

LATEST TELEVISION NEWS

Popular & Wireless TELEVISION TIMES

**SWITCHES MEAN
HITCHES!**
By JOHN SCOTT-TAGGART

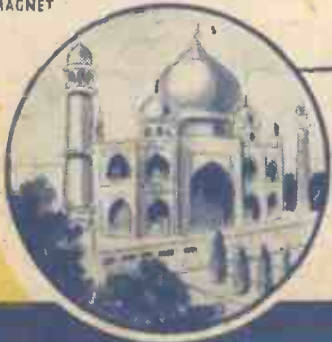
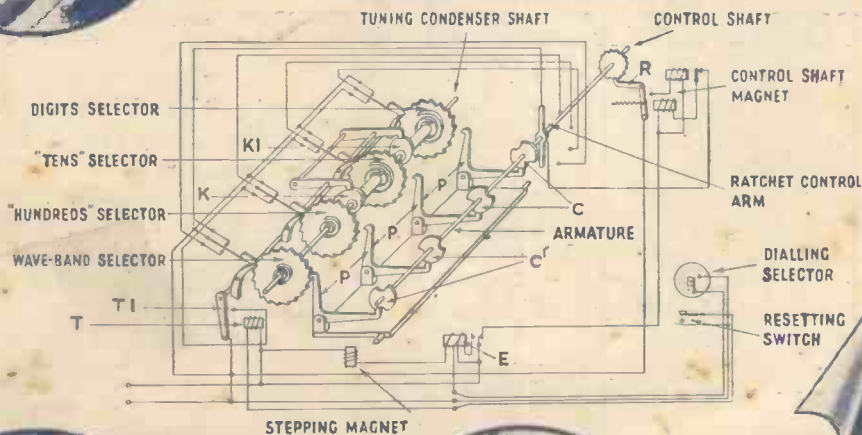
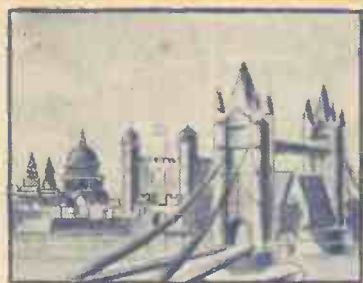
EVERY
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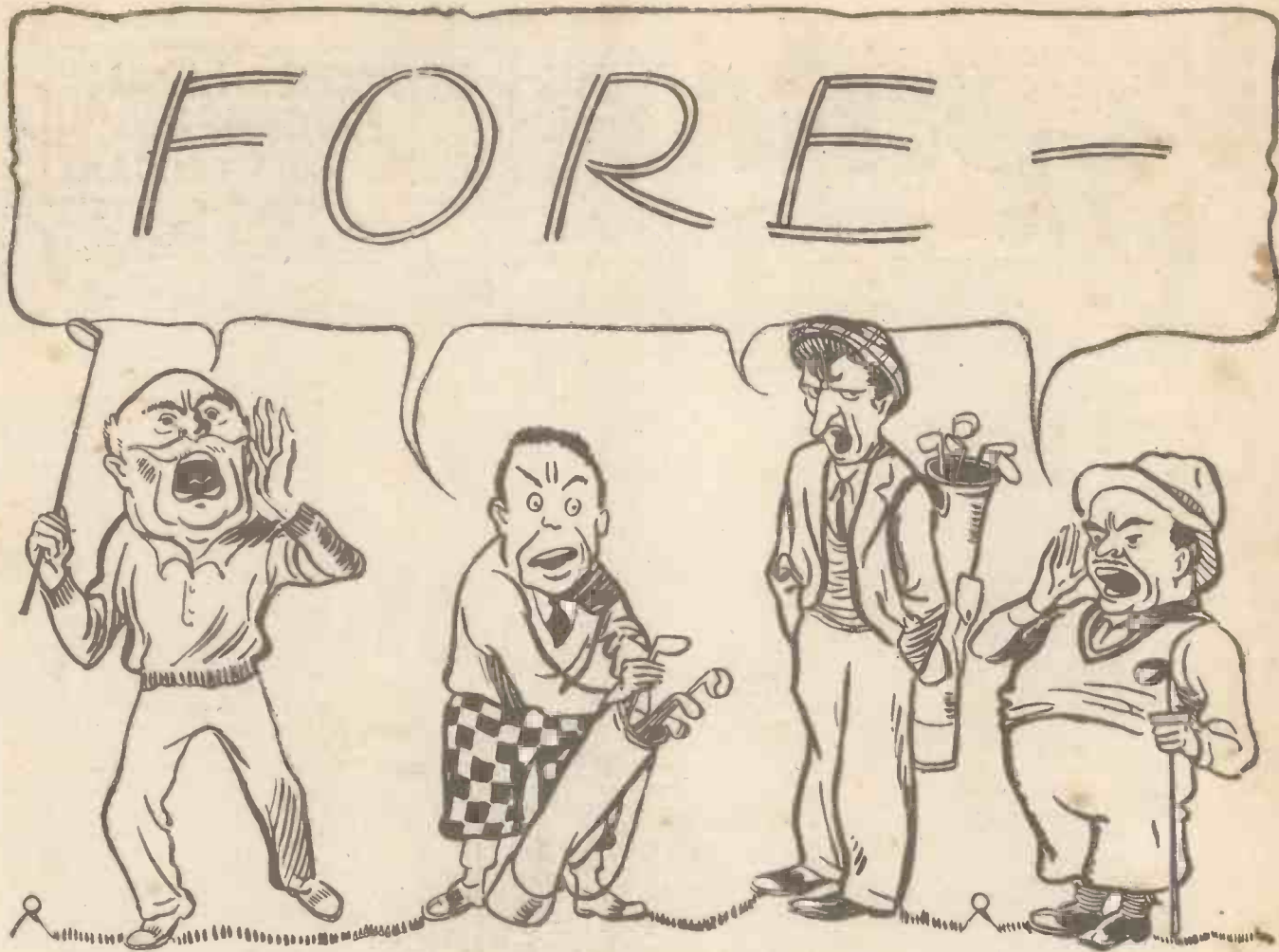
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Nov. 20th, 1937.

DIALLING for STATIONS

See Inside





— all the Golfing Thrills there are, go buy the Grand New Card Game —“Kargo”

Believe it or not, all the exciting situations in golf—the thrills of driving, the successful negotiating of hazards and the satisfaction of a keenly fought game—really can be enjoyed in your own home with KARGO, the new card game that everyone can play and everyone is playing. Whether you know anything about golf

or not, you'll enjoy KARGO from the very first. The golfer will find great fun in his favourite pastime, played away from the links in the comfort of his own home; to others, KARGO brings an entirely new pleasure. Don't delay, buy KARGO today and get yourself in form for the greatest new indoor game.

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“Kargo” 2/6
CARD GOLF PER PACK



Editor: G. V. Dowding

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

FASCINATING BOOK
RELAY EXCHANGES
CONVICTS AND RADIO

RADIO NOTES & NEWS

HEAVILY DAMPED
LOOKING AHEAD
CAT BURGLARS

Things to Come

DO you recall how one of the odd effects of our first radio relays from America was to puzzle people about the difference of time? They had never realised, till radio proved it, that our European afternoon existed simultaneously with America's morning; or that our "to-day" is the "to-morrow" of the Antipodes. A great many people must have had their first experience of the mystery of time through their radio receivers.

I have always expected that one day some well-known radio personality would popularise further interest in this fascinating subject of mingled past and future. And I am delighted to find that it is the Editor of "P.W." who has taken this task in hand.

He has just written a book on True Prediction, and if you are interested in the scientific possibilities of foreknowledge you will certainly enjoy reading it.

"True Prediction"

THE book is in two parts. First, a reasoned theory showing how the future of the individual is influenced and largely predetermined; secondly, practical deductions, and the logical extension of the theory into everyday life.

Mr. Dowding has a fascinating subject in "True Prediction," and he deals with it clearly, vigorously and convincingly. There is plenty to think about in Part I, and plenty to act upon in Part II, so whether your interest in the subject is academic or practical, you are assured of the book's direct appeal. "True Prediction" is published in London by the Millway Publishing Company, High Holborn House, W.C.1, price 2s. 10d. post free.

Another G.P.O. Venture?

YOU will remember that the Ullswater Committee on Broadcasting recommended last year that relay exchanges and the technical development of wired broadcasting should be taken over by the Post Office.

It is estimated that about a quarter of a million people listen to loudspeakers connected to one or other of the 160 different relay companies now operating in Great Britain. And if the Post Office took over in bulk it is probable that the system would spread even in the districts where it is now

DIRECTOR OF SCHOOL BROADCASTS



Miss Mary Somerville, Director of School Broadcasts, at home with her radio set. Miss Somerville, who in private life is Mrs. R. F. Brown, has done more than anyone to establish radio as an essential part of our educational system.

most popular. Although official notification has not been received at the time of writing it seems probable that the first State-owned service will start, as forecast, at Southampton, where the local authorities have recently been approached by the P.O.

Amateur's Emergency Communications

THE violent and unusual thunderstorms to which this autumn treated us interrupted telephone communication with several outlying villages in Somersetshire. In one of them, Churchill, an amateur short-wave transmitter sent out a description of the plight of the village, and this was picked up by other amateurs before normal communications were restored.

It is rare that such instances occur in this country, so we are apt to forget how important can be the services rendered by amateur radio in emergencies. Canada, the U.S.A., and other less thickly populated countries can tell a different story, for every year brings instances of panics averted and lives saved there through the amateur radio link.

When Life Stands Still

A RECENT item in the news, easily passed over, seems to me to afford a terrible instance of the monotony of long imprisonments.

The news was to the effect that some of the convicts in the Minnesota State Prison have just heard wireless programmes for the first time. Their sentences were imposed before broadcasting became general and only now, owing to relaxation of the rules, have they made acquaintance with what is such an ordinary amenity of modern life.

Their amazement at hearing a football match described while it was in progress was pitiful.

If we stop to think about it we all know that such things are inevitable when life sentences are imposed; but when we make an effort to cast our minds back to pre-radio days we get an awful insight into what it means when life stands still in a prison cell.

They Said It

"I DO not think the searchlight (of criticism) beats on any newspaper to the extent that it does on Broadcasting House." (Sir Stephen Tallents, B.B.C.'s Director of Public Relations.)

(Continued overleaf.)

Next Week: A SHORT-WAVE H.F. AMPLIFIER "W. L. S." By

VACANCIES FOR BOYS IN ROYAL AIR FORCE

"I don't understand wireless sets," says Mr. Sandbach, the Marylebone magistrate. "I can't even turn them on."

"There are far too many people with sets who cannot even turn them off." (*Evening News.*)

* * *

"I think there is more peace value in a description of a football match, internationally broadcast, than can be obtained by almost any other sort of propaganda." (The late Marchese Marconi.)

The Stars Look Down

GRUMBLERS sometimes say that a little advertising on the air would be no worse than some of the B.B.C. programmes. But they should pause a moment to ponder on the plight of listeners on the Mexican border, where the latest aftermath of advertising is an astrology craze.



Claiming prophetic vision, "Mexican Rex," or other soothsayer, nightly

asks one and all to send the necessary dollar, and then listen on their radios to hear what the heavenly portents say about the future.

Even the firmest believers in astrology get a little cloyed by hearing horoscopes day after day. The disbelievers who are forced to listen now crave only one boon of Fate—that somebody should push "Mexican Rex" right through the mystic doorway that separates the Unknown from the Known.

Too-Fluent Speakers

THE wives of radio engineers and executives of the U.S.A. have recently noticed that their husbands' bad language—always plentiful and varied—has acquired a new and darker tinge.



Questioned upon the subject, the aforesaid gentlemen loosed a flood of oratory from which emerged only two printable words—the words "long waves." And further inquiries show

that it is all Canada's fault.

Canada has decided to line up with Great Britain and go in for a long-wave station like Droitwich. Until now the American radio market has never had to bother itself with long-wave stations, except for fun. But Canada's decision means that the American public, as in Europe, will demand long-wave programmes, and the engineers must now work out all the switch-troubles, wave-changing and what-not. This means hard work, worry, and endless complaints. Hence . . . "Stop it, Elmer—the children will hear you!"

Heavily Damped

ONE of the queerest Outside Broadcasts ever staged was handled recently by engineers of the National Broadcasting Company at New London, Connecticut.

It took the form of a two-way conversation by radio between commentators ashore and others in a submarine, which was running beneath the surface ten miles away. The talk was clearly heard by listeners, to whom it was relayed on ordinary wavelengths, the actual ship-shore conversations having been carried out on short waves too low for general reception.

This has been claimed as the first really successful telephony from a submerged vessel at a considerable distance. Does any "P.W." sleuth know of an earlier instance?

BROADCASTING BREVITIES

There will be dancing to music by Reginald Williams and his "Futurists" Dance Band, in B.B.C. "Ballroom" from a studio on November 23rd, in the West of England programme. Reginald Williams was at one time a violinist in the Bristol Amateur Orchestra, and then became leading violinist in a pit orchestra. He was pianist in a Midland recording and broadcasting dance orchestra prior to forming his present "Futurists" Dance Band, whose engagements take them all over the West of England and the Midlands. The band was formerly at the Atlantic Hotel, Weston-super-Mare, where Mr. Williams still runs a band.

Islington takes its darts seriously; two teams of eight, one from the Hanbury Arms and the other from the Caledonian Arms, do battle twice a year.

The spirit of rivalry between these two teams has become a local legend. Mr. C. W. Garner, who broadcast the previous commentaries on the darts championships, will act as the B.B.C. observer on November 25 (Regional Programme), describing the last fifteen minutes of the contest; including the scene at the Hanbury Arms (typical of many gatherings in olden days), the interested faces of the spectators, and the keen play of the competitors.

Looking Ahead

A RECENT Air Ministry announcement will be of interest to parents, Sonny Boys, and all who hanker after high positions in life.

The announcement is to the effect that in January, 1938, there will be vacancies for hundreds of boys aged between 15½ and 17¼ in the Royal Air Force. The boys will be trained as R.A.F. wireless operators, armourers and photographers.

Particulars of prospects, pay, promotion and so forth, are obtainable from the Air Ministry, Kingsway, London, W.C.2.

If you are thinking of applying it will be advisable to get details without delay, as the final applications must reach the Air Ministry by December 15th at the latest.

Broadcasts in Foreign Languages

IT had to come some day, but nobody can say that Britain barged in with broadcasts in foreign languages before she was forced.

Major Tryon, the Postmaster-General, put the matter straightforwardly in the House of Commons, and I cannot do better than quote him exactly as reported.

"The Government has decided to make broadcasts in foreign languages. When we send out news it will be straight news, and not the sort of propaganda which goes out from some foreign countries—not

to their credit, and not for the better information of the many people all over the world who listen to it."

The languages to be used at first are Spanish and Arabic. There will be no attempt at counter-propaganda.

While Listeners Laugh

DID you know that the cat burglar, the least conventional of all callers, always likes to pay his visit between the hours of 8 and 11 p.m.?

He may select a small back window instead of the conveniently placed front door; he may ignore the brick path and the clean front steps, and roguishly shin up a drain-pipe instead; but in one respect he is a stickler for etiquette, and so you may always be sure that he prefers the 8-11 p.m. period for business calls.



These hours are not dictated by cat-burglar fashion, but by the fact that during the period named the best variety programmes are usually broadcast, and so the radio set is generally working.

The hour of the wisecrack is the wise crackman's hour.

Facsimile Newspapers

A COMPANY has been formed in the U.S.A. to start facsimile newspapers in that country, probably at Sacramento. Subscribers to the service will leave devices in their homes switched on all night, and broadcasts will take place at intervals from a radio station sending out printed news, and possibly photographs, charts, etc. The receiver will print these messages as picked up during the night, and in the morning all the householder will have to do is to take out his radio "newspaper" from the receiver instead of from the letter-box.

Nothing To Look At

INTERESTING forecasts of things to come were outlined by Sir Francis Joseph in an address on "Great Britain Twenty-five Years Hence," which he delivered at the annual conference of the Union of Lancashire and Cheshire Institutes.

Referring to politics, he said—if correctly reported—that "general elections will be decided by the success or otherwise which political leaders achieve on the wireless in those days. Television will enable us to see the speaker as well as to listen to him. *This development will be a great help.*"

I can't help doubting the last sentence, Sir Francis. I have seen some of our future leaders—and, believe me, their appeal to the optic is so slight as to be negligible.



ARIEL

GETTING THE MOST FROM THE S.T.900

PART II

By JOHN SCOTT-TAGGART, M.I.E.E., F.Inst.P., Fel.I.R.E.

IT is hardly necessary for me to tell you that to get the best out of the S.T.900, or in fact almost any other set, you should know what you are doing! It is surprising how many constructors trust to luck, and go on turning knobs until they get what they want. It is also surprising how many people get successful results this way, but it takes time.

Whenever I am demonstrating a set, there are always some present who feel that I treat the knobs with reprehensible contempt, turning them at excessive speed and moving from one to the other before I have apparently got the effect I am looking for. The explanation is very simple. I know what the effect is going to be, and I know what is going to happen before it actually does happen.

Knowing What Will Happen

Those who know what is going to happen before it occurs will always arouse interest, and probably envy, especially if their speciality is the Turf or the football field.

In radio operation skill at foreseeing or rather forehearing what is going to happen is partly a matter of technical knowledge and partly merely listening. A good example of listening is estimating the effect on signal strength of a given adjustment. If you are to improve the selectivity of a set you will reduce the signal and then apply reaction. The ideal condition is the obtaining of full loudspeaker results with reaction critical. The final signal strength, however, should be kept below maximum. You can arrive at this process of reducing input and increasing reaction by a couple of steps if you are skilled or a thousand steps if you are entirely without intelligence. The poor operator of a set not only takes a long time but he gets the final result wrong. For example, when he applies the reaction he does it with the signal too strong at the start. The result is that he can never apply enough reaction to get the desired selective results or else he makes reaction critical and not only does not get selectivity, but produces distortion because the high-frequency signal has been made too strong.

The most striking lesson I ever learnt in forehearing what was going to happen was in connexion with the old S.T.400. This set squawks if it is made to oscillate. Reaction could be adjusted to the critical point, but you learnt when you overstepped the mark. In giving demonstrations all over the country (I literally went from Land's End to John o' Groat's) I learnt more about reaction adjustment than ever before in my life. The complexity of the controls, all of which affected the others, made it very easy to make the set oscillate unintentionally. To avoid oscillation one

learns to hear how near the oscillation point one is by the intensity of the rushing noise. When reaction is at its extreme point one gets a squeelch, a swishing noise as one tunes over the correct tuning point.

Give an absolute beginner a radio set to tune and the chances are that he (usually it is a she) will stop tuning when he thinks the signal sounds all right. He does not realise that you never know things are right until they have become wrong by going on doing what you are doing. "Keep on doing what you're doing" is a golden rule in operating any wireless set. When you have over-done what you are doing signals will become worse and you must then go back again. But you never know you are at the best tuning point until at each side of that tuning point signals fall off in strength.

A detailed knowledge of the circuit of the S.T.900 is not at all necessary for its correct operation, but you should certainly know what the various controls do, and how far they are essential controls, and how far merely for improving performance.

Let us look at the front of the S.T.900. If you have not built one, look at the photograph. To have the on-off plug in its socket is an "essential." To have the valves in and all the batteries connected and the aerial and earth joined up to their respective terminals and the loudspeaker duly connected; are all "essential," although we have all been worried at some time or another at not getting results because one or other of these simple precautions has not been observed.

Preliminary Control Settings

The selectivity plug is a "refinement," and this can be left inserted in the lower socket which gives normal selectivity and maximum signal strength. The aerial coupler is set to a position about half-way round. This, of course, is the knob on the left-hand side-piece. The aerial reaction knob, which is the second from the left on the front of the panel, should be turned fully round to the left, i.e. anti-clockwise. No aerial reaction is now being applied. The anode reaction knob, which is on the extreme right on the front of the panel,

should also be turned fully to the left (anti-clockwise), so that no reaction is now being applied.

Under these conditions the set is workable but will not be very sensitive. It is in a condition, however, where experience of tuning may be easily gained. There are two tuning controls, and by tuning I now mean adjustment of knobs so that the set is in a state to receive a particular wavelength. The first and most important technical factor which you must know about the S.T.900 is that it has two tuned circuits, each having a coil and a tuning condenser. The first tuned circuit, which I may for convenience call the aerial circuit, is fed with current produced in the aerial system by the incoming waves. These currents are amplified by the pentode valve and appear in the second tuned circuit which also consists of a coil and a tuning condenser and which may be called the tuned anode circuit, or simply the anode circuit. Neither term is very accurate, but will do.

The aerial circuit is tuned by means of the aerial balancer. The second circuit (the anode circuit) is tuned by means of a main tuning condenser which is fitted with the

(Continued overleaf.)



GETTING THE MOST FROM THE S.T.900

(Continued from previous page.)

pointer which moves round the station name dial. Both condensers are of the slow-motion type. The most important thing to remember is that the aerial balancer is not an improving control, but is one of the two essential tuning condensers. In other words, if it is not correctly tuned you will not hear the station at all under normal conditions. You need not know where the pointer on the aerial balancer is, but you do need to get it correct. In the dark you may turn a key until it fits into a lock. It is not important that you should know anything about the lock or the key. But when the key turns the lock smoothly you know you are all right.

Nearly everyone building the S.T.900 will have had experience of two-circuit sets with separate condensers. The first thing you notice is that the selectivity is apparently not as good as on a ganged receiver. This is a fallacy. I have known constructors, especially at demonstrations, who mutter "It does not seem very selective" when they notice that a station spreads as one of the tuning condensers is adjusted. The explanation is simply that you have only altered one of the selectivity devices, and that naturally if you work these one at a time the individual improvement is not great. If you got a friend to alter the tuning of the aerial balancer while you concentrated on the main tuning condenser you would get apparently much greater selectivity. In a ganged set you are unable to alter either of the tuned circuits separately, and so you get an entirely false idea of its merits.

How should one tune a two-circuit set? Most people would reply, "Tune the anode circuit until you hear the signal at its loudest, and then go to the aerial circuit and tune that until the condenser gives the loudest results."

We probably all do this, but actually there is a better method and one, moreover, which becomes essential if signals are weak. When signals are poor in strength it is probable that you will not be able to hear them until both circuits are in tune. By casually playing with the controls you might never pick up the station. It would rather be like trying to open a combination lock without knowing the combination. Actually the correct way of tuning a two-circuit receiver is exactly similar to that which you would employ in trying to pick a combination lock. In the case of a safe it might, however, take you a hundred years to do it systematically, and by that time the owner might have returned or the police may have put in an appearance. Incidentally, you may have lost interest in the process.

Let me tell you how to find stations on

the S.T.900 with only the aerial balancer and the main tuning control. First set the main tuning pointer to its zero position, i.e. fully round to the left. Then swing the pointer of the aerial balancer back and forth several times over the portion of its movement to the left. In other words, rotate its knob so that the pointer covers between, say, zero and 40 degrees. The dial is calibrated in degrees, by the way, as well as by station names. Although the aerial balancer is not calibrated, you can estimate what I mean. Now turn the main tuning pointer slightly up and repeat the process with the aerial balancer. Moving the main tuning pointer in very small steps round the dial and swinging the aerial balancer back and forth at every step you will very soon pick up some stations. If, for example, the main pointer is at 42 degrees, you would swing your aerial balancer between, say, 30 degrees and 60 degrees. You will then probably hear Radio-Lyons. The fact that you may hear Radio-Lyons at good signal strength does not at all mean that you are tuned-in to that station. You will,

will hear it even when you are not tuned, and so you can make the back and forth movements quite rapidly. The main tuning pointer may be moved round very slowly while the aerial balancer is swung back and forth rapidly, following it up, so to speak. This is the method you would adopt when the signal to be expected is strong, but naturally you go very much more slowly if you are dealing with a very weak signal. This explanation is rather important, because it applies even when you have given one dose of reaction or two. In fact, the weaker the signal and the shorter the wavelength (for quite different reasons), the more desirable is this method of tuning.

There is one essential test which I hope the printer will emphasise in black type, and that is that when the S.T.900 or any other two-circuit receiver is correctly in tune, a movement of either pointer should produce a weakening in signal strength.

If, for example, the main tuning pointer is moved to the left or right of the position that you think is in tune, then signals should go weaker. If they do not change, or if they become stronger, then you know you are not in tune. Similarly, even though the main pointer may result in a diminution of signal strength if moved, moving the aerial balancer may not cause a weakening in signal strength. In this case it is the aerial circuit that is not in tune.

Remember that the aerial circuit may be in tune to one station and the anode circuit may be in tune to another. The result is that you may get one or other of these stations, or even both! A very common experience is for the aerial balancer to be adjusted to the local station, which is heard even though the main pointer is not pointing to the name of your local station. You may,

for example, have set your pointer to Prague and then rotated the aerial balancer in the hopes that you will hear Prague. But as the small pointer on the aerial balancer travels round you may hear a very strong B.B.C. station. This may be your B.B.C. Regional. What is happening is that you have picked up and specially strengthened, by the simple process of tuning, your local station. The signals are so strong that the second tuned circuit cannot of itself reject that unwanted signal by merely being off-tune.

There are two important lessons that have to be appreciated at this point. One is that selectivity is a matter of teamwork. One circuit at a time may appear to be unselective, but when both circuits are correctly tuned you will find that you have obtained a very high degree of selectivity. With the set in its simplest working form, as I have described, you will not, of course, be working it in its most selective condition.

The second point to notice is that strong signals will always, on any kind of set, give the illusion of lack of selectivity. In

COILS FOR THE S.T.900

The full list of approved coils appears below. No others have been approved.

DIAL REF.	S.T.900 RANGE	MAKE	TYPE No.
L.W.	800-2,000 metres	B.T.S. "One-Shot"	9/L.W.
M.W.	170-580 metres	B.T.S. "One-Shot"	9/M.W.
S.3.	24-70 metres	Eddystone	6 P.
		B.T.S. "One-Shot"	9/S.3.
		Raymart	C.X.6.
S.2.	15-45 metres	B.T.S. "One-Shot"	9/S.2.
		Eddystone	6.L.B.
		Raymart	C.A.6.
S.1.	9½-27 metres	B.T.S. "One-Shot"	9/S.1.
S.O.	6½-8 metres	B.T.S. "One-Shot"	9/S.O.

IMPORTANT NOTE.—The above coils, and these only, should be used in the S.T.900.

The addresses of the firms supplying the coils are as follows:
B.T.S.: Peto-Scott Electrical Instruments (Holdings) Ltd., Pilot House,
Stoke Newington Church Street, London, N.16.

Eddystone: Stratton & Co., Ltd., Bromsgrove Street, Birmingham.
Raymart: 44, Holloway Head, Birmingham.

J. S. T.

no doubt, be tuned on the aerial balancer, because you will naturally leave it at the adjustment giving the loudest signal. But actually your main tuning pointer may be just below the correct point for Radio-Lyons. You should now slowly turn the pointer of the main tuning condenser to the right, moving the aerial balancer pointer slowly back and forth at each position. When a movement of the main pointer makes the signal go weaker, you will know that you will have to go back on that pointer. You can now carry on your search for other stations by continuing the movement to the right of the main pointer, swinging the aerial balancer pointer back and forth over a fairly wide arc, so that you know if a station is coming in on the wavelength to which the main pointer is adjusted, you will certainly be picking it up on the aerial circuit.

Signal Strength and Speed

The speed with which you turn the aerial balancer knob will depend upon how large the signal you expect to receive may be. Obviously, if it is a very strong signal you

other words, the more sensitive the set or the louder the signals, the more you will feel that selectivity is poor. The reason is simply that you are overloading the receiver. The test of selectivity is whether you can pick up a station you desire in spite of interference. If then you have the set in such a sensitive condition that when correctly tuned the desired station tends to be louder than you require it, then you will get lack of selectivity.

The desired station should give full loudspeaker signals, but if you start pouring into the set stronger signals than the loudspeaker and valves will handle comfortably, then the signal will begin to spread, and you will feel that tuning is flat. The banks of a river will define closely the path of the river, but if there is an excessive input of water due to heavy rains, then the river may overflow its banks and is no longer properly defined. The river may, in fact, become a flooded area.

Overloading the Set

If your set appears to be unselective it will be because you are flooding it with too strong a signal, and you should immediately cut down the input by turning the aerial coupler knob to the left (anti-clockwise). Your ultimate signal when you have tuned the circuit correctly may be full loudspeaker strength. Feeding more signal than this into the receiver will not give you louder results; you will merely get distortion and apparent lack of selectivity.

Very great care has been taken on the S.T.900 to avoid any break-through of medium waves on the long waveband. This has been done by raising the resonant point of the long-wave primary coils and by keeping the coupling between primary and secondary sufficiently loose; the fact that plug-in coils are used also overcomes one of the causes of break-through. But

there is no doubt that many cases of break-through, reported in past years, are not true break-throughs at all, but due to the fact that the set has been very sensitive and that the two tuning controls have not been in any position which they would occupy in practice when receiving a long-wave station.

Having learnt how to tune the two main controls of the S.T.900, I think it advisable that you should make a very light pencil line between the recognised station and the point on the dot line passed by the main pointer. It is also a good idea to put a light pencil dot at the end of the small pointer of the aerial balancer. This can be done for your local Regional station, which will usually be the station which is most easy to identify and pick up. You will find that the aerial balancer pointer will not be parallel with the main pointer, but will lie pointing somewhat to the left of it. Those areas which have a national and a regional programme on the medium waves may similarly make a mark for their national station, both on the dot line to the medium waves and by means of a dot at the end of the aerial balancer pointer. You could conveniently put the letter N over this dot and similarly the letter R over the dot corresponding to the correct position of the aerial balancer for your regional station. This, in fact, may be made a permanent arrangement as a convenience to those members of your household who may not be able to operate the aerial balancer quickly.

The merit of the aerial balancer system with the main tuning dial calibrated in station names has now been proved beyond any shadow of doubt. This system has been used by me on the S.T.700 and S.T.800 and on less important sets and the public have proved in actual practice the merits of the system. There is no need to calibrate the aerial balancer, but, nevertheless,

it must be correctly tuned. Later on you will see that the way to do this is to make the second circuit selective, by means of reaction, for example, and then to turn the aerial balancer round until the desired station is heard. In this case you may pass over one or more other strong stations until you find the correct one. Actually, the pointer of the aerial balancer would then lie in quite different directions from that of the main pointer, and if you hear a signal you will know it is not the station you are looking for.

A little common sense and practice should enable you to get the "hang" of using the aerial balancer. But even if you have neither, other methods of operation are given later!

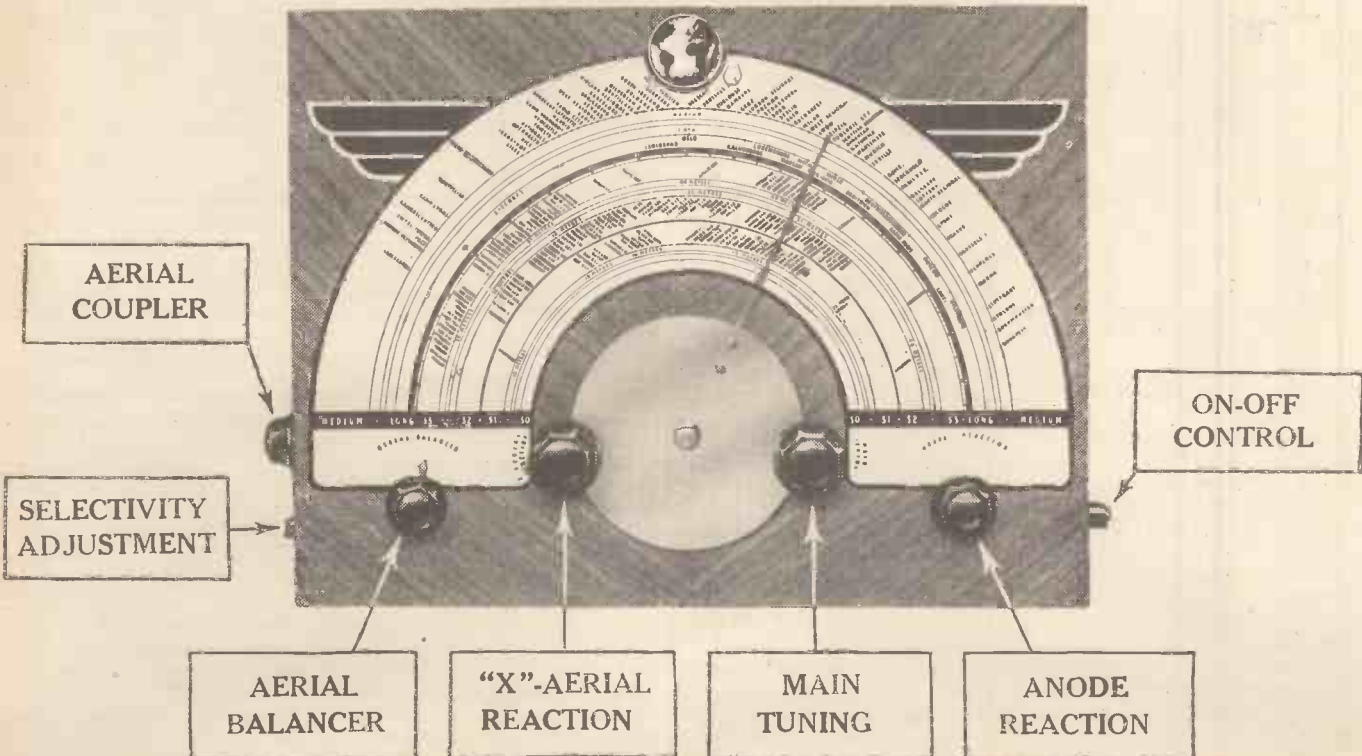
Circuits Quite Separate

So much for the two essential controls of the S.T.900. The others are for the purpose of increasing signal strength and improving selectivity. Always think of the two circuits as being quite separate, which they are. You can increase the strength of the signal in each of the circuits separately, and you can improve the selectivity of these circuits.

The first circuit, i.e. the aerial circuit, is fed with signals via the aerial coupler condenser on the left side-piece. Having tuned the local station, say in the manner described, try altering the aerial coupler. You will find that as you turn it to the left (looking from the left side of the set) signals will become weaker. As you turn the aerial coupler to the right, signals will become stronger. If you turn the aerial coupler to the left, then swing the aerial balancer pointer backwards and forwards, you will notice that the spread of the station is less. This is partly because the selectivity of the circuit has been improved, and partly because signals are weaker.

(Continued overleaf.)

THE S.T.900 CONTROLS



GETTING THE MOST FROM THE S.T.900

(Continued from previous page.)

Having reduced the aerial coupler by turning it to the left, try moving the main pointer backwards and forwards. You will find that the spread here has been reduced, but this is not because you have improved the selectivity of the second circuit. You have done nothing of the kind; you have merely reduced the apparent spread by reducing signal strength. Do not think of the aerial coupler as improving the selectivity of the set as a whole; think of it as improving the selectivity of the first tuned circuit. Altering the aerial coupler may cause a slight change in tuning of the aerial circuit. This will only be slight, but you should readjust the aerial balancer until the loudest signals are obtained. You would do this in any case because under conditions of worse selectivity you may easily not have been accurately tuned-in.

those who have had previous experience of reaction. Reaction should never be applied without a corresponding slight retuning. The application of reaction improves signal strength, but it will also improve selectivity. It increases the signal strength of the desired station without increasing that of the interfering station. The application of reaction for the purpose of improving selectivity will nearly always be accompanied by reduction of the input signal by the operator. In other words, on the S.T.900, if you want the most selective results, reduce the aerial coupler and then bring up reaction. If when you have done this signals are still very strong, reduce your aerial coupler still more.

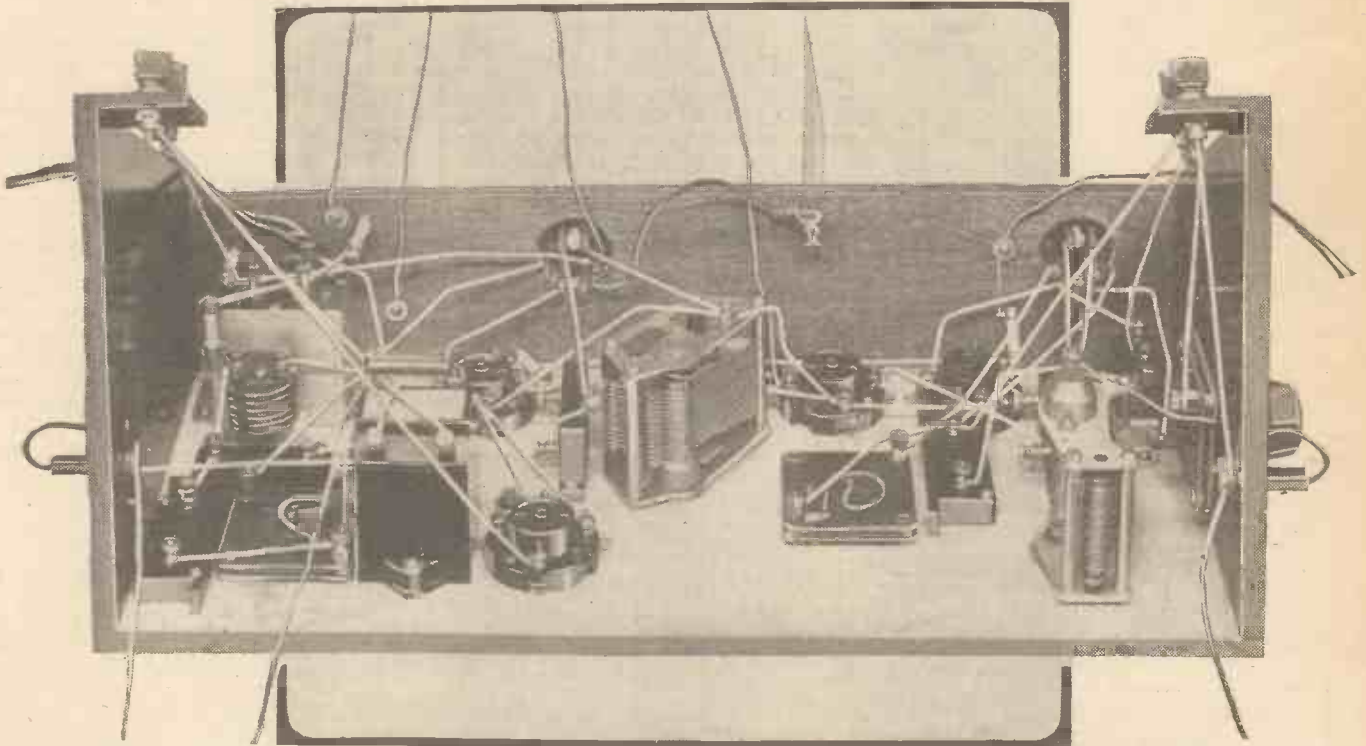
The Second Tuned Circuit

Now reduce the aerial reaction to zero by turning the knob fully to the left. Adjust the aerial coupler so that the station on which we are experimenting, say your local, is made fairly weak. I am now going to show you how we can modify the signal on the second tuned unit. This second tuned circuit is fed from the H.F. amplify-

ing circuit. If the plug is put in the upper socket, a negative voltage is applied to the grid of the H.F. pentode. This voltage may conveniently be made $-4\frac{1}{2}$ volts, but the constructor may himself alter this by altering the position of the G.B.-2 plug in the grid-bias battery. The effect of applying this negative bias to the grid of the variable-mu H.F. pentode is to reduce the amplification and so to weaken signal strength. It also reduces the load on the second circuit and so improves selectivity. Always associate that selectivity plug with the second tuned circuit and not with the first. It does to the second tuned circuit what the aerial coupler does to the first.

Put the plug back in the lower socket and now turn to the question of anode reaction. By applying anode reaction (turning the knob on the extreme right in a clockwise direction, i.e. to the right) and slightly retuning on the main pointer, you will get louder signals and better selectivity. Too much anode reaction will, of course, produce oscillation.

In both cases, therefore, reaction improves signal strength and improves



This photograph of the S.T. 900 well illustrates the simplicity of the layout and construction. Note the three anchoring screws to which the G.B.-1, G.B.-3, and H.T.+3 flexible leads are joined.

Having weakened signals with the aerial coupler you will also have improved selectivity. So you can look upon the aerial coupler both as a means of increasing selectivity and varying signal strengths.

If signals are too loud on your receiver, reduce the aerial coupler. You will also improve selectivity, but you will not object to that.

Having weakened your signal without losing it altogether, by reducing the aerial coupler, increase the signal strength by applying the hitherto untouched aerial reaction. You do this by turning the aerial reaction knob (second from the left on the front of the panel) and readjusting the aerial balancer slightly as you increase the reaction. This process is mechanical to all

ing valve, i.e. the pentode. Just as we can vary the current fed into the first tuned circuit by means of the aerial coupler, so we can vary the high-frequency current fed into the second tuned circuit by varying the amplification given by the valve. This is done by altering the voltage on the grid of the H.F. pentode. On the left side-piece of the S.T.900 are two sockets and a plug. When the plug is in the lower of these sockets, zero bias is given to the grid of the H.F. pentode. Under these conditions the pentode is amplifying to its full extent, and the anode circuit of the valve impairs the selectivity of the second tuned circuit. As in the case of the aerial circuit the larger the signal the worse the selectivity. The valve is said to throw a load on the second

selectivity, while in both cases the method of feeding causes an increase of selectivity at the same time as it causes a weakening of signals.

To make the set selective, you can rely entirely on the first tuned circuit, or entirely on the second tuned circuit. But in practice you will improve the selectivity of both circuits. The most important thing to remember, however, is that it is no good trying to get selective results with reaction until the signal to begin with is weak. That is to say, you must make it weak if it is not already weak. Here it is that the aerial coupler will be found the most useful control. If you are obtaining selectivity by anode reaction only, with little or no aerial reaction, you will adjust the aerial coupler to

such a low value that when maximum anode reaction is used (just before oscillation) the signal strength is still just a little below maximum. Under no circumstances must you get distortion or overloading, as otherwise you will not get the benefit of reaction as a means of giving you selectivity. It is better to have the signals too weak and then to improve them a little at a time by increasing the aerial coupler.

There are two practical rules which apply not only to this set but to all receivers in the same general class. The first is that as you go up in wavelength on a given waveband you will have to apply more reaction to keep conditions the same. For example, if you have been listening to Radio Lyons at the bottom of the dial on the medium wavelengths, and then go up to, say, North Regional, you will have to increase the reaction to get the set into the same condition for reception. This applies whether you are considering the aerial or the anode reaction. As you go down the dial, you of course need less reaction, even if you are only going down the dial a very short way. The S.T.900 makes no squawky noises when it oscillates, but no one wishes to oscillate unnecessarily. When you have been receiving a station well up the dial, do not simply turn down to a lower reading, or the set will probably oscillate. This will at once remind you that it would have been better to have reduced the reaction first and then to have brought up the reaction on the new station.

Always Use Reaction

A certain amount of reaction should always be applied both to the aerial circuit and to the anode circuit. On the S.T.900 there is no credit in receiving stations without reaction. A certain amount is always desirable on both circuits. It is a good plan to try the effect of the two reactions on a fairly weak signal, so as to become accustomed to how the controls work. Having tuned-in the station, leave the anode reaction at zero and bring the station up in strength on the other circuit by increasing aerial reaction and slightly retuning on the aerial balancer. Now reduce the aerial reaction to zero, and bring the station up in strength on the anode reaction, retuning slightly on the main tuning condenser. The third test should be to apply a little aerial reaction but to get the critical adjustment of the anode reaction. The fourth test is the reverse of this, namely to apply a little anode reaction and to get critical results on the aerial circuit. A final test is to get critical reaction on both circuits. Under these conditions, you will be getting the greatest selectivity.

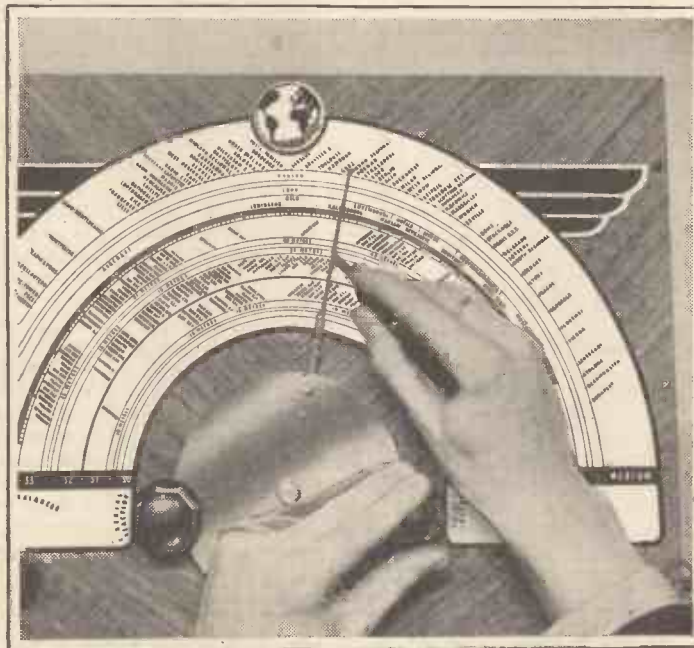
In the S.T.900 the two circuits have been made as independent of each other as is possible, but it may occur now and again that when the anode reaction is on

the very verge of oscillation the increasing of the aerial reaction will cause a spilling-over and the set will oscillate. Similarly if the aerial reaction is very critical, bringing up the anode reaction to a highly critical point may cause the set to oscillate. If, however, you bring the two circuits up together, increasing the reaction of each in turn, both can be brought up to the critical point.

On previous double-reaction circuits of mine there has been considerable dependence of one circuit on the other, but with X-reaction it is possible to say that to all intents and purposes the two circuits are quite independent; but nevertheless it is never wise to have one of the circuits adjusted to extremely critical reaction before applying reaction to the other. It

aerial coupler to ensure that a sharp tuning point is obtained on the main dial. You should now adjust the main pointer until loudest signals are obtained, using critical anode reaction. Remember that it is most important that having selected the tuning point, any movement of the pointer to either side should produce a reduction of signal strength. It is sometimes a good plan to close your eyes and to move the pointer back and forth till the loudest signals are heard. This prevents your being influenced in any way by the station name. Now apply a pencil dot directly under the pointer, taking care not to bend it or move it. Then move the pointer to one side by means of the tuning knob, and join the dot you have made to the dot at the end of the station name. This is

THE DOT SYSTEM ENSURES ACCURACY



This photograph shows the Dot system of exact station logging being carried out. The method of procedure is as follows: Between the medium and long-wave station names will be found two parallel lines. On the line nearer the medium-wave stations is marked a dot in pencil where the pointer crosses the line, the set being correctly tuned to a particular station. The dot is then joined by a pencil or ink "junction" line to the dot at the end of the name of the station being received. This is done for all the stations received on the medium waves. Similar dots are placed on the other parallel line nearest the long-wave station names, and junction lines drawn to the appropriate long-wave station names. Similar parallel dot-lines are provided for the SO, S1, S2, and S3 wavebands. This system ensures 100 per cent. correct calibration of each station. Slight variations between coils and condensers make the scheme an ideally accurate one.

called the junction line. This junction line may slope a little to the left or the right, but this does not matter. You can, if you wish, alter the setting of the slow-motion disc and pointer on the spindle so as to bring the station dots opposite the station names. You would make this adjustment when tuned-in to a station somewhere around the middle of the medium-wave dial. If there is a sloping of the junction line to the right you will probably find that all the junction lines slope in a similar way. Also, if the junction lines slope to the left, you will find that there is a general tendency for the lines to slope in this direction. Having marked one or two stations on the medium waveband, you will find that all the others fall into place, and by drawing or imagining junction lines approximately parallel with those you have drawn, you will be able to see where any new station is likely to come.

Gives Exact Tuning

There is no other dial like this in existence, and it has the very great advantage that not only are nearly all the stations mentioned by name, but each one may be tuned-in at any time exactly. The commercial dials usually give only a few stations, and even then the calibration is broad. It has to be because the dials are printed and it is impossible to get two sets exactly the same. Consequently the calibration is either incorrect or else instead of a sharply defined dot being provided a comparatively long line is used to indicate the station's tuning point, and the actual point may appear anywhere on this line. This is very unsatisfactory because you may be tuned to a neighbouring station. The constructor, however, can calibrate his set with great precision and in a short space of time. The dial which is provided with the S.T.900 was calibrated on the medium waves and long waves by myself in a matter of three hours. This involved the identification of about 80 stations and an extremely accurate calibration. You
(Continued overleaf.)

is much better to have the circuit a little distance off the critical reaction position before altering the other reaction control.

The sooner you begin calibrating the set the better, and naturally you will start on the medium waveband where there will be several stations you can easily recognise, such as B.B.C. stations, Radio Normandie and so on. The auto-dial ensures absolutely correct calibration, and you can always go back to the same station. In between the medium-wave station names and the long-wave station names, you will see two lines like a pair of railway lines. The one nearest the medium-wave station names is called the medium-wave dot-line while the other is the long-wave dot-line. For making a calibration you should set the selectivity plug in the upper position and apply anode reaction. Signals should be made sufficiently weak with the

GETTING THE MOST FROM THE S.T.900

(Continued from previous page.)

can see, therefore, that it is not a very long business.

Having calibrated the medium waves, you do the same to the long waves. This time the junction lines may quite well slope in the opposite direction but, in any case, the slope of the lines should not be much. I cannot emphasise too often that under no circumstances should you put down a dot until the station is sharply tuned and becomes weaker if you move the pointer to either side of the dot.

Having once tuned-in and calibrated a number of stations the method of going back to them is very simple. You turn the main pointer until it crosses the dot going to the station name, apply some anode reaction and then, having set the aerial reaction to a small value and the aerial coupler to a medium value you turn the aerial balancer until you hear the station desired. It is a good plan to mark the aerial balancer portion of the dial with two or three dots corresponding to the principal stations. For example, if you are a listener to North Regional it is a good plan to put a pencil dot at the end of the aerial balancer pointer when the aerial balancer is correctly tuned. You can mark this dot with the letters N R. Similarly, you can put a dot on the end of the aerial balancer corresponding to your local National programmes. The letter N could be placed above this dot. A similar dot could be placed for Droitwich and marked D. You can then go back instantaneously to the principal stations which you or your household will most usually patronise. This will be found a help to those members of the house who are not familiar with tuning such a set.

When thus going back to a particular station you desire to receive, the anode circuit should be made selective. Do not use much aerial reaction, but use a critical amount of anode reaction. Use as little aerial coupler as possible. The pointer of the aerial balancer will tend to point a little to the left of the direction of the main pointer. You will soon learn how much it lags behind the main pointer (due chiefly to the difference in "law" of this make of condenser). It is possible that in tuning the aerial balancer you will hear one or two stations other than the one desired. But these, of course, are ignored. The most probable one will be your local station. But as I have already indicated, if you make the anode circuit selective and do not apply much aerial reaction you will very easily find the station you want. A final test is to move the main pointer a little to either side of the position to which you have set it and if the signal weakens, that is the station. If, however, the signal strength does not weaken but remains steady or even increases when you move the main pointer, it is a sure indication that the aerial balancer has picked up a wrong station and you could very easily tell which one this was by swinging the main pointer until you got the loudest results. You could then read off the station from the dial.

A Foolproof Test

There is a very simple foolproof way of telling when the aerial balancer is correctly tuned, and it may be applied to all the wavebands. This involves setting the main pointer to the station desired, increasing the anode reaction until the set oscillates. You will probably hear the whistle of the carrier wave of the station desired or, if you do not, then a very slight alteration of the main tuning pointer will give it to you. You then turn the aerial balancer back and forth around the probable

position it will finally occupy until the whistle suddenly changes note. The note will probably go down and then rise again, but, in any case, there will be a certain adjustment of the aerial balancer where the whistle is suddenly changed in some fashion or another. Leave the aerial balancer at this position and reduce the anode reaction until oscillation stops. You will find you are on the station desired. Then tune carefully in the ordinary way.

On the short waves, when receiving a very weak station, this system can be extremely useful. You would have the aerial balancer at somewhere around its probable ultimate position, i.e. its pointer adjusted a little to the left of the main pointer. You then make the set oscillate by applying too much anode reaction, and turn the main pointer back and forth until you hear a jumbled whistle which indicates you are on a short-wave broadcasting station. You now turn the aerial balancer until this jumbled whistle suddenly changes tone. Reduce the anode reaction until the set stops oscillating and tune-in the station accurately with the aid of the main tuning knob and anode reaction. A slight re-tuning of the aerial balancer will probably improve results, while the application of some aerial reaction followed by a slight re-turning of aerial balancer will certainly bring about a big improvement.

This method should be especially underlined as being the quickest and most foolproof method of finding a station, but once you know where stations come, or if stations are sufficiently strong, the following method will be more commonly used:

Set the aerial balancer, having applied a little but not much aerial reaction, to the approximate position it will finally occupy, i.e. a little to the left of the main pointer. If you desire to pick up the 25-metre broadcasting stations on the S2 coils, you would turn the main pointer

(Please turn to cover iii.)

379 STATIONS ON THE S.T.900

A Further Report from Mr. Perrins of Birmingham

Dear Sir,—From a point of DX reception October 30th has undoubtedly been the "highlight" of the week. Between 23.00 and midnight I received 50 (20-m.) amateurs, including W2IKV, R99, White Plain, N.Y.; HH5PA, R7; EI2L, R8; W1AXA, R7; W1OM, R8; LU4D, W8RJQ, R8; W1KCK, R7; W9AS, R8; W2QUX Pattison, New Jersey, R9; G6PC, R99; W2IID, R8; W8MPX Michigan, R9; W3EOZ Pa., R9; Q2AV, R8; ON4GG, R6; W2IGD, R8; W4DSY Chicago, R6; W5BB Texas, R7.

At midnight, from 19 m. to 50 m., one could simply follow the "World Radio" list of stations that were on. By application of the "X"-reaction, weak stations were brought in at a full R8 or 9. On 31 m. Moscow, R W 99, raised the roof asking "Workers of the world to unite." Just above W3XAU R9, Philadelphia gave "Liebestraum" and "Whispers in the Dark" by an orchestra. Then W1XK Millis R8 has a service. The sermon was on "Life." Zeesens R8, orchestra, W2XAF, R8 orchestra dance. PRF5 Rio de Jan. R8 Announcement. On 49 m. P V 3 M R Georgetown, C O C O Havana, etc., all at full L.S. strength.

During the evening a friend, over on a visit from Vancouver, gave me a call. After listening to the local variety I quickly changed the coils to the S2 band and brought in W2XAD, who were giving a commentary on a ball game, at full L.S. He had not seen me turn a switch, and so naturally thought we were still listening to Midland, for his remark was that he did not know the B.B.C. relayed the American ball games like that. When I explained that we were hearing W2XAD, he said that I must be using more valves than he, for his 10-valve all-mains set way back in Vancouver did not pull in the S.W. like the 900. I then explained that there were only five valves, and one was being used for extra reaction, but he would not believe me until he had seen for himself.

He then asked to try the set, and received on his first attempt W2XE, W8XK, GSP (who he hears almost daily at this time in Canada), W1XAL and several Zeesens, all in about twenty minutes. He said it was one of the simplest sets he had ever handled, and far superior to the majority on the other side of the Atlantic.

Sunday 31st provided another good day starting with VK2ME Sydney at 07.00, R7, announcing in several languages, with records of Flanagan and Allen in "Underneath the Arches" and "This is a Fine Romance." This station was held at good L.S. till the close at 07.30, when on 20 m. I picked up (out of two or three dozen) the following amateurs: W1IED Connecticut, R8; SM5SV, R99; F3OO, R99; Florida, SM7YA, R9; OH5NR, R8; W4BAZ, R8; LAIG, R99.

The set is truly remarkable. I have made markings of S.W. stations on the dial, and I find that I have only to set the pointer to one of these markings and I can bring in the desired station. It is perfectly staple in every way. No hand-capacity or threshold howl. As I have said before, the coil changing is definitely not a bugbear, and is practically as easy as switching. I have now heard a total of 379 stations with many more to come on this truly "all-wave" set.

LESLIE A. PERRINS.

101, Sycamore Road, Aston,

Birmingham 6.

SWITCHES MEAN HITCHES!

PLUG-IN COILS ENSURE MAXIMUM EFFICIENCY ON ALL WAVEBANDS

By JOHN SCOTT-TAGGART

THE presence of wires near to metal parts such as cans and switches (which become very bulky on even simple coil units) results in unwanted capacity effects, and there is a direct high-frequency loss. In addition, the proximity of various leads results in interaction which may result in unintentional reaction effects or reverse reaction effects. If there is interaction of a reaction type the set will tend to be unstable, normal reaction will become plopky, and you will not be able to go in and out of reaction in the proper manner as there will be a so-called hysteresis effect.

In order to make the coil unit work in a stable manner the couplings between the coils, or the windings, are so arranged that the efficiency is intentionally reduced! If a reverse reaction effect takes place there is, of course, an immediate reduction of signal strength and of natural selectivity.

If you have the opportunity, open almost any canned coil unit and look how the different wires go to the switch points. You will be amazed at the intermingling of wires and the proximity of dangerous points on the circuit which should normally be kept well apart. Frequently even the screening merits of a can (about the only merit there is) are often partly neutralised by the wiring to the switches.

The difficulties of switching limit the kind of circuit which can be used. This is usually not appreciated. By adhering to the idea of switches you may have to forgo an excellent circuit.

The S.T.900 circuit embodies two tuned circuits to each of which reaction may be applied. Each circuit is fed through a coupling coil, so that altogether there are six inductance coils in the set. Each of

these have, of course, two ends, so that there are twelve points of contact, all very efficiently made, over a great area of polished metal the moment you plug in the coils.

If a switch were used, imagine the problems connected with providing four or five wavebands! There is a medium-wave band, a long-wave band, and certainly two short-wave bands. Actually there is no limit to the wavelength ranges with the S.T.900 if you have the right coils. But even with four wavebands the number of switch contacts would be alarming. It would not be as much as 48 (12 times four), but it would be very substantial. If any one of these had a dry joint or if the wire were broken or if a soldering girl made a mistake (which is very easily done in this complicated class of work), the whole coil unit would be a dud.

All Difficulties Removed

In the S.T.900 this cannot occur, as perfectly simple plug-in coils are used and the difficulties of switching are removed.

Another great advantage of abandoning the canned unit system, with its incorporated complicated switch, is that the coils can be put where they are wanted. When in a unit the position of the coils has of course to be in the unit. This may result in long leads to other components in the circuit, a disadvantage which may be very serious from a general design point, especially as the wavelengths to be received are reduced.

Another point against canned units is that all the terminals of the unit are close together. There has not been a case in my experience where the terminals have not had to be altered to avoid certain points

of the circuit being brought close to other dangerous points. For example, the input tuned circuit is connected to a grid terminal. The anode terminal of the valve is connected to a point associated with the second tuned circuit. Obviously, these two points which appear as quite large terminals on the coil unit must not be close together. This kind of thing is sometimes almost impossible to avoid. Capacity couplings between nearby terminals is always a problem, and there are also dielectric losses in the insulating bushes. Points which should be as free as air (such as the "live" ends of tuned circuits) have perforce to be brought very close to metal which is earthed. *None of these defects occurs when you have plug-in coils.*

When coil units with built-in switches are very likely to go wrong, or even to be wrong, the constructor has no remedy. There is nothing that the constructor can do about it. He can only tear the coil unit out of the set and post it to the manufacturer. This is very troublesome, and he may even have to pay for it to be tested. So great is the distrust of complicated coil units that constructors sometimes unjustly blame the unit for a fault which may have nothing to do with the coils. Personally, I do not blame them. To test one of these complicated coil units is a very difficult matter and calls for apparatus and equipment which no constructor is likely to have. He is working in the dark.

How different is the position with a plug-in coil! In the first place, it is the very last item in the set likely to be wrong. Secondly, it is always easy to blame a coil if it is faulty, because if the set works

(Please turn to page 279.)

S.T.900—CLIMAX OF YEARS OF BRILLIANT SUCCESSSES

No other designer has such a long string of successes to his credit. Read these earlier reports

S.T.300

I should like to testify to its amazing sensitiveness and selectivity.—S. MILLS, 27, SEYMOUR HOUSE, COMPTON ST., LONDON, W.C.

The set is extraordinarily selective and sensitive for a 3-valver.—W. IRONS, 173, GOSSET ST., LONDON, E.2.

I can only characterise it as remarkable indeed.—C. ROPSEY, 21, PRINCES AVENUE, GREENFORD, MIDD.

S.T.400

The set was absolutely uncanny—what every wireless enthusiast has only dared to dream about.—FRED HOWARTH, 112, CHURCH ROAD, KEARSLEY, LANCASHIRE.

The quality of reproduction was very fine indeed.—ROBERT YOUNG, GARDONALD GARDENS, GLASGOW.

S.T.500

The sensitivity, quality and volume are tremendous, while the selectivity is as good as you have claimed it to be.—G. J. MILLARD, 65, BEECH GROVE, ACOMB, YORK.

It is really a remarkable set.—WALTER A. CROSS, 170, WALLACE ROAD, SHEFFIELD 3.

S.T.600

The set has a wonderful punch behind it.—W. J. SHIPLEY, 109, CLEVERLY ESTATE, WORMHOLT ROAD, SHEPHERD'S BUSH, LONDON, W.12.

The selectivity of the set is amazing.—R. D. BEEBE, 24, SHEPHERD'S BUSH GREEN, W.12.

S.T.700

The quality of reproduction was superb, and the set is undoubtedly the high-water mark of design.—GEO. MACLOCHLAN, 10, WARKWORTH GARDENS, GREAT WEST ROAD, ISLEWORTH, MIDD.

The S.T.700 came through the most difficult of tests with flying colours. Truly a wonderful set.—T. POLLETT, 2, GREENHAM ROAD, LONDON, N.10.

I think it is wonderful that a set costing so little will do so much.—W. R. WALTHAM, 1, ONSLOW MEWS, SOUTH KENSINGTON, S.W.7.

S.T.800

The S.T.800 is easy to handle, and gives excellent results on all bands, with great volume and tone, and will bring the rest of the world to the speaker.—H. B. REED, 7, MONKS ROAD, EXETER.

The performance of the S.T.800 at once delighted and astonished me. Reception on the long and medium wavebands left nothing to be desired. I received 72 stations on medium and long wavebands. It is amazing to find that, although no bigger than a normal receiver, the S.T.800 gives simply marvellous results on the short waves.—JOHN S. STEVENSON, 18, WILLOWBANK STREET, GLASGOW, C.3.

RANDOM RADIO REFLECTIONS

By VICTOR KING

DAVENTRY'S WEATHER REPORTS :: ON FIRE! :: HOME CONSTRUCTION

TALKING ABOUT THE WEATHER

A FELLOW scribe happening to see my paragraph about the B.B.C. and the weather draws my attention to the fact that the Daventry station sends out useful information.

It is the transmitter that the B.B.C. used to use, but that has since been taken over by the Air Ministry. Operating on a wavelength of about 1,200 metres this outfit broadcasts every hour weather-condition reports concerning the various aerodromes in the country.

The purpose of this is to provide airmen with information so that they shall know what they are going to meet on their journeys from point to point in the country, or if they are flying in from overseas.

Obviously, it can be very useful to other folk as well, because if the weather is so-and-so, at, say, the Liverpool aerodrome, then you know what it is likely to be anywhere within a few miles of it.

Good old Air Ministry! they do their stuff pretty well, don't they? I've several times rung up their meteorological department at Kingsway, London, for weather reports and have always been given very courteously the information I've wanted. And I must say it's generally turned out to be pretty accurate.

FIRE DOWN BELOW

WHILE I was sitting before my typewriter wondering what to write about next, the telephone bell rang. A friend came on the line to tell me that his new set had acted "most peculiarly."

Apparently, right in the middle of a programme there was a sudden bright flash, a whiff of smoke—and all was silence.

What did I think had happened?

I reserved my judgment until such time as I could examine the thing.

Curiously enough, this is the third event of the kind that has come to my notice during the past few weeks. In another case a set was operating quite satisfactorily when a smell of burning became apparent. This was followed by smoke, whereupon the set was hastily switched off and carried out into the garden to cool off. In this instance it was the transformer that was the cause of the trouble.

The third case was much more serious. The owner and his wife went out to the pictures, and when they returned rather late they were staggered to discover that all the lights in their house were blazing away and a policeman and a fireman were standing by the front gate.

There had been a fire and one of the rooms was pretty badly burnt out. But seemingly it was no faulty set that was to blame. They don't know quite how it could have occurred, but as far as they can make out a loudspeaker standing on top of the receiver fell down and in so doing banged

over the switch of an electric fire. The speaker lying against the hot elements of this was soon alight and the flames spread to other things in the room. If it hadn't been for the quick-wittedness of a neighbour noticing a glow from the window they might not have had any house at all to return to.

Which reminds me. Did you see that bit in the papers some time ago about the man in Chicago and the house that went up with a big bang? He went to the house of a friend and pressed the front door bell. Whereupon, there was immediately a terrific explosion, the house flew to bits and he was flung right across to the other side of the street. There had been an escape of gas which was ignited by the sparking of the electric bell.

Reverting to radio and fire, I don't think any of you users of mains sets need take alarm from what I have said. There are millions of mains sets in use and there has not been much fire trouble traced to them. Probably not as much as there has been to other domestic electric appliances. Certainly there have been mighty few instances of shock.

No, modern radio is quite safe, and those who obtain insurance premiums on radio alone are on a pretty good thing.

Now and then there are periodic lightning scares, but I have yet to meet anyone who has suffered through their radio from the effects of thunderstorms. Except in so far as the crackling noises they cause are concerned.

P.S.—The cautious ones always earth their aerials and switch off the electricity at the meter switch when they leave their houses for any length of time.

P.S.S.—I'm afraid I'm not one of the cautious ones!

NOT WORTH WHILE!

A NEWSPAPER radio expert declared recently in one of his articles that home construction was not now worth while. He based his observation on the costs of "rolling your own" as compared with the factory-assembled outfit.

I think what he forgets is that even although one might not save a great deal by building a similar kind of set to a given commercial type, in so far as first costs are concerned, the "exchange" value of the two will be vastly different. In the one instance all you can get is a "little bit off" when buying a new set. In the other you can dismantle and use many of the parts again for something entirely up-to-date.

In any event there are no commercial



LISTEN FOR HER ON YOUR SHORT-WAVE SET.

Jane Rhodes, sixteen-year-old rhythm singer, who broadcasts over the American N.B.C.-Red network. Jane first started singing "over the air" when she was seven years old.

equivalents for some of the designs made available to the home constructor. The S.T.900 is a very good case in point.

And what about the enjoyment of assembling your own gear? There are many less intrinsically valuable hobbies.

The home constructor can also take an old time-worn outfit and modernise it at a cost of, perhaps, only a few shillings. And he is able to get a broken-down set going where his set-buying brethren remain helpless and minus their radio until the services of an expert have been obtained. Plenty of commercial sets go wrong—don't I know it! Three out of the last four receivers I've recommended to friends gave trouble within a few weeks of their being installed. There are now only two makes I care to advise any but my enemies (if I have any) to buy.

WHAT ABOUT TELEVISION?

THE progress of television, though it may be sure, seems to be depressingly slow—on the viewing side, I mean. Technical progress has been extremely satisfactory. And yet there are only about a thousand people with television sets. Why is this?

I've heard three reasons advanced: 1. It is too expensive. 2. The pictures are not large enough. 3. The programmes are too short and not good enough.

In view of the fact that quite large numbers of people were paying up to fifty pounds for two-valvers at the beginning of broadcasting and that these instruments were giving relatively far worse results than the very excellent results achieved on television sets, I am still of the opinion that it is to the programmes we must turn for the "hold up."

After all, those early broadcasting programmes might have been poor as compared with present-day ones, but they were enthusiastically presented and there was

(Please turn to page 280.)

FREE! S.T.900 FULL-SIZE AUTO-DIAL CARD WITH EVERY PETO-SCOTT PILOT AUTHOR KIT

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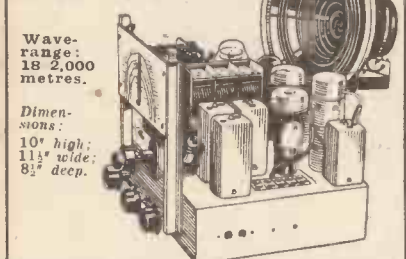
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Wave-range: 18-2,000 metres.

Dimensions: 10" high, 11 1/2" wide, 8 1/2" deep.

● 3 Wavebands: 18-50, 200-550, 900-2,000 metres. ● Automatic volume control on 2 stages. ● Bandpass on all stages. ● Mains input filter.

5 British Valves: Hexode as Detector and oscillator. Variable-mu H.F. Pentode as I.P. amplifier. Double diode-tetrode for second detection, A.V.C. and 1st L.F. amplification. High slope output pentode. 4 position wavechange switch for 3 bands and gram. Each band separately dial lighted. Provision for extension speaker. Combined on-off switch and volume control. Separate tone control. A.C. Mains, 200-260 volts, 50-100 cycles. Output 3 watts. Complete with Valves and High-Fidelity Field-Energised 8" cone Moving-coil Speaker illustrated. Cash or C.O.D. £8/6/0, or 10/- down and 11 monthly payments of 12/-.

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KIT "CT" Complete kit of first specified parts, including Konectakit, 10 B.T.S. One-Shot Inductors, Peto-Scott TABLE model cabinet, and 5 first specified valves. Cash Price, Carr. Pd., £6/14/9, or 13/9 down and 11 monthly payments of 12/9.

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Type 9/M.W. (178 to 580 metres) per pair	5 6
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Type 9/S.1. (9.5 to 27 metres)	5 0
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COMPLETE SET of 10 B.T.S. ONE-SHOT INDUCTORS comprising (2) 9/M.W., (2) 9/L.W., (2) 9/S.2., (2) 9/S.3., (2) 9/S.1. CASH PRICE 27/-, or 2/6 down and 8 monthly payments of 3/6.

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COMPLETE KIT OF PARTS necessary for converting the S.T.800 to S.T.900. Comprising Peto-Scott Metalexed and ready drilled panel, Peto-Scott ready drilled platform, Peto-Scott ready drilled screen, 2 B.T.S. Type "O" self-latching coil holders, 1 Graham-Farish .0005 log-mid-line condenser, 2 Lissen .006-mfd., 2 Lissen .00005-mfd., 1 T.M.C. .0002-mfd tubular, 1 Dubilier 1-meg. 1-watt resistor, 1 B.T.S. All-Wave H.F. Choke, 1 W.B. 4-pin valve holder, 3 Clix sockets, 2 Clix master winder plugs, 16 feet 18-gauge T.C. wire, lengths of sleeving, 24 screws, 8 washers, 1 Free S.T.900 Copyright Auto-Dial Card, and including 10 B.T.S. ONE-SHOT INDUCTORS as detailed in right column above and required additional specified Hivac valve. CASH or C.O.D., Carriage Paid, £2/9/3, or 4/- down and 11 monthly payments of 4/9.

S.T.700 to S.T.900 CONVERSION KIT. Complete Kit for converting the S.T.700 to S.T.900, including 10 B.T.S. ONE-SHOT INDUCTORS and free S.T.900 Copyright Auto-Dial Card. Less Valves. CASH or C.O.D., Carriage Paid, £2/13/0, or 5/- down and 11 monthly payments of 5/-.

If Osram L.21 and Hivac L.210 valves are required, add 8/6 to Cash Price or 1/- to deposit and 9d. to each monthly payment. If J.B. slow-motion drive and knob required, 2/6 extra.

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CONSOLE MODEL

All S.T.900 finished receivers are built by Peto-Scott's expert technicians exactly to Mr. Scott-Taggart's first specification. A full-size celluloid dial places the finishing touch on an extremely attractive receiver. Each component is rigidly tested on actual broadcasting on all wavebands.

The Battery Version Console Model Finished Instrument illustrated is supplied with aerial coupler control extended to operate outside cabinet. Complete with set of first specified valves and 10 B.T.S. One-Shot Inductors covering Long, Medium, and 3 Short-Wave bands; also Peto-Scott Type No. 210 P.M. Moving-coil Speaker, housed in Peto-Scott walnut finished Console Cabinet (illustrated) with spare coil rack, less batteries. CASH or C.O.D. Carr. Paid, £11/15/0, or Deposit 27/6 and 11 monthly payments of 22/-.

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CONSOLETTA MODEL

(on right). Exactly to specification. Celluloid dial. In walnut veneered cabinet, with spare coil rack, valves, and 10 B.T.S. Inductors. Peto-Scott P.M. Speaker, less batteries. CASH or C.O.D., Carr. Paid, £10/10/0, or 21/- down and 11 monthly payments of 19/9.

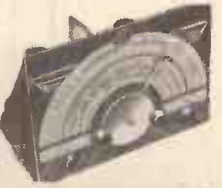


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Ready-assembled S.T.900 Battery Version Chassis (illustrated on right), complete with 5 specified valves, 10 B.T.S. Inductors, less Cabinet and Speaker. Cash or C.O.D., Carr. Paid, £7/5/0, or 15/- down and 11 monthly payments of 13/6.

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SEEN ON THE AIR

News and Views on the Television Programmes by Our Special Radio-Screen Correspondent

L. MARSLAND GANDER

LET us, for once, do some counting of chickens before they are hatched.

Many people are now busy with this risky but engaging pastime with reference to the amount of the new contribution which the Government is expected to make for the maintenance and development of television.

As a matter of fact, I do not know that, the eggs have been placed in the incubator though there seems to be general assumption that they have. At any rate, we'll express the hope that there are no ugly ducklings in the brood.

As a contribution to the discussion I will fix the amount that the Exchequer is going to pay at £500,000, or exactly half the sum retained by the Government out of annual licence revenue. Fifty-fifty seems a fair division—to me. In any case there can be no mistake that the average man wants the money he pays out for his radio licence to be devoted to betterment of broadcasting and not diverted to other purposes.

I must mention, however, that the £500,000 will not be devoted exclusively to television; not by any manner of means. The bulk of this sum, call it £500,000, or X pounds, will be devoted to the building of a new group of transmitters at Daventry for the broadcasts in foreign languages. But that, as Mr. Kipling says, is another story.

New Studio in Operation

Television will be lucky if £100,000 is allocated to its needs in the next year. I should think it more likely that Mr. Cock will get £50,000 and the B.B.C. will be expected to find the remainder. This means no great extension of programme hours, no provincial transmitters, but television will be able to hold its ground until the technicians are ready for the next step.

In the meantime the B.B.C. is finding more room at Alexandra Palace by adaptation of the former Baird studio. Most of the dis-used apparatus has now been removed, and, from this studio, now designated No. 2, a number of programmes have recently been televised. As I write Army boxers, among them famous "Dusty" Miller, are giving a demonstration of the work of seconds throughout the ages.

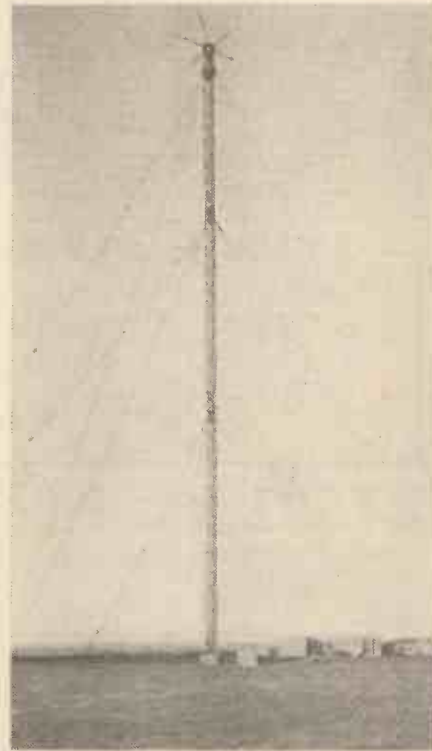
The pictures on my screen show that presentation in No. 2 can be every bit as effective as in No. 1. Lighting is excellent. A full-sized raised boxing ring was set up for the purpose of this demonstration, which, as an exposition of the brutal methods of the old days, was an unqualified success. In those times the battered pugilist was revived by the simple process of twisting the ears, thrusting needles under the finger-nails, or even giving a slash with a knife. On the screen when under this treatment the subject

gave a bloodcurdling yell which showed that it had worked.

I wondered whether one of the seconds had exceeded his instructions, and overdone his part!

Among the programmes which I saw this week I liked best Stephen Leacock's three epic dramas. I hope it does not disparage Mr. Jan Bussell's production to say that with such material it would be hard to misfire. Mr. Leacock is most at home in "Forging the Fifteenth Amendment," but his most superb tomfoolery is in the little

STAGSHAW'S AERIAL



Last week we published a description of the new B.B.C. station at Stagshaw. Here is a view of the "anti-fading" aerial which is 435 feet high. The mast itself acts as the aerial and is held in position by three sets of three insulated stay wires.

Napoleonic drama. Frank Birch was a grand Napoleon.

In offering pictures as an alternative to broadcasting the B.B.C. is to some extent competing with itself. This is a curiously anomalous position and calls for great care in the arrangement of times. On the whole the period 9 to 10 p.m. is convenient to me (I speak in the first person because it is the only thing I can do in my ignorance of the habits and customs of the generality of viewers).

The chief mistake is that the time clashes with the third news bulletin.

Surely it would make no great difference to the programme staff if television ran from 9.15 to 10.15 p.m. I regard this as a most necessary reform. The present timing has caused me to miss many a news bulletin. Forestalling Mr. Cock's answer ("Why not listen to the 10 o'clock bulletin?") I should like to add that the television programmes so frequently overrun the allotted time that I miss the main items of the 10 o'clock summary as well.

Among coming programmes I am looking forward most to the hundredth "Picture Page." Charming Joan Miller, who is an established character as the switchboard girl is, I understand, throwing a party in connection with this occasion, and among the guests will be some of the most confirmed "Picture Page" viewers.

Few details have yet been fixed of the Christmas programmes, but I hear that there will be another Old Time Music Hall, and St. George's Hall will *not* be ready in time.

Mr. W. R. Westhead, the Brighton enthusiast, has issued a friendly challenge to the B.B.C. which has important bearing on the service of television. He has undertaken to receive a picture anywhere within a radius of 100 miles of A. P.

Long Distance Reception

He bars the bottom of a coal-mine! Apart from this, he thinks that the most difficult places would be Bath or Birmingham. We are getting on. A hundred miles is exactly four times the distance suggested as the maximum when A. P. started.

Among the latest places where television pictures have been received outside the recognised area are Iffley, near Oxford, Littlehampton and Burnham-on-Crouch, but I am hearing of so many similar feats that the novelty is fading.

An exceedingly interesting point has arisen in connection with one of these long-distance demonstrations. The organisers thought that to cover expenses an entrance fee might be charged. They were informed, however, that owing to copyright considerations this could not be done without arrangements with the Performing Right Society. However, the difficulty was met by taking the hat round.

It occurs to me that if private enterprise were, under proper control, allowed to stage exhibitions of television and charge for admission, a great deal might be done to help it forward. Difficulties of copyright should not be insuperable and, at a venture, I should say that the Performing Right Society (I put it forward merely as a suggestion) would be willing to accept some reasonable proportion of the takings subject to suitable safeguards.

The more I think of this idea the more I am impressed with its possibilities. But, there are, I admit, other problems.

"DIALLING" FOR STATIONS

By CARDEN SHEILS

An explanation of the working of the latest idea in the simplification of modern receiver operation

SWITCH tuning is the last refinement for the "lazy" listener. It has established itself in America and is already beginning to show signs of catching-on over here. A selection of models, some fitted with automatic push-button selectors and others adapted for remote dialling-control, were in fact featured at the recent French and German Radio Exhibitions.

In push-button tuning the usual indicator scale is replaced by a panel-board of small tabs or "buttons," each marked with the name of a transmitting station. Instead of twiddling a knob, the listener simply pushes the particular button corresponding to the station he fancies, and the set does the rest.

Pre-set Condensers

The secret lies in the provision of groups of small fixed condensers, each pre-set to a different frequency. The push-button merely inserts the correct condenser across each of the H.F. coils, so that all the high-frequency circuits are simultaneously tuned to the required frequency.

In order to make assurance doubly sure, the set is also fitted with one of the well-known circuits for "automatic fine tuning," so that, even if the pre-set condensers are slightly out of true, the error is corrected and the circuits automatically brought to the exact tuning point. The selecting buttons are usually mounted on the cabinet or the set, but they may be fixed to a separate panel which can be placed on the arm of an easy chair, or at any other convenient place, for remote control.

Of course, all this tends to complicate the set design and naturally costs money, so that push-button tuning is likely to be rather a luxury for the present. At the same time it should be possible to market a moderate-priced set provided with three or four push-buttons for easy manipulation by the ladies of the house, plus the ordinary control knob and scale for those who like to do a bit of "ether-combing" in their spare time.

The second scheme that is coming into favour is dial tuning. Here the idea is to control the position of the tuning condenser by current impulses derived from a rotary switch of the kind used for making automatic telephone calls. To begin with, suppose the set has four different wave-band settings, then the ultra-short wave-

band will be selected by dialling "1," and the long waveband by dialling "4," and so on.

The next step is to adjust the tuning condenser to receive a selected programme. By way of example, imagine the ordinary circular type of tuning scale to be divided, first into ten equal "large" divisions, each of which is divided into ten smaller subdivisions, and these in turn again subdivided into tenths. This will split the full circle into 1,000 parts, instead of the usual 360°. Suppose now that the required station is located at the 873rd of the smallest sub-divisions on the scale.

One first dials eight impulses to step the condenser up to the eighth of the first or "large" divisions on the tuning scale. Next one dials 7, which steps the condenser through seven-tenths of the next "large" division. Finally, one dials 3 to move the condenser through three-tenths of the succeeding small sub-division. In other words, the dialling control is effective up to the thousandth part of a complete

Suppose the set is at rest, and it is desired to tune-in a station on the short waveband. It will be observed that the control cams C on the "control shaft" are so placed that the left-hand pawl P is the only one in contact with any of the ratchet wheels, namely, the one marked "waveband selector."

By dialling 1 on the selector this will be moved through one step to set the waveband switch to "short." If the long waveband is required, one dials "4" and the same ratchet wheel is rotated accordingly.

Quite Automatic

At the end of this movement, a relay marked E automatically closes a circuit which brings the "control shaft magnet" into operation to rotate the "control shaft." This brings a "ratchet control arm" on to the next contact in the clockwise direction and simultaneously rotates the cams C so that the left-hand cam moves the end pawl out of contact with the "waveband selector" and brings the second pawl P into engagement with the second ratchet wheel marked "Hundreds selector."

The circuits through the "ratchet control arm" are now set so that the first step can be taken to rotate the tuning condenser shaft to position 873.

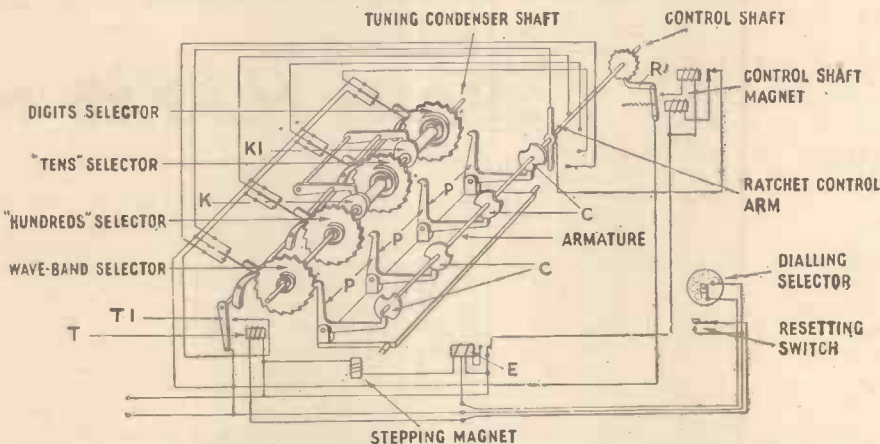
One first dials "8," and the resulting impulses are applied through the "stepping magnet" and "armature" to the second pawl P, which steps the tuning condenser shaft through the "hundreds" ratchet wheel over the first eight of the ten large divisions. At the end of this operation the

relay E again comes into operation to step the "control shaft" round until the "ratchet control arm" moves on its next contact. This releases the first two pawls P and brings the third into contact with the "tens selector" ratchet wheel.

The listener next dials "7" and the pawl drives the "tens" ratchet wheel through seven steps. But instead of turning the tuning-condenser shaft directly, the drive is in this case applied through a curved cam K which reduces the drive by a ten-to-one ratio. The final dialling of "3" is similarly reduced by a ten-to-one ratio through a cam K1, so that the last position of the tuning condenser shaft corresponds to the 873rd division of the circular tuning scale.

Whenever the listener desires to change over to another station he operates a "resetting switch." This restores all the ratchet wheels to the "zero" position.

A SKELETON SCHEME OF THE MECHANISM



This simplified drawing illustrates the way in which the selectors turn the tuning to the right station when the dial is operated.

circle, or to within one-third of an ordinary degree.

The layout of the control mechanism is shown in the Figure. It looks somewhat complicated at first sight, but its ingenuity will repay a little study. It will be noticed that there are four ratchet wheels. Each of these is rotated by means of impulses sent from the "dialling selector," which may be located at any convenient point remote from the set.

How the Method Works

The impulses are applied to a "stepping magnet" which vibrates a pivoted armature carrying all the pawls P. These are intended to operate the four ratchet wheels, though a separate "control shaft" is provided, and is fitted with cams marked C to ensure that only one ratchet wheel can be operated at a time, and each in its proper turn.

THE DIAL REVOLVES

By LESLIE W. ORTON

NOVA SCOTIA ON 49 METRES :: ANOTHER CHALLENGE ::
AMATEURS ON 20 METRES :: GOOD RECEPTION ON THE
ULTRA-SHORTS

BBRITAIN'S annual little war, the Fifth of November, has passed, and with singed eyebrows and shaking hands we once again turn to our receivers to provide entertainment to soothe our shattered nerves.

Personally, I've been paying more than usual attention to the short-wave broadcasters, and the result has been much to my liking.

At 9.30 p.m. on several occasions K Z R M Manila, has conjured up visions of bacon and eggs, and provided a decent signal during their "breakfast time" programmes. However, no sooner does W I X K, Millis, take the air than one jumps out of the frying-pan into the fire, as it were, and a howl reminiscent to a local fire brigade's "call to arms," rends the ether!

Another Mystery

Swing your dials up in the region of 49 metres, and one of the first stations you are likely to hear is C J C B at Sydney, Nova Scotia. He may be heard around midnight on 49.9 metres, and verification is about as easy as slipping on a banana skin, for announcements are made at each quarter of an hour.

By the way, the other day I pulled in V Q 7 L O, Nairobi, transmitting a programme of operatic recordings at 5.20 p.m. Volume, however, was not particularly good. Nevertheless, turn to this band after midnight and you can bet your bottom dollar that the North and South (not forgetting Central) Americans will provide as much entertainment as ever you will want. Incidentally, if you get up between 3 and 6 a.m. everything (except the poor shivering DX-er) seems to be an R9 signal.

On 19.8 metres Y D C in Java has been heard broadcasting "setting up" exercises as late as 11 p.m.

And oh, by the way, I have added a new "mystery" station to my log. Operatic and highbrow selections, including "I Pagliacci," entertained me for something like an hour. But I was bored. You see, I spent more time with that station than the proverbial "Scot" would with his best girl—and the answer was a lemon! All I can definitely say is that announcements were made in German and French. Can any of you wise guys solve the mystery? I'll be everlastingly grateful if you can.

Can You Beat This?

Hey ho, what have we here! Ah, another challenge! Well, well, I'm beginning to feel a somebody! P.Y., of Bedford, a tough guy (with a mighty tough single-valver) challenges me to beat his "log." And here it is: K 6 N Z Q, K 6 O G E, W 6 C C T, W 6 C Q I, W 6 A L, W 6 F G C, W 7 F Q K, W 5 B V H, J 2 O A, K 4 D T H, K 4 E N Y, C O 2 E G, N Y 2 A E, H C 1 F G, T I 2 F G, H K 3 J O, V K 3 E X, V K 3 Z Z, V K 3 Z L,

V K 2 X U, V K 3 V E, V K 3 K X, O A 4 N, V S 2 A K, and K A 1 M E—all on 20 metres. After that little lot I'll pause a moment to regain my breath! Can any of you DX-ers beat it? I can't.

By the way, as a parting shot, P.Y. remarks: "I make a point of hearing at least two Australians before breakfast each day!" Last week I considered moving to Cheltenham, but I'm thinking of Bedford now!

Sunday Morning Listening

After a week of trudging through rain and practically everything but sunshine, the hardiest of us feel like a limp rag by the week-end, and what a relief it is to tune to the 20-metre band on Sunday morning and listen to the merry chatter of amateurs throughout the country whilst the "missus" is cooking dinner! From all corners they come. Here is G M 5 N W near Dundee; there is G 6 G B in Cornwall, and here we have G W 5 F K in Swansea. Come on, boys, there's untold pleasure awaiting you down here.

Short-Wave Station Identification

By F. A. BEANE

SPAIN MAKES NEWS

ACAREFUL combing of the chaotic 40-metre amateur band will reveal innumerable stations of the Spanish Government, generally "reddened" by their antagonists, and of the so-called "Nationalist" rebels. Generally we find the Requetos or the Falange operating the latter on behalf of Franco, while the stations of the Government carry communiques of the Popular Front originating in Valencia. From Salamanca, chief town of the Insurgents, is radiated the programme of "Radio Nacional de Espana," which, according to the announcer, "is broadcast on all short wavelengths," the key station being at Salamanca on a wavelength of 28.2 metres.

Further extolling of Franco, talks in various languages, and the "national" programme may also be heard from the seldom reported R R 6 of Vitoria, which may be found on 41.5 m. around 20.30, using the title "Radio Requete de Vitoria, R R 6." News in French is generally heard first, then English and German, and finally the usual "Saludo Franco; Arriba Espana" ("Salute Franco; Spain Above All"), and at 20.45 the rebel anthem. Later on, generally at 21.30, R R 6 is back on the air with the programme of "Radio Nacional de Espana."

More "Arribas" and "Vivas" are heard at frequent intervals from another insurgent transmitter on 42.83 m. with the call-sign F E 1 1, and it should be searched for from about 21.30, when it generally radiates news in Italian and German, the call being "Emisoro Falange F E 1 1." F E 1 1 is situated in Valladolid and relays the official "Radio Nacional de Espana" programme from 22.00. Chimes, generally four at each quarter hour, serve as an identification signal, while "Falange" is



There's plenty of radio activity in Alaska. Try for the above amateurs in the early mornings.

On 10 Metres

Now your S.T.900 is built, you have no excuse for passing over the 10-metre band. Come on, boys, conditions are amazing at the present time. My log includes W 1 B J E, W 2 S S Y, W 3 K S, W 3 J C Y, W 4 A U C, W 5 F D E, W 7 E M P, and W 9 P V, but it's beaten by a Cheltenham reader who reports receiving W 6 N I S, W 6 E B H, W 7 E M P, W 5 F D E, W 4 E G, W 3 E F V, W 2 K B G, W 1 I Y K, W 8 A Y T, and W 9 P V (all districts).

I am always interested to receive "logs" from different localities, and once again I appeal to you boys to let me know how you are being served by Fate.

often mentioned during the Spanish announcements.

For real excitement, however, one should tune to E A J 8, 41.65 m., at 21.18 or so, when an English speaker may be heard luridly describing the "Reds" and the "red hell" of Republican Spain, while shortly after he reads extracts from a sympathetic publication which, he claims, tells the "truth" about the Civil War! Identification is simplified by the English announcement, "This is Radio Espana in San Sebastian, at the service of Spain for Spain," or in Spanish the abbreviated announcement, "Aqui Radio Espana de San Sebastian," while a studio clock may be heard chiming at 15-minute intervals. Broadcasts in the English language are given twice daily, simultaneously on 238.5 and 41.65 m.

Latin-America Again

Not to be ousted from the limelight, even momentarily, the West Indies have furnished a surprisingly good transmission from H I 4 V, operating on 46.27 m. It is situated in San Francisco de Macoris, Dominican Republic, uses the slogan "La Voz de la Marina," a 4-chime signal with the last note only just audible, and plays the "Stein Song" almost nightly at 00.40, apparently to herald the next programme. The full Spanish announcement is "Broadcasting H I 4 V, La Voz de la Marina, en San Francisco de Macoris, Capital de Provincia Duarte, Republica Dominicana," but it is often shortened to "Emisora H I 4 V"; "Radio Philco" is also sometimes mentioned, and the broadcasts concluded at 02.00 with the Republican national anthem.

ON THE SHORT WAVES

CONVERTERS FOR ALL PURPOSES

By W. L. S.

THE short-wave converter has always been a special friend of mine, but never before can I remember readers taking such an interest in it. Just why this should be so I don't know, unless it is that so many readers have really good broadcast receivers that they feel they would like to use them for their short-wave work.

Now a good broadcast receiver can perform in a most excellent way the functions of the "latter half" of a short-wave superhet. What one has to do, obviously, is to build a converter that will be worthy of it. In other words, one has to build a really excellent short-wave superhet which gets no farther than the "entrance" to the first stage of I.F. amplification, or, in other words, the aerial terminal of the broadcast receiver.

So just now I'm not going to talk any more about autodyne converters, but about something with more of a *de luxe* flavour about it. The first part of a good short-wave superhet would certainly be a stage of H.F., and then it would go on to a "mixer"—that special combination of detector and beat-oscillator which can take so many different forms.

Following the Signal

We had better pick on a particular signal and decide what's going to happen to it on its journey through the whole set. Suppose we take a signal on exactly 20 metres, and start thinking in kilocycles forthwith. This signal has a frequency, then, of 15,000 kc. Our converter has got to convert it into a new signal with a frequency that comes within the range of our broadcast receiver's powers. Let us, therefore, tune the broadcast receiver to a frequency of 600 kc., or a wavelength of 500 metres.

To "convert" our 15,000-kc. signal to the new frequency of 600, we have got to mix it with a signal 600 kc. away from it, which we will generate on the premises. That's what the beat oscillator is for. Let us set our beat oscillator, therefore, on a frequency of 14,400 kc. (It might just as well be 15,600 kc.—the effect would be the same—but we will stick to the lower frequency and save argument.)

Fig. 1 shows two ways of doing the thing. There are many more, but I am assuming that you don't want more than two tuning controls for the moment.

Fig. 1a shows an untuned buffer stage first of all; then there is the detector, tuned to 15,000 kc., and the oscillator, tuned to 14,400 kc. These two can have separate controls, or they can easily be ganged.

The other way of doing things (Fig. 1b) is to use a tuned H.F. stage, followed by an

untuned detector. In this instance, the H.F. tuning will be 15,000 kc., and the oscillator 14,400 kc.—and once again there's going to be no trouble about ganging them, if you want to.

These three stages will hand on to the aerial terminal of your broadcast receiver an artificially-produced signal with a frequency of 600 kc. and your broadcast receiver won't know, so to speak that this isn't a perfectly genuine signal coming in from the aerial. It will treat it in exactly the same way as it would treat a 500-metre

away. So the oscillator resembles what normally would be the detector on a short-waver, except that its reaction hasn't got to be controllable. It will just be a detector with a fixed reaction control, but one which will oscillate steadily and evenly over the whole range that it has to cover.

For this reason it will be as well to give it a grid leak of about 50,000 ohms instead of the more usual 2 megohms. Instead of a reaction control you will have a fixed condenser of about .0001, which will keep it oscillating all the time.

It can be coupled to the detector in a variety of ways, but the easiest is to use one of the special mixer valves on the market, which have some electrodes set apart for the oscillator section, and others for the detector.

Now I should imagine that from the above description anyone who has built a few short-wave receivers for himself would be able to turn out a perfectly good converter. But there are sundry practical aspects that want dealing with, and I will cover them in the next few articles as they occur to me. Finally if possible, I should like to build a really nice converter myself and describe it in detail, but I can't make any definite promises about that yet.

Second-Channel Interference

The H.F. and detector *must* be good. For one thing, if your oscillator, working on 14,400 kc. can produce that artificial signal for you, then so can a real signal that happens to be coming in on 14,400 kc. And so, for that matter, can another one on 15,600 kc. ! So your H.F. and detector have got to tune sharply enough to the real frequency—15,000 kc.—to keep the other fellows out. And that's the whole story of second-channel interference in a nutshell!

The whole lot will slide up and down the dial, with the oscillator always doing its stuff 600 kc. away from the signal, but I have stuck to these arbitrary fixed frequencies to try to explain just what happens and why. Next week we'll get a little more on the practical side.

The actual frequency of 600 kilocycles is, so far as I know, never used in practice. The favourite intermediate-frequency for short-wave superhet work is either 465 or 475 kilocycles, which, of course, can't be used by people with ordinary broadcast receivers and converters because it comes between the two broadcast bands, on the part of the spectrum not covered by the receiver. Use a quiet spot somewhere up the top end of the medium band, however, and whatever its actual frequency is, the chances are that you will be all right.

ALTERNATIVE METHODS

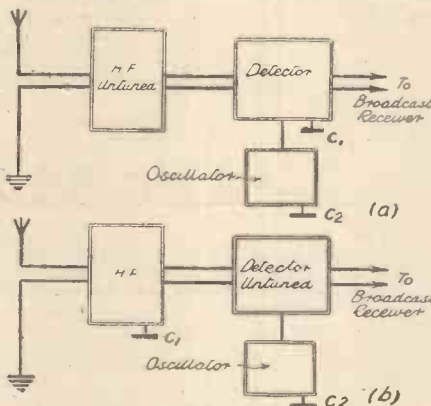


Fig. 1: Two ways of arranging the stages of a converter. In (a) the H.F. stage acts as a "buffer," since it is untuned, while in (b) the detector circuit is untuned but the H.F. stage is tuned.

signal, and will come into action with its A.V.C. and its selectivity exactly as it would on a 500-metre broadcasting station.

Obviously, therefore, we can leave the broadcast receiver alone and all our energies can be spent on providing a really nice signal on which it can do its job.

Now to look at the converter again. And before I go on, I may as well say that it would be a still better job if all three circuits were tuned—H.F. stage, detector and oscillator. Three circuits like this can be ganged together, but if you're new to the game you will find it much easier to be content with two at the start.

Your H.F. stage and detector will be exactly the same as the H.F. stage and detector of an ordinary short-wave receiver. They must be built with just the same care over their layout, and the only difference will be that you won't provide any reaction on the detector. It hasn't got to oscillate at the frequency of the signal—you've got to produce a separate oscillation 600 kc.

ON THE SHORT WAVES—Page 2.

POINTS from the POST-BAG

W.L.S. Replies to Correspondents

L. J. C. (Maidstone) refers to the circuit that I recently suggested for an ultra-short-wave converter. He intends to build it and to add an L.F. stage, making a 0-V-1 of it as an alternative arrangement. No objections to this, that I can see—sound scheme, in fact.

H. J. W. (Lowestoft) wants particulars of a converter which will enable the average broadcast receiver to cover the 130-190-metre band. I should think a straightforward triode-hexode arrangement (or a detector and separate oscillator) would be all right for this frequency-band, but the broadcast receiver would, of course, have to be put at the top of the long-wave band to give decent conversion efficiency. I have started covering the whole subject of converters again this week, and I won't leave the "long-short waves" out of consideration.

Coils for 2 H.F. Unit

H. W. S. (Leeds), who is impatiently waiting for the two-H.F. unit, wants to know what kind of coils I use in it. The answer to that is—two ordinary four-pin plug-ins. It consists of two straightforward H.F. stages, screened, their tuning controls being ganged. The first coil is used for aerial coupling and first grid coil, the second for the second grid coil.

F. G. B. (Queenborough) has been running a two-valve short-waver with S.G. detector and pentode output. Recently, however, he put a triode in the output stage and found an overall gain of about 50 per cent. He took the pentode to be tested, but it was found to be perfectly O.K. I suggest that he had unsuitable screen voltage or wrong bias on it. In any case, however, it is perfectly in order to stick to the triode—it won't blow up, or anything like that!

L. D. (Wakefield) wants to use a good converter for short-wave reception. He has tried a commercial one, which gave no results at all, and then approached his dealer, who told him that he simply won't be able to obtain one that really works! That strikes me as something more than commercial candour, because I have tried several models that go really well.

A Good Circuit

M. T. (Handsworth) is building the ultra-short-wave converter (yes, still at it!) which I recently talked about, and sends along his layout to know if it is all right. It certainly is—and for the benefit of other readers who are on the same track I suggest that they look up the diagrams of single-valvers in the "standard baseboard" series, if they have kept their copies of "P.W.," and stick to a layout as close to those as possible.

The sketch on this page suggests a circuit arrangement for that receiver which so many readers want—something to cover the 5-12-metre band. I have been using something similar for quite a time, and it certainly goes well. The circuit, as you will see, uses cathode reaction, with a choke in the positive L.T. lead. For the benefit of

readers who have not used this circuit before, I had better issue a warning that this choke must be wound with heavy-gauge wire, as it carries the L.T. current.

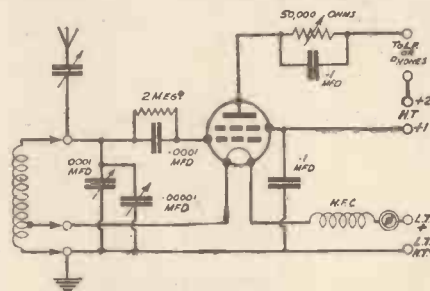
About sixteen turns, half-inch diameter, of 16 or 14-gauge make a nice choke for this purpose. If you do it the other way, using thin wire and pushing the filament volts up to four to compensate for it, use No. 26 or 28 wire and wind about thirty turns.

The coils are tapped about one quarter of the way up for reaction. For the 5-metre band you will need a four-turn coil, half an inch in diameter; for the 10-metre band you can use seven or eight turns. On the other hand, you may be able to get a six-turn coil to cover the whole band—5 to 10 metres—but efficiency with a lot of lumped capacity across it won't be so good as you will get by using separate coils for the two bands and keeping the band-setting condenser near its minimum all the time.

Reaction is controlled by the 50,000-ohm variable resistance in the anode circuit; the screen voltage is found by experiment and then left alone. Generally speaking, something between 27 and 36 volts will be found in order.

This same circuit, of course, is suitable for all kinds of short-wave work, but it is particularly applicable for the ultra-shorts,

FOR THE ULTRA-SHORTS



A circuit for 5-12 metres. The choke in the L.T. lead should be wound with thick wire because it carries the L.T. current.

and it handles very nicely down there. It is very stable and your frequency doesn't drift as the valve warms up, nor does it vary much with changes in L.T. and H.T. voltage.

Of course, if you like to make a nice converter out of it—but I think we'd better leave that subject alone for a bit!

MIDLAND MUSIC

'Moon Melodies' is the title of a programme by Jan Berenska and his Orchestra to be broadcast from the Pump Room, Leamington Spa, on November 22nd in the Midland Programme. It will open with a selection from Romberg's 'New Moon,' and will include Reginald King's 'Moonlight Reverie.'

On November 26th, the Hawaiian Islanders will be heard by Midland listeners. For about eighteen months they broadcast regularly, and lately they have been doing a stage act. They consist of four brothers under the direction of one of the family, Peter Hodgkinson, who also composes. He wrote the descriptive number 'Tiger Shark.' The vocalist with the combination is Harry Hartland who was a student at the Birmingham and Midland Institute, and has had a good deal of experience in opera and concert party work. He first broadcast in the early part of last year.

AMATEUR BAND NEWS

Phone working is now the mode

I SHOULD imagine that the proportion of short-wave sets that can take in the 80-metre amateur band is exceedingly small. It's rather a pity, because that band is becoming very interesting just now. Not if it's DX that you're after—but if you like listening to some really interesting local work, 80 is the place for you.

On Sunday mornings the band becomes a real old-timers' club. I listened up there recently and heard eight stations, every one of which had been on the air for more than ten years. At least three of them went back fourteen years. Don't imagine that the operators were doddering old men, either! Their procedure on the air would have put most of the newcomers to shame. I suppose I'm allowed to say this, although I happen to be one of the fourteen-year-olds.

This phone craze is really amazing. Never have I heard such a welter of amateur telephony on every band as we are getting this season. Even the most hardened of the old C.W. men seem to be taking up the mike and despising the key as something that is only meant to be used when conditions are bad.

Spilling a D.X. Band

It's a great pity that the 20-metre band is being used so much, however, for "local" phone work. I have often complained about the absolute hash that has been made of 40 metres, which is—or could be—a rattling good DX waveband. Now 20 is going the same way, and we hear contacts being made between the South and North of England—or even across London—on this wavelength which should be kept for contacts of 2,000 miles or more.

What's wrong with 160 metres for local work? And the 80-metre band is even better, but its neglect is understandable, since few are licensed for 80-metres.

I don't suppose it has ever before been so easy to receive the distant American stations on phone as it is now. Even a year ago it was a comparative rarity to hear a "W5" or "W7" on phone, but now it can be done any day on 10 metres. "W5" stations in Texas, New Mexico, Oklahoma, and "W7's" in Oregon, Washington and Idaho come in with the best of them, and there can't be any active Britishers on 10 metres who have not worked all districts.

One of the ruling crazes, of course, is to "work all States." I wonder how many readers can claim to have received all States? I know of only one off-hand. Nevada appears to be the stumbling-block, for of all the hundreds of "W6's" on the air, 99 per cent. seem to be in California—and most of those in San Francisco or Los Angeles.

Look up your cards, some of you enthusiastic amateur-band listeners, and see how many States have sent you verifications—and let's have some claims in.

And what can we say about 40 metres? It gets worse and worse every day, and until 40-metre phone is banned, I don't see that it will ever be any good for DX after about 8 a.m.

W. L. S.

TELEVISION TOPICS—Collected by A. S. Clark

"TELEFRAMES"

Items of general interest

THE POSITION ABROAD

ALTHOUGH we in this country have definitely built up a lead in television, we must be careful if it is to be held. Other countries show signs of catching up a bit.

For instance, there are the Eiffel Tower experimental transmissions. These are liable to develop into a regular service at any time now.

Then there is Germany. The stations, which it is hoped to start operating before the end of this year, will serve many millions of people. Even America, it is rumoured, will be having a coast to coast service in the next year or two.

A station is being built in Rome. The Russian public service should be going soon, and authorities in other European countries are getting down to the question of television. Let's hope we are not caught napping.

NOTICED ON THE SCREEN

A shadow of the microphone moving across the scenery in a recent playlet produced in the television studio.

An appalling amateurishness in the "trailers" of what is to come, showing up the pitiful lack of money that the television producers have to cope with.

Film transmissions are getting a little better, but are still not very good when compared with studio transmissions.

TELEVISION DX

We learn that a short-wave listener has heard the sound programmes from the Alexandra Palace down in Cornwall, at fair strength. It looks as though the distribution of television frequency channels will one day be quite a big international problem.

CONTROL ADJUSTMENT

Apart from personal preference in picture values, the adjustment of contrast on a television receiver is largely dependent on the brightness control. This can easily be proved by turning the two controls together.

As the brightness is increased, increase also the amount of contrast. It will be found, if the controls are moved at the right speed, that the relative tone value of the picture can be kept constant over quite a large movement of the knobs.

FILM STUDIO TRANSMISSIONS

Charles Laughton, Elsa Lanchester, John Lodge, Diana Churchill, Betty Balfour and other stars will be introduced to viewers in the inaugural television transmission from the studios of the Associated British Picture Corporation at Elstree on the afternoon of November 23rd. Distinguished directors will also face the cameras, including Erich Pommer, Paul Stein, Herbert Brennan and Albert de Courville.

THE SPOT'S POSITION

ANYONE who thinks much about the theory behind television circuits is bound at some time to come up against a tricky point concerning the time-base and its moving of the spot on the screen. The point in question can be briefly described as follows:

The spot is in the centre of the screen, and we apply a positive potential to one deflector which pulls it aside until the potential is removed, when the spot returns to its original place. But as soon as we apply scanning potentials from a time-base, which is done by charging up and discharging a condenser, the spot, instead of going backwards and forwards from the centre to one side, immediately begins

to go backwards and forwards across the centre of the tube, the original position of the spot falling half-way along the line! Why should this be?

The answer to this question is: Because the deflectors are fed from the time-base via a fixed condenser.

What the Condenser Does

As we know from fundamentals, the condenser will not pass on direct current, but will pass on the variations of pulsating D.C. current. But in doing so these pulsations are changed to their equivalent A.C. pulses.

Just at first the movement is entirely to one side of the spot's original position, but it soon takes up a point of reference which coincides with the original position of the spot. If the swings were not about a point of zero, it would be equivalent to the feed condenser taking on a continued potential of one "sign," which could result in current flowing and thus be equivalent to the condenser passing D.C., which we know it does not.

THE BEST DARK BACKGROUND

WORKERS who are experimenting in the transmission of crude light images usually find it necessary to have their images of as contrasty a nature as possible. It is difficult to excel the extreme contrast provided by a white figure or image when seen against a perfectly black background, this arrangement often being more satisfactory than having a black object against a white background.

For light-cell transmitting purposes by far the best and the most intense black background is that provided by the "tunnel," which device is merely a



one-ft. or two-ft.-long box having a cross-sectional area of the necessary dimensions. The box should be open at both ends, and should be blacked with a non-shiny stain within and without.

To form the black background, a piece of black velvet is loosely thrown over one end of the "tunnel," or box, and the white figure or object is placed a few inches in front of the open end of it and strongly illuminated, preferably by side-lightings.

The open end of the box or "tunnel" will form a background of the densest and most impenetrable blackness and, in consequence, will in many instances prove of utmost service to the television and photo-cell experimenter.

TELEVISION AT SEA

AT the end of last month some interesting tests were conducted with a Marconiphone television receiver, the company's engineers installing the instrument on the Britannic, the Cunard-White Star liner. The outstanding feature of the tests was the great distance from Alexandra Palace over which satisfactory reception was obtained, which indicated the possibility of television reception as a normal thing on transatlantic crossings.

A normal di-pole aerial was used, but, due to its height of 130 feet, the feeder lines were longer than usual. First test was in King George's Dock, North Woolwich. This is about 18 miles from Alexandra Palace, and, as was to be expected, results were good.

The Problem of Interference

Results were bad for a short period while going down the Thames, presumably due to the ship's steel mast coming directly between the aerial and Alexandra Palace.

Reception was good off the Nore Lightship, and also at 17 miles south-east of Hastings. Later, at 30 miles south of Hastings, with a field-strength of 100 microvolts, reception was still good.

Pictures were still coming in when the boat docked at Le Havre, but interference from cranes and other dockside and ship machinery rather spoiled them. Similar trouble was later experienced at Southampton.

Later, reception near Alum Bay was perfect, but once again dock interference upset things at Plymouth, although a measurable signal was being obtained.

No doubt engineers will be able to take care of interference produced on the ship, and we may look forward to big things in ship television as the outcome of this origination of the idea by Marconiphone.

QUESTIONS AND ANSWERS

By K. D. ROGERS

REDUCING HIGH NOTES IN A PENTODE OUTPUT CIRCUIT

T. H. (Newbury).—*I have been told that a variable condenser between the anode and grid of an output pentode will act as a high note reducer. Is that right?*

Yes, sir. It acts as a sort of reverse reaction condenser feeding back part of the impulses in the anode circuit to the grid circuit. The higher the value of condenser the more is fed back.

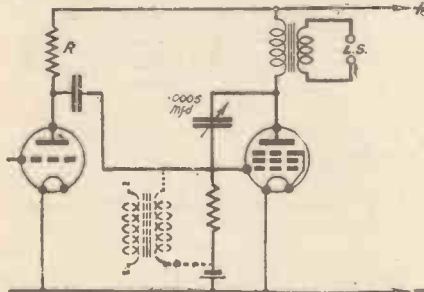
As the impulses are out of phase with those in the grid circuit the effect is to cut down the volume.

That looks silly at first. But it must be realised that the reactance of the condenser is such that it will allow the high notes (or higher frequencies) to be fed back to the grid more readily than it will allow the lower frequencies. The result is that there is a greater reverse reaction on the high notes than on the low ones. Thus the high notes are cut down. Ingenious, isn't it?

Someone will probably write in, however, to tell me that the condenser is in effect merely "across the anode and earth of the valve," or "across anode and cathode," or "across the loudspeaker transformer" in effect, and therefore what is happening is just a by-passing effect.

Admittedly there is such an effect, but it is very small. You must remember the impedance of the

BETWEEN ANODE AND GRID



A .0005-mfd. variable condenser, connected as shown, acts as a high-note reducer. (See answer to T. H., Newbury.)

grid leak and the anode resistance R in the case of the resistance-coupled set, and the impedance of the secondary of a transformer if an L.F. transformer circuit is used. These things would so militate against a .0005-mfd. condenser (as shown) by-passing anything that the by-pass effect is negligible.

MAINS BORNE INTERFERENCE

W. R. E. (Sydenham).—*I have a great deal of trouble from interference carried by the mains from the electric trains. Every time the trains change over the pick-up shoes from one rail to another I can hear the change in the set.*

I have tried every test I know, and while interference suppressors certainly get rid of some of the trouble due to other forms of interference, I cannot stop the train racket.

Shall I have to grin and bear it? Can something be done?

Without a personal test of the interference at your own home I cannot say for certain what is likely to act as a complete cure—if anything.

I should advise you to write to the Radio Department of the General Post Office; label your envelope "Interference," and tell them all about it.

In many cases they send down engineers to test the trouble.

WHAT IS HAPPENING?

Here is a query for readers to answer, so do your best.

C. J. (Portsmouth) writes to say that he has read the letter from "Dabblers" in "P.W." October 16th, and he agrees with the statements made about relay service pick-up. Then he goes on like this:

"I experience a similar trouble to 'Dabblers,' but in my case it is Normandie, and I can hear it R2 to R3 on practically the whole of the S.W. band.

"If my finger is put on the input grid of the amplifier I can hear Normandie at good strength. This is not L.F. induction from relay wires or from another receiver."

There you are. You might wonder why C. J. puts his finger on the grid if he doesn't want to hear Normandie. But the case is interesting.

Is the French station coming in through his body as aerial—he is not so very far away when you think of it—and then being rectified by the L.F. valve? Or isn't it?

I am not going to try to answer this query. It is time you all had a little mental exercise, so you can write to me and answer it for me. I shall publish the replies—or some of them—that I consider the most feasible.

And if you say, "Aha, the beggar doesn't know. That's why he's asking us to do his work for him," you are right—up to a point. I don't pretend to know.

Probably S.W. choke tuning is due to the pick up of the station all round the S.W. scale. Probably the finger phenomenon I have mentioned accounts for the other "manifestation." But I don't know for certain. So let's hear what you think.

CAN I?

I have a trickle charger (writes a reader from Slough) for H.T. batteries. Can I use it as an H.T. mains unit?

I cannot say. If the charger gives the necessary voltage you might do so with good smoothing equipment attached. On the other hand, you could not do it if it is designed for those H.T. batteries which are put in parallel for charging and then have a quarter of an amp. pumped in.

Let me know more about the charger, type, etc.

PRETTY LIGHTS

R. J. (Grimsby) says that he gets a "brilliant blue light" from his U8 rectifier. *He thought it might be of the mercury vapour type, but understands it is of the hard vacuum type.*

Yes, that's right. It is—or should be. It looks as if yours is a bit soft. I should get it back to the makers for test if I were you before it goes phut. After that they may not be so impressed with your story about the blue light. After all, you live in a "fishy" neighbourhood, and while I believe you the makers might not after the valve has burned out.

It certainly sounds to me as if it is very soft for a rectifier, and if that is the case it will enjoy a bright life but a short one.

Your query about the resistances I have passed on to the technical draughtsman. He will be working it out for you and will probably let you have a rough sketch.

THOSE ELIMINATORS

J. V. (Norfolk).—*Should not eliminators be tested every now and then? I believe that faulty mains units cause a lot of the troubles in sets.*

I agree—up to a point. The dry rectifier type is usually pretty reliable as regards the constancy of the H.T. output of the rectifier, but the valve rectifier should be tested at intervals to see if it has lost emission.

Where I think the trouble is mostly to be found is in the electrolytic condensers. They are not yet completely reliable and a faulty—leaky, not necessarily broken down—electrolytic condenser can play old Harry with a set without it being suspected except by an expert.

He suggests I write an article about eliminators and their faults. Maybe I'll do it—if the Editor will stand for it.

Then he goes on to kick my pants for not having suggested to H. I. B. (Walford) in the October 23rd issue that he should try different valves as a cure for his hum.

"Valves often give rise to hum," writes J. V.

He is correct: they do. Only our Watford friend had mentioned in his letter that he had tried all sorts of valves without result.

I ought to have said so in my reply. Sorry.

CLUB, PLEASE!

George Henshall wants the names and addresses of any radio clubs in his district. *Perhaps the secretaries will drop him a line. He lives at 23, Carpathia Street, Garston, Liverpool 19.*

TOO LATE!

J. M. (Beckenham).—*I have thought out an idea for the projection of a cathode-ray television image on to a screen through a system of lenses. Is it new? Can I patent it?*

Without going into the matter deeply—and I have studied your sketch, J. M.—I am sorry to have to say that you are too late.

Such projection has already been done, and Philips (I believe it is) have a television receiver coming on the market before long giving a projected picture from a specially brilliant cathode-ray tube. It will be projected by lenses, of course.

I do not know that your particular method of cathode-ray construction is not new, but I do not think it would form a valuable patent in view of the fact that its object is one that has been successfully covered already.

I cannot see the object of the thick layer of fluorescent material. It would probably only increase the lag of the tube, and that is not desirable.

The Editor cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped, addressed envelope must be sent with every article.

All Editorial communications should be addressed to the Editor, "Popular Wireless," Tallis House, Tallis Street, London, E.C.4.

All inquiries concerning advertising rates, etc., to be addressed to the Advertisement Offices, Tallis House, Tallis Street, London, E.C.4.

The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialties described may be the subjects of Letters Patent, and the amateur and the Trader would be well advised to obtain permission of the patentees to use the patents before doing so.

THE S.T.500

Anyone got a blue print and copy of "P.W." dealing with the S.T.500? You, sir? Thanks. Please drop a line to Mr. R. G. Milne, 1, Bridge Street, Keith, Banffshire; he's asking for it. Thank you!

A B.B.C. TRANSFER

THE B.B.C. announces that Mr. Gordon Crier, Studio Manager in the Television Department, will be transferred as a producer to the B.B.C. Variety Department early in the New Year.

Mr. Crier was appointed to the Television Department in February this year. Before joining the Corporation he had been stage manager for Dennis Neilson-Terry and Sir Barry Jackson; stage director for Emile Littler in pantomime, and for Dame Sybil Thorndike. He has also stage managed in Canada and America.

In addition to his duties as stage manager of Television, Mr. Crier devises and produces the "Television Follies," which are a regular programme feature at Alexandra Palace.

He has also recently written several shows for sound broadcasting, notably the fantasy "The Princess of Paraphernalia."

CLUB NEWS

EDGWARE S.W. SOCIETY

This society has arranged a programme of field-days for the winter months, at which visitors will be welcome.

The club meetings are well attended and Morse practice is progressing well, the members proving quite good at speed tests. The various clubs at home and abroad who have written wishing the society luck are heartily thanked for their kind wishes. Full particulars of membership and meetings can be obtained by writing to the Hon. Sec., Mr. George Yale, 40, Raeburn Road, Edgware.

EAST DORSET AND WEST HANTS RADIO CLUB

It is proposed to form a club in the Bournemouth-Poole area, under the above title, meeting monthly.

The co-operation of G5OH has been obtained, and others in the district are being approached.

The proposed annual subscription is 5s. Inquiries would be welcomed from anyone in the area interested in the formation of this club, and these should be addressed to Mr. D. M. Williams, "Amberley," Cornwall Road, Poole.

WEST HERTS AMATEUR RADIO SOCIETY

The first meeting of the above society was held recently at the Handicraft Centre, Gossoms End, Berkhamsted. Business was of an informal nature, consisting of the election of officers, the reading of a Paper on ultra-short wavelengths, and the demonstration of two short-wave receivers. It is hoped that a television demonstration can be arranged in the near future.

A hearty welcome is extended to all who are interested in amateur radio and short-wave transmission and reception. Details from the Hon. Sec., Colin Peck, 2, Queen Street, Tring, Herts.

WELLINGBOROUGH AND DISTRICT RADIO SOCIETY

The fortnightly meeting of the Wellingborough and District Radio and Television Society was held at the Exchange Hotel, Wellingborough, on Wednesday evening, October 27th, when a lecture, entitled "Television and the Cathode-Ray Tube," was given by Mr. Bettridge, of Messrs. Marconi-Phone.

Commenting upon the present-day position of British Television, Mr. Bettridge said that Great Britain was well ahead of any other country and the Emitron camera was an exclusive British product and far in advance of anything that had been produced in other countries. Questioned as to whether he, Mr. Bettridge, thought the future of television was as rosy as the television manufacturers would have us believe, Mr. Bettridge stated that on the whole the sale of television receivers inside the service area of the television station had been much slower than had been anticipated and he blamed the sparse and often unsuitable programmes radiated, and the lack of funds on the part of the B.B.C. for this.

A Television Forecast

Such broadcasts that had been televised, such as the Coronation ceremony, had caused a large number of people to buy television receivers, but apart from the fillip given to the trade by that broadcast, sales had been much lower than would enable the manufacturers to mass-produce receivers and considerably lower the price of television receivers.

Ten years, said Mr. Bettridge, would see the almost universal use of television receivers, and in that time 90 per cent. of the country would have a television service available. Asked where the money was coming from to

provide funds for the erection of relay stations, the speaker said that the only hope was for the Government to make a subsidy or grant to the B.B.C. to help build the relay stations, the demand for receivers would immediately follow and a large reduction in prices would then come about. As it was, the B.B.C. could not possibly afford the expense of building the relay stations—and, after all, the Post Office netted a very large proportion of the licence fee at the present time and it would be an act of justice to return some of this money to start the cycle of prosperity in the television industry and so provide television in every home that at present had a radio receiver.

The president of the society, Mr. A. E. Fletcher, was in the chair, supported by the Hon. Sec. and a fair attendance of members. Hon. Sec. of the society, Mr. L. F. Parker (G 5 LP), 22, Second Avenue, Wellingborough, Northants.

ST. GEORGE'S HALL

Life stories of stars and celebrities are nowadays commonplace, but it is not often that a building has even the material to justify a "biography" of itself. But St. George's Hall, in Portland Place, London, now the home of the B.B.C. Variety Department, has seen many different kinds of entertainment during the seventy years of its existence, about which Leslie Baily has collected the material for "Entertainment at St. George's, 1867-1937," to be broadcast on December 3rd in the National programme and on December 4th on the Regional wavelength. Charles Brewer will produce the programme, in which several people associated with activities at St. George's Hall in the past will take part.

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ABSOLUTELY COMPLETE WITH 10 COILS & specified H.V.A.C L210 VALVE

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Cash £2/9/3, or **5/6** WITH ORDER and 10 monthly payments of 4/10.

KIT comprises: £ s. d.
Set of all necessary extra components, condensers, resistors, panel, platform, choke, coil and valve holders 13 8
10 Coils for all specified wavebands 1 7 0
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£2 9 3

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3 Minutes from St. Pauls

LONDON RADIO SUPPLY COMPANY EST. 1925

11 OAT LANE, NOBLE STREET, LONDON, E.C.2

You'll get it QUICKER and on BETTER TERMS from L.R.S.

Questions About Aerials

AMONG my post I quite often get letters from readers asking me whether I can recommend this, that or the other kind of new-fangled aerial. As you probably know, there are all kinds of aerial available, some made of stranded wire which is claimed to be extra efficient in pick-up properties; some in the form of a cage; some in the form of a "shaving brush," and so on. Perhaps a reader has heard a friend's set working from some particular kind of aerial and wants to know if it is worth his while to go in for an aerial of the same sort.

Well, it is always very difficult to give a definite answer on the question of aerials, because so much depends upon the location of the aerial, its height, the arrangement of the down lead, and the surrounding objects, such as buildings and so on.

Depends on Conditions

The same aerial will give quite different results in different conditions, and this fact alone goes to show how hard it is to predict what any particular aerial will do in any particular conditions. To compare honestly different types of aerial it would be necessary to set them up one by one—separately, not all together—in the same conditions and make tests under very accurate scientific control. Some people claim that one particular kind of aerial gives wonderful results, which no doubt it does if they say so, but that doesn't mean to say that the same aerial will give the same results in your particular conditions.

Try One or Two Different Kinds

Aerials are comparatively cheap nowa-

TECHNICAL JOTTINGS

Items from an expert's notebook.

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

days—the principal cost is in the erecting—and therefore it is not a very killing matter, if you feel very tempted about it, to try one or two or even more different kinds of aerial and see what sort of comparative results you get.

But I am afraid it is no use asking me, or anybody else, to tell you beforehand just how any particular aerial is going to act. This would be bad enough even if I knew the precise conditions in which you proposed to erect it, but when you bear in mind that I have not even seen the conditions you will realise that it is impossible to give any very reliable answer. The most reliable answer I can give you is what I have already done, and that is to try something of the same kind and see if it appears to be an improvement on your present outfit.

Loose Valves

I was fitting a new (and, by the way, very expensive) valve into a set the other day when, to my great disappointment, I found that the glass bulb was loose in the moulded base.

I need hardly say that, before going any further in handling the valve, I took the precaution to fix the base securely in position with adhesive very carefully squeezed and worked down the nick be-

tween the glass and the base, leaving the valve until the next day before handling it again. Glue in any form has the faculty of sticking like—well, nothing on earth to glass; any form of celluloid cement is not nearly so good for this purpose as it does not stick nearly so tightly to glass as glue will do.

A Special Cement Used

When the glass bulb is fixed in the base by the valve manufacturers it is generally secured by a form of cement after the style of plaster of paris. Each manufacturer has his own particular formula for this cement, but in any case you cannot use the same kind of thing for repairing a loose valve, because you cannot get at it in the same way as when it was being assembled in the first instance. When it is being made, a good dab of the cement can be inserted into the cavity of the base, and the valve just squeezed in. I think the glue idea is about as good as you can when you have to repair a loose valve. This is a trouble which quite often happens, and if any of you have come across any better dodge than this I should be glad if you would let me know.

Don't Handle

But whatever method you use, I strongly advise you never to go on using a valve, and particularly handling it, that is, inserting it and pulling it out, if the glass is loose in the base. You may think you are being very careful, taking hold of the base only with your fingers and not touching the glass, but sooner or later you are certain to forget this, grab hold of the glass bulb and pull it out of its base, thereby breaking off

(Continued on next page.)

THE SUM TOTAL OF A GOOD CIGARETTE



100404E PLAYERS NAVY CUT CIGARETTES 'MEDIUM' OR 'MILD' 10 FOR 6^p 20 FOR 11^p

To maintain Good Reception

To trace faults it is essential to have an accurate meter. The AvoMinor enables you to service your set efficiently and speedily. With either of these accurate combination meters you can track down trouble quickly and make every test to valves, circuits, components, batteries and power units. Each model of the AvoMinor covers a wide field of measurement and provides testing facilities unrivalled by any other meters near their prices.



The D.C. AvoMinor
Current
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0-30 "
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Voltage
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Resistance
0-10,000 ohms
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A smaller brother of the Universal Avometer. Gives 22 ranges of readings (A.C. and D.C.) of current, voltage and resistance. 3in. scale. Total resistance, 200,000 ohms. Complete with instruction book, leads, interchangeable testing prods and crocodile clips.
Price £5.10.0
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BRITISH MADE
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Obtainable at all good Radio Shops

TECHNICAL JOTTINGS

(Continued from previous page.)

the leading-out wires and ruining a perfectly good valve.

Photo-Cells

Those of you who use photo-cells will be interested to have some up-to-date details of the Cetron photo-cell which is claimed to be one of the best on the market. This particular appliance hails from the United States, and has been in use for some time past by sound-equipment manufacturers and various industrial organisations. The particular advantages claimed for the Cetron cell are, first of all, longer life than most of its competitors and, secondly, higher ionisation point. As regards the first point, it is claimed that Cetron cells have been on continuous test for several years and show very little change in their characteristics.

Ionisation Point

With regard to the ionisation point, most cells ionise around 100 volts, and this is apt to limit their efficiency and operation to a comparatively narrow voltage range. The Cetron photo cell on the other hand is claimed to have an average ionisation voltage of 125 volts, giving a wide range and avoiding critical adjustments; also the gas ratio is unusually low.

As regards current output, the makers of this cell make the remarkable claim that it gives two to five times as much current as any other cell on the market similarly tested. It is furthermore claimed that the cell has a very wide frequency-response, and will show an almost straight-line-frequency response from 20 cycles upwards over the entire audible range, and even up to frequencies of the order of 100,000 cycles, this latter frequency being, of course, much beyond the audible range. When used in talking-picture apparatus it is said that this photo-cell gives a better quality of reproduction, owing to the higher ionisation point.

Various Applications

Further details are that the cells are non-microphonic and that the glass bulbs are clear, that is, free from any smudgy appearance that will absorb light and reduce efficiency. They are made in 36 different types for all purposes, including sound-equipment, colour analysers, safety devices and the various electronic applications.

Full information, with interesting technical details and circuit diagrams can be obtained from Batwin Electrical Appliances, Limited, 138, Southwark St., London, S.E.1.

A.C. and D.C. Instruments

I often get letters from readers asking if it is possible to use alternating-current measuring instruments on D.C. circuits or vice versa. I expect a great many of you have been in the same difficulty. It is curious how when experimenting you never seem to have just the right instrument to hand unless, of course, you are one of the plutocrats and can afford a range of instruments to suit all purposes. In passing, I should mention that you can nowadays obtain very excellent combination instruments which, after a little study and practice, you can readily adapt for almost any purpose under the sun, and these combined instruments, whilst being extremely useful, are also relatively inexpen-

sive, having regard to the multitude of purposes they serve.

However, that is by the way, and unless you have such an instrument you often find yourself in difficulty because you have, say, a D.C. instrument and you want to read A.C.

As a rule an A.C. instrument will read D.C. current as accurately as A.C.

Universal Measuring Devices

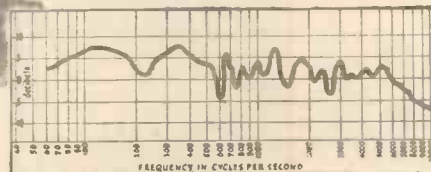
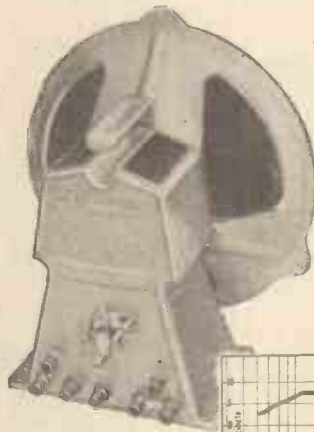
A very interesting innovation in connection with universal A.C., D.C. instruments has been made lately, which is based upon the use of a copper-oxide rectifier. You will see at once that if a small and reliable rectifier could be incorporated with a D.C. instrument, then when the rectifier is in circuit this instrument can be used for reading A.C., because with the rectifier A.C. becomes D.C., and it is D.C. which feeds into the instrument all the time. It

goes without saying that such an arrangement would be useless unless the rectifier were of quite a high order of accuracy and reliability. So far as I know, none of the rectifiers which were available before the days of the copper-oxide rectifier would have been really suitable for this purpose.

There is no doubt that the copper-oxide rectifier marks a new era in the practice of alternating-current rectification, and there seems to be no limit to the purposes to which this type of rectifier can be applied.

An interesting and important Paper on the use of these rectifiers in connection with ammeters and voltmeters was recently read before the Institution of Electrical Engineers, and it was shown that this rectifier may well open up a new field in connection with electrical measurement, just as it has done in other branches of electrical practice.

Satisfied with your reproduction?
WAIT TILL YOU HEAR THIS!



Make no mistake—here is no mere superficial alteration in design.

An observant glance at speech coil, centring device, and cone, will show you a few of the differences; and two or three minutes of listening will show you many more.

Another 600 cycles of top response—complete absence of 3,000 cycles peaks—slight gain in average sensitivity—it takes a keen ear to analyse this new smoothness and fidelity, but no ear can fail to detect it.

Prices (at present) remain at the old low level—17/6 to 42/-. Get your new Stentorian speaker now!

“An ideal speaker for the S.T.900 or any set,” says Mr. L. W. Orton in his independent test (*Popular Wireless* 30/10/37). Hundreds of delighted new S.T.900 owners endorse his statement daily.



ANOTHER NEW

Stentorian

DIFFERENT—AND BETTER STILL

WHITELEY ELECTRICAL RADIO CO., LTD. (Information Department) MANSFIELD, NOTTS.

FROM OUR READERS

THE FUSE BULB THAT LIT UP THE SET

The Editor, POPULAR WIRELESS.

Dear Sir,—I would like to write to you, if I may, of an experience which befell me recently. I am the owner of a battery three-valver, two tuned circuits and one L.F. Well, the other day while listening-in to the medium-wave band I happened to tune-in to a station on a wavelength of about 369 metres. Imagine my annoyance when, without warning, a terrible crackling burst forth from my loud-speaker. For the minute I put it down to atmospheric, but when it continued I suspected other trouble and, thinking it was perhaps interference from a neighbour's set, I switched off, only to switch on again and find the same racket prevalent on the same wavelength.

Then I decided that it must be my set that was at fault, so I left the set on 369 metres and opened the back, to find to my horror that the fuse bulb was glowing brightly. I immediately switched off and put on my thinking-cap. Finding no satisfactory explanation for it I decided to have a look at the works. Suddenly it dawned on me—H.T. was leaking through somewhere—so I began a careful inspection of the works, finding, a few minutes later, that the anode of the first detector was indirectly connected to the fixed vanes of the ganged variable tuning condensers. Here was my trouble: one of the variable vanes was shorting across the fixed vanes, and, of course, the fuse bulb was glowing. Five minutes later my trouble was ended. Wishing your interesting paper all the best.

JAMES C. PENNY.

Woodsford Rectory, Dorchester.

TOO MUCH NOISE

The Editor, "Popular Wireless."

Dear Sir,—While the Ministry of Transport, scientists and most other people are striving after a quieter background to life, the B.B.C., apparently, doesn't believe in it, and aims at readjusting the balance by indulging more and more in their "background to broadcast" noises.

The latest addition to an already annoying number of occasions when the boisterous young fellows at the B.B.C. apparently adopt "more and more noise" as their motto, was demonstrated the other afternoon during a dance music session. Someone thinks (or does he?) that a background of cheering children adds to the tango's appeal. The said children's voices undoubtedly sounded great as an accompaniment to the broadcast of the Coronation procession, but mixed up with dance music they are just a pain in the ear.

Everyone, of course, is familiar with the music hall audience that always blots out the point for the listener of any radio comedian's joke, by their anticipatory laughter and applause. It can only be supposed that no one has enough "savvy" to switch off the auditorium microphones.

But the looniest of inmates at the Looney Bin surely can see no virtue in a background of futuristic music (?) that renders completely inaudible the spoken word in many radio plays. Perhaps the producer is trying to be merciful by blotting out the more painfully impossible dialogues. Stravinsky versus Chekov. Poor listener!

The ways of the B.B.C. are often bewildering, but this prize exhibition of cranial solidity will take some beating. An announcer makes a touching appeal for listeners to keep down the volume of their loudspeakers, explaining and demonstrating with two gramophone records how speech and music heard together are altogether too painful. The said announcer then frequently continues the programme with a gramophone recital, and one can only charitably suppose he does it to give point to the thing he has just been deploring—proceeds to start off the records and announce the titles simultaneously. Words and music!

It now only remains for a few appropriate noises from the local abattoir to be introduced as background to the dead meat prices!

A. E. ROSE.

75, Breedon Street, Long Eaton, Notts.

A peculiar fault in a reader's set, and how it was traced and rectified.

GIVES "SAFETY FIRST"

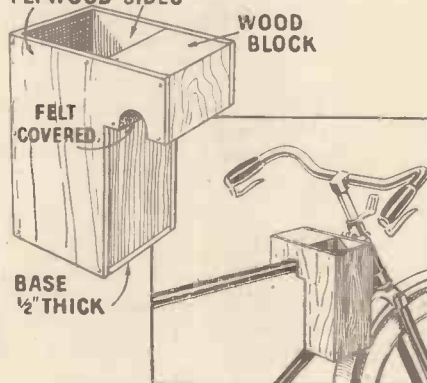
The Editor, POPULAR WIRELESS.

Dear Sir,—I enclose a diagram of a box for carrying a wet L.T. battery on a cycle so as to leave hands free for steering. It is advised to make the two sides of plywood, as single-grained wood will break.

In my own case I have had to cut a slot in each side to take the extra width of glass for the handle. The handle of the battery is used for one end of the strap, the other end being passed around the bottom of the box below the down-tube. The box will, of course, keep on without support from straps, the weight of the battery keeping it down on the cross-tube, but the roads here are very bumpy, and I use a strap for safety.

R. WALMSLEY.

51, Oozehead Lane, Blackburn, Lancs.

FOR YOUR ACCUMULATOR
PLYWOOD SIDES

There must be many readers who take their accumulators to be charged, on bicycles, and who will welcome this tip from Mr. R. Walmsley.

MORE ESPERANTO WANTED

The Editor, "Popular Wireless."

Dear Sir,—One has only to look at a recent Esperanto publication of the Brno radio station to realise how much we are losing through the failure of British Broadcasting to take advantage of Esperanto for making known the culture of our country to other nations.

"Verda Storio: Esperanta Almanako de la Cekoslovaka Radio" is an excellent publication of eighty pages, containing chapters on the Czecho-Slovak State and its radio service, and some fifty pages on the evolution, programmes and personnel of its Esperanto broadcasts, the detailed list of which discloses a wonderful variety of programmes, comparing well with those in the national tongue. Some of the Czech broadcasts last one hour, and one filled 100 minutes. Tributes are paid by many people to the clarity of the broadcasts, and to the beauty of the language.

If the B.B.C. were to undertake anything on the same scale, its programmes would reach a far greater number of Esperantists than those who listen to the Czech broadcasts; and a lead in this direction would stimulate other countries to provide "international fare." It is almost unnecessary to remark that the use of an international tongue would greatly increase enjoyment of programmes, and do much for peace in the world.

At present thirty to forty radio stations broadcast regularly in or about Esperanto, and numbers of courses are given. The B.B.C. should see what it could do in this matter.

Besides the radio, there are numbers of other pleasures to be had from the Esperanto movement. Perhaps it is impossible for most of us to go abroad to one of the annual Universal Esperanto Congresses, but we can at least wait till one occurs in our own land. Next year, the Congress will take place in London from July 30th to August 6th, when several thousand Esperantists from as many as thirty to forty lands are likely to be present.

As most people can learn Esperanto in six to nine months, there is ample time to become fluent enough to take part in the Congress. Why not start now, and make many foreign friends.

I should say that most Esperantists use their language for foreign correspondence. I myself have never been abroad, but I correspond with a number of lands. Some people find it possible to correspond after a few weeks. I myself became fluent in three months, and became Esperanto editor and translator for a small polyglot fortnightly newspaper after nine months, although till then I had had to do only two translations per fortnight during a few months.

Several thousand Esperanto books have been published already, and some 100 Esperanto journals of all kinds appear throughout the world.

The language has spread to all countries, one of the strongest movements being found in Japan. In Europe, besides those in Great Britain, there are large numbers of Esperantists in France, Spain, Belgium, Holland, Denmark, Norway, Sweden, Germany, Austria, Italy, Czecho-Slovakia, Hungary, Poland and Russia.

Further information can be supplied by the British Esperanto Association, 142, High Holborn, London, W.C.1.

W. J. BRIGDEN.

(Hon. Sec. Pacifist Esperanto League.)
232, Sellincourt Road, Tooting, S.W.17.

ABOUT MORSE INTERFERENCE

The Editor, POPULAR WIRELESS.

Dear Sir,—Re Mr. G. Gooch's letter complaining of Morse interference with Regional programmes. I must say this seems very strange, as Mr. Gooch states he received this interference on whatever English programme he tuned to, regardless of wavelength. This seems to point in my opinion to some local interference. Also, is Mr. Gooch certain what he heard was actually Morse code? May I say in conclusion I find no trace of this trouble on my set, which is by no means up to date, being, in fact, the good old "Air-Sprite" with Class B added.

Wishing "P.W." every success.

H. HICKLING.

71, Halifax Road, Wadsley Bridge, Sheffield.

THE VALUE OF MORSE

The Editor, "Popular Wireless."

Dear Sir,—In reply to Mr. G. Gooch about Morse.

How would he like to put himself in the place of my father who is a captain of one of the steamers plying from Dover to Dunkirk?

Unknown to Mr. G. Gooch, those Morse signals might mean life or death to those on board ship.

A glance at the address will show that we get Morse signals day and night on all the wavebands.

Before now I have heard when these will send anyone cold when you think how many lives depend on those signals. Only those on board know that they depend on a ship to help them to safety.

I might add that I am only nineteen years of age, and that I have studied wireless for ten years, starting on threepence a week.

I have been a reader of "P.W." for about eight years, but I still use a one-valve set with plug-in coils, which has an ebonite panel and baseboard.

Wishing "P.W." all the best, especially Mr. G. Gooch (I hope that I have not been too hard on you).

P. S. ROBINSON.

Gordon House, Dover Road, Folkestone.

(Continued on next page.)

FROM OUR READERS

(Continued from previous page)

SUCH IS LIFE !

The Editor, POPULAR WIRELESS.

Dear Sir,—All radio enthusiasts, whether listeners or experimenters, like to hear any amusing incidents which crop up, so here are three incidents which happened to me, and one which occurred at a friend's shop. All are true. A few years ago I was called round to a friend's to see why the set wasn't working right, and while I was there I asked him why the windows were open when it was such a cold day. He replied, "I must open them, or how are the wireless waves going to get to the set."

Not long after, one of my mates bought a set and came round for me to tell me it had

WHO WANTS A GUINEA ?

Most of you, probably ! Well, you all stand an equal chance of winning the guinea awarded each week to the sender of the best letter, in the opinion of the Editor. Neither literary merit nor length is a criterion of success ; no radio subject is barred. This week the prize goes to Mr. J. C. Penny.

arrived, but would not go. I went round immediately and, going in the kitchen, I was surprised to see his father and brother-in-law with a valve each, warming them before the fire. I asked what they were doing, and they replied that on switching on they couldn't see them light up, so they thought that if they warmed them it would put matters right. Needless to say, after putting valves in and connecting up batteries, set was O.K. The third incident happened to my friend who is a dealer. A lady came in one day and couldn't think what she had come for, when all of a sudden she said, "I know, it's one of those things Cleopatra used to wear." It seemed her husband had damaged his loudspeaker cone, which was one of those golden affairs, and sent her round for a new one.

The last incident happened to me a fortnight ago. A friend of mine bought an all-wave receiver, and not being able to receive America he sent for me. I soon showed him how to work it, and going from 16 metres to 50 metres I said, "That's Bound Brook, that's Schenectady, that's Zeesen, that's Rome, that's Daventry," etc., to the top of the band. On reaching the top I thought I would get Schenectady on 19 metres, so tuning down I passed through Rome on 25 metres and stopped as the music seemed familiar. After listening a second or two I said, "Tannhäuser," and imagine my surprise when he said, "And where's that ?" Well, after that, I think I'd better end, so best wishes to "P.W." and long may it reign !

H. J. BARLOW, 2 B C X.

8, Harton Avenue, Gorton, Manchester.

A WELCOME CHRISTMAS GIFT

MOST boys of to-day are keen on mechanics and science, and you could give them no more welcome Christmas present than the excellent **BOY'S BOOK OF MECHANICS AND EXPERIMENT**, price 6/-. Magnificently illustrated, it deals with dozens of mechanical devices and science in many forms, and includes simple and safe experiments that may be carried out in the home. Youthful engineers will be especially attracted by the articles on making inexpensive working models—an absorbing and very instructive hobby.

SWITCHES MEAN HITCHES !

(Continued from page 265.)

perfectly on another waveband the probability is that one of the coils used first is faulty. If, however, the set does not work properly on other wavebands, the fault lies probably in the wiring, the valves or batteries, or some other component. In any case, the only instruments you require for testing a plug-in coil are usually only a pair of eyes. The only fault that might not be really visible is a reversed reaction winding—and you can prove this by trying the other coil of the same waveband by interchanging it. A break in a winding is easily tested by the cheapest voltmeter.

With a plug-in coil of this type everything is so much aboveboard and open that you experience a justifiable and very gratifying feeling of security and confidence. Instead of always rather wondering whether something is wrong or is going to go wrong, you are not going to have any worries. You are no more likely to worry about the coils than you are that a valve manufacturer has reversed the connections to grid and anode.

I think I have presented an overwhelming case in favour of efficient open-air plug-in coils as against the cramped, unreliable switch-containing canned units.

As regards reliability you cannot, of course, make any comparison at all. Every turn of a switch in a complicated unit is another nail in its coffin. You never know when, where, how, or why the switch is going to break down. Ask any wireless shop or service man what are the main causes of breakdown. He will say switches

and potentiometers. Both are deliberately omitted from the S.T.900.

The only argument, then, against the plug-in coils is that extra few seconds of trouble per evening. Do you not think, now, that it is very well worth while, not only from the point of view of technical results, but also from the fact that you can build the S.T.900 with absolute assurance that the inductance part of it will be right when you build and will remain right ?

I have grown weary through the years of complaints about manufacturers' coil units either not being correct when sent out or developing faults later. This time I have provided an absolute and complete solution of the problem which enables you to go ahead with every assurance of success without that gnawing feeling that something may be wrong—or go wrong—with the coil unit.

Its Simplicity Is An Advantage

The very simplicity of the six-pin coil, which manufacturers have been making for years, ensures easy construction and testing (without having to train special staffs) and adequate supplies in a hurry. The question of quick supplies of coil units has also been very much at the front of my mind. The disgraceful delays of past years cannot be allowed to occur again, and here again the obvious solution is the plug-in coil in which every coil resembles every other coil except in the thickness of wire and the number of turns.

As regards the little extra trouble of changing coils, this has been greatly

(Continued overleaf.)

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SWITCHES MEAN HITCHES!

(Continued from previous page.)

minimised by the introduction by B.T.S. of a coil with a special guiding plug which ensures that the coil can only be put in its correct fashion. You simply turn the coil until the centre plug slips in a similarly shaped slotted hole in the coil holder, and then all the six metal plugs slip home into their correct sockets. The whole process is extremely rapid and can be carried out just as well with the eyes closed. The process is easier than fitting a key into a keyhole. There is no having to look at the position of the pins every time and then wagging them into the right sockets. It is vastly easier than plugging a four-pin valve into its holder. But even if this system were not available to constructors, the ordinary method would involve so little trouble that the advantages of a plug-in coil would remain overwhelmingly in its favour. I had decided to use plug-in coils before this simple-to-plug-in type was evolved. This is a further development which finally wipes out the faintest remaining prejudice.

J. S.-T.

RANDOM RADIO REFLECTIONS

(Continued from page 266.)

a fair amount of time devoted to them. Several hours every day, in fact.

But one hour per evening, week-days only, is a mighty thin ration, and that is all television has to offer. No, I'm not forgetting the afternoon sessions, but these are of no use to most of us who have to work for our living. I think the B.B.C. ought to do its damndest to extend the programme hours. And why should television have a holiday on Sunday, the very day when most people might want it?

It is pure bunk to say that without much more boodle the same thin ration must continue. It shouldn't be difficult, as the Editor of "P.W." has already suggested, to put the television cameras on some of the sound-only material. And what is wrong with running some chunks of film?

If, as appears to be the case, television is sticking badly, then, in my view, it is the B.B.C. that is to blame. They have the technical equipment and are using it extremely well—but for too brief periods.

Another thing: Their programmes, such as they are, are often "mooked" about without note or apology. I've several times run up against that. For example, the other evening I was glancing at the television programme in the *Radio Times*, and I saw that James Agate was billed to appear, so I altered my plans for the evening. It was worth it to see and hear the author of the "Egos" doing a spot of personality stuff.

It was due at nine o'clock. But when that hour arrived there was no "Ego"—not a sniff nor a nod from the worthy James. Not even a word about him from the charming announceress. She merely introduced some song act, and that was that. I listened and watched through this until the second item was announced, and as there were still no signs or signals of the Agate, I disgustedly switched off and went out to pay my delayed visit.

Well, that sort of service isn't going to help to put television on the map.



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

MANY people think that fuse design is a simple matter and that all one requires is a piece of easily fusible wire stretched between two points so that when a current above a certain predetermined value passes through the fuse the wire will melt and so break the circuit. This, of course, is what a fuse actually does, but there is far more in the design than meets the eye.

In radio, for example, the ideal is a fuse capable of withstanding the surges which occur when first switching on a wireless set, and, at the same time rated low enough to protect the receiver against a small continuous overload. Usually the faults which occur in a radio set result in a heavy current in only one secondary winding to the mains transformer, so that the resulting overload current in the primary of the transformer is insufficient to blow an ordinary house fuse or an insensitive radio fuse, but is nevertheless large enough to cause severe overloading and possibly fire in the set. What is required is a half-ampere fuse with a delayed characteristic which prevents it blowing on a short period overload.

This has been achieved by Belling & Lee engineers, who have been carrying out research on the subject. In the new Belling-Lee "Mag-nickel" fuse those of half-ampere rating will resist the same surges as a one-ampere conventional cartridge fuse and yet will blow on a 75 per cent. overload if the overload persists for one second. These fuses are available in three ratings, namely $\frac{1}{2}$ -ampere for small receivers; $\frac{3}{4}$ -ampere for medium-size receivers from four to seven valves, and $1\frac{1}{2}$ -ampere for large multi-valve set, radiograms, etc.

The price is the same for all ratings, namely 9d. each, and the dimensions are the same as standard radio fuses. Therefore they fit all standard radio fuse holders.

They are colour coded with rings indicating the same nominal ratings as the standard fuses.

* * *

50,000 MILES TOUR

Mr. Roy Moxam of the G.E.C. is going on a 50,000 miles tour of the world with an all-wave radio set as his sole companion. His tour will last for eight months, and is the result of the immense overseas business done at Radiolympia.

Wherever he goes Mr. Moxam will test reception under all conditions, instruct and advise G.E.C. dealers and agents and pursue the company's policy of giving service after sales in all parts of the world. His tour will embrace: Gambia, Sierra Leone, Gold Coast, Nigeria, French Cameroons, Sudan, South Africa, Rhodesia, Kenya, Tanganyika, Bombay, Calcutta and Rangoon, while flights will include trips from Burma to the Straits Settlements and from Malaya to China, from where he

will travel to Australia and New Zealand, and thence via Panama back to his regular job at Coventry.

NEW K.B. SETS

Kolster-Brandes announce two new set releases. The first is the K.B. 620T, a three-valve all-wave battery set priced at £9 complete with batteries. In addition to the normal short waveband this receiver also covers the "trawler" band, thus providing interesting reception from trawlers, coastal stations, lightships and police radio-units. The waveranges are 18-52 metres, 85-220 metres and the usual medium and long-wave broadcast bands.

The circuit utilises an H.F. pentode for radio-frequency amplification and another pentode in the output stage. There is a bandpass input circuit for long and medium waves and special aerial and anode circuits for short waves.

Other features are a "local-distance" switch, combined volume control and on-off switch and separate sensitivity control.

The second set is the K.B. 670, an all-wave A.C. mains radiogram priced at 21 guineas. Apart from the medium and long wavebands, the receiver covers the short waves from 16.5 to 50 metres. The circuit utilises a pentagrid frequency changer, H.F. pentode for I.F. amplification, double-diode-triode for second detector, delayed A.V.C. and L.F. amplification and a power pentode giving three watts in the output stage. Full-wave rectification is provided.

There are six tuned circuits, including a special input circuit to eliminate whistles. The tuning control is of the two-speed type having ratios of 6-1 and 36-1. The tuning control, wavechange and radiogram change-over switches, together with the combined tone control and mains switch are concealed by the lid of the cabinet when closed. Continuous variation of volume of both radio and gramophone is provided by a separate control mounted on the front of the cabinet so that the volume may be adjusted without opening the cabinet lid.

The gramophone unit includes a high-grade motor, which is suspended antimicrophonically to obviate "mechanical" distortion; speed regulator, and automatic start and stop switch. Containers for new and used needles are fitted to the motor-board.

The cabinet is a console of figured walnut with ebonised decorative features and pedestal supports. The set is designed for A.C. mains of 200-250 volts 40-60 cycles.

* * *

STOP PRESS

P.C.J., the famous Philips experimental station at Hilversum and the first station to relay a B.B.C. programme on short waves to the Empire, is ten years old this year. It was, therefore, decided that this week a birthday party programme should be radiated in which many famous radio, stage and screen artists would take part.

Listeners with all-wave sets may hear the birthday programme from P.C.J. to-night, the 17th, from 6 until 8.30 o'clock on a wavelength of 31.28 metres (9.5 megacycles). Artists taking part include Carroll Gibbons and his full Savoy Orpheans Orchestra, Florence Desmond, Haver and Lee, Danny Malone, Greta Keller, the Three Canadian Bachelors and their Hill Billy Band, Miss Fientje de la Mar, Ilomay Baily and Lee Sims.

GETTING THE MOST FROM THE S.T.900

(Continued from page 264.)

to the words "25 metres" on the calibrations corresponding to that coil and make the anode circuit oscillate by applying too much anode reaction. Do not, by the way, turn the pointer to the 25 metres on the S1 or S3 range. These stations will come in on any of these three coils at different points of the dial; at each foot of the dial you will see the words "medium," "long," "S3," "S2," "S1" and "S0." These are the titles of the coils (see coil list) corresponding to my calibrations.

When applying anode reaction for searching purposes to make the set oscillate, do not apply more anode reaction than is necessary to obtain oscillation. The set is most sensitive when the oscillation has just started. With the anode circuit oscillating you move the main pointer over the words "25 metres" until you hear the whistle of a broadcasting station. If the station is very weak you may simply hear a steady whistle. If the station is strong it will be a jumbled whistle, and such a jumbled whistle is nearly always an indication that speech or music is being radiated. A pure whistle, on the other hand, may simply be a Morse station. If you actually hear Morse you would ignore it and pass on to more interesting whistles. Having picked up what sounds like a good station, by the fact that it is both jumbled and loud, you reduce the anode reaction and tune-in the station in the ordinary way on the main dial and the anode reaction. You are getting it in spite of the fact that the aerial balancer is not properly tuned, so when the aerial balancer is adjusted correctly the station will become much louder. You can improve results now by applying aerial reaction and retuning slightly on the aerial balancer.

Aerial Coupler on Short Waves

I have not said anything about the aerial coupler, but this, of course, will control signal strength. It is to be noted, however, that on the short wavelengths lower values of aerial coupler will be usual, and that by increasing the aerial coupler beyond a certain point not only will you not get any louder results, but you may make it more difficult to get sufficient reaction. Also when working at the bottom of the dial on the short waves, a large value of aerial coupler would reflect too much capacity from the aerial circuit and you might not be able to tune low enough on the aerial balancer. These things may happen when you have a large amount of aerial coupler on the short waves, but you

have no business using so much aerial coupler anyway. You do not gain any advantage by doing so. Remember that the aerial coupler is a large one and intended to work on a set going up to 2,000 metres. When working on short wave-lengths, therefore, keep the aerial coupler on the low side.

Still another method of receiving the short waves is the one you were to use when receiving medium waves. This applies if a short-wave station gives good signals and will not require a search. This will apply to most of the stations on the S.T.900 and so no greater skill is required than when tuning the medium waves. The only point to remember is to turn the main pointer slowly. This time you do not make the set oscillate but apply critical anode reaction and turn the pointer around to, say, the words "25 metres" until you hear a good station. Previously the aerial balancer has been set to approximately the final position. Having heard the signal you then adjust the aerial balancer to make it louder, and then apply aerial reaction. If you wish to apply more critical aerial reaction, you will find it convenient to reduce the anode reaction a little.

Tuning Not Complicated

All these methods of tuning sound more complicated than they are. I could demonstrate all the methods in ten minutes. Nearly all the constructors of this set will have had some experience of tuning and if you sat down and wrote exactly what you did when tuning-in a station you would be amazed at the apparent complexity of your operations, which actually you carry out as a matter of course. Because I am giving you the fullest details on tuning do not imagine that there is anything complicated about it. On the other hand, I do think that you ought to read over what I have written several times and carry out the tests and experiments on tuning which I suggest. You will tumble to things on your own even without instruction but it will be a slower business. It would be a good thing to read this article every few weeks.

The S.T.900 is considerably easier to tune than the S.T.800 on the short wavelengths, because the signals themselves will be very much louder due to the greater efficiency of the set, and also because the anode reaction does not alter the tuning of the main pointer. On the S.T.800, however, the anode reaction condenser did affect tuning fairly considerably in some cases, due apparently to the coil design. When the coil is included in a can and has to be designed for switching the efficiency is not as good as I fully explained in my main article on the S.T.900. Due to the enhanced losses, there is greater difficulty in obtaining reaction, and so reaction windings have to be tighter. This increases the capacity coupling between reaction coil and the main tuning coil. Also more capacity is reflected from the reaction circuit into the main tuning coil. The ultimate effect of this is to produce a change of tuning of the main circuit when reaction is altered. In the S.T.900, not only are the coils very much more efficient, but the reaction coils can be better designed and the coupling made looser. Adjusting reaction, therefore, does not alter tuning.

(Continued overleaf.)

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S.T.900 Kits exact to specification with specified valves, and five pairs of specified coils, £5/15/3. Part exchanges. Servwell Wireless Supplies, 64, Prestbury Road, London, E.7.

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GETTING THE MOST FROM THE S.T.900

(Continued from previous page.)

Some of the letters of those who have tested out a sample of the S.T.900 point out how easy it is to go back exactly to a station on the short wavelengths. These wavelengths are highly susceptible to capacity changes, so you can see what a high tribute to the set these remarks are. Unless you obtain these advantages you are liable to pick up the whistle of a station, then lose it when the reaction is reduced because in reducing reaction you have altered the tuning of the circuit and you have to find the station again. You may thus waste a lot of time tracing a station. Nothing of this kind occurs on the S.T.900, and you can go in and out of oscillation without altering tuning.

In general, the S.T.900 tunes in the same way as most of my previous sets, and the aerial reaction is the important additional control. It is undesirable to leave this absolutely at zero (fully left), and I advise you, even when you do not intend to use aerial reaction, to leave a little permanently in circuit, so to speak. You can turn the aerial reaction knob about one eighth way round from its extreme left-hand position.

I have said a good deal about anode reaction not affecting tuning, because I notice on page 201 of the main issue I repeated a paragraph published last year in connection with the S.T.800, in which I said that you should keep the station or its whistle within hearing by means of the main pointer. This is quite unnecessary on the S.T.900, although apart from aerial reaction the tuning of the set is very similar to that of the S.T.800.

You have no doubt heard about aperiodic aerial circuits for short-wave reception. In these an H.F. valve is used but the aerial circuit is not tuned. The claim is made that this system makes reaction smoother, avoids hand-capacity effects (alteration of tuning by moving your hand near the controls), and prevents dead spots in reaction (places on the dial where reaction stops working). The S.T.900 can be used in this way by putting the aerial reaction at zero and turning the aerial balancer to zero (fully left, i.e. anti-clockwise). The aerial coupler may be left at its half-way position. The set can now be used on any waveband, for that matter, but the arrangement is more common for short-wave reception, and all your tuning is now done on the main tuning condenser and anode reaction. This makes the operation of the set as simple as the most primitive broadcast receiver of the det. and L.F. type.

Ignoring Some of the Controls

You will get quite good results on the S.T.900 using this arrangement, which is one more example of my annually repeated assertions that all my receivers could be used as less efficient and easier-to-work sets by simply leaving the extra controls at zero or normal positions. You would receive the short waves by simply making the anode circuit oscillate, finding a jumbled whistle and then "resolving" it by reducing the anode reaction and care-

fully tuning on the main pointer. You will certainly get many stations this way, but the advantages of high-frequency amplification are not obtained nor do you get the added selectivity of a second circuit, nor do you get the benefit of aerial reaction. You can prove the merits of these very simply on the S.T.900 by tuning-in a station in the simple fashion already described and then bring up the aerial balancer until it is in tune; signals will be much louder and the selectivity will be much greater. If you then add aerial reaction you will see the enormous benefits of this system also.

Here is a final note to those who wish to be certain they are correctly tuned. The scientific method of correct tuning is as follows: Tune a trifle below the station on the aerial balancer and get the station at its loudest by swinging the main tuning control slowly. Then tune very slightly higher on the aerial balancer, repeating the swinging on the main pointer. The signals should become louder. Keep on with this process until the signals are at their loudest. If you overture on the aerial balancer, signals will begin to fall off in strength. During these tests, which take only a few moments, the anode reaction should always be kept at a critical value if you want the loudest results on a weak station. This method is more scientific than tuning first the anode circuit and then the aerial circuit, but actually there is not much in it.

The Triple Extractor

The operation of the Triple Extractor calls for no further comment than that in the main S.T.900 issue, where details for its adjustment were given. The latest version of Triple Extractor is about 10s. cheaper and is very simple to make. In fact, you could make it in five minutes, because it consists simply of a triple iron-cored coil assembly and three pre-set condensers mounted on a board. You connect the aerial and earth to the terminals on the coil. The Triple Extractor may be left in for the short waves, but I have known cases where a slight reduction in signal strength is observed when using it. The Triple Extractor acts towards the short waves like a small condenser in circuit in series with the aerial coupler. It really has the same effect of a lower adjustment of the aerial coupler. As the aerial coupler will usually be at a fairly low value anyway, the Triple Extractor is not likely to make any difference. But where you have ordinarily a large amount of aerial coupler, the introduction of the Triple Extractor would have the effect of preventing the full advantage being obtained from a large value of aerial coupler. It is, of course, a very simple matter to short-circuit the Triple Extractor, or to disconnect it. Its use is of enormous value for preventing swamping in the case of those people who live close to the B.B.C. There is no device I know which even approaches the Triple Extractor as a means of cutting out or, if you wish, greatly reducing your local stations. I have used it at one mile from the B.B.C. at Brookmans Park and obtained 50 medium-wave broadcast stations in spite of the fact that two B.B.C. aeriels were blazing away within sight. So good has the Triple Extractor proved that, although a cheaper version of it is issued this year, no change is made in the general

idea. The direct pick-up of unscreened coils even at one mile from Brookmans Park does not interfere with selectivity. At far greater distances pick-up occurs, but there is no spread at all.

I ought to mention, however, that the Triple Extractor will be less necessary on the S.T.900 than any set I have designed, because the improved coils, small detector grid condenser, and the aerial reaction make the set more selective. You will, of course, when receiving a station close in wavelength to the B.B.C. reduce the aerial coupler and put the selectivity plug in its upper socket. You may have also to apply more than $-4\frac{1}{2}$ volts to G.B.—2.

Readers' Reports

I shall be most interested to read of readers' experiences with the S.T.900. Designing these sets is something a little more than a mere professional "job of work." I am keenly interested to know that you are getting the excellent results which the set will give. For years I myself have been up and down the country trying out my receivers, and I can say that I know conditions from one end of the country to the other probably better than any other designer in the country. It has involved a great deal of hard work and much time, but no reader can say that any of my sets may work well in London but will not work well in his own locality. I do not regard myself as a London designer at all. I am thoroughly familiar with Wales, Scotland, the Midlands, the North and all other parts of England; only in Ireland have I not had any practical experience. Conditions, of course, are changing, as, for example, in Newcastle, where the Stagshaw transmitter has been erected. But here the selective features of my set have been proved time and again under the worst possible conditions, and any local change is merely similar to another condition in some other part of the country.

I do ask you to write and let me know how you get on. I cannot start a correspondence with thousands of readers, although I should like to if I had the time, because it is these readers who have built up my reputation in this particular field. It is, however, a matter of great interest to a designer to hear how his products are working. I do not think any set more foolproof has ever been offered to the constructor to build, and it is with the utmost confidence that I commend the S.T.900 to you as a set that will work "straight off" as well as my own models and will go on working equally well for years.

J. S.-T.

**COMING
ATTRACTION!**

**A SUPER QUALITY
14 WATT RECEIVER**

By JOHN SCOTT-TAGGART

M.I.E.E., F.Inst.P., Fel.I.R.E.