres is among the best, but it's a pity he stops so early. We folk who have to work for our living just don't get a chance to listen to him except during wet week-ends—but we've certainly had enough of those this year.

W 2 X A D is the same old reliable signal, except every fourth day or so. I compare notes on three different sets still, so that there isn't the slightest doubt that it's conditions that cause the variation. As the days lengthen, W 2 X A D is lasting longer in the evenings. His fade-out is noticeably later each week.

W. L. S.

# RANDOM RADIO REFLECTIONS

By Victor King

## BAIRD'S GREAT PIONEER WORK :: THE FULHAM POWER STATION COMMENTARY :: THE ALEXANDRA PALACE PROGRAMMES

IT must have been quite a month before the actual announcement that I heard the first rumours that Bairds had lost the Alexandra Palace television transmitting contest. Even before that there were whispers of a six-months' "rest" for the Baird apparatus, which would be tantamount to its elimination.

Of course, it was mainly flicker, or the absence of it, which was the reason for Marconi-E.M.I.'s triumph. That, and the very successful Emitron camera.

I feel very sorry indeed for the Baird people. They have had some extremely bad breaks. The fire at the Crystal Palace almost entirely wiped out their research, and now they have been completely wiped out at the other Palace.

I can't help holding a suspicion that they haven't had a square deal.

What has eventuated from the television transmissions that was not known before? Have they added any new knowledge about the two systems not possessed by the Television Committee when they recommended the dual act?

### "WHAT HAS OCCURRED?"

If the Baird system was considered good enough to go on the air a few months ago, what has occurred since to enable the Committee to come to such a quick, ruthless decision?

Just nothing, in my opinion as an independent expert, though a lot, apparently, in the view of the official pundits.

Surely plenty of others could also have seen it sticking out a mile that the E.M.I. people had two aces in their Emitron camera and their interlacing. The relative merits of the two systems do not appear to me to have changed one whit during the past few months. Maybe you will remember that quite a long while ago I mentioned these points and also expressed the opinion that on their side Bairds could handle film better than E.M.I.

It has been said that attempts to get the two concerns to pool their ideas failed. So what? Why shouldn't the B.B.C. have taken matters into their own hands and done the pooling themselves?

I have had my tilts at Baird and his men in the past, when it seemed to me that their enthusiasm rather over-ran itself. But I here and now place it on record that we are in their debt for the following:

1. Early propoganda work without which it is doubtful if Great Britain would to-day hold such a commanding television lead.

2. It was undoubtedly also due to the

above that the Government was stimulated into the action which resulted in the world's first television service.

3. Practical transmission tests at the Crystal Palace and an unending succession of private and public demonstrations which revealed the great possibilities of television.

4. Considerable valuable research work. I myself saw something of what was being done by Bairds before the disastrous fire.

No, I am not at all happy about this business. There is too strong a smell of blundering and dictatorship about it. After all, even when drastic action has to

to the formation of the Television Committee. And then, suddenly, it was revealed that they had "the goods." And now it is plain for everyone to see (or should I say "view"?) that they have such a strong grip on the technique of television that theirs is virtually a monopoly in so far as transmission is concerned.

But Bairds, prophetically perhaps, had a picture of a phoenix on their last Xmas card. Here's wishing them all the best of luck in the future and a "break" which will put them back on the map of British television. Maybe they'll yet be the first ones away with a really

inexpensive receiving outfit.\*

### THE "CHEEKY CHAPPIE" AT H.M.V.



MAX MILLER, vaudeville and radio star, before the mike at the H.M.V. recording studios. The latest recordings by this popular comedian are "Ophelia" and "Down in the Valley" (H.M.V. BD396).

### B.B.C. EXPERT

I WAS very amused the other evening to hear a B.B.C. commentator (giving a "running commentary" on the Fulham Power Station) glorying in that old tag, "Nobody knows what electricity is." He was so pleased with it that he repeated it at least twice. You'd have thought that he'd invented it "all on his little own!"

Very deep philosophy. Let me spill a bit.

Anyone can see a lump of wood if he has eyes in at least fair working order; but no one can say what a lump of wood is, or even if it exists at all outside our collective imaginations.

Anyone could see a B.B.C. announcer, or even a B.B.C. commentator, providing the tie worn wasn't too dazzling, but no one can say with certainty if such a creature really exists.

Some say that all matter in the ultimate analysis is only a bunch of vibrations. What then, if this theory be tenable, is the fundamental difference between Sir John Reith and the squawk of a singing mouse floating unheard in a deserted public house?

The answer will depend, of course, upon your appreciation, or otherwise, of the radio programmes.

### LISTENING TO TELEVISION

LET me urge you once again not to ignore these television programmes. Even if you can't yet afford to "look-in" you can at least listen to them. You can make an ultra-short-wave adaptor for a few shillings, and if you live within fifty miles of London your chances of hearing the Alexandra Palace are good. Later there will, of course, be stations at Birmingham and Manchester. Probably one of

(Please turn to page 668.)

\* Since writing the above I have seen a notice to the effect that Bairds have reduced their set to 55 guineas.—V.K.

be taken there are various ways of going to work. For instance, there would be less cause for unease if the arbitrary official decision had been accompanied by some such qualification as: "The Baird Television Co. has been invited to submit designs for apparatus conforming with the required desiderata of transmission as laid down (etc.). Should this be considered satisfactory it will be installed experimentally if and when a second station is erected."

### APPARATUS TO BE SCRAPPED

Then it would be up to Bairds. It would give them a chance.

Still, there it is. The word has gone forth and the sleek-looking Baird gear at the Alexandra Palace, so proud in its newness a bare six months ago, is to be scrapped.

And now a word of congratulation for Marconi-E.M.I. They plugged quietly, secretly along during the year or two prior

# WIRELESS AS A CAREER

Like most callings, success in radio can only be achieved as the result of proper training. Apart from the many opportunities which occur from time to time on the manufacturing and servicing sides of wireless there is a constant demand for fully qualified sea-going operators. Here are some interesting details of the well-known Colwyn Bay and Calmore Wireless Colleges together with helpful information concerning the training required for those who wish to make radio their profession.

IT has been said that "he is a lucky man who can make his hobby his profession," yet, probably, few will realise, when a lad is seen "tinkering" with wireless gadgets, or indulging in that wireless art of "knob-twiddling," that with a suitable training the lad's hobby can be guided into a profitable, interesting and lucrative career. A lad showing such interest in the practical and theoretical side of wireless should be given an opportunity of securing one of the many highly paid positions which are now available to the properly trained man.

A lad might, quite easily, obtain an appointment in some section of the radio industry with no real training beyond that which he has picked up himself by his "tinkerings," but that lad can only be amongst those who repair punctures and call themselves motor engineers. He can,

has its own foot-ball, Rugger, and cricket fields, its own gymnasium, swimming pool, etc. After graduating at either of these colleges, a young man is sure of a well-paid position, and the parent can rest assured that he has given to his son the very best opportunity of rising in the radio profession.

## Specialising in Various Branches

The training period will depend mainly on the branch of the science the lad wishes to enter, but as the fundamental principles of radio remain the same for all branches, the question of specialising for any one particular section would not arise until the student has been in training for about six months.

Messrs. Marconi's state that they have immediate vacancies for 100 marine wireless operators and that they will require 250 new entrants during 1937. To enter the service of this well-known company a young man must be in possession of either a second class or first class Postmaster-General's certificate, and the examinations for this certificate are held three times yearly

at both the above colleges. The demand for qualified men in all other branches of the profession is on a similar scale, and far exceeds the supply available.

A second class certificate can be obtained after a training period of six to eight months, and this certificate will enable the holder to act as a wireless operator on certain ocean-going vessels. The first class certificate is obtainable after about twelve months training, and enables the holder to act as wireless operator on any British ship and to sail as operator-in-charge. When either certificate is secured the lad is appointed to one of the large ocean-going vessels and feels rather proud in his gold lace as the ship draws away from the quay-side. He has an opportunity of visiting all



A corner of the service engineers training department at Colwyn Bay.

parts of the world—obtaining the education which only travelling the world can give, and at the same time drawing a good salary. If it is his intention to remain at sea and to rise in that branch, he will have in mind the day when he will sail as wireless man in charge of the equipment on such vessels as the "Queen Mary."

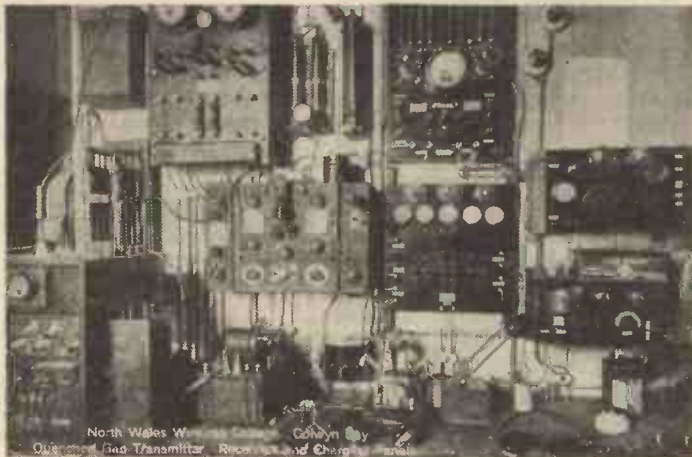
If the lad is in the middle "teens," probably the best plan is for him to secure both P.M.G. certificates, then to remain at the college and continue training for one of the wireless engineers certificates. He could still take an appointment as a wireless operator at sea and thus secure the education which only travel can give, and when he feels that he would like an appointment ashore, his wireless engineers certificate will indicate that he has the required training and the necessary qualifications for such an appointment. There is, of course, no need for a lad to go to sea at all—this is merely suggested for the educational point of view—for with the wireless engineers certificate he can obtain an appointment in one of the many shore departments of radio and know that his training will enable him to rise high.

At both the Colwyn Bay and the Calmore, Southampton, colleges, a scheme is in operation which enables the training fee to be paid from the salary after the student is trained and has been placed in an appointment. This is a real practical guarantee of employment, for the payment of the fees depends upon this, obviously.

## Radio's Rapid Growth

Radio has grown at a rate far greater than was anticipated by even the wildest optimists of a few years ago. Television is just being launched and the day is not far distant when every home will have its television receiver in addition to its "sound" equipment. These sets must be designed, manufactured, installed and serviced, and the men to do this work must be trained now. If your lad is interested in radio in any form you should write to either The Wireless College, Colwyn Bay, or to The Wireless College, Calmore, Southampton, for a free descriptive booklet of their training facilities, thus giving your son the opportunity of applying his interest along sound lines, and making for himself a profitable and interesting career.

## SHIP'S APPARATUS AT COLWYN BAY



A quenched gap transmitter, receiving apparatus and charging panels of the standard types met with on board ship. A thorough knowledge of ship installations is essential in qualifying for the P.M.G. certificate.

at the best, be only a "first-aid" man, and can never rise to be a "specialist."

The largest and best known training centre for all branches of the radio profession is The Wireless College, Colwyn Bay, N. Wales, and from where large numbers of wireless operators and wireless engineers graduate each year. This college has been filled to capacity for some years, and, as they have been quite unable to supply anything like the number of trained men required, they have opened a new training centre at Calmore, Southampton, where they have installed apparatus of the latest type to train students for all branches of the profession. This new college can accommodate 150-200 resident students. It stands in its own grounds of 16 acres,

**'I always get  
Drydex now. It  
has Exide's name  
behind it.'**



**Drydex**

**DRY BATTERIES FOR RADIO**

*'Still keep going when the rest  
have stopped'*

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# SEEN ON THE AIR

## News and Views on the Television Programmes

### By our special radio-screen correspondent

L. MARSLAND GANDER

"CLEARING the decks for action" may be a cliché, but it succinctly describes the B.B.C.'s next moves at Alexandra Palace.

Hitherto only one large studio has been available for both transmissions and rehearsals on the 405-line standard. Inside the studio during transmissions the congestion has been almost comical. Trailing cables, camera and microphone trolleys, floodlights and other paraphernalia provided obstacles round and over which surged a mixed crowd of artists, technicians, and producers.

The producers developed the irascibility of Indian Army colonels as they strove with the elements, human and mechanical, in this heterogeneous collection.

Television has been hopelessly cramped from the start. In all the circumstances I admit frankly it is a high tribute to the producers to say that they have produced some first-rate entertainments.

#### More Studios Available

Two more studios, one as big as the original studio, will now be made available for 405-line transmissions. One on the same floor as the existing 405-line studio has hitherto been used for the 240-line standard. Its measurements are 70 ft. by 30 ft. by 25 ft. high. Then it is proposed to knock together the disused 240-line control-room and the room formerly used for 240-line telecinema apparatus. This will make a third medium-sized studio. The small "spotlight" studio on the same floor will probably be used for talks. What use will be made of the great 240-line transmitting hall below has not yet been decided. Owing to the fact that there are a number of pillars supporting the floor above it is not regarded as suitable for a studio. It may be used for additional office accommodation.

With four studios available instead of one, producers will find a new freedom. Alterations will, however, obviously take some time, particularly in the former transmitting hall on the ground floor.

As I write there is still hope that the Coronation ceremony may be televised from the Abbey. Since set prices were reduced, I am informed, sales have increased by 100 per cent. Televising of the Abbey ceremony will be the final spur to public interest which will make television a triumphant success. I fervently hope that no difficulty will be allowed to stand in the way. It is a singular opportunity for television which must not be allowed to slip.

But in any case viewers will see the

Coronation procession televised, as I am now informed, from Hyde Park Corner.

Plans for the Television Exhibition at the Science Museum are going ahead. The exhibition will open early in June, and will remain open for three months. All the chief British television manufacturers are co-operating with the R.M.A. and the B.B.C. to make the exhibition fully representative.

The exhibition will be partly historical, but besides showing the development of television will also demonstrate the recep-

the effect was at once entertaining and exhilarating. The eye turned from one corner of the café to another, from close-up to extended view. I was more interested in the technique than in the actual programme, for the possibilities are great. When three studios are in use, more elaborate sets can be built, and switching from one to another will make visual drama far more impressive than at present.

Still, Carmen del Rio, Ernest and Lotte Berk, and Anthony Holles all deserve full credit for their contributions to this vivacious transmission.

I, for one, greatly appreciate the scenes from Shakespeare, and have the warmest admiration for Henry Oscar's performances. Artists and talkers are rapidly falling into four classes.

(1) Those who are equally good at television and broadcasting. (2) and (3) Those who are better at one thing or the other. (4) Those who are no good at either.

#### A First-class Broadcaster

Mr. C. H. Middleton is in Class 1. He can illustrate his gardening talks admirably either at the blackboard or with plants brought into the studio. I like his material, his manner, his dry humour.

The trouble is that so many of the B.B.C. television artists are in Class 4.

In the current "Picture Page" three items were extremely good.

The three items which pleased me so vastly were by a retired Scotland Yard detective, a London statue cleaner, and a woman collector of hats. The inspector told of early flying-squad adventures, the statue cleaner was a born comic with a fund of anecdote, and the hat collector had interesting and unusual objects to show.

I am afraid the B.B.C. are still having difficulty in the hunt for films. There have been one or two moderately amusing cartoon films, and on the whole at the moment this seems the most likely line of country which the B.B.C. film department is exploring.

Among future programmes I am chiefly interested in Mr. Stephen Thomas's idea for March 2nd, based on tricks with the television camera. The other day the boys at A.P. found that Mr. Leslie Mitchell could be made to shake hands with himself simply by using two cameras together with one in electrical "reverse."

Now Mr. Thomas is going one better. Four cameras will be trained on Maude Lloyd while she dances to a Bach fugue. Four different Maude Lloyds will be seen on the screen simultaneously, and the effect should be most interesting.

### TELEVISING "MR. PICKWICK" AT A.P.



The Inn Scene during the television performance of "Mr. Pickwick" at the Alexandra Palace. Note the Marconi-E.M.I. Emitron cameras in the foreground.

tion of B.B.C. programmes on modern receivers of various makes. A local transmitter will also be operated so that reception can be demonstrated out of normal B.B.C. programme hours. This transmitter will, I understand, transmit films only on the newly adopted standard of 405 lines interlaced. It will cost about £1,000—an earnest that no expense is being spared in this exhibition.

Easily the most ambitious and the most successful programme during the week I have under review was "Cosmopolitan Café." The idea is familiar to listeners in "Café Collette" and its successors. Vision will give the broadcasting café programme a vigorous new lease of life.

#### Extensive Use of Built-up Sets

It was the first occasion on which the B.B.C. had attempted use of built-up sets on a fairly extensive scale. Earlier I described the congestion which, usually prevails in the television studio, so that it may be imagined that the building of a life-size café with cocktail bar and other appurtenances was not a job to be lightly undertaken.

However, the viewer is not concerned with the trouble involved in a transmission, but only with the effect on his eye. And



# A GREAT SET FOR WORLD-WIDE RECEPTION

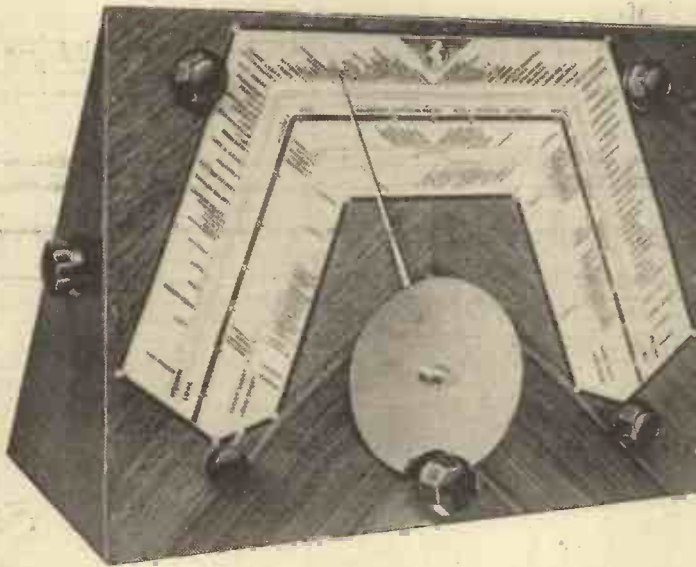


THE repetition of the S.T.800 constructional details rather speaks for itself. The success of this set is considerably greater than that of last year's receiver—the S.T.700, itself a very popular model. There are always many constructors who miss the special issue containing details and are met with a sepulchral "sold out" when they belatedly apply for a copy.

This week you will find the essential "meat" from the original article. The trimmings have been shorn off, editorial flamboyance smothered, and my own description chopped down from 5,000 to 500 words. But the essence remains, and the set is as fresh as paint to-day as it was on November 4th last.

The chief difference is that now the rush is over the late-comers can get immediate deliveries of components. The great and sudden demand threw the manufacturers—as it usually does—out of gear. The natural disgust of everyone is being replaced by delight with the excellent results obtainable from the S.T.800.

There has been a deliberate editorial attempt to curb further interest in the S.T.800 by not writing about it and not publishing letters from constructors who are pleased with the set. If new interest had been aroused the position would have been far worse as regards delivery of components. But now the "silence conspiracy" about the S.T.800 can be



note that the detector valve **MUST** be a Mazda L2 metalised and not the detector valve of the S.T.700. On the short waves the detector valve is all-important.

The delivery delays have resulted in components being substituted in some kits. It should be an infallible rule to check up each component and valve with my own published list. If you accept anything else it is absolutely your own affair. I have refused to authorise any substitutions whatever. If you have been told you can change later to specified components you should emphatically do so. I shall always completely wash my hands of any set containing departures from my list.

The gravest consequences may unexpectedly result from such a

step, however insignificant your or the trade may think the change. And remember, it will be *you*, and not the trade, who will suffer if the set "mysteriously" does not work. Only

## THE S.T.800

abandoned, and some letters of appreciation are published to-day. Needless to say, such letters are some recompense for the amount of work I put into these annual sets, and each of such letters is personally acknowledged by myself.

### Important Points to Note

There are one or two special points to note. You must use 18-gauge wire, not 20-gauge. This is because of the short-wave side of the set. Those who convert from S.T.700 to S.T.800 must especially

yesterday I received a letter from a constructor complaining about a celluloid dial for the S.T.800. He had just blindly ignored the repeated instructions about the only authorised and checked version and bought one I've never seen—far less, approved.

My final advice, therefore, to new readers is to build the set according to my instructions. Remember that I've worked on the set for months, day and night. I've tried and rejected just those little changes you or the trade are burning to make. Make a duplicate of my set and raise Cain if anyone tries to stop you. J. S.-T.

## S.T.800: READ WHAT THESE CONSTRUCTORS SAY

### PERFECT TONE

Dear Sir,—Please accept my thanks for designing such a fine all-wave receiver. I have now had the S.T.800 working for the last two weeks, and it does all you vouch for it, and the tone is perfect on any waveband.

I switched it on at 10.30 p.m. for the first time, on the short waves, and, not looking to see exactly where I was, was surprised to hear the voice of an American announcer say, "Kellogg is on the air." I have since heard programmes on all wavebands, and I am real proud of this set. I should like to add that I have made a simple cabinet, so that the set lies like a writing desk, and it greatly adds to the comfort of tuning, and looks good.

I must also bring to your notice the most business-like and efficient system run for constructors by the London Radio Co., of Oat Lane, London. My order was executed in two days, and everything as specified.

With very best wishes from a very satisfied "P.W." constructor.

C. J. THIMBLEBY.

13, Caesar's Walk, Mitcham, Surrey.

### AMAZING PERFORMANCE

Dear Sir,—May I offer my thanks and appreciation of your S.T.800. I have only just received the coil after waiting two months, but it has been well worth waiting for. I am truly amazed at the performance of the set, especially as I am working below ground level with a poor aerial and within fifty yards of an electric light power station. I have received dozens of stations on all waves; in fact, I logged 60 stations with the greatest of ease and all at loudspeaker strength. As I say, I am 7 feet below ground level, and I feel convinced that if I can receive this number of stations

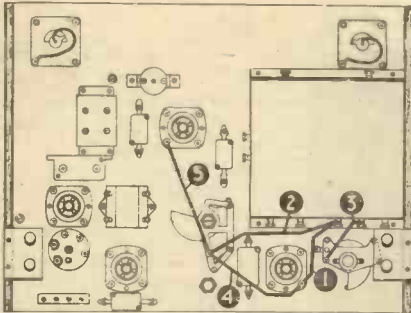
working under my conditions, that S.T. supporters are in for a real fine time when working under normal conditions.

I have been a keen follower of the Scott-Taggart sets since the issue of the S.T.300. There is, however, no comparison between the 600 and the 800—it is like chalk and cheese. If at any time I can help "Popular Wireless" readers who may be in any difficulty I shall be pleased to do so, and if one follows the specified kit of parts there is no reason for not getting real radio from a real and mighty set.

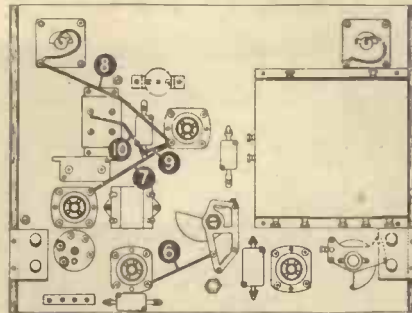
Thanking Scott-Taggart for producing a set within the reach of the working-man's pocket. So many sets on the market to-day only try for the stations; the S.T.800 definitely gets them. Once again, success to Scott-Taggart and all his productions.

Yours faithfully, F. W. POOLE.  
49, Bankside, Southwark Bridge, London, S.E.1.

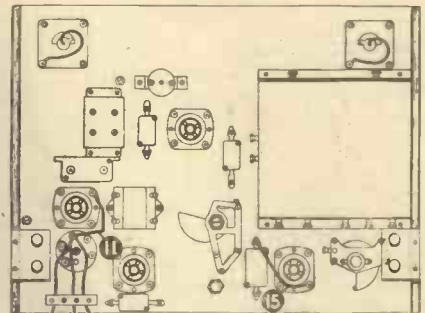
# S.T.800 HI-SPEED WIRING DIAGRAMS



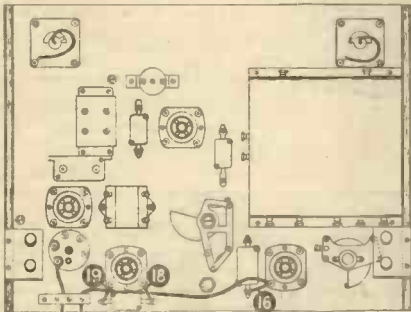
**WIRES 1, 2, 3, 4, 5.** Every wire in every diagram should go absolutely straight between terminals or by quickest route (no bending near terminals) unless otherwise stated. Wire (1) must clear every part of aerial balancer by  $\frac{1}{2}$  in.



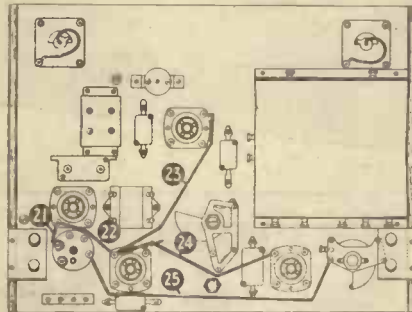
**WIRES 6, 7, 8, 9, 10.** Wire (6) horizontal  $1\frac{1}{2}$  in., then slopes to valve holder. Wire (3) straight but bends where touches condenser block case.



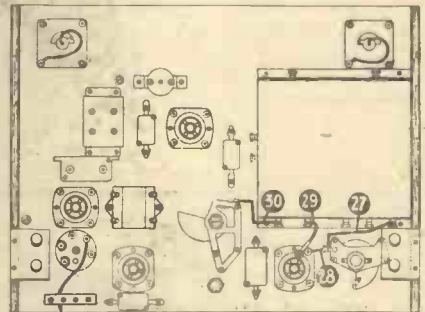
**WIRES 11, 12, 13, 14, 15.** Wires (11) (12), (13), (14) to go exactly as shown. Wire (15) goes quickest way. Make certain correct wander-plugs used, and accumulator "spade" on (12). (13) is 21 in., (14) is 21 in.



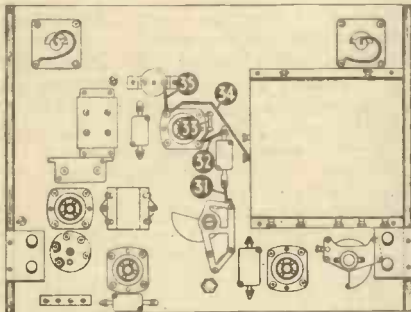
**WIRES 16, 17, 18, 19, 20.** Make sure correct wander-plugs attached; accumulator connection on (20) must be correct. (20) is 20 in., (17) is 27 in.



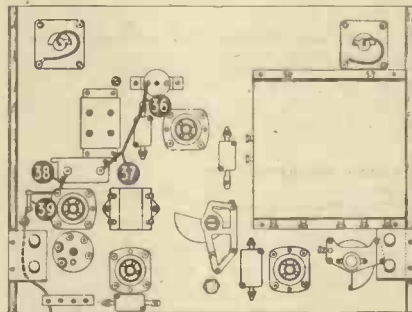
**WIRES 21, 22, 23, 24, 25.** Wire (22) as shown. Wire (23) as shown and flat against panel. Wire (24) as shown. Wire (25) as shown but steadily sloping all way up to aerial balancer.



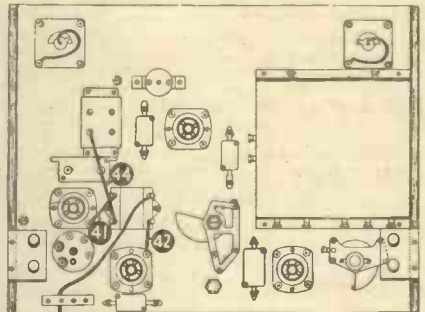
**WIRES 26, 27, 28, 29, 30.** Correct wander-plug must go on (26). Wire (27) must clear terminals 2 and 3 and aerial balancer. Wire (29) vertically for 4 in. up from terminal and then across to anode. Wire (30) must not touch case. (26) is 21 in.



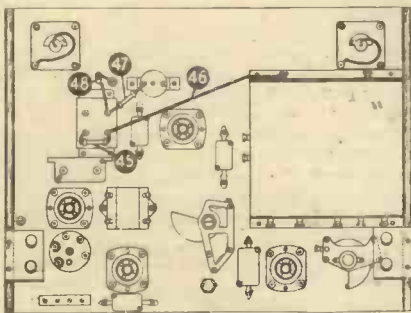
**WIRES 31, 32, 33, 34, 35.** Wire (34) clears terminal on the way. Wire (35) horizontal  $\frac{1}{2}$  in. at choke end.



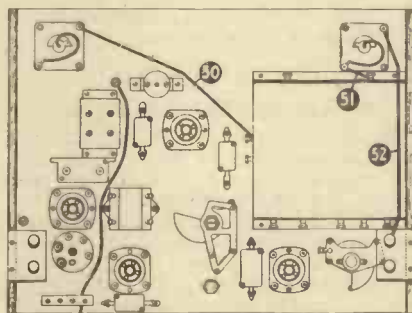
**WIRES 36, 37, 38, 39, 40.** Wire (36) horizontal  $\frac{3}{4}$  in. at choke end. Wire (37) as shown. Wire (39), note anchoring screw (connections must be looped between two washers). Wire (40) along surface of panel. Correct wander-plug on (40). (40) is 22 in.



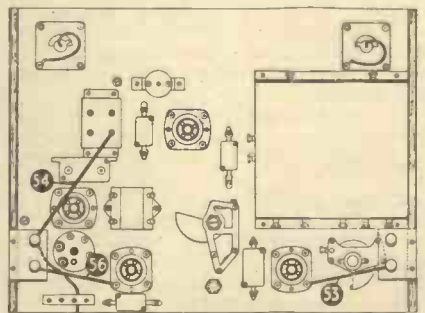
**WIRES 41, 42, 43, 44.** Wire (42) quickest route. Wire (43) quickest route. Wire (44) just clears terminal P on Nide. (43) is 24 in.



**WIRES 45, 46, 47, 48.** Wire (45) as shown (resistor must not touch container of condenser). Wire (46) quickest route. Resistor (47) must clear container. Note anchoring screw. Lower end of wire must be between two washers.



**WIRES 49, 50, 51, 52.** Wire (49) as shown and on surface of panel. Note anchoring screw: wire must be between two washers. Correct wander-plug on (49). (49) is 28 in.



**WIRES 53, 54, 55, 56.** Wire (53) straight but must clear moving vanes, when out, by  $\frac{1}{2}$  in. Wire (54) slight bend half-way to permit clearing valve by  $\frac{1}{2}$  in. and to allow withdrawal of valve. (55) is 25 in.

# THE S.T.800

## RAPID CONSTRUCTION GUIDE

**THIS** rapid construction guide is based on the same principles as those in previous years. Experience has shown that not only is the absolute novice assisted, but even the experienced constructor, by being told exactly what to do and when. Actually, you can build the S.T.800 from the wiring diagram alone, but for extra speed and certainty of success, you cannot do better than follow the rapid guide in detail. Naturally, the guide is based on the actual components used in my original set.

If you have bought a complete author's kit, including the panel and side-pieces, or if you have bought a kit of the panel and side-pieces, cross out sections (C), (D), (E).  
 (A) Collect and examine required components. If you have an author's specification kit, check each item to see that it corresponds to my list of parts actually used. Handle J.B. tuning condenser with care, keeping moving vanes closed. Bending of vanes would affect calibration of station names.

(B) Tighten terminal securing nuts (not terminal heads) on components where necessary.

(C) Using Fig. 4, mark out on the front (not back) of panel the position of the holes. With a fine-pointed bradawl prick all the hole positions. Using a 1/8-in. twist drill, start each 1/8-in. hole carefully, using light pressure and turning the drill in a reverse direction at first; this is to avoid splitting the veneer. Continue drilling these 1/8-in. holes in the ordinary way. Centre bits are recommended for all the remaining large holes in panel, but twist drills may be used. Drill these holes.

(D) Drill 3/8-in. hole in a side-piece, as shown in Fig. 3.

(E) Drill terminal strips and battery lead clamping strip according to Figs. 1 and 2.

(F) Fit terminals to terminal strips.

(G) Screw terminal strips to side-pieces. The terminal strips are screwed at the bottoms of the back edges of the side-pieces (this is not obvious from the wiring diagram which shows the plan view), the terminal strip containing the aerial terminal being fixed to the side-piece with the hole in it.

(H) To each of the four T.C.C. Type M condensers (.0001 mfd., .0005 mfd., .0005 mfd., .004 mfd.) fit a pair of 1/4-in. 6 B.A. screws and nuts, unless already fitted.

(I) Four bare wires are now fixed to terminals on the coil unit as follows: A 4-in. 18 gauge wire

### SIMPLE STEP-BY-STEP DETAILS WHICH WILL GUARANTEE SUCCESS

through the appropriate hole in the panel, holding the condenser up against the back of the panel. Fit bush of slow-motion driving spindle through its appropriate hole in panel from the front so that the remaining hole in the metal spacing strip slips over the main bush of the tuning condenser. If this upper hole does not slip over the main bush, it indicates that the distance between the two holes in the wooden panel is not accurate, and you will require to elongate the lower hole in the appropriate direction to rectify matters, e.g. with a round file. Fit the fixing nut to the main bush of the main tuning condenser at the front of the panel. Fit fixing nut to bush of driving spindle at the back of the panel.

**THIS COMPLETES THE FIXING OF COMPONENTS.**  
 Now you are going to wire the components. For this you need the wiring diagram and the Hi-Speed series of wiring diagrams on facing page. Use the Hi-Speed drawings to help find wire on wiring diagram and the Hi-Speed instructions (under the drawings) as guide to the shape, when this is necessary. You also place a tick against wire numbers below Hi-Speed diagram as each wire is completed. The wiring diagram is always the final authority.

Lay panel face downwards, resting it on two books or cloth-covered blocks of wood; this is to prevent scratching of the veneer and to prevent pressure on control spindles.

**TURN TO HI-SPEED WIRING SERIES.**  
 This series consists of a number of pictures of back of panel showing the connecting wires divided into small groups in their order of wiring. This system makes it possible to find any wire immediately on the wiring diagram. The wires in all my diagrams are numbered strictly in their order of connection, which has been carefully worked out for speed and simplicity of construction. Note the hints under the Hi-Speed diagrams regarding certain of the wires. The side-pieces are shown in position on all the Hi-Speed drawings, but actually they are not fixed until after wire (51) has been fixed.

The recommended wire is S.W.G. 18 tinned copper wire. Over each wire connection is slipped a suitable length of 1 mm. insulating sleeving. It is important to use this wire for all high-frequency circuits for technical reasons in connection with short waves, and therefore it is best to wire the whole set with this wire. Incidentally, the method of wiring is just as easy, if not easier, than any other method.

(J) Lay the panel face downwards on a cloth-covered table to avoid scratching veneer. Lay the following components on the panel in the positions shown in the wiring diagram, and prick through on the panel the fixing holes of these components; the bradawl actually going through the fixing holes in the components themselves: Coil unit, valve-holders, H.F. choke, Varley Niclet, Lissen .006 mfd. coupling condenser, T.C.C. Type M .004 mfd. condenser, .0005 mfd. T.C.C. Type M condenser, .0005 mfd. Type M T.C.C. condenser, .0001 mfd. T.C.C. Type M condenser, T.M.C. Block condenser.

(K) Screw the following components on the back of panel, using the sizes of screws indicated (remembering that if you use too long a screw, it would project through the panel). At the end of the list are two anchoring screws whose positions are given in the wiring diagram and may be traced by following wires 40 and 49. Coil unit (four 1/4-in. No. 3 round-head brass screws), valve-holders (each is fixed on with two 1/4-in. No. 4 round-head brass screws), B.T.S. H.F. choke (two 1/4-in. No. 4 round-head brass screws), Varley Niclet (two 1/4-in. No. 4 round-head brass screws), Lissen .006 mfd. condenser (1/4-in. No. 4 round-head brass screws), T.C.C. .004 mfd. condenser (two 1/4-in. No. 4 round-head brass screws), T.C.C. .0005 mfd. condenser (two 1/4-in. No. 4 round-head brass screws), T.C.C. .0005 mfd. condenser (two 1/4-in. No. 4 round-head brass screws), T.C.C. .0001 mfd. condenser (two 1/4-in. No. 4 round-head brass screws), T.M.C. Block condenser (four 1/4-in. No. 4 round-head brass screws). Insert, but not fully, two 1/4-in. No. 4 round-head brass screws, each screw passing through two 1/4-in. brass washers with 1/4-in. hole, one of these screws being later used for anchoring H.T. + 2 flex lead (i.e. wire 49) and also a 5,000 ohm resistor (No. 48) and the other screw anchors (39) and (40). Fit battery lead clamping strip (four 1/4-in. No. 4 round-head brass screws).

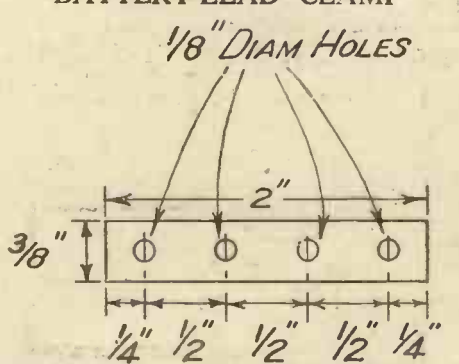
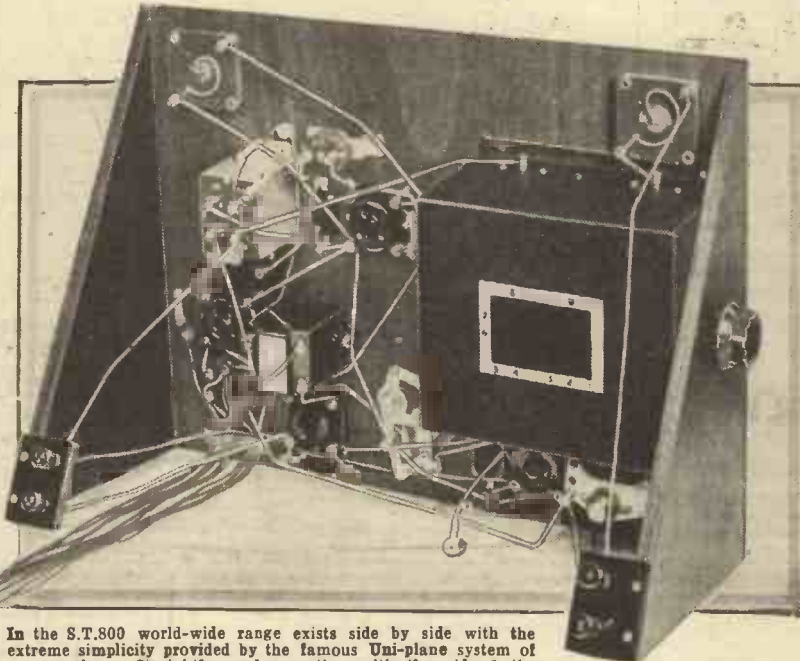


Fig. 2. A piece of fibre, drilled and cut as above, is used to secure the battery leads and remove all strain from the points where they join components.

The best procedure for wiring is as follows: Lay a length of sleeving in the position which will ultimately be occupied by the wire itself between the two terminals. Cut the sleeving to the required length. The wire itself requires a little stretching to take out the kinks. This can be done in several ways; you can hold one end in a vice and pull on

(Continued overleaf.)



In the S.T.800 world-wide range exists side by side with the extreme simplicity provided by the famous Uni-plane system of construction. Straightforward operation with the aid of the 4-band Auto-dial is also a feature of the receiver.

of the coil unit, and pointing a little towards terminal No. 4. These wires are all in the general direction they will ultimately occupy in the original set, as shown by the wiring diagram.

(L) Fit aerial coupler condenser, anode reaction condenser and turret switch, having remove knobs in each case. Remove knob, pointer and pointer locking-nut of the aerial balancing condenser (.0005 mfd. Polar slow-motion air condenser). Remove fixing nut and fit condenser to panel, replacing fixing nut on front of panel. Remove fixing nut from bush of slow-motion driving spindle. Remove fixing nut from the main J.B. tuning condenser and pass the fixing bush on the condenser

(M) Fit aerial coupler condenser, anode reaction condenser and turret switch, having remove knobs in each case. Remove knob, pointer and pointer locking-nut of the aerial balancing condenser (.0005 mfd. Polar slow-motion air condenser). Remove fixing nut and fit condenser to panel, replacing fixing nut on front of panel. Remove fixing nut from bush of slow-motion driving spindle. Remove fixing nut from the main J.B. tuning condenser and pass the fixing bush on the condenser

### TERMINAL STRIPS

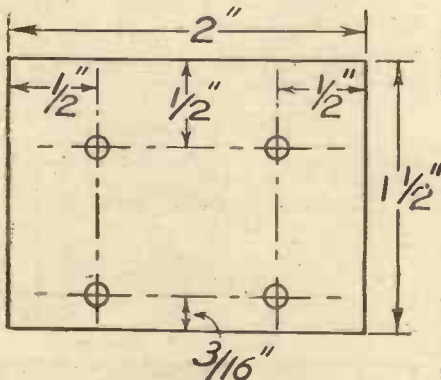


Fig. 1.—Both the terminal strips of ebonite are identical and are prepared in accordance with these dimensions.

has one end connected to terminal No. 1 on the coil unit, this wire coming out towards No. 2 terminal. A 3-in. wire is connected to terminal No. 2, this wire pointing vertically towards the top of the can of the coil unit. A 6-in. wire is connected to terminal No. 3, and points towards terminal No. 4. A 4-in. wire is also connected to terminal No. 3 on the coil unit, but this wire points outwards from the can

## THE S.T.800 RAPID CONSTRUCTION GUIDE

(Continued from previous page.)

the other end of the wire. The wire should be pulled sufficiently hard till you feel it "gives" a little, after which it will be found that the wire is stiff and straight. The wire may also be stretched straight between two persons, each having an end wrapped round pliers or a piece of wood. Cut the wire into approximately three-foot lengths for easy handling. When wiring up two points in the set, slip the correct length of sleeving, as described above, over a three-foot length of the wire. Now cut the wire so that it projects outside the sleeving at each end by 1/2 in. This method of wiring makes it necessary for the initial length of sleeving to be correct, and the measurement of the sleeving should therefore always be done accurately from the side of one terminal to the side of the other terminal, following the line of the wiring as shown in the illustrations. The 1/2 in. at each end should be shaped into a round loop. Now have a cup of tea.

**(M) USING WIRING DIAGRAM AND HI-SPEED DIAGRAMS** (reading notes beneath them) **WIRE UP THE SET UP TO WIRE (51).** The lengths of battery leads (40), (13), (26), (43), (20), (12), (55), (14), (49), (17) are suggested under the Hi-Speed diagrams. It is vitally important to get the right wander-plugs on the right wires.

In tightening the terminals on condenser block, avoid over-tightening as this will cut wire; do not finally tighten these or any other terminals till all the wires are on.

The leads going to the grid-bias battery, the H.T. battery and the accumulator may be 14/36 single rubber-covered flex or "Maxamp" wire, which latter is stiff wire with insulation which may be slipped back. Leave 1/2 in. bare at each end of each wire. Bend one of the ends 1/2 in. from the end back on itself and push the loop so formed into the hole in the side of the appropriate Belling and Lee Midget wander-plug, having loosened the head of wander-plug. Tighten head of wander-plug. Fit other end of wire to correct component.

None of the wander-plugs is in the actual list of components of the set, because constructors will already have these. The make specified is specially recommended.

**(N)** Having completed wire (51), remove knob on wave change spindle of coil unit and **FIT THE SIDE-PIECES** shown in the drawings. Now complete the wiring by adding wires (52), (53), (54), (55), (56) Check the whole of the wiring of the set by the method suggested at the end of this guide. Make certain the battery leads are correctly labelled. A mistake is highly likely and may burn out your valves.

**(O) FITTING THE DIAL:** Place the dial in the approximate position it will occupy on the panel. The outside corners should be the same distance from the sides of the panel. A degree scale will be found between the long-wave station names and the short-wave station names. At the left side will be

found a line corresponding to 0 degrees. This line should be exactly 3 1/4 in. up from the bottom of the panel, while the 180 degrees mark in the corresponding position on the other side should also be 3 1/4 in. from the bottom of the panel. Prepare ten ordinary plated brass pins (if a pin is of a type that could be bent it can be used) by cutting them diagonally with wirecutters or pincers about 1/4 in. from their heads. You have now ten very short and pointed pins. Any other type of very short miniature nails may be used.

There are ten small white circles with black centres along the border of the dial. Keeping the dial flat on panel, start with the two top circles and prick through centre of circles with some thin pointed instrument (I used a drawing pin) for about 1/8 in. into the wood. Insert a prepared pin into this hole and push pin with any hard, flat-sh-ed instrument (I used the handle of a screwdriver). Then fix two pins in the two holes on the inside border opposite the two upper pins already fitted. Now fit pins in the two lowest holes, i.e. at each extreme pointed end. Fit the other pins in any order desired.

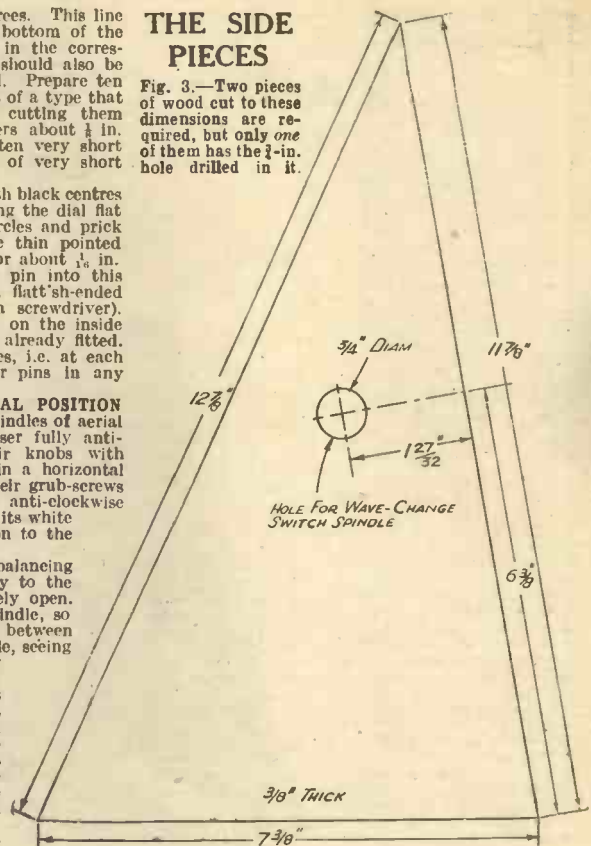
**(P) STAND SET IN ITS NORMAL POSITION WITH DIAL FACING YOU.** Turn spindles of aerial coupler and anode reaction condenser fully anti-clockwise (fully to left). Fit their knobs with their white spots pointing exactly in a horizontal direction to the left. Tighten up their grub-screws. Turn spindle of turret switch fully anti-clockwise (fully to the left). Fit knob with its white spot pointing in a horizontal direction to the left. Tighten up the grub-screw.

Turn the spindle of the aerial balancing condenser fully anti-clockwise (fully to the left) so that the vanes are completely open. Screw on pointer to the screwed spindle, so that 1/2 in. of the spindle is exposed between the pointer and the end of the spindle, seeing that the pointer points exactly horizontally to the left. Fit the lock-nut to the end of the spindle, thus locking the pointer, taking care that the pointer is not moved round from its correct horizontal position pointing to the left, as the lock nut is tightened the pointer being held to prevent this occurring. Now set the knob of the plain (as distinguished from the screwed) spindle.

Remove the knob from the driving spindle of the slow-motion drive. Remove spring and sleeve washer from spindle of drive. Turn main spindle fully anti-clockwise (fully to the left) so the condenser vanes are fully open. Place pointer disc on spindle of condenser with the pointer pointing exactly to the line marked 0 degrees on the dial, care having been taken that the pointer disc just rests on the flange of the driving spindle. Now tighten the grub screw in boss of pointer-disc. Replace sleeve washer on drive spindle. Place spring over this washer. Place knob on drive spindle and press down an appropriate amount and tighten grub screw. The correct pressure for the drive for best results may be found by varying the pressure of the knob. Fit knob on wavechange spindle of coil unit.

## THE SIDE PIECES

Fig. 3.—Two pieces of wood cut to these dimensions are required, but only one of them has the 1/2-in. hole drilled in it.



**YOUR SET IS NOW COMPLETE.** (See separate section on installation and operation. It is desirable to check the wiring before attempting to install.)

## THE S.T.800 WIRING CHECK INSTRUCTIONS

**PROVIDED** great care is taken, the best way for a constructor to check his wiring is to take each wire in order from the Hi-Speed series and then to look at his own set and see whether the wire connects the same points. This has to be done very conscientiously, one wire at a time, making sure that the wire goes to the right side of each component, and where there are two components of a similar kind, such as valveholders, making certain that you have got hold of the right component.

Having found the wire correct on the set, you should then have another glance at the Hi-Speed diagram as a final check.

Each wire thus checked may be ticked off or written down.

It is possible that, although you have all the wires correctly in place, you have added one or more wires unnecessarily. The way to look for this is to write down a list of all the components in the set, and also the four terminals, A, E, L.S.+, L.S.-. Against each component and the terminals mentioned, write down the number of wires that go to it; this information is obtained from the wiring diagram. Then take each component in your set and count the number of wires that go to it. You will thus find out which components have an extra connection. This can then be removed. This check, of course, is not really necessary unless your set definitely does not work, or there is a short-circuit.

The checking with the Hi-Speed diagrams, however, is recommended in all cases, before any attempt is made to install the set.

## THE S.T.800 DIAL

A handsome celluloid dial for the S.T.800 is obtainable for 2s. 6d., post free, from Celluloid Printers, Ltd., Kingston By-pass Road, Surbiton, Surrey.

This is the only dial approved and checked by the designer of the S.T.800.

## S.T.800 PANEL DRILLING DIMENSIONS

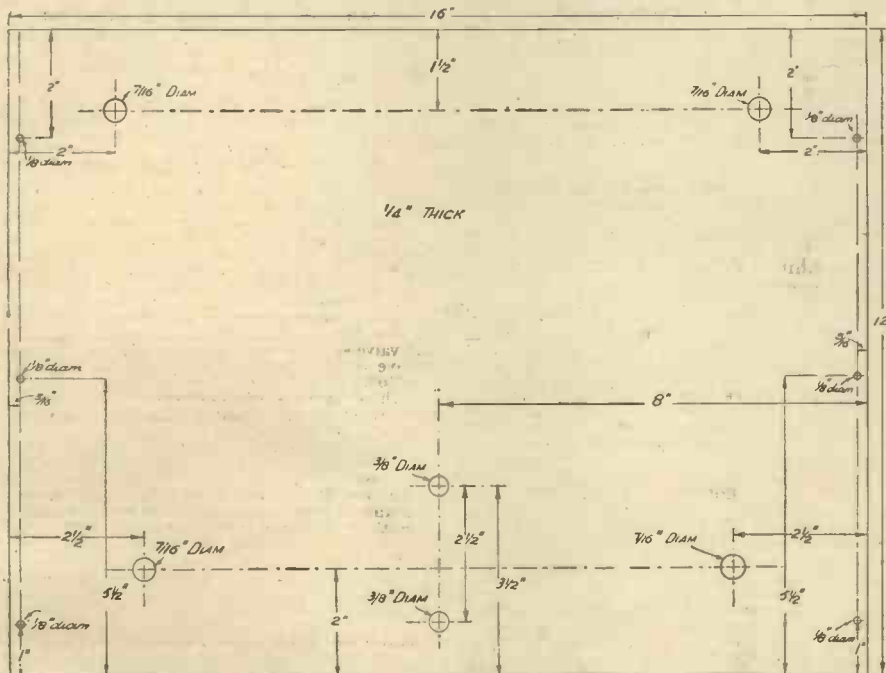


Fig. 4.—The positions of the various holes in the panel are given here. When marking out the drilling centres, the instructions given under section "C" in the Rapid Construction Guide should be followed carefully.

# HOW TO BUILD THE TRIPLE EXTRACTOR

If you use .0005-mfd. air condensers of other makes, you will most probably need a larger box. You must not fit your condensers closer together than described, and the coil assembly should not be nearer to the side of box or nearer to condensers. If you use the S.T.800 Extractor coil, together with a single Colvern medium-wave Extractor (which costs 5s.), the same precautions should be taken.

N.B.—The Extractor condenser used in S.T.800 should not be used; but the better Ormond condensers (e.g. as used in S.T.300, S.T.400, and S.T.500) are all right. The efficiency of the condensers is of extreme importance; for that reason I have given as alternatives to Polar only condensers proved on measurement to be satisfactory.

(A) Collect and examine (handling carefully) the three specified .0005-mfd. air variable condensers and the Wearite Triple Extractor coil assembly which I designed for my sets.

(B) Using Fig. 1 and Fig. 2, mark out and prepare the wooden top and sides of box, unless bought prepared. The wiring diagram is only to show wiring and not dimensions.

(C) You are now going to build the box. Lay one end-piece of box, face upwards, on a table. Knock in about 1/4 in. deep four 3/4-in. ordinary nails at the points indicated in Fig. 2. Hold one side-piece vertical on end. Driving in two of the nails in the prepared end-piece, nail end-piece to side-piece. Drive the other two nails through into the end of the other side-piece which is held vertical on end.

Drive four ordinary 3/4-in. nails 1/2 in. into other end-piece in the same way and complete frame of box. Now lay drilled wooden panel right way up on the table and knock in about 1/4 in. deep six 3/4-in. ordinary nails in positions marked on Fig. 1. Lay panel on box frame and hammer in the nails. Sandpaper any rough edges and, if desired, stain. (I used Jackson's of Mitcham, Surrey—oil varnish stain, walnut shade, a size 6 tin being more than enough for both set and Triple Extractor.)

(D) Using two 3/4-in. No. 6B.A. countersunk head brass screws and nuts, fix the Triple Extractor coil assembly inside the box the right way round. Fit

Wire (5). A1 terminal joins coil terminal 4.  
 Wire (6). Coil terminal 4 joins C3 moving vanes terminal on top.  
 Wire (7). Coil terminal 3 joins C2 moving vanes terminal on top.  
 Wire (8). Coil terminal 2 joins C1 moving vanes terminal on top.  
 (F) Check wiring by asking a friend to read out the above wiring instructions while you look at Triple Extractor. In case of error, correct at once.  
 (G) Fit knobs of condensers.  
**THIS COMPLETES TRIPLE EXTRACTOR.**

## INSTALLING THE S.T.800

These instructions are as precise and accurate in detail as those for building the set.

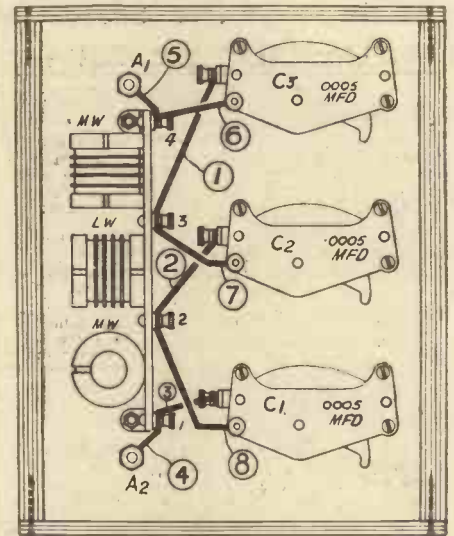
BEFORE connecting any batteries to the S.T.800 see that the free end of lead (29), which is for later connection to the anode, i.e. top of H.F. pentode valve, is "in the air." If it touches any metal it may cause a short-circuit when the batteries are first connected. An extra precaution would be to wrap the free end in paper temporarily.

Turn set (without valves) with dial facing you. Place loudspeaker on right of set and preferably not pointing directly towards it. The Triple Extractor is not connected at this stage, or not connected at all unless swamping is experienced. The two-volt accumulator is placed behind the left-hand end of set. The high-tension battery, which should be of the 120-volt type (the bigger capacity types are always cheaper in the long run), is placed behind the right-hand end of set. The grid-bias battery can be placed between the accumulator and the high-tension battery—the position of these batteries is not very important, but the leads should not be long. Long leads to the accumulator especially may result in a drop of voltage at the valveholders. Suggested lengths are given under the Hi-Speed diagrams.

Connect the aerial lead (after scraping or sandpapering) to terminal A on one of the terminal strips and connect the earth lead (a short earth lead is desirable, if possible)—after similar treatment—to terminal E. The loudspeaker is connected to terminals L.S.+ and L.S.—

There is no special way round in the case of a moving-coil loudspeaker. All connections to wander-plugs should be absolutely perfect. Many troubles, cracks, and often disconnections altogether are due to faulty connections in wander-plugs. I strongly favour testing all leads by the aid of a voltmeter or a flash-lamp battery and bulb, or other method, as much more trouble than you imagine is caused by faulty contacts in leads.

Join the L.T.+ and L.T.— to the correct terminals on the accumulator. Insert



TRIPLE EXTRACTOR UNIT  
VIEW FROM UNDERNEATH

This is the wiring for the Triple Extractor which effectively kills local station swamping.

the H.T.— plug in the negative socket of 120-volt H.T. battery. Insert H.T.+1 plug in + 72 volts (or near voltage) socket. Insert H.T.+2 in socket just below the maximum socket (i.e. usually 108 volts). The constructor can experiment with this tapping if he wishes, and if the H.T. begins to run down he may have to use a higher voltage on the H.T.+2 which goes to the detector anode.

Insert H.T.+3 in + 120-volt socket. The grid-bias plugs are fitted as follows: G.B.+ is inserted in the G.B.+ of the battery, which should be of the 16 1/2-volts type; the G.B.—1 is connected in — 4 1/2 volts; this position can be altered according to the degree of selectivity required; the G.B.—2 is inserted in — 3 volts; the G.B.—3 is inserted in — 12 volts, the exact position of this being dependent upon the desire for H.T. economy. Actually, the higher voltage you can make this the better from the point of view of H.T. economy, provided distortion is not noticed.

Check all the above connections most carefully preferably getting someone to read them out slowly to you while you follow the wires. An astonishingly large number of constructors get their leads on to the wrong terminals; this may cause a serious short-circuit, or may affect the efficiency of the set, and the constructor may not know of it for weeks. There is no excuse for this on the S.T.800, as all the plugs and terminals are easily identified, and none of them is duplicated. All terminals should be firmly tightened up. The plugs should also make good contact and should not be smeared with bitumen.

Switch on by turning the switch in the bottom right-hand corner of the panel fully to the right.

A good precaution now is to connect a voltmeter or flash-lamp bulb across the filament terminals on each valveholder in turn, taking care that it is across the filament terminals.

The lamp should light up normally. If a very bright light is obtained, or the bulb is fused, external wiring, and if necessary internal wiring, should be checked. If a voltmeter is used, it should read about two volts. If it reads much more, wiring should be checked.

Switch off set by turning switch fully to the left. Take out the H.T.— plug from the H.T. battery.

Insert H.F. pentode (Hivac VP 215 Met.) in valveholder nearest aerial terminal of set. Connect free end of wire (29) which has been "in the air" to top of this valve. Insert detector triode valve (Mazda L.2. Met.) in valveholder nearest terminal 7 of coil unit. Check this carefully, as the type of detector valve is important in this set. Insert "first L.F." valve (Osram or Marconi L21, clear or metallised) in valveholder nearest L.S.+ terminal. Insert power valve (Hivac PX230) into valveholder nearest bottom edge of panel.

Check valves to see that they are in their correct valveholders. Constructors often get poor results by having valves in their wrong valveholders.

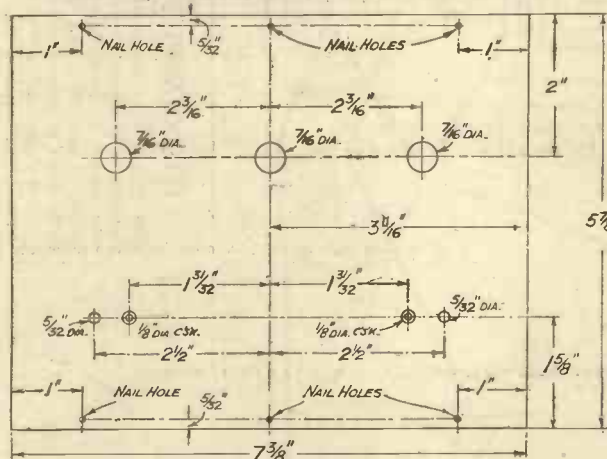
Check once again all battery voltages, including that of the grid-bias plugs. A vast amount of trouble is caused by grid-bias plugs being in their wrong positions, and yet frequently quite good results are obtainable even when these plugs are in their wrong positions, the constructor not realising for that reason that he could get much better results if the plugs were correctly placed.

Put H.T.— plug back into H.T.— socket on H.T. battery.

The aerial lead, it should be noticed, should be kept away from the loudspeaker and high-tension battery side of the set, and similarly the leads to the loudspeaker should not trail round the left-hand side of the set. The aerial lead should always be kept away from the earth lead.

(Continued overleaf.)

PLAN OF UPPER SIDE OF EXTRACTOR PANEL — 3/16" PLYWOOD.



DETAILS OF EXTRACTOR PANEL.

Fig. 1 (above).—The drilling dimensions for the Extractor panel. Fig. 2 (right) shows how the wooden end pieces and sides are made.

terminals A1 and A2. Fit the three Polar .0005-mfd. condensers. Write with a pencil the markings C1, C2 and C3 on the ends (not vanes) of condensers in order shown on the wiring diagram. This will enable you to identify each condenser.

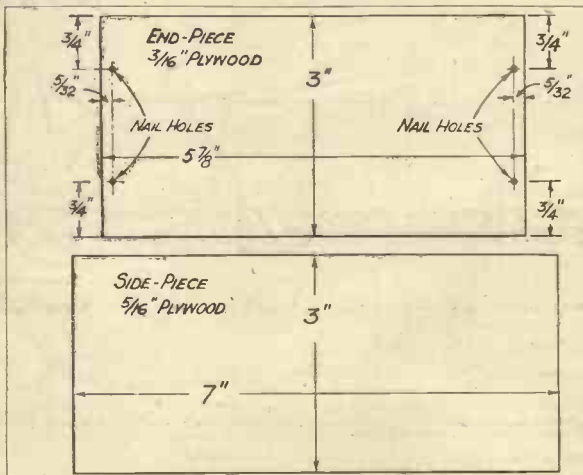
(E) Preferably using "Maxamp" wire, wire-up as follows: (Do not confuse coil numbers with wire numbers: wire numbers are in circles.) Tick off wire numbers in list as connections are completed.

Wire (1). C3 fixed vanes terminal at side joins coil terminal 3.

Wire (2). C2 fixed vanes terminal at side joins coil terminal 2.

Wire (3). C1 fixed vanes terminal at side joins coil terminal 1.

Wire (4). A2 terminal joins coil terminal 1.





**1936 BROADCASTING REVIEWED**  
Northern Ireland

**O**UTSTANDING among all events in broadcasting in Northern Ireland during the year 1936 was the opening of the Lisnagarvey transmitter by His Grace the Governor, The Duke of Abercorn, on March 20th. Until then the Northern Ireland Region had a transmitter in Belfast of only 1½ kilowatts in power. This was inadequate to serve listeners except in Belfast and the immediate neighbourhood, but with the opening of Lisnagarvey, with a power of 100 kilowatts, broadcasting was taken to every corner of the six counties which constitute the Northern Ireland Region.

When Lisnagarvey came into operation, programme development followed rapidly. Until that time there was little object in seeking the raw material of radio outside that area which was served by the old transmitter, but after Lisnagarvey was completed the programme staff went out into the distant parts of the Region to seek material.

**The Provincial Journey Series**

Notable examples of this extension of what might be called the programme area are to be found in the Provincial Journey series, in which the microphone was taken to various towns for local talent of all kinds, for local history, and local life and work.

Equipment at the studios in Linenhall Street was modified and added to during the year. A new and up-to-date Dramatic Control Panel has greatly facilitated the production of plays and feature programmes and other items in which the multi-studio technique is used, and a new and up-to-date Talks Studio and an Announcing Studio were completed during 1936.

All this activity was reflected primarily in a considerably increased output of programmes, not only for the Northern Ireland Region, but also for its contribution to the National and Regional Pools; in this respect it is worthy of special note that the Northern Ireland Region now contributes to the National and Regional Pools on the same basis and to the same extent as the other and larger Regions.

**Public Concerts Series**

Among the programmes of outstanding interest during the year may be mentioned the two series of public concerts given in co-operation with the City of Belfast Corporation and the Belfast City Y.M.C.A. During the first quarter of 1936, two concerts in each series were given, representing the second half of the 1935-1936 winter season, and the two series for the 1936-1937 winter season have both begun under auspicious circumstances, and hold every promise of being a record.

Talks in Northern Ireland were considerably increased during the year, and some series of outstanding interest were given. In the first quarter, six talks under the general title "Six Men Went Forth" created great interest; in these the lives and work of six Ulstermen who had gone forth from their native land to achieve fame and distinction elsewhere were dealt with by their descendants or by people who had made a special study of their subject. During the last quarter of 1936, Mr. E. Maxwell Fry, distinguished London architect and town-planning authority, toured Northern Ireland and gave a series of six talks on Town Planning. This series, which was given under the auspices of the Government of Northern Ireland, aroused widespread interest, not only among architects and local authorities, but among the general public.

(To be continued.)

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\* S.T.800 EXTRACTOR is available as a kit of parts or ready-built at the same price, £14/0. Cash or C.O.D., or add 2/3 to deposit and each monthly payment. Please state which is required when ordering.  
\* If the above Kits are required complete with 8 wander plugs and 2 accumulator connectors, as specified, ADD 1/9 to Cash or C.O.D. prices or 1/9 to the deposit.

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Comprising: B.T.S. Quadwave Tuner, aerial balancer, condenser, turret switch, B.T.S. H.F. choke, 3 1/2-watt resistors, 5,000 ohms, and 2 1-megohm, 2 mica fixed condensers, .0001 and .0005-mfd. Cash or C.O.D. Carr. Pd. 36/6, or 2/6 down and 6 monthly payments of 4/3.



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Battery Version. Built by Peto-Scott's expert technicians. Complete with FOUR FIRST SPECIFIED valves and Peto-Scott walnut table cabinet (illustrated on left), less batteries.

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**A.C. S.T.800 KIT "A"** Comprises complete kit of components as FIRST SPECIFIED and used by Mr. J. Scott-Taggart, including Peto-Scott ready-drilled and polished walnut plywood panel, ready-drilled terminal strips, aluminium brackets, mains lead, nuts and bolts, less valves, cabinet, speaker and Extractor Kit. Cash or C.O.D. Carriage Paid £9/19/0, or 18/3 down and 11 monthly payments of 18/3.

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**KIT "B"** As for Kit "A," but including set of 3 specified valves. CASH or C.O.D. Carr. Paid £3/19/0, or 7/3 down and 11 monthly payments of 7/3.  
**KIT "CT"** As for Kit "A," but including set of 3 specified valves and S.T.800 type Table model cabinet (above). CASH or C.O.D. Carr. Pd. £4/16/6, or 8/9 down and 11 monthly payments of 8/9.  
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## HOW TO OPERATE THE S.T.800

**REMEMBER** there are two tuned circuits. The first has its selectivity affected by the aerial coupler and its tuning by the aerial balancer (bottom left-hand knob). The second circuit, tuned by the main knob with long pointer, is made more selective by having turret switch at the first "on" position (half-way), while the reaction knob also improves selectivity greatly.

**Aerial Coupler.** Normally about a third from the left. Turn left for reducing signal strength or improving selectivity. Turn right for stronger signals (but selectivity is reduced). Tuning is not appreciably affected. Main dial not affected at all, but very slight readjustment on aerial balancer may improve signals after alteration of aerial coupler.

**Aerial Balancer.** As this tunes the aerial circuit it is a vital control; if not accurately tuned you will not properly receive the desired station. You do not, however, need to know or remember its position. Its pointer will point approximately parallel to (or a little to the left of) the main tuning pointer. Tuning is done *after* main pointer has been set.

**On-off and Selectivity Switch.** (Bottom right-hand corner.) When full left, set is off. When first position to right, set is at ultra-selective, but set is not fully sensitive. When switch

knob is full right signals are loudest but selectivity is only normal.

**Main Tuning Knob.** Tunes the second circuit, i.e. the anode circuit. Alteration of reaction should be followed by *slight* readjustment of this knob.

**Wave-change Switch.** On left side of set. Looking from the left side when the knob is turned fully left (anti-clockwise) you are on the short-short-waves. First position to right

first and reduce their strength, e.g. by turning aerial coupler to left and selectivity switch half-way. Apply reaction so as to get a fine tuning point. The aerial balancer should be tuned to give loudest signals, its pointer being approximately parallel or a little to left of main pointer. Mark a dot in pencil where main pointer crosses the dot-line nearest the outer ring of stations. Join dot by pencil line to end of station name.

If the pointer does not point at the station name you can slightly slacken grub screw which holds condenser drive disc to the condenser spindle. The pointer disc can then be turned a little to left or right as the case requires; the grub screw is then tightened.

Having marked your local, you can always go back to it by setting the main pointer to it and then turning the aerial balancer until the station comes in. (Do not forget to adjust the aerial balancer.) Repeat the process on other easily recognised medium-wave stations. Intermediate stations are easily found by noting the general angle of the junction lines to the station names.

When the set is not in its most selective condition it is possible for the main pointer to be set at a foreign station and the aerial balancer as it is turned may bring in some other station, due to its not being correctly adjusted. For example, the local station may come in. You rapidly learn to ignore these stations and continue to turn the aerial balancer until the actual station wanted comes in. The final test to make sure you have the wanted station is to move the main pointer to each side of its correct position. Signals should weaken which

(Continued on next page.)

**S.T.800**

**THE POWER SUPPLY**

Batteries: H.T. 120 v.—Drydex, G.E.C.,  
Aerialite, Milnes H.T. Unit,  
Lissen, Fuller.  
G.B. 16.5 v.—Drydex, Lissen.  
L.T. 2 v.—Exide, Lissen, Fuller.

Mains Units: Ekco, Atlas.

**SUITABLE LOUDSPEAKERS**

W.B., Rola, Blue Spot, Amplion, Wharfedale.  
(No significance attaches to the order of makes.) J. S.-T.

is long-short waveband. Next position is medium waveband. Fully to right (clockwise) you are on the long waves (Droitwich, etc.).

**Calibrating the S.T.800.** You should start logging as soon as possible so as to get a few easily recognised stations marked with a dot. As the aerial balancer is not calibrated, "old hands" may find things a little strange at first, but this feeling disappears rapidly as you mark up a few stations. Pick up your locals

### LIST OF COMPONENTS FOR THE S.T.800 BATTERY MODEL

Component	Make Used by Designer	Suitable Alternative Makes
1 Coil unit for S.T.800	B.T.S.	No other possible.
1 Main tuning condenser, .0005 mfd., with silent pigtail and with pointer for S.T.800	J.B.	No other fits dial.
1 Aerial balancer, .0005-mfd., air-tuning condenser for S.T.800	<b>POLAR</b>	
1 Aerial coupler, .0005-mfd., with silent pigtail and flanged nut for S.T.800	GRAHAM FARISH Little's log-mid-line	B.T.S. (mention S.T.800).
1 Reaction condenser, .0005-mfd., with silent pigtail and flanged nut for S.T.800	GRAHAM FARISH	B.T.S. (mention S.T.800).
1 Turret switch with flanged nut (look for it before purchase)	GRAHAM FARISH	B.T.S. (mention S.T.800).
1 Block condenser (2 mfd. + 2 mfd. + 1 mfd.), similar to that used in S.T.700	T.M.C. B.1007	Or separate condensers by Dubilier, type B.B.; T.C.C., type 50; T.M.C., type 30; B.I.C., Amplion, Ferranti.
1 L.F. transformer	VARLEY Niclet Standard 1 : 3.5	
1 H.F. choke for S.T.800	B.T.S.	No other possible.
4 4-pin valve holders	BENJAMIN Vibrolders	No alternative recommended.
1 30,000-ohm ½-watt resistor	BULGIN	Ferranti G.5, Dubilier, Erie 1 watt, Polar N.S.F. 1 watt.
1 5,000-ohm ½-watt resistor	BULGIN	Ferranti G.5, Dubilier, Erie 1 watt, Polar N.S.F. 1 watt.
1 20,000-ohm ½-watt resistor	BULGIN	Ferranti G.5, Dubilier, Erie 1 watt, Polar N.S.F. 1 watt.
2 1-megohm ½-watt resistors	BULGIN	Ferranti G.5, Dubilier, Erie 1 watt, Polar N.S.F. 1 watt.
1 .004-mfd. condenser	T.C.C., type M.	Lissen Mica, Dubilier type 610.
1 .0001-mfd. condenser	T.C.C., type M.	Lissen Mica, Dubilier type 610.
2 .0005-mfd. condensers	T.C.C., type M.	Lissen Mica, Dubilier type 620.
1 .006-mfd. condenser	LISSÉN Mica	T.C.C. type M. mica, Dubilier type 610 mica.
4 Terminals (A, E, L.S., L.S.—)	BELLING-LEE type R.	Clix type A, Bulgin type-T.L.
2 Terminal strips (Ebonite 2 in. x 1½ in. x ¼ in.)	PETO-SCOTT	
1 Panel, 16 in. x 12 in.	" "	
2 Side pieces	" "	
1 Fibre battery-lead clamping strip	" "	
<b>OPTIONAL</b>		
8 Wander plugs, H.T.—, H.T. + 1, H.T. + 2, H.T. + 3, G.B. +, G.B.—, 1, G.B.—, 2, G.B.—, 3	BELLING-LEE	Clix, Bulgin
2 Accumulator connectors, L.T. +, L.T.—	BELLING-LEE	Clix, Bulgin.

### TRIPLE EXTRACTOR UNIT

1 Triple Extractor iron-core coil	WEARITE	
3 .0005-mfd. air-variable condensers	POLAR No. 4 with knob (mention S.T.800)	J.B. "Popular Log" (without dial or slow motion, but with small knob), Ormond R.483 (log condenser), with small knob (only really efficient air condensers may be used).
1 Wooden box—5 wood pieces	PETO-SCOTT	
2 Terminals, A1, A2	BELLING-LEE, type R.	Clix type A, Bulgin type T.L.

#### VALVES

V.P.215 met.—HIVAC.    L.2 met.—MAZDA.    L.21—OSRAM, MARCONI.    P.X.230—HIVAC.

#### MISCELLANEOUS REQUISITES FOR S.T.800.

(Rapid Construction Guide shows where these are used).

WIRE.—20 feet of 18 S.W.G. bare tinned copper.

SLEEVING.—5 three-foot lengths 1 mm. insulating sleeving.

WASHERS.—4 brass ¼ in. with ¼ in. hole.

FLEX.—20 feet 14/36 single rubber-covered flex.

SCREWS.—10 ¼ in. No. 4 round-head brass.

14 ½ in. No. 4 " " "

8 1 in. No. 4 " " "

4 ¼ in. No. 3 " " "

10 ½ in. No. 4 " " "

J. S.-T.



## HOW TO OPERATE THE S.T.800

(Continued from previous page.)

ever way you move the main pointer. If they do not weaken (unless signals are already very strong) it means you are on the wrong station, due to an incorrect setting of the aerial balancer.

The simplest way of tuning is to set your main pointer to the station dot, make the set oscillate with reaction. You will no doubt hear a whistle. Then turn the aerial balancer to a point where the whistle suddenly changes note. Loosen reaction and there is your station. This system, although fool-proof, is only used for logging very weak stations, but the system can be recommended for short waves owing to sharpness of tuning on those bands.

**Tuning the Short Waves. 1st method.** The short waves may be received with aerial balancer pointer fully to the left, tuning being accomplished with the main pointer and reaction, the selectivity switch being turned fully to right. The set may be made to oscillate with the reaction and the main pointer turned to around the middle of a group of short-wave stations. Heterodyne whistles will be heard. Gradually reduce reaction until set stops oscillating, and by careful tuning on main pointer and by keeping reaction critical you will pick up a number of stations.

**2nd method.** Having received a station you can make it much louder by turning the aerial balancer knob until the signal comes into tune on the balancer. You may find that as it does this the set oscillates. In that case you will have to reduce the reaction. This second method is usually only advised when the short-wave signals are strong.

### BENJAMIN VIBROLDERS

Messrs. Benjamin Electric Ltd., inform us that the Benjamin "Vibrolders" (as specified for the S.T. 800) are available from the British Radio Gramophone Co. Ltd., to whom all enquiries should be addressed.

**3rd method.** Make the set oscillate by use of plenty of reaction (use more than is necessary just to start oscillation). Keep the aerial balancer pointer more or less parallel, but a little to the left of the main pointer. Pick up a station on the main pointer by its heterodyne whistle. Leave go of the main tuning control and turn the aerial balancer either way until the whistle suddenly changes character. This will only occur at one point. You will find that you can get a silent point adjustment on the aerial balancer and that if you tune the balancer to either side the note of the whistle will rise. At the silent point the aerial balancer may be regarded as in tune. Leave it alone. Now go back to the main tuning knob and adjust it while reducing reaction to the normal critical non-oscillating condition. In this process you will hear the whistle appear again, and you should not "lose" it by over-rapid alteration of either reaction or main tuning knob. It will be found that the reaction knob will affect tuning somewhat, but if you keep the whistle or the clear station itself within hearing by suitable tuning of the main pointer this will cause no ill-effect.

**4th method.** A final polish for the satisfaction of experts may be given as follows: Tune a trifle below the station on the aerial balancer and get the station at its loudest by trial "swinging" of the main tuning control. Then tune very slightly higher on the aerial balancer, repeating the swinging. Signal should be louder. Keep on with this process till signals are at their loudest. If you over-tune on the aerial balancer signals will begin to fall off in strength. During these tests (which actually only take a second or two) reaction should be kept critical.

Note. As usual on straight sets, as you tune higher up the dial more reaction is needed, this applying to all wavebands. Another point useful to note is that an increase of reaction may require tuning down a trifle on the main pointer, and vice versa.

**How to Adjust the Triple Extractor.** Connect Triple Extractor Unit between aerial lead and aerial terminal of set. Aerial lead goes to A1 on Triple Extractor, while A2 on Triple

Extractor is joined by a wire to aerial terminal on set.

(a) At first have all three extractor condenser knobs turned fully clockwise (to right).

(b) Tune the S.T.800 set to receive your local National medium-wave station, or your relay station if this causes swamping. Signals should be loud but not made unnecessarily so. Reduce aerial coupler and volume control if necessary. Now slowly alter that knob on the Triple Extractor which is nearest terminal A1, until the local National is cut out. On either side of the silent point the National will become louder.

(c) Tune S.T.800 to receive your other medium-wave local—the Regional. Signals should be loud but not be allowed to overload set. Reduce volume control and aerial coupler if necessary. Now slowly turn that knob on the Triple Extractor nearest to terminal A2 until Regional disappears.

(d) Switch S.T.800 to long waveband and tune in Droitwich in the ordinary way, not permitting it to overload the set. Reduce volume if necessary. Now slowly turn middle knob

on Triple Extractor until Droitwich disappears.

(e) You can now slightly readjust any of the three knobs to allow just as much B.B.C. signal to get through to main set as you wish. Remember which station each Triple Extractor knob controls.

(f) Never let the Triple Extractor knobs be "just anywhere." They may be extracting the very station you are looking for. Midland Regional listeners may set both outside Extractor knobs to Midland Regional. When not needed, it is best to take the whole Triple Extractor out of circuit. Its extreme usefulness will, however, be appreciated in all districts suffering from B.B.C. swamping. J. S-T.

JOHN SCOTT - TAGGART'S  
FAMOUS SET DESIGNS ARE  
DESCRIBED EXCLUSIVELY  
IN "POPULAR WIRELESS"

# T.C.C.

ALL-BRITISH  
CONDENSERS

## SPECIFIED FOR THE S.T. 800

T.C.C. condensers are specified because of their DEPENDABILITY. Dependability is the result of specialised experience and

**T.C.C. HAVE MADE CONDENSERS AND CONDENSERS ONLY FOR 28 YEARS.**

### BATTERY MODEL

Each  
1 .004-mfd. T.C.C. type M, 1/-  
1 .0001-mfd. T.C.C. type M, 8d.  
2 .0005-mfd. T.C.C. type M, 9d.  
\*1 .1-mfd. tubular T.C.C.  
type 250 - - - - 1/4  
(\*Incorporated in the coil unit)

### A.C. MAINS MODEL

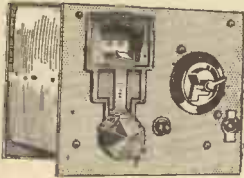
Each  
2 0.5-mfd. T.C.C. type 250, 2/-  
2 0.1-mfd. T.C.C. type 250, 1/4  
3 1-mfd. T.C.C. type 50, 2/6  
1 50-mfd. Electrolytic  
T.C.C. type FW - - - 2/3  
2 8-mfd. Electrolytic (wet)  
T.C.C. type 802 - - - 6/-



THE TELEGRAPH CONDENSER COMPANY  
LIMITED, WALES FARM ROAD, NORTH  
ACTON, W.3

Convert your receiver into an ALL WAVE with a

## “RIDCO” SHORT WAVE UNIT



“RANGER” MODEL 15-85 metres. Suitable for any type of A.C. Mains or Battery receiver.

← AMERICAN RECEPTION GUARANTEED ON ANY RECEIVER.

Price 27/6 (less valve) Price 37/6 (with valve)

Post Free.

“Ranger”

“CUB” MODEL 19-50 metres. Suitable for A.C. Mains. Superhets only. Price 9/6, ready for reception. Post Free.

RIDCO UNITS ARE RECOMMENDED BY “POPULAR WIRELESS.”

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**RADIO INDUSTRIES DEVELOPMENT CO.,**  
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“Cub”



Up-to-the-minute news concerning the radio industry

### MANUFACTURERS PLEASE NOTE

THE commercial and technical department of the Leicester City Libraries is engaged in building up a collection of manufacturers' catalogues. Firms are invited to supply a complete set of their current publications, which will be indexed in the card catalogue both under the firms' names and the particular productions in which they specialise.

### LUXURY SETS FOR INDIA

What are believed to be the most expensive radio sets ever built are those which have just been sent to India for the Maharajah of Patiala. The receivers in question have been specially constructed by Philips Radio, and are remarkable for the beauty of their outward appearance. The cabinets are made of the costliest kind of wood, whilst the dial holders and control knobs are of carved ivory.

In order to make the sets easily transportable in the halls of the palace, they are placed on chromium sledges provided with small wheels. A costly kind of leather has been used for the handles on the sledges. The rear panels of the sets are, with the exception of the control knobs, identical with the front panels, so that the receivers present the same high finish when viewed from all sides.

The sets have been built on a low sledge, it is explained, in order to adapt them to the customs of the country, for in Patiala no chairs are used, and it is usual to sit on a carpet or cushions.

### FOR HOME CHARGING

Gordons Equipment Limited have produced a compact and inexpensive charger for those wishing to charge their own accumulators at home. Having a consumption of approximately 5 watts, the “Gnome” charger, as it is called, gives an output of ½ ampere at 2 volts. A metal rectifier is employed, the charger, of course, being for A.C. mains. The price is 13s. 6d.

### NEW FIRE H.Q. EQUIPMENT

The Westinghouse Brake and Signal Co., whose metal rectifiers are world famous, have been awarded the contract by the L.C.C. for the whole of the new battery-charging equipment for the fire appliance batteries at Fire Brigade Headquarters.

### AT THE B.I.F.

Overseas visitors to the British Industries Fair, which closes on Friday of this week

have been provided with special facilities for sending telegrams to any part of the world, due to the foresight of Cable and Wireless Limited in opening a special office in the fair.

Those interested in the transmission and reception of messages on the beam wireless system have been able to see working demonstrations of the automatic apparatus used.

Another feature of the Cable and Wireless exhibit is a large revolving and illuminated globe, eight feet in diameter, showing the world-wide overseas telegraph services controlled by this firm.

### NEW EVER READY SETS

Here are some new set releases.

First, two new Ever Ready models—an all-wave table superhet, and an A.C. transportable.

The all-wave superhet has six valves (including rectifier) and costs 18 guineas. Designed for A.C. mains, it covers the usual medium and long wavebands, and in addition two short wavebands of 13-33 metres and 30-82 metres. A visual tuning indicator is provided as is also a two-speed tuning control, selectivity tone control and a sensitivity control. The loudspeaker is a moving coil of the non-focusing type.

The A.C. transportable is priced at 10½ guineas, and incorporates four valves, including the rectifier. It is a medium and long-wave broadcast receiver and has a full vision tuning scale calibrated in wavelengths and station names.

The aerial is built into the receiver, the cabinet being mounted on a turntable so that full advantage may be taken of the directional properties of the aerial.

Provision is made for an external aerial to be used if desired. The weight of this receiver is 29 lb.

### LATEST DECCA RELEASES

The Decca Gramophone Co., Ltd., also announce two new models. One is an all mains six-valve universal portable and the other an all mains six-valve universal table model.

Both models employ the same type of circuit, namely a superhet giving three waveband tuning, the wavebands being 19-49 metres, together with the usual medium and long-wave ranges. Delayed A.V.C. is fitted and the tuning dial is calibrated in metres, kilocycles and station names.

In the case of the portable model provision is made for headphones, and an external speaker can be used, if desired, with the table model.

The portable, which is known as the Model “55,” costs 8½ guineas and is available in three different colours, namely, blue, black or maroon leather finish. It has a carrying handle at the top and the weight is 12½ lb.

The table model, called the Model “66” is 9½ guineas.

## SHORT WAVES SLIP A SLOT



### AERIAL FILTER

IN YOUR AERIAL

Essential for all-wave sets. Makes your aerial adjustable at the turn of a knob. Complete with cut-out switch, from all dealers or post free from:

**GRAHAM FARISH LIMITED,**  
Masons Hill, Bromley, Kent.



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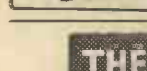
NOW IS THE TIME TO HAVE YOUR SET OVERHAULED—EXPERT REPAIR SERVICE—BRITISH AND AMERICAN SETS—COLLECTED AND DELIVERED FREE, LONDON—CARRIAGE PAID ONE WAY, PROVINCES—ESTIMATES FREE.

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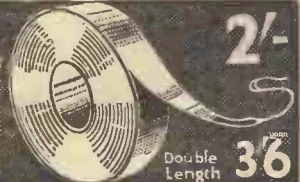


## THE ONE AERIAL FOR THE MODERN SET

# PIX INVISIBLE AERIAL

PIX LONDON, S.E.1

Highly efficient, self adhesive aluminium strip—gives wonderful pick-up clear of interference—fixed in a jiffy without tools—just press it and it sticks.



2/-  
Double Length  
36

## TECHNICAL JOTTINGS

Some items of interest

By Dr. J. H. T. Roberts, F.Inst.P.

### Aerial Transformer

AN interesting new invention is an all-wave aerial transformer. The transformer is enclosed in a completely weatherproof case, and externally looks for all the world like a somewhat-larger-than-usual aerial insulator. It may be used with any set, but those that have no built-in set transformer need an extra companion unit. It is claimed that this accessory is efficient on all waves, and provides the maximum elimination of extraneous noise. It has to be completely weatherproof, inasmuch as it is connected directly, outdoors, to the aerial. The aerial is divided at the centre, and the aerial transformer is introduced at the junction, the down-lead then being taken from the transformer.

### Cathode-Ray Tubes

The cathode-ray tube, like so many radio components, seems to find ever-increasing uses in directions sometimes relatively removed from radio.

As an example of this, some tests have recently been made in America with a new cathode-ray direction-finder for aircraft. These tests were carried out over all kinds of country, mountainous and flat, as well as over water, and in the daytime and at night. It was found that reliable bearings could be obtained even through heavy atmospheric disturbances and interference from other radio signals on the same frequency as the observed station did not seriously upset the operation.

### For Direction-Finding

When this cathode-ray direction-finder is in use, the cathode-ray pattern gradually opens from a vertical line into an ellipse on approaching a station until finally, when directly over the radio station, an almost perfectly circular pattern is obtained. This "directional sense" is quite automatic, and the approach to any broadcast or beacon station is readily observed.

In addition to its use as a radio direction-finder or "homing" device, right-and-left indicator and so on, this cathode-ray device was also found to give a very accurate bearing and directional indications of electrical storms.

### Safety in the Air

The equipment uses two separate amplifying channels, one utilising the energy from a simple vertical aerial, and the other amplifying the signals from a rotatable loop.

It is stated that commercial air lines in America will probably soon be fitting cathode-ray equipment of this type standard, as it is claimed to be one of the most important contributions to safety in air travel.

### Traffic Control

We are all by now familiar with the loud-speakers in the London Tube lifts which tell us to "Stand clear of the gates, please", and this arrangement is now being tried out in connection with traffic crossings. In some recent tests, whenever the light turned red in one direction the loudspeaker

announced a warning something like this: "This is a busy and dangerous crossing. Several people have been killed or injured at this crossing because they did not observe the traffic signals. Wait till the light turns green before stepping off the pavement."

The authorities found that, whereas the drivers of vehicles realise their responsibility to observe traffic signals, the pedestrians as a general rule either do not appreciate that they also should obey the traffic signals, or else are completely oblivious to them. It is obviously necessary for the organisation of the crossing traffic that drivers and pedestrians should observe the signals. If it is found that this double warning draws much greater attention to the traffic lights, and has the effect of materially reducing accidents, it will be adopted in other dangerous spots.

### Improvements in Electrolytics

Electrolytic condensers which made their appearance a few years ago have proved a great boon in that they enable us to obtain an enormously greater electrostatic capacity in a given space than we could obtain by the ordinary condenser consisting of layers of tinfoil and waxed paper. Electrolytic condensers, as you probably know, have a definite polarity and therefore cannot be used for all purposes for which ordinary laminated condensers are used. However, it so happens that the particular cases in which we require very high capacities in a radio set, namely, for the smoothing of rectified current and other smoothing generally, are cases where the polarity is no drawback, and so the electrolytic type of condenser fills the bill.

Not content with the extraordinary  
(Continued on next page.)

# New Times Sales Co.

PILOT AUTHOR KITS—IMMEDIATE DELIVERY

S.T. 800 KIT "A" CASH or C.O.D. 70/- OR YOURS 7/-  
Carriage Paid 7/- FOR

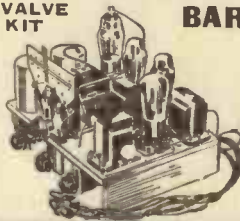
Deposit 7/- and 11 monthly payments of 6/4.

Complete Kit of first specified parts, with KONECTAKIT (Gratis), but less wander plugs, accumulator connectors, valves, Extractor Unit Kit, cabinet and speaker.

<p><b>KIT "B"</b> As Kit "A" but with 4 FIRST specified valves only, less cabinet and speaker, etc. Cash or C.O.D. Carriage Paid £24/18/6, or 9/- down and 11 monthly payments of 8/10.</p>	<p><b>KIT "CT"</b> As Kit "A" but with valves and Peto-Scott S.T. 800 Table Cabinet only, less speaker, etc. Cash or C.O.D. Carr. Paid £26/14/0, or 12 monthly payments of 10/6.</p>	<p><b>KIT "CC"</b> As Kit "A" but with valves and Peto-Scott S.T. 800 Console. Cabinet only, with speaker, baffle and battery shelf, less speaker, etc. Cash or C.O.D. Carr. Paid £25/11/6, or 12/3 down and 11 monthly payments of 12/-.</p>	<p><b>KIT "CLL"</b> As Kit "A" but with valves and Peto-Scott S.T. 800 Console Cabinet, Type "LL" only, with lift-up lid, and speaker baffle, less speaker, etc. Cash or C.O.D. Carr. Paid £27/14/0, or 12/3 down and 11 monthly payments of 12/3.</p>
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## ★ 4 BIG N.T.S. BARGAINS! ★

4-VALVE KIT



BARGAIN CLASS "B" 4 KIT

LIST PRICE £4 : 4 : 0 BARGAIN

45/-

● Latest Class "B" Circuit built on METAPLEX. ● 4 Stages. ● Variable Mu, Screened Grid high-frequency detector. Class "B" Driver and Class "B" Output Valves. ● Shielded Coils. ● Twin gang Air Dielectric Condenser. ● Range 200-550 and 1,000-2,000 metres. Working Drawings and instructions with each kit. KIT "A". All parts, less valves, cabinet, speaker, Cash or C.O.D. Carriage Paid £25/5/0, or 2/6 down and 11 monthly payments of 4/3. KIT "B" with valves, £23/13/6, or 12 monthly payments of 6/9. KIT "C" with valves, walnut finished Console cabinet, and N.T.S. Class "B" M.C. Speaker, £25/15/6, or 10/- down and 11 monthly payments of 10/9.

2/6 DOWN

### CLASS "B" 4 CHASSIS

WITH 4 BRITISH VALVES

LIST PRICE £6 : 6 : 0

BARGAIN

£3 : 3 : 0 Cash or C.O.D.

Or 5/- down and 12 monthly payments of 5/6. Another new and wonderful N.T.S. half-price offer! Battery operated, this splendid bandpass circuit gives amazing purity of tone and adequate volume, yet is unusually economical in battery consumption.

● Variable-Mu H.F. Pentode, Rectifying Detector, Class "B" Driver and Class "B" Output Valves. ● Slow-motion tuning. ● Illuminated circular air-plane dial. ● Wavelengths 200-550 and 900-2,100 metres.

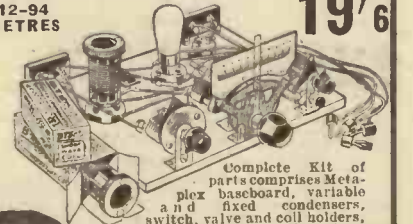
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### BARGAIN 1-valve S.W. KIT

LIST PRICE 35/- BARGAIN

12-94 METRES

19/6



Complete Kit of parts comprises Metaplex baseboard, variable and fixed condensers, switch, valve and coil holders, H.F. choke, terminals, slow-motion drive, 3 short-wave coils, connecting wire, and FULL WIRING DIAGRAM. Less valve. Cash or C.O.D. Carr. Paid 19/6, or 2/6 down and 8 monthly payments of 2/6. N.T.S. Lightweight headphones, 7/6 pr. extra.

2/6 DOWN

### BARGAIN S.G.3 CHASSIS

WITH S.G. DET. AND PENTODE VALVES

LIST PRICE £5 BARGAIN

Cash or C.O.D. 42/-

or 2/6 down and 12 monthly payments of 4/-



Each chassis brand new and tested, and complete with knobs and black escutcheon. CIRCUIT COM. PRIZES Screened Grid, H.F. Detector and Pentode Output Valves; Screened wave-wound coils; 2-gang Air Dielectric condenser; Metal chassis; only 9 m.a. H.T. consumption. Illuminated and wavelength calibrated dial; Wave range 200-2,100 metres. COMPLETE RECEIVER consisting of above chassis housed in walnut finished Consolelette cabinet with valves and P.M.C. speaker, less batteries. Cash or C.O.D. Carriage Paid £3/7/6, or 5/- down and 12 monthly payments of 5/9.

2/6 DOWN

## TECHNICAL JOTTINGS

(Continued from previous page.)

condensing property of the electrolytic condenser, radio scientists have been working to reduce still further the size of this type of condenser or, if you like, to cram still more capacity in the same size.

### High Capacity Condensers

You probably know that the electrolytic condenser owes its special condensing property to the fact that the aluminium plates form a layer of oxide on their surface when current tries to pass through one way, this layer being formed in exceedingly close contact with—or rather proximity to—the metal. We all “learnt at school” that the capacity of a condenser *increases* as the distance separating the plates *decreases*, and so if we can arrange plates exceedingly close together we shall be able to get a very high capacity with a relatively small plate area. Using actual metal plates it is quite impossible to get them into anything like such close proximity as that of the film of oxide and the aluminium sheet.

### Special Plates

The secret of the newest developments, by which the electrostatic capacity of these condensers has been still further increased, is the use of special types of plate. Until recently “dry electrolytic” condenser plates were formed of smooth polished metal. The effective area of the metal was simply the product of its linear dimensions. Since the capacity of the condenser, however, is controlled by the effective area of the plate, if we can find any simple means of increasing the effective area without increasing the overall size, we shall gain to that extent. The answer to this has been found in a form of *etched* plate construction in which rolls of polished aluminium are passed through an acid bath so as to produce a roughened surface. The polished finish of the aluminium is converted into a kind of fine sandpaper-like surface which, when viewed under a powerful microscope, is seen to be in the form of innumerable hills and dales. As a result of this, an etched-plate condenser having a given rating as to life and capacity can be built into a container only about one-quarter the size of the more usual type of electrolytic condenser.

### Ribbon Armatures

A new kind of microphone, of the so-called “velocity” type, has been produced, using a ribbon armature. This new microphone is claimed to be so much more sensitive than its predecessors that it will give the same performance as others with one stage less of amplification. The microphone is of the high-impedance type and no transformer is required and in this way at least one source of trouble due to the pick-up of hum is eliminated.

Another advantage of the microphone is that it is highly directional, so that in this way it escapes to a large extent unwanted sounds and is relatively free from acoustic feed-back which, as you know, is so liable to set up a howl with a sensitive microphone. It can also be used for speaking very close without the usual “boomy” effects present in other velocity microphones with good frequency response.

As regards the design of the new microphone, it employs eight thin aluminium-foil

ribbons which are placed loosely across an insulated perforated metal plate. This metal plate and the ribbons thus form a condenser which normally has a capacity of about 500 micro-microfarads. The ribbons are anchored at each end and the unit is mounted in a protective case.

### Eliminating Inertia

In operation, a polarising voltage is applied to the ribbons, through a resistance network, and when sound vibrations fall upon the microphone and vibrate the ribbons the effect is to vary the capacity between the ribbons and the fixed plate, thus causing corresponding variations in the minute charging current flowing through the resistance network. The aluminium ribbons are only about one-thousandth of an inch in thickness and so have very small inertia at ordinary audio frequencies.

### Looking for Trouble

I don't know whether you have ever had the experience of a transformer with a broken wire inside which sometimes makes contact and sometimes doesn't? You often hear about this sort of thing and it sounds rather improbable but in point of fact it actually happens a good deal more frequently than you might think. I had a case myself only a few days ago. The set would work all right for a time, then there would be an awful crackling, then it wouldn't work at all; sometimes it would “come on,” sometimes go off. If you come across this kind of thing it is almost a certain indication of a broken wire, either in a transformer or sometimes even in the soldered connections in the wiring. A simple test is to give the cabinet of the set a fairly sharp bang with your fist—not so hard, of course, as to damage the valves—and if this results in a grating noise or in a set coming on when it was previously off, or going off when it was previously on, you can guess that there is a broken wire somewhere about.

Incidentally, quite often such a break occurs at the end of a winding where the thin wire joins a thicker leading-out wire.

## RANDOM RADIO REFLECTIONS

(Continued from page 653.)

these will be working before the end of the year if the cable that has already reached Birmingham proves successful, and there is no reason to believe otherwise.

Although I have a complete television receiving outfit working at home, I often merely listen. Looking is too distracting for a busy man like myself. I can get on with my jobs while only the sound side is on, but when I switch on the C.R. Tube, then I have to drop everything and give myself over to viewing.

No, the novelty appeal hasn't worn off, or perhaps it's truer to say that it has given way to solid entertainment appeal. I particularly like the News Reel. A very successful item was the Peterson-Neusel fight. Having this brought right into one's own parlour, as it were, was thrilling to the extreme. I could no more do without my television now than I could face giving up reading, driving, or smoking.

But I can assure you that many of the items make good listening. You ought to cash in on the new service, at least to some extent.

## FROM OUR READERS

(Continued from page 649.)

quite proud of. It was a battery, Class B, arrangement run from an eliminator. While putting on a record he gabbed away about the quality it could produce, but when I heard it I was utterly disgusted to think that a man who had been at radio since 1921 or 1922 could build a receiver with such an appalling output. About all I heard were the beats of the drums—it was a jazz record. All the while he kept saying to me: “Listen to that bass!” I could do nothing else; there was nothing else!

If I had gone into another room and shut the door all I would have heard would have been, thump, thump, thump! That is not quality. A quality amplifier is one which gives even response on all frequencies. And set manufacturers are nearly as bad. You need only walk through a built-up area any evening. And what do you hear? I'll tell you! The “boiled-shirted” gentleman from the B.B.C. giving the news, etc., “reicht dahn in t' cellar-oyle.” Those are the fruits of putting so-called tone-controls on to receivers which I prefer to call “top-cutters.”

It is pitiful to hear the excellent quality which the B.B.C. puts out ruined in this way. I think this state of affairs has arisen through the squeaky tones of the loudspeakers we used in the “good old days” (?). Mind you, I'm no lover of the “light-coloured” set. NO! I condemn that as much as the “cut-top” set. I like to be able to hear everything.

Yours faithfully,  
F. W. COOK (2 C I T).

3, Airedale Cliff,  
Pollard Lane,  
Bramley, Leeds.

### GOOD-BYE, OLD PAL!

The Editor “Popular Wireless.”

Dear Sir,—I read, not without a certain sadness, the decision of the Television Advisory Committee to adopt the E.M.I. transmissions for television. Though these transmissions are better, both in sound and vision, one feels sorry for the pioneer, John Logie Baird and his, perhaps, wasted apparatus. I understand that the E.M.I. camera is much more adaptable to the different lights, atmospheres and treatment than the Baird camera.

It seems to me that even though this system has been thrown down, private experiments could still doubtless be carried on, and some further important technical developments take place to put Baird's system once more on top.

In conclusion, I should like to say that I think they might give the Baird System a royal “send-off” at the very least.

Wishing “P.W.” every success in all its branches.

Yours faithfully,  
JOHN ADDISON.

Cranborne Vicarage,  
Wimborne, Dorset.

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## CONNECTING TWO H.T. BATTERIES

A point to remember

I STUMBLED across a case quite recently which demonstrated very clearly that in spite of the enormous amount of information that has been propagated in connection with wireless, there is still a great deal of ignorance existing concerning the use of wireless apparatus. A man had installed a perfectly straightforward receiver, very simple to operate, and in the set provision had been made for two positive H.T. tappings in addition to the negative.

Being unaware of his real requirements he had purchased a 60-volt H.T. dry battery and successfully inserted the H.T. plugs into the sockets the correct way round, H.T. +1 being about 40 and H.T. +2 60. As readers would expect, his reception was rather poor from the point of view of quality and volume, so he had called in a friend to give advice.

### Parallel Instead of Series

After an examination this friend rightly told him that he had insufficient H.T. voltage, and advised him to buy another 60-volt unit to use in conjunction with his present one, and matters would be rectified.

The advice was taken, but after placing the extra battery in circuit and switching on, no difference was noticed. Naturally, the friend was duly informed and, making a further examination, he found that the new 60-volt unit had been joined in parallel with the first one, i.e. leads connected together the two positive and two negative extremities of the batteries, while the two original H.T. leads had been left in the same sockets as previously.

### Easily-Made Mistake

The perpetrator of this thought he was quite right in joining positive to positive and negative to negative, and the occasion served as an opportunity for a short dissertation on that vexed question of series and parallel, not only with reference to batteries, but also coils, resistances, condensers, etc.

It was the work of a moment to rectify matters and put the batteries in series, and since then the set has given no trouble, but the incident is recorded to show how easy it is for the newcomer to wireless to make little mistakes which to the more experienced seem to savour of the ridiculous.

H. J.

## HENRY HALL'S HOUR

New programme developments will take place in connection with Henry Hall's Hour, starting on Saturday, March 13, on which date the B.B.C. Dance Orchestra completes five years of broadcasting.

It is intended that each of the Saturday night programmes shall include one or two examples of modern rhythmic compositions by British, American and Continental composers, many of the British contributions to the series being new works specially written for the B.B.C. Dance Orchestra. In this way Henry Hall hopes to stimulate the British composer in a field which has been exploited almost exclusively by the famous names of American rhythmic music, and the scheme will undoubtedly create a new interest for listeners.

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# INSENSITIVITY

This fault divides itself into three main heads. Carry on from the one which applies to the case under consideration

1  
Volume all right but few stations are heard!

Examine aerial and earth systems. Check connections from and to isolator. Test joints

Check over voltages of any batteries used

Check over all plug and socket connections (including valve pins and holders) for sound and clean contact

Test valves (including rectifier in case of a mains set) for lost emission

IF STRAIGHT CIRCUIT

Check over continuity of reaction circuit

IF SUPERHET CIRCUIT

Test windings of oscillator coils

Test tuning coils for continuity and check condensers for proper trimming

IF MAINS SET

Test bias condenser and bias resistance or potentiometer of H.F. valve

2  
Few stations heard and with little volume

Follow out No. 1 first, and if results are not then turn factory carry on with No. 3

3  
Plenty of stations heard but with little volume

Test L.F. coupling components— anode resistance—grid leak—grid condenser—stopper resistance—transformer—coupling condenser

Try another loudspeaker with new loudspeaker leads

Apply following tests to detector anode circuit and following stages

Apply following tests to detector grid circuit and preceding stages

Test end of each lead for dry joint or dirty contact

Test by substitution all fixed condensers not already dealt with

Test or replace, one at a time, all components not yet tested

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