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THEY SAID IT
DOUBLE DEALING
CLOSE SHAVE

RADIO NOTES & NEWS

SOCIETY NOTE
COME AND GO
GOOD WORK

Youth Must Be Served

DO you remember, you rascal, how at the age of less than ten you could conveniently become stone deaf if your father or mother called you in from play?

The youngster of the future will be debarred from that sort of affliction, I fear, for an American engineer has hit upon a scheme that trumps the youthful ace every time. He has fitted his little daughter's toy truck with a small radio receiver and loudspeaker.

Wherever she is, and however exciting the game, the set is liable to start itself up and "This is daddie calling Jean! Come in now, dear. Dinner-time."

Jean is five years old. A self-possessed young lady, she cannot see why grown-ups should be so interested in her toy truck's vocal eccentricities!

They Said It...

SOME wireless listeners complain that there isn't enough Queen's Hall. Others say there isn't enough Henry Hall.—Mr. Graham White, in the House of Commons.

"Criticism is welcomed by us if it is informed and given with an open mind."—Mr. R. C. Norman, Chairman of the Governors of the B.B.C.

"They had to bore for water at Broadcasting House, Which talk did they use?"—"Era."

"Whether my grandchildren will 'lauf' as they 'dawnce' on the 'grawss' at half-pawst ten, or 'laff' as they dance on the grass at half-past ten doesn't make much difference to me, provided they don't do it through their noses."—Dr. A. Lloyd James, from an N.B.C. studio.

... Where Honour is Due

THERE was one name in the New Year Honours List that appealed with special force to those practical and technical men who normally work without

much public recognition; I refer to the name of Lt.-Col. A. G. Lee, O.B.E., M.C., who received a knighthood.

As Engineer-in-Chief of the Post Office, Lt.-Col. Lee had been very closely associated with radio for years. But, like many another Civil Servant, he was less well known to the public than if he had been connected with private enterprise instead of with State enterprise.

It is fashionable to sneer at State enterprise, but I beg you to remember two facts. It was the British G.P.O. that encouraged Marconi, and enabled him to demonstrate what wireless could do. And it is the British G.P.O. that handles with striking success some of the world's greatest radio

The great thing is that the individual messages can be received separately on the ordinary ship's receiver; they go out on wavelengths separated by about ten kilocycles, and the king pin of the arrangement is a high-speed thermionic switching device.

The laddies in charge will probably lose a lot of hair when faults develop on this apparatus, but there should be much less delay in traffic during rush periods.

Radio Point Duty

BEFORE the new radio-point-duty station at Baldock, Herts, steals all the thunder, tribute should be paid to the little-known G.P.O. frequency measuring station at Colney Heath, near St. Albans, Herts.

Consisting only of a wooden hut and tall mast, it had the unenviable job of watching wavelengths, to see that the rules of the ether road were obeyed, and that no station crowded another into the kerb.

The G.P.O. is held responsible for seeing that all British stations stick to their allotted frequencies, and complaints of jamming used to pour into the little station at Colney Heath at all hours. Nobody knows how much interference has been untangled in that little wooden hut, and before it fades into forgetfulness, I should like us to slip in a quick "Thankee kindly."

A Close Shave

WHEN I took on this job of reporting to you fellows the news and human items that struck me as of radio interest, I never in my wildest dreams thought that I should have to keep a watch on the curling whisker. But so it is.

Television has now made it necessary. If our old pal Stuart Hibberd lost his voice I should have to record that fact, shouldn't I? And therefore, with television here, it is equally my bounden duty to place on record the effacement, total loss, banishment

(Continued overleaf.)

"CONGRATULATIONS ON A VERY FINE SET"
Praise from an S.T.800 Builder

Dear Sir,—About a fortnight ago I wrote you feeling pretty fed up about the S.T.800, saying the set was a wash-out. I must now eat my own words. I wrote Messrs. Peto-Scott at the same time and they have now sent me a specially tested Tuner. The set now is perfect. It is 8.30 p.m. and Schenectady, Ma Perkins and the Oxydol Programme are at present coming through just like a local. I haven't troubled to log my stations as they are too numerous. I can get nearly every station on the short and medium side. Being in the Midlands Droitwich swamps and covers a pretty big area on the dial; anyway, I am putting in the Rejector, when I get the parts I have sent for, which I feel sure will knock the big bully off the dial, or at least quieten him down a bit.

I congratulate you on a very fine set. As you say, I think it is by far the best you have turned out for the home constructor. I was O.C. Signals in The Loyal Regiment (North Lancashire), during the War, and having dabbled a bit with the old trench wireless sets in France, amplifiers, etc., I am not exactly a novice. I have still to improve my aerial system, this being a bad locality, as I am screened on all sides, my aerial being only about 20 ft. high.

Anyway, with the present aerial system the S.T.800 will hold her own with any set on the market, and for anyone who doesn't know you and fears to take your word, the set is here for anyone to try out for themselves if they wish. So here's to your next S.T. set. Wishing you every success.

I remain, Yours truly,
J. DAVENPORT.

"Grosvenor House," Hermitage Avenue, Mansfield, Notts.

services to-day. The knighthood bestowed on Lt.-Col. Lee is a timely recognition of the debt we all owe to the engineer.

Double Dealing

THAT is a fine stunt for ship-to-shore radio communication tested recently from Portishead. It enables two distinct messages to be sent, at the same time, from one radio transmitter.

"How come?" says you. Well, I gather it is on the well-known principle of duplex transmission, whereby either circuit appears to send out only its own message, though actually both circuits are pooling the dots, dashes and spaces, and drawing upon each other's as required.

MORE S.T.800 APPRECIATIONS ON PAGE 657

WHEN SIR JOHN REITH WAS TOLD TO SIT DOWN

ment, and complete disappearance of the handsome and well-known moustache which hitherto has adorned the countenance of Leslie Mitchell, London's television announcer.

Why this deforestation policy was decided on I don't know. But such are the ramifications of science to-day that razors have now acquired radio significance.

Problem of the Portable

A COMPLETELY self-contained wireless set which is small enough to be carried in a man's pocket, or in a woman's handbag, has been invented in Denmark.



Mass production of the sets, which are about the size of a one-hundred tin of cigarettes, has begun. It is reported that these miniature receivers are capable of giving small-loud-speaker results on

most ordinary-wavelength European broadcasting stations. Married Danish pessimists, however, are not too sure about the advisability of having a set that will go in a man's pocket or in a woman's handbag. They say it will always be in the handbag when it works all right, and the pocket will never get a chance at it except when it is going back to the dealer in town for repairs!

P.O. Wants Wireless Men

THE coming of the teleprinter and similar instruments which have ousted the Morse telegraphist from the inland telegraph services has caused a shortage of wireless operators in the Post Office.

The position is so serious that the Department has made a special appeal to the Union of Post Office Workers for a conference, to arrange for training young postal workers in sufficient numbers to maintain the necessary recruitment.

Plans have been discussed for the obtaining of candidates from junior sorting clerks and telegraphists, between the ages of seventeen and twenty.

Too Good to Get the Job

WHEN an accomplished artist applied to the Belgrade radio authorities to hear his imitation of a Hawaiian guitar, he was confident of being given a chance to broadcast, for everyone assured him that the imitation was perfect. But the authorities turned him down flat, and said he would have to apply again when television was available there.



Indignantly, he demanded the reason. They explained that he was *too good*. Listeners, they said, would never believe it was an imitation, but would think he had a real Hawaiian guitar in the studio!

Society Note

IT was nice to receive the other day a report of the activities of the Southall Radio Society, and to learn that the meetings are going in great style. When G 6 WN spoke on "Ten Metres," he had to answer questions for more than forty minutes at the end of his address. And recent talks on mast construction and on long-distance working have set a high standard of interest.

Visitors to the Southall Library, Osterley Park Road, Southall (near Southall G.W.R. station) will find the Society going strong on Tuesdays at 8.15 p.m. You will be welcome in person, or particulars will be sent to you by the Hon. Sec., Mr. H. F. Reeve, 26, Green Drive, Southall, Middlesex.

"MIKE" SLIPS AND QUIPS

Australian commentator describing Test Match at Brisbane:

It looks as if Allen is going to open himself at the northern end.

Uncle during "Children's Hour":
Such a lot of names I'm going to call you all later on!

Advertising a hair tonic from a sponsored station:
To-morrow at this time I will give you a hair by hair description of a satisfied user.

During a talk on cricket:
A fast bowler is an absolute necessity to a team, and a great handicap.

Announcer:
Up till now Scotland has turned out hundreds of pipers, and she's still turning them out. You can't blame her.

Here's another bright remark during a Test Match commentary:

A very fine piece of work by Oldfield; he couldn't possibly have seen that ball; he just caught it from memory.

350, Not Out

THE irrepressible Tommy Handley is not only an excellent "Mr. Winterbottom" (playing opposite to the "Mr. Murgatroyd" of Ronald Frankau), but bids fair to throw in an impersonation of Don Bradman as well; for Tommy recently made his 350th appearance before the mike, and I don't think any other British radio star can claim an innings like that.

For twelve years Tommy has averaged thirty broadcasts per annum. And the remarkable thing is that he still hits out as freely and finds the boundary as often as he did when he first came on.

However, Tommy has the true Test Match temperament, and he rises to an occasion like a balloon at a fete. Other artists like working with him, too; and perhaps that is the secret of Tommy's perennial success—he is "a good trouper," which is the highest tribute his profession can pay to its members.

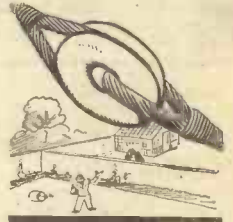
Come and Go

MR. H. F. HUMPHREYS, engineer-in-charge of the Washford Cross station for three years, is leaving to take up the appointment of engineer-in-charge of Droitwich.

Mr. R. J. Bird, of the Scottish Regional, is going to take over Mr. Humphrey's post at Washford Cross.

John Listener's Outfit

CONSIDERING the many British homes with two radio sets, and the too-many homes with no licence, the total number of radio receivers in use in Britain probably approaches 10,000,000, calculates that popular writer, Mr. R. W. Hallows.



Since the average price is somewhere in the neighbourhood of £10 each, he estimates that they cost us some £100,000,000; and, reckoning their average weight at only 10 lb., the total weight is well over 40,000 tons.

Undaunted by this, "R. W. H." tots up the total length of aerial wire used, and finds that his total comes out long enough to reach about half-way to the moon.

To which I append the solemn thought that if all the world's insulators were rolled up into one whacker of an insulator, it would be able to hold up the aforesaid aerial. And, oh, boy! what an aerial that would be for the neighbours to be jealous of!

Good Work

IT was in April, 1930, that the B.B.C. appointed its Director of Music, and the years have proved the wisdom of the choice.

Adrian Cedric Boulton, D.Mus., LL.D., Mus.Doc., F.R.C.M., has achieved some notable successes, and his unswerving faith in British music is now shared by an ever-widening circle of music-lovers.

In the recent Honours List he was created a Knight Bachelor, and I am sure that my readers will wish me to put on record our hearty congratulations.

Missing from the Scrapbook

STANTON JEFFRIES, once "Uncle Jeff" of 2 L O, was on the air in "Scrapbook for 1922," but there was one story they did not ask him to tell.

As station director, accompanist, piano-shifter, conductor, programme-planner and general bottle-washer, it fell to his lot—says Jonah Barrington, in the "Daily Express"—to interview some Pressmen immediately preceding a broadcast.



Stanton Jeffries pushed them all into their chairs, then rushed out to see that the transmitter was working properly—or that the charlady had been paid. When he returned it was to find a tall man waiting patiently.

"Sit down, sit down!" shouted the distraught Jeff. "What newspaper do you represent?"

The tall one crossed his legs deliberately. "My name," he said, "is John Reith."

ARIEL.

TELEVISION TOPICS—Collected by A. S. Clark

THE AMERICAN OUTLOOK

ACTION similar to the recent decision of the B.B.C. to scrap television transmission on the Baird system in favour of the alternative Marconi-E.M.I. system was foreseen by officials of Philco Radio and Television Corporation of Great Britain, Ltd., when they declared months ago that they would not market a television set until a single standard of reception had been set for the radio manufacturing industry.

It has always been the policy of Philco Radio that a unified system of receiving would be necessary to popularise television and make it possible for set makers to produce receivers which would be as clear in definition as home motion pictures. Philco has maintained that this could not be done at a popular price as long as it was necessary to plan sets for two systems of reception.

Mr. Murray's Address

Mr. Albert F. Murray, a leading authority on television in the United States, recently said: "To be forced to design television receivers for the two types of transmission used in Great Britain instead of a single standard planned for the United States, appears to us to be an expensive and unsatisfactory procedure."

In fact, the American outlook on the problems of television broadcasting may be of interest to British readers. Some inside information on the experimental work being done in the States and numerous contrasts between television broadcasting conditions in the United States and the British Isles, were pointed out recently in an address given by Mr. Murray, chief television engineer for Philco, before a meeting of Engineering Alumni of the University of Pennsylvania. Mr. Murray heads the television experimental department of Philco which is not only a pioneer in television research, but the largest wireless set manufacturing company in the world.

"As early as 1907, a cathode-ray receiver was shown by the Russian, Boris Rosing, and in 1911 Campbell-Swinton of England gave to the world an early idea of the cathode-ray camera tube. Now we find that the heart of the television camera is this special camera tube. In the Philco television system the light beam traverses the signal plate in this camera 345 times per picture because at present we are using a 345-line system. Shortly we shall be using 441 lines.

"Television synchronisation must be precise. We are satisfied to have the electric clocks in our homes 'accurate to the one-fifth of a second,' but for the reproduction of a television picture which the critical eye says is acceptable, the synchronisation must be accurate to one two-millionth of a second.

"To reconstruct electrically at the receiver end a television picture requires an immense amount of information reproduced in an extremely short time, for instance, one-thirtieth of a second. Each picture is subdivided into about 120,000 elements or dots. Each of these must be individually transmitted. Television engineers, knowing that they need channels 600 times as broad as those used for sound broadcasting, decided that transmission must take place on ultra-high frequencies far above the present broadcast band, and so for experimental purposes they have, for the past six years, been working on frequencies of 42,000 to 86,000 kilocycles.

Optical Waves

"The effective range of an ultra-high frequency transmitter is limited to the optical horizon. That means that if a 200-foot antenna tower is constructed, and from its top on a clear day, one can see a distance of 17 miles, then the satisfactory service range would be about this distance. If mountains or other obstacles intervene between transmission and receiving antennae, the signal strength will be greatly reduced because these waves, like light, travel in essentially straight lines. There is practically no static on these frequencies and no fading within the service area.

"In England there are regular

experimental programmes on the air two hours a day. Picture broadcasts on 41,500 kilocycles are scenes from the studio, short films, and a few outdoor scenes. Reports of the early demonstrations of this costly 'adventure' of the British Broadcasting Company can be called satisfactory.

It is reported by the B.B.C. that more than 5,000 television receivers have been sold at prices ranging from 85 to 120 guineas.

"In Germany, commercial television was announced by the German post office many months ago. However, less than a hundred receivers are believed to be in use and none are being sold. One transmitter, at Witzleben, is operating. Other active companies are Telefunken, Fernseh, Loewe, Lorenze, Te-La-De and Philips. Reproduction of the Olympic Games by television was not entirely successful. It is now difficult to get information because the German War Department has taken over television, and it is said that engineers are more interested in it in connection with aviation than with entertainment. The 180-line standard was lately changed to 375 lines interlaced."

"TELEFRAMES"

Items of general interest

WE have received the following statement from Messrs. Scophony Limited.

"Scophony Limited welcome the adoption of a uniform standard for the B.B.C. television transmissions from Alexandra Palace, though without expressing at this stage an opinion as to what the final standard should be. This view was put forward by Scophony Limited before the Television Committee two years ago, and has been stressed since. It is clear that a single standard will prove beneficial to

AN AMERICAN RECEIVER



This American television receiver, installed in an engineer's home for the N.B.C. tests, is very reminiscent of British receivers.

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

manufacturers, as it will simplify apparatus and will therefore cheapen production.

"Scophony Limited have from the start aimed at the production of receivers with larger screens than those now available on the market, and recent experience has confirmed this policy to be correct."

A RAILWAY DEMONSTRATION

Saturday, March 6th, will be "railway day" in television, for the camera is to be taken to Alexandra Palace station in the afternoon to show viewers the latest rolling stock used on the L.N.E.R.

Viewers will be taken through the newest in sleeping cars and Post Office mail vans and will also witness a demonstration of railway signalling. Leslie Mitchell, who is conducting this outside broadcast, will give a commentary.

In the evening there will be a demonstration of railway models in the studio.

MESSRS. PYE SAY

From the makers of Pye television receivers comes the following announcement:

"Naturally, we welcome the simplification of the television transmission, as in our opinion it was ill-advised to attempt to transmit on two different systems.

"Now that one arrangement has been definitely decided upon it will, of course make the cost of manufacture of Pye television receivers substantially less, although perhaps not so much lower as some people anticipate.

"At the same time it will make their operation definitely simpler and the controls less complicated.

"We consider the chief advantage of the new policy to be that more time will be concentrated on programme production and more space will be available for it.

"With our experience to date the chief difficulty in popularising television has been not so much the price of the receiver as the uncertainty in the mind of the public on matters of continuity, and the experimental nature of the programmes which have been transmitted.

"The Pye Television Policy and prices will be announced in the near future."

It is possible the latter information will already be published by the time this copy reaches readers.

PRICE ALTERATIONS

Marconiphone, G.E.C., and H.M.V. television receivers have all been considerably reduced to the same level; that is, 60 guineas for the plain television receiver and 80 guineas for the model which incorporates an all-wave broadcast set.

In all cases terms of a small deposit and £1 a week are available. Similarly, installation is included together with free servicing for a considerable period.

A Cossor television receiver is now available for 70 guineas.

TELEVISION TOPICS—Continued

MORE ABOUT COLOUR TELEVISION

SINCE writing my article on colour television in the January 16th issue of POPULAR WIRELESS I have received a number of letters from puzzled readers who were under the impression that red, blue, and yellow were the three primary colours. Typical of these are the two following extracts from K. T. H. of Birkenhead:

"Possibly the instruction I received at various art schools was all wrong, but here is the gist of it: The primary colours are red, yellow and blue, from combinations of which all other colours can be obtained. Red and yellow will give us orange. Red and blue, purple (and violet). Blue and yellow, green. Green, orange and purple are the secondary colours."

And, "I really would like Mr. Clark to inform us, out of which of his primary colours, red, green and blue in combination, we can get a yellow mixing. Green can only be obtained by mixing blue and yellow. If green is a mixture of two other colours, how can it be a primary? I trust Mr. Clark will clear up this doubt or ignorance on my own part."

Fascinating But Rather Complicated

Well, I will do my best. The subject of colour light is rather a complicated one, though extremely fascinating to study.

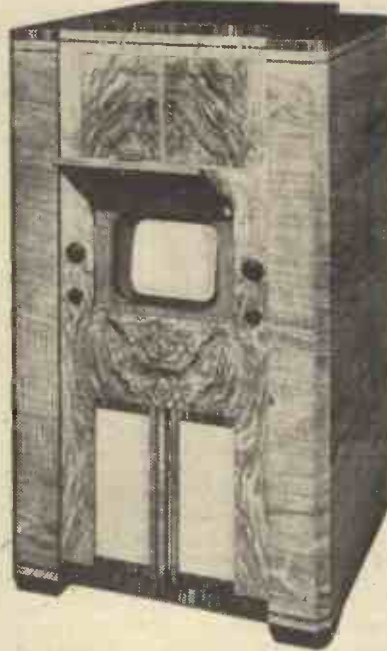
K. T. H. goes wrong mostly when he ignores my warning that we were not dealing with the mixing of paints, which I stated was a somewhat different matter. This confusion, however, is such a common

one, that it will be found specifically dealt with in many technical treatises on light.

The first thing to bear in mind is that scientifically considered light rays are simply ether waves of differing frequencies. They have no colour except in so far as the way the eye interprets them.

Scientifically you cannot combine light

REDUCED IN PRICE



This G.E.C. television receiver was recently reduced in price from 120 guineas to 80 guineas. It incorporates an all-wave broadcast receiver as well.

rays. If you apply a coloured light to a stroboscope, it will split it up into its component colour bands according to the frequencies concerned. White light is split up into seven bands, red, orange, yellow, green, blue, indigo and violet.

As we understand the eye, it contains three nerves, one most sensitive to the red band, one to the green and one to the blue. There are thus two ways of producing the effect of yellow to the eye.

We can look at the yellow band as separated out by the stroboscope. This affects both the green and the red sensitive nerves and conveys the impression of yellow to the brain.

Paints Seldom Mono-colours

Or we can apply the right shades of green and red to the eye separately, thus exciting the red and green sensitive nerves in the same way as the yellow light did, and again sending the impression of yellow to the brain. But a stroboscope would not pass this impression of yellow on; it would split the light up into red and green bands.

It must be remembered that the right shades of red and green must be applied to the eye, and some form of scientific instrument is really necessary to obtain these rays and combine them satisfactorily.

Paints and pigments are seldom mono-colours. They generally contain a certain amount of white body.

Red, blue and yellow, can be called the primary paint colours for the purpose of art work most correctly. What happens when blue and yellow are mixed is that the blue absorbs red and yellow rays and the yellow absorbs red and blue rays, so that only the green get reflected.

So you see, we are not combining blue and yellow rays to make a third colour, we are simply reflecting the primary colour of green.

LAST week we saw that the tuned circuit of a vision receiver had to respond to a much wider band of frequencies than a coil in a corresponding broadcast receiver. To broaden the tuning of a coil there are one or two things we can do, but before stating them we might consider the question of tuning as a whole.

The Resonant Frequency

The frequency to which a tuned circuit responds (the "resonant" frequency) is that at which the maximum voltage is developed across the combination of condenser and inductance. This frequency is governed by the values of capacity and inductance and these are chosen accordingly. Now, as we alter the value of the capacity the value of resonant frequency alters accordingly and the voltage developed begins to fall off as we get farther from the frequency of the applied signal. You have probably seen the expression, "10 kilocycles off tune," which means that the value of the tuning capacity has been altered until the resonant frequency of the coil and condenser differs by 10 kc. from the frequency of the incoming wave. In an ordinary tuning circuit the voltage developed at this frequency would be very much less than that at the

TELEVISION FOR BEGINNERS

Methods of arranging the tuning on a vision receiver are described by G. Stevens

normal frequency and as a result a signal differing by 10 kc. from the incoming signal would receive very little amplification. This is what you get in a normal broadcast set.

Such a circuit would be said to be sharply tuned because the voltage falls off very rapidly, whereas a broadly-tuned circuit would have its voltage constant over a wide range of frequency on either side of the resonant frequency. In a television circuit we require a broadly-tuned circuit, i.e. the voltage must be practically constant across the coil for a frequency of two million cycles on either side of the signal frequency. Now the sharpness of tuning or otherwise mainly depends on the amount of resistance in series or across the coil. This resistance is not that due to the wire itself but the "high frequency" resistance at the frequency at which the coil is operated, which may be several hundreds of ohms. As we increase the resistance in the circuit the tuning broadens until by overdoing it we stop the coil tuning altogether.

This high frequency resistance is so important that special measurements are taken on short-wave coils to find the ratio of the inductance to the resistance, which is called the "Q" of the coil. In our case we want a coil with a low Q and it might pay us to deliberately wind the coil with resistance wire to increase the value. It is much easier, however, to broaden the tuning by connecting a resistance in series with the coil or across it, and then we can adjust its value until we have the requisite band width for tuning.

Double-hump Effect

When two coils are coupled together, so that the field from one interacts with the turns of the other like a transformer the simple tuning response of one is altered and we get what we call "double-hump" tuning, i.e. there are two values of frequency at which the voltage developed is a maximum. This property of coupled circuits may also be turned to advantage in television tuning if we make the two humps correspond with the

extremes of frequency which we wish to cover. Unfortunately there is a snag in this arrangement in that the voltage output between the humps is less than the maximum and we get the case of a coil developing maximum voltage at two points either side of the main tuning point.

Adjusting the Coupling

By careful wangling of the coupling between the coils we can smooth out the humps and make a continuous level of voltage over the whole band width, but this is not too easy and requires careful adjustment. However, we need not worry too much about these points because the short-wave coils on the market are already designed to have the correct ratio of resistance to inductance to give us the necessary band width and alteration will only be needed in one or two places when the tuning is altered by stray capacities such as valves.

Remember, of course, that the capacity for tuning short-wave coils is so low that the capacity of the grid and cathode in the valve forms an appreciable fraction of the total capacity and the least bit of extra wire may put the coil completely off tune.

Next time we can reckon up the amplification that we can expect from a television receiver.

FROM OUR READERS

WOULD-BE LOOKERS IN THE UNITED STATES

The Editor, POPULAR WIRELESS.

Dear Sir,—With the comparative success which has met our television service and the success our neighbours on the Continent have had in their experiments, we are apt to overlook the plight of our cousins across the Atlantic. The following are extracts from letters I have received during the last few weeks, and they tell their own tale: "... I am thoroughly disgusted with N.B.C.'s so-called exhaustive experiments; they are trying to fool the people as they (the people) know so little about television."

That is from Boston; then from Kansas City where a large television station W9 X A L is situated, a correspondent writes "... its progress in this country is mighty slow, they are all talk."

Then along with a book from Chicago comes the message, "Read the article on television in the United States; that is the sort of bunkum we are being fed with."

These letters are not alone, I have dozens in the same strain, but they are the views of the people who have radio as a hobby, or if not as a hobby they are in no way connected with a broadcasting company; so for a change of viewpoint let's take a man on the other side of the scales, Mr. David Sarnoff, the president of the Radio Corporation of America.

He says that the next ten years will see "... the addition of sight to sound in the service of radio." (A very good prophecy, but in my opinion about ten years late.)

There has recently been a television demonstration in the famous "Radio City" to the "Gentlemen of the Press." It was to show the progress made in the technique of the programme presentation besides that in the actual transmissions, for the programme department, we are told, is daily experimenting in new methods of make-up, staging and continuity writing. A 12-inch cathode-ray tube was used, making 7½ by 10-inch pictures, claimed to be the largest yet known which is capable of general usage. The receivers for this demonstration were on the sixty-second floor of the N.B.C. building, the transmitter was situated on the top of the Empire State Building about three-quarters of a mile away. The definition used was 343 lines. The programmes were mostly films, and although a little interference was present the pictures were fairly distinct.

But to get back to Mr. Sarnoff, he says: "First we must develop suitable commercial equipment for television and reception; second, we must develop a programme service suitable for network syndication; third, we must also develop a sound economic base to support a television service. Our present facilities for the distribution of sound broadcasting cover the vast area of the United States and serve its 128,000,000 people. Similar coverage for television programmes in the present state of the television art would require a multiplicity of transmitters and network interconnection by wire or radio facilities still to be developed." But in spite of this, he says that in research, technical demonstrations and laboratory development, the United States definitely holds the leadership in television. In his own words: "We lead in the research which is extending the

Remarkable statements on Television in letters to a reader from friends in the United States of America

radio horizon, and in technical developments that have made possible a transmitting and receiving system that meets the highest standards thus far obtainable in field demonstration."

England deserves credit for being the first country to start a public programme service, but the distinction between television in this country and abroad is the distinction between experimental public services undertaken under Government subsidy in countries of vastly smaller extent and the progressive stages of commercial development undertaken by the free initiative, enterprise and capital of those who have pioneered the art in the United States.

So here we have a public wholly disgusted at the futile efforts of their broadcasting company to start a television service, and a broadcasting company who must serve almost as many people with television as they serve at present with sound transmission before they can start with such a service. For their life blood is the advertiser, and unless there are a large number of viewers—and with the present price of television sets so prohibitive it is impossible for this to be so—and as it does not pay an advertiser to sponsor costly programmes to a mere handful of viewers everything is at a deadlock.

In spite of everything I am certain that the United States of America will soon surprise the world and take the lead in television by organising a nation-wide television network.

Yours faithfully,
W. BREWIN.

13, Ings Road, Leeds, 9.

METAL RECTIFIERS IN PLACE OF CRYSTALS

The Editor, "Popular Wireless."

Dear Sir,—I note with interest that there are two references to crystal sets in a recent issue of "Popular Wireless." Whilst one of them is in somewhat jocular vein, the "Change-over" set is quite an interesting proposition.

Nowadays, if anyone mentions crystal sets, they are usually looked upon as abnormal or, to say the least, out-of-date.

Personally, I think it is rather a pity that the advent of the valve should have practically eliminated crystal research. Most of those who have experimented with crystal sets know their limitations, difficulties of adjustment and inherent instability.

I would like to ask, however, why, if for any reason someone does not want or cannot use a valve, he should think the only alternative is a crystal? Certain experiments which I have carried out over a long period convince me that a form of "metal rectifier" is far superior. In

some cases full-wave rectification is desirable to produce increased power, and in this instance a metal rectifier is much more adaptable than any crystal.

My results seem to show that there is a possibility of actually inducing a metal rectifier to oscillate and perform to a certain degree the function of a "cold valve." I would point out that the small high-frequency metal rectifier sold for use in certain valve circuits are not in themselves a satisfactory substitute for a crystal. To adapt a metal rectifier requires a fair amount of experiment, but it will be found very interesting, and the result, when once set, is for all practical purposes, permanent.

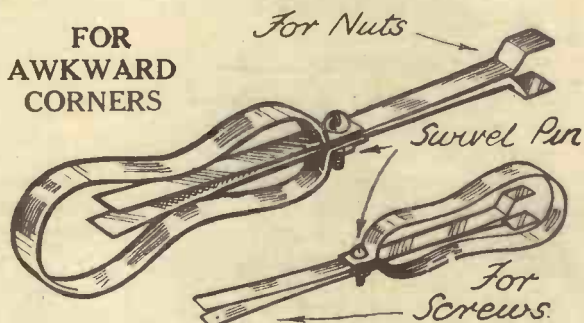
Yours faithfully,
J. STANLEY JOWITT.
3, Clifton Square, Lytham.

RADIO AIDS CRIPPLED OPERATOR

The Editor, POPULAR WIRELESS.

Dear Sir,—Last week some friends and I set out on a "field day." We had three transceivers, and so we split the party up into three—two in each party, and went off to form a kind

FOR AWKWARD CORNERS



This is a copy of the sketch sent by Mr. A. Davidson, with his letter, which is reproduced on this page.

of triangle, the sides of which were about half to one mile long. My friend and I were just arriving at our "post" when he caught his foot in a rabbit hole and strained his foot.

He could not walk, and if we did not get help soon, it would be dark, and so I got into communication with our friends, told them what had happened, and inside half an hour they arrived and helped to get my friend back to his home.

This, I think, is a perfect example of what a help radio can be in such circumstances.

Yours faithfully,
P. W. McNAUGHTAN.
Littleton, Newmarket.

A USEFUL TOOL

The Editor "Popular Wireless."

Dear Sir,—In your issue of December 12th,—"Random Radio Reflections," by Victor King—a gadget is described for inserting screws and nuts in inaccessible places. Several years ago I bought one of the following—I can't remember where—but it is marked, "The Lewis Spring Co., Ltd., Redditch. Regd. No 736014."

One end of the double-swivelling spring is recessed for nuts, and the other—plain ended for screws. (Usual no connection, etc.). The length is about 5 inches.

Yours, etc.,
A. DAVIDSON.

Brailsford, Heads Nook,
Carlisle.

A BIG BIT OFF THE TOP

The Editor, POPULAR WIRELESS.

Dear Sir,—From time to time I have seen remarks in the pages of your excellent journal on that boundless branch of amateur radio, QUALITY. Well, as far as I can see, the majority of people interested in this subject have either misconstrued its definitions or are misinformed. Here's an example:

Some time ago an acquaintance of mine let me hear his broadcast receiver, which he seemed (Please turn to page 668.)

AN EASY GUINEA

When you've read these letters, sit down and drop us a line about one of your experiences or opinions on radio. Others will enjoy reading it just as you enjoy reading theirs. And you may at the same time win the Guinea which is awarded each week to the sender of the letter which, in the opinion of the Editor, is the best one. This week it goes to Mr. W. Brewin.

QUESTIONS AND ANSWERS

By K. D. ROGERS

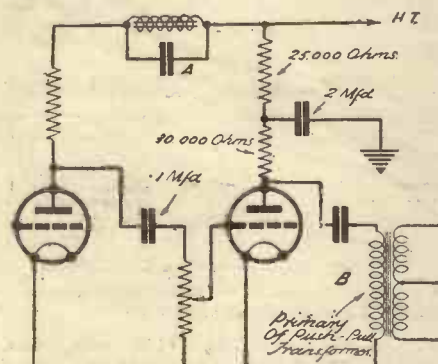
INCREASING THE BASS IN A PUSH-PULL CIRCUIT

F. S. (Yeovil).—*I use a push-pull arrangement which works perfectly except for one thing; it is rather lacking in bass and I should like to increase the bass response without having to alter the circuit more than is necessary. Can I do that? I don't want to cut treble to do this if I can help it.*

Your best plan is to alter the circuit in the way I have indicated in the sketch. In that way you will not cut the treble to less than it is now, but the bass response should come up.

As I do not know the full details of your circuit, impedances of transformer, etc., I must ask you to try different values of condensers at the point marked B. I should start with a .01-mfd. and increase up to 1-mfd. feeding the transformer.

This condenser will tune the primary of the transformer and allow the bass to be peaked a little. You will note that I have altered the wiring so that the transformer is now shunt-fed. You can try the condenser scheme by connecting it across the primary of the transformer as you have it now—series fed—but that may reduce the treble too much for your liking.



The circuit modifications suggested in the reply to F. S. (Yeovil) are shown here.

As regards point A you should try an ordinary good L.F. choke of about 25-henry size, and tune that with a condenser, trying different values. The high notes will not be amplified as much as the bass notes, but you will get the same amplification of high notes as you do at present from this section of the circuit.

Note that I have put in a decoupling resistance and condenser in the anode of the second valve. That is essential if you use shunt feeding for the push-pull transformer. If you try the scheme of tuning the primary of that transformer without making it shunt-fed you need not bother about the decoupling. It is possible, of course, that you have decoupling in that stage already—your sketch does not show that much of the circuit.

Incidentally, I have also changed the .01-mfd. condenser coupling the first and second valves. You would do better with the 1-mfd. there, or you could try an even bigger capacity, say, 1-mfd.

A PECULIAR EFFECT

B. E. F. (Manchester).—*I have a three-valve battery set which has been giving good results for some years. Now the valves are getting a bit old. The S.G., for instance, has to be tapped gently sometimes to make it work properly. It has become microphonic. But there is a fault that puzzles me, and perhaps other readers may be able to help.*

On Luxembourg, and on that station only, I get variation of volume in a peculiar manner. It may be quite steady for a time, and then it begins to go up and down at a frequency of about 2 cycles, gradually increasing to about 30 cycles, when it becomes a purr that makes the programme unintelligible.

Probably the trouble is due to the microphonic S.G. valve, and some I.F. effect sets it off. Try another valve there and see if this effect is removed. I should not like to say definitely what is happening,

but I feel that the S.G. valve is the cause of the trouble. It obviously has a bad internal connection somewhere, and for some reason or other this connection starts the trouble when you are listening to Luxembourg. There may be another reason, but I cannot see it at the moment. Other readers may have had similar trouble, but I have never heard of it before. If they have, perhaps they will drop me a line and let me know what experiences they have had.

"AGONY AD."

As I am totally unable to lay hands on issues of "P.W." for Nov. 3rd, 10th and 17th, 1934, I should be grateful if as a final effort I could make use of your columns in order to advertise my wants. Could you insert an "agony ad." on my behalf?

There you are, readers, what about it? The heart-cry comes from G. Bowman, 91, Croydon Road, Newcastle-on-Tyne. Drop him a line, someone, and tell him you have the copies on hand and will either lend them or sell them to him. He is willing to pay postage, etc. Thanks.

PLAY THE GAME

I am still getting complaints from "Good Samaritan" readers who have loaned copies of "P.W." and have had neither acknowledgment nor return of their copies. This is the latest letter. (I have deleted the name of the offending person. If he sees this, please will he take steps to remedy matters?)

"I loaned a copy of 'P.W.' and blue print of the S.T.600 to a reader. I asked for return, but got no answer. That's the last SOS for me. It looks as if I lost a valuable copy and print. When one is out of work and wants to do a good turn, stamp money is scarce. But I would sooner have the return of my copy, etc."—(Signed) G. J. Dowsett, Glynhir, Pontardulais, Swansea.

Will the reader who is concerned please get in touch with Mr. Dowsett and let him have his copy back? It looks as if I shall have to treat you all like a lot of schoolboys and stop the SOS service. I am loath to do this, for it penalises the many because of the sins of the few. So please play the game.

WILL IT HURT?

H. W. (no address).—*I am at present charging my own accumulator at home. I have the charger installed in the bedroom. I understand that when an accumulator is being charged it gives off some kind of gas. Is this gas dangerous? We sleep in the room where the charging is going on.*

The gas given off is mainly hydrogen. There is also some oxygen. Now, hydrogen is inflammable, though so little comes off that it is doubtful if it would catch fire unless you put a match actually to the vent hole of the battery. But what I do not like about having the battery in the room is that with the gas will also come off a certain amount of acid fumes. These are not healthy and may also affect the furniture in the room if the battery gases freely. Personally, I should not charge the battery in the room where I was sleeping. It may do you no harm, but I don't like the idea.

TERRIBLE HUM

L. C. D. (Alfreton) has a power unit for H.T. and 2-volt L.T. H.T. works O.K., but the L.T., when on the battery set, lights the valves but causes terrible hum.

I know. I have heard some of these L.T. units. I presume you have a good earth and all that. The only thing you can do is to try a large electrolytic condenser, something of the order of 2,000 mfd. Get one of the 12-volt variety (borrow one, if possible, to try) and connect it across the filaments of the set—that is, across the L.T. terminals.

If this does not help, you might get a special L.F. choke for carrying large current, but I think that you will probably have to have it wound for you. Those chokes have gone out of fashion nowadays. You might get in touch with Messrs. Wingrove & Rogers, who now control Wright & Wearle, the original makers of the chokes. They would tell you what sort to have. It would be placed in series with the L.T. supply from your unit, and the large condenser would also be used.

ANOTHER SOS

R. H. Hutchings wants blue prints of the S.T.300 and S.T.400. Those who can help please write to him at 33, Lime Grove, New Malden, Surrey. Thank you.

AN EXCELLENT DETECTOR COIL

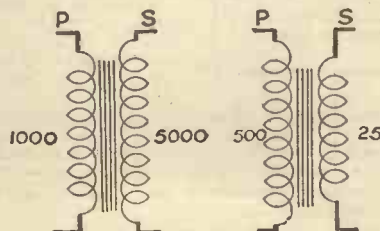
D. B. B. (Leicester).—*I want to use a Colvern T.D. coil in my set. I have the coil, but do not know what the connections are. Can you tell me?*

The sockets marked 1, 2, 4 and 5 are for taps from the aerial, and you use which one of them you like best. In series with the aerial you should have a .001-mfd. preset. The other connections are as follows: No. 3 to moving vanes of tuning condenser and to earth. No. 6 to fixed vanes of tuning condenser and to grid condenser of detector. No. 7 to one point of a three-point shorting waverange switch. No. 8 to another point of this switch, and the remaining point of the switch to earth. Terminal No. 9 goes to E1 on the differential reaction condenser. The reaction is completed internally, so that there is no other reaction connection to the coil.

TECHNICALITIES EXPLAINED—No. 41

STEP UP AND DOWN

What is meant by a step-up or a step-down transformer? Just a transformer in which the voltage input is changed by the arrangement of the windings to either a higher or a lower voltage output. If you have a 10-volt input in a 1 to 5 step-up transformer, the output will be 50 volts. If the transformer has a 2 to 1 step down the original 10 volts will be reduced to 5 volts.



It is important to remember that while the voltage is stepped up or down, the current is influenced in the opposite way. Thus a step-up transformer steps down the current (provided it is used in a circuit in which current is taken) and a step-down transformer steps up the current while reducing the voltage. This occurs in loud-speaker transformers where current is taken from the secondary.

ON THE SHORT WAVES

RANDOM JOTTINGS
By W. L. S.

IT seems a long time since I gave this first page up to talking about nothing in particular; there have been so many subjects to talk about recently. Don't infer from that that I have nothing else worth mentioning now! On the contrary, the examination of the superhet "in slices" will continue next week. Meanwhile, though, various small matters have accumulated, and I want to clear them off.

Details of the "Simplex" Two

First and foremost, we have all had so many letters about the "Simplex" Two at the office that I have decided to reprint the wiring and circuit diagrams. You will find the lay-out on this page, and the theoretical circuit overleaf. It is the straightest of straight sets, but it seems to have been more satisfactory to a greater number of readers than any other short-wave set I have turned out.

I am not giving a list of components for this set. Use what you have, if it's not hopeless junk. If you haven't a .00015 or a .00016 tuning condenser, make do with the nearest that you have got. Put band-spreading on it, if you like, just by connecting a smaller condenser—about .000025—in parallel with the actual tuning condenser.

Make the best of it with what you have, and I'll guarantee that the set won't let you down. I'm not given to making fantastic claims for any set I turn out, and this one is no exception. It's just a short-wave two-valver which, if you make it decently, will give you anything that two valves ought to get, and that's saying a heap more than some people realise.

Young S.-W. Enthusiasts

The QSL racket continues to fill my post-bag with letters of all kinds, but I don't think I'll refer to it any more. After all, it is a most unimportant subject for a seriously-minded radio paper to give space to! Collect the things if you like them; scrap them if you don't. I won't worry any more about it.

More and more do I notice the rapidly increasing number of very young readers who turn to short waves almost at the start of their interest in radio. I am continually getting pleasant surprises in this way, reading through quite intelligent letters and finding at the end: "I am only 13 (or 14) years of age, but very keen on short waves," etc.

It's a healthy sign and, I suppose, quite the natural development. For a youngster who is really keen on what I call the "mechanical" side of radio (not

necessarily the technical) there isn't a great deal of attraction in the idea of building a receiver for ordinary broadcast. It has to be cheap, and it will have to be very good indeed if it is to rival the family set already occupying the corner of honour.

By turning to short waves, however, one can break new ground, and one can even enhance one's reputation in the family by bringing in stations that the all-purpose set won't get.

The amateur movement gets an enormous backing from these younger listeners. In fact, it recruits all its new blood from them. There is hardly a transmitter getting his licence to-day who wasn't dead-nuts on short waves "when he was a mere kid."

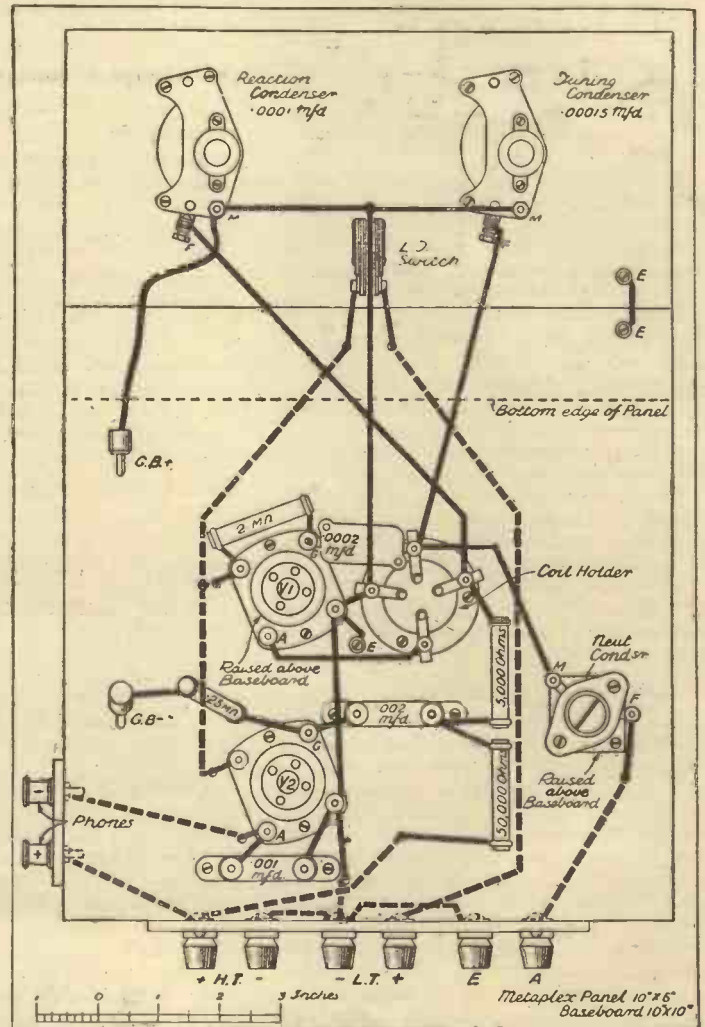
To introduce a personal note, I went completely mad on radio when I was just over fifteen. We didn't start younger in those days, partly because everything cost about ten times as much as it does to-day. From the proceeds of the sale of a fine model railway and a lot of "Meccano," I just about scraped together enough to build a rather indifferent one-valver receiver!

Before I was eighteen I had my full transmitting licence, but short waves were only just "coming" then. We worked on 150-200 metres, except for a few adventurous spirits who, without the slightest encouragement from the G.P.O., worked

on the "unknown" wavelengths of 100 metres and made Transatlantic contacts with surprisingly low powers. I know I worked my first American in 1925 with an input of 3½ watts from flash-lamp batteries (4½d. a time, and about sixty of them strung together with those terrible clips we used to use!).

The youngster of to-day has a much easier path to follow. So much more is known about short waves, and about the (Continued overleaf.)

A SIMPLE BUT EFFICIENT LAYOUT



The original layout of the "Simplex" Two, first described by W. L. S. in 1935. It is a perfectly straight two-valve short waver. The dotted wiring is that which goes under the Metaplex covered baseboard. The points marked "E" are connections to the metallising.

ON THE SHORT WAVES—Page 2

POINTS *from the* POST-BAG

W. L. S. Replies to Correspondents

E. S. D. (E.1), and others, ask about the best form of short-wave adaptor or converter to use with commercial sets and radio-gramophones. I recommend them to the special adaptor that I described in the Show numbers of "P.W." last year.

E. H. (Ossett, Yorks.) asks me to thank the readers who answered his request for surplus short-wave components some time back. He has been able to build a band-spread three-valver in consequence. He now wants to develop it into something that will cover all the short-wave bands, including 5 metres—although he thinks of using a separate 5-metre receiver and covering the other five amateur bands on one straight set.

If any reader can help E. H. with suitable layouts for these two sets, he would be greatly obliged. His full address is E. Hudson, 26, Springstone Avenue, Ossett, Yorks.

S.-W. Club Wanted

W. R. B. (Bletchley) wants to know if there is a short-wave club within fifteen miles or so of Bedford and Luton. He wants to join one. If anyone can put him wise, please write to W. R. Baldock, Motor Dept., Woburn Abbey, Woburn, Bletchley, Bucks.

J. B. (Liverpool) has built the "W.L.S." One and added a pentode. He now wants to know how to convert the set to take a screened-grid detector. My advice is the famous tip—"Don't." I have shown conversions recently, and if you like to turn one up and try it, all well and good. But I think most people who have a set going well, and who try to convert to a screened-grid detector, are disappointed with the results. Sets specially designed for S.G. detection are a different tale.

T. K. (Blairgowrie) wants me to reprint full details of the "Q," "R," and "T" codes. I have given them quite recently, but we seem to pick up so many new readers lately it seems advisable to give them again. I will do so as soon as possible. Readers who want them should cut them out and paste them on a sheet of cardboard, which can be stuck on the lid of the receiver cabinet (if it has one!).

A Reader's Superhet

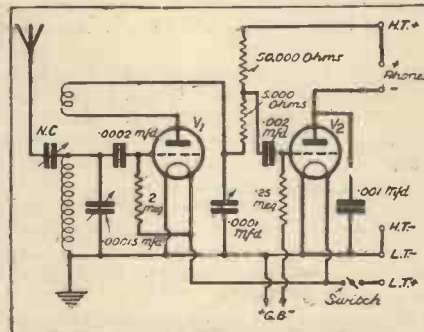
L. C. (London, N.1.) sends in the diagram of a four-valve superhet using a triode-hexode, and wants my comments. It seems very good indeed—including triode-hexode as F/C, H.F. pentode for I.F., triode for second detector, and pentode output. But I think it rather questionable whether a four-valve superhet of this type will really do more than a straight H.F. det. and two L.F.

Incidentally (it is L. C.'s commendably short letter that has reminded me of this), I am receiving more correspondence than ever; and, unfortunately, I'm busier than ever, too. In other words, I regard long, rambling letters as a plague just at present. I can't afford a secretary or a handwriting

expert on my personal staff, which consists of me! So will you please keep letters short, and if your handwriting isn't legible, get someone else to write them for you. Thanks! At present I'm just passing right over the long letters and simply dealing with the short ones.

E. W. J. (London, W.9) reports some mysterious conversations on the short waves from a station calling himself "ISI," and talking about his "9 kc. aerial." Unless it was an amateur, and E. W. J. got the call-sign wrong, I can't solve the mystery without further clues.

R.C. COUPLED L.F.



The theoretical arrangement of the "Simplex" Two. It will be noticed that the L.F. stage is R.C. coupled and that a resistance of 5,000 ohms is used in place of an H.F. choke in the anode circuit of V1.

RANDOM JOTTINGS

(Continued from previous page.)

technique of amateur transmission, that he has his way mapped out for him. For this reason, I am afraid that 90 per cent. of the thrill must have gone out of it.

This, however, is just a word in season to young readers. Don't imagine that amateur transmission is something that is going to be beyond you. It will come in time, if you're keen enough. But, for goodness' sake, don't go and spoil your chances by playing about with transmitting gear before you have a licence. You will be caught, sure as anything, and then you will probably never get a licence.

The Value of Learning Morse

Reception of short-wave broadcasting is so easy nowadays that most of the exclusiveness has gone out of it. I mean, it's a little disheartening to show a neighbour W 2 X A D on your "hot" short-waver and then to go into his house and find the same station considerably louder and clearer on his "ordinary" all-wave broadcast receiver! If you want to make a name for yourself as a short-wave wizard these days, you have to be pretty good at the game.

One way of doing it is to concentrate on amateur work, which means learning Morse if your heart is really in it. Another is to concentrate on something really good in the way of superhets which will beat the commercial all-wavers at their own game. The first way is the easier, believe me!

Lots of readers seem to want a receiver "for amateur bands only." There's not much point to it, as the best receiver of this type has band-spread tuning, and by using the band-setters it is also a good receiver for anything else on the short waves.

Short-Wave News

MORE long-distance 5-metre reports coming in—G 5 C M heard in French Morocco, two more South Africans in the news with 300-mile contacts on that wave. Also another South African listener getting the London television signals.

Ten metres is full of international DX, including Japs, West Coast Americans, Australasians and an occasional signal from the Philippine Islands.

Numerous reports from readers of reception of Americans in the flood-stricken areas, many of them handling the entire traffic for their city. Some of these contacts have been almost in the category of S O S calls—certainly one of them has been responsible for the saving of many lives.

When the official news comes through from the States, I guarantee to be able to tell you some good stories.

Using "Beam" Aerials

The American "hams," by the way, are catching the craze of the American broadcast stations—to wit, that of erecting good beam aerials projecting their signals in some pre-determined direction. Needless to say, many of them are "squirting" at Europe, and this accounts for some of the terrific signals heard lately.

I heard from a friend in Essex that the ultra-short-wave craze is intensifying in that part of the world. Two amateurs, not content with the usual week-end rush of 5-metre work, have been doing two-way work not only on 2½ metres, but also on 1½ metres—free from all interference, man-made and otherwise.

Two and a half metres is going to be a recognised "ham band" before long, and I think it's time some of us gave up being content with receivers that will just crawl down to 3 metres or thereabouts. We've got to get lower still, even if we go back to the nefarious practice of "de-basing" valves to do it.

At the other end of the scale, I might mention that quite a lot of real long-distance work is being done on the 160-metre band. Two or three British stations have had good contacts with the States, and, on the other side, transcontinental contacts are becoming quite commonplace.

Erratic Transatlantic Stations

U.S. broadcasting stations have been erratic of late, but when they do come through, they nearly wrench the speaker off its mountings. W 3 X A L on 16-87 metres is among the best, but it's a pity he stops so early. We folk who have to work for our living just don't get a chance to listen to him except during wet week-ends—but we've certainly had enough of those this year.

W 2 X A D is the same old reliable signal, except every fourth day or so. I compare notes on three different sets still, so that there isn't the slightest doubt that it's conditions that cause the variation. As the days lengthen, W 2 X A D is lasting longer in the evenings. His fade-out is noticeably later each week.

W. L. S.

RANDOM RADIO REFLECTIONS

By Victor King

BAIRD'S GREAT PIONEER WORK :: THE FULHAM POWER STATION COMMENTARY :: THE ALEXANDRA PALACE PROGRAMMES

IT must have been quite a month before the actual announcement that I heard the first rumours that Bairds had lost the Alexandra Palace television transmitting contest. Even before that there were whispers of a six-months' "rest" for the Baird apparatus, which would be tantamount to its elimination.

Of course, it was mainly flicker, or the absence of it, which was the reason for Marconi-E.M.I.'s triumph. That, and the very successful Emitron camera.

I feel very sorry indeed for the Baird people. They have had some extremely bad breaks. The fire at the Crystal Palace almost entirely wiped out their research, and now they have been completely wiped out at the other Palace.

I can't help holding a suspicion that they haven't had a square deal.

What has eventuated from the television transmissions that was not known before? Have they added any new knowledge about the two systems not possessed by the Television Committee when they recommended the dual act?

"WHAT HAS OCCURRED?"

If the Baird system was considered good enough to go on the air a few months ago, what has occurred since to enable the Committee to come to such a quick, ruthless decision?

Just nothing, in my opinion as an independent expert, though a lot, apparently, in the view of the official pundits.

Surely plenty of others could also have seen it sticking out a mile that the E.M.I. people had two aces in their Emitron camera and their interlacing. The relative merits of the two systems do not appear to me to have changed one whit during the past few months. Maybe you will remember that quite a long while ago I mentioned these points and also expressed the opinion that on their side Bairds could handle film better than E.M.I.

It has been said that attempts to get the two concerns to pool their ideas failed. So what? Why shouldn't the B.B.C. have taken matters into their own hands and done the pooling themselves?

I have had my tilts at Baird and his men in the past, when it seemed to me that their enthusiasm rather over-ran itself. But I here and now place it on record that we are in their debt for the following:

1. Early propoganda work without which it is doubtful if Great Britain would to-day hold such a commanding television lead.

2. It was undoubtedly also due to the

above that the Government was stimulated into the action which resulted in the world's first television service.

3. Practical transmission tests at the Crystal Palace and an unending succession of private and public demonstrations which revealed the great possibilities of television.

4. Considerable valuable research work. I myself saw something of what was being done by Bairds before the disastrous fire.

No, I am not at all happy about this business. There is too strong a smell of blundering and dictatorship about it. After all, even when drastic action has to

to the formation of the Television Committee. And then, suddenly, it was revealed that they had "the goods." And now it is plain for everyone to see (or should I say "view"?) that they have such a strong grip on the technique of television that theirs is virtually a monopoly in so far as transmission is concerned.

But Bairds, prophetically perhaps, had a picture of a phoenix on their last Xmas card. Here's wishing them all the best of luck in the future and a "break" which will put them back on the map of British television. Maybe they'll yet be the first ones away with a really

inexpensive receiving outfit.*

THE "CHEEKY CHAPPIE" AT H.M.V.



MAX MILLER, vaudeville and radio star, before the mike at the H.M.V. recording studios. The latest recordings by this popular comedian are "Ophelia" and "Down in the Valley" (H.M.V. BD396).

be taken there are various ways of going to work. For instance, there would be less cause for unease if the arbitrary official decision had been accompanied by some such qualification as: "The Baird Television Co. has been invited to submit designs for apparatus conforming with the required desiderata of transmission as laid down (etc.). Should this be considered satisfactory it will be installed experimentally if and when a second station is erected."

APPARATUS TO BE SCRAPPED

Then it would be up to Bairds. It would give them a chance.

Still, there it is. The word has gone forth and the sleek-looking Baird gear at the Alexandra Palace, so proud in its newness a bare six months ago, is to be scrapped.

And now a word of congratulation for Marconi-E.M.I. They plugged quietly, secretly along during the year or two prior

B.B.C. EXPERT

I WAS very amused the other evening to hear a B.B.C. commentator (giving a "running commentary" on the Fulham Power Station) glorying in that old tag, "Nobody knows what electricity is." He was so pleased with it that he repeated it at least twice. You'd have thought that he'd invented it "all on his little own!"

Very deep philosophy. Let me spill a bit.

Anyone can see a lump of wood if he has eyes in at least fair working order; but no one can say what a lump of wood is, or even if it exists at all outside our collective imaginations.

Anyone could see a B.B.C. announcer, or even a B.B.C. commentator, providing the tie worn wasn't too dazzling, but no one can say with certainty if such a creature really exists.

Some say that all matter in the ultimate analysis is only a bunch of vibrations. What then, if this theory be tenable, is the fundamental difference between Sir John Reith and the squawk of a singing mouse floating unheard in a deserted public house?

The answer will depend, of course, upon your appreciation, or otherwise, of the radio programmes.

LISTENING TO TELEVISION

LET me urge you once again not to ignore these television programmes. Even if you can't yet afford to "look-in" you can at least listen to them. You can make an ultra-short-wave adaptor for a few shillings, and if you live within fifty miles of London your chances of hearing the Alexandra Palace are good. Later there will, of course, be stations at Birmingham and Manchester. Probably one of

(Please turn to page 668.)

* Since writing the above I have seen a notice to the effect that Bairds have reduced their set to 55 guineas.—V.K.

WIRELESS AS A CAREER

Like most callings, success in radio can only be achieved as the result of proper training. Apart from the many opportunities which occur from time to time on the manufacturing and servicing sides of wireless there is a constant demand for fully qualified sea-going operators. Here are some interesting details of the well-known Colwyn Bay and Calmore Wireless Colleges together with helpful information concerning the training required for those who wish to make radio their profession.

IT has been said that "he is a lucky man who can make his hobby his profession," yet, probably, few will realise, when a lad is seen "tinkering" with wireless gadgets, or indulging in that wireless art of "knob-twiddling," that with a suitable training the lad's hobby can be guided into a profitable, interesting and lucrative career. A lad showing such interest in the practical and theoretical side of wireless should be given an opportunity of securing one of the many highly paid positions which are now available to the properly trained man.

A lad might, quite easily, obtain an appointment in some section of the radio industry with no real training beyond that which he has picked up himself by his "tinkerings," but that lad can only be amongst those who repair punctures and call themselves motor engineers. He can,

has its own foot-ball, Rugger, and cricket fields, its own gymnasium, swimming pool, etc. After graduating at either of these colleges, a young man is sure of a well-paid position, and the parent can rest assured that he has given to his son the very best opportunity of rising in the radio profession.

Specialising in Various Branches

The training period will depend mainly on the branch of the science the lad wishes to enter, but as the fundamental principles of radio remain the same for all branches, the question of specialising for any one particular section would not arise until the student has been in training for about six months.

Messrs. Marconi's state that they have immediate vacancies for 100 marine wireless operators and that they will require 250 new entrants during 1937. To enter the service of this well-known company a young man must be in possession of either a second class or first class Postmaster-General's certificate, and the examinations for this certificate are held three times yearly

at both the above colleges. The demand for qualified men in all other branches of the profession is on a similar scale, and far exceeds the supply available.

A second class certificate can be obtained after a training period of six to eight months, and this certificate will enable the holder to act as a wireless operator on certain ocean-going vessels. The first class certificate is obtainable after about twelve months training, and enables the holder to act as wireless operator on any British ship and to sail as operator-in-charge. When either certificate is secured the lad is appointed to one of the large ocean-going vessels and feels rather proud in his gold lace as the ship draws away from the quay-side. He has an opportunity of visiting all



A corner of the service engineers training department at Colwyn Bay.

parts of the world—obtaining the education which only travelling the world can give, and at the same time drawing a good salary. If it is his intention to remain at sea and to rise in that branch, he will have in mind the day when he will sail as wireless man in charge of the equipment on such vessels as the "Queen Mary."

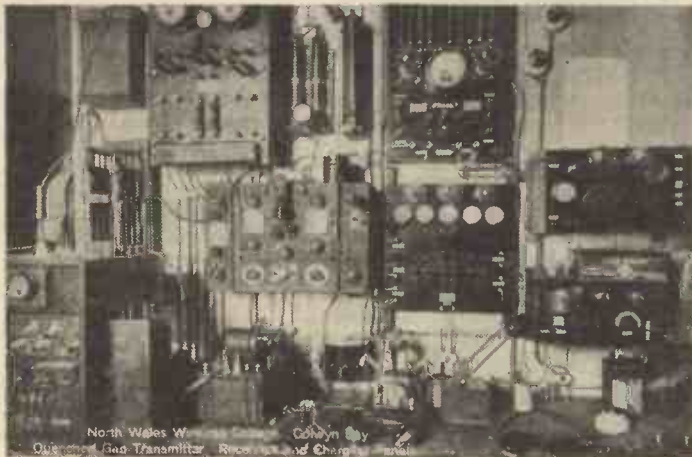
If the lad is in the middle "teens," probably the best plan is for him to secure both P.M.G. certificates, then to remain at the college and continue training for one of the wireless engineers certificates. He could still take an appointment as a wireless operator at sea and thus secure the education which only travel can give, and when he feels that he would like an appointment ashore, his wireless engineers certificate will indicate that he has the required training and the necessary qualifications for such an appointment. There is, of course, no need for a lad to go to sea at all—this is merely suggested for the educational point of view—for with the wireless engineers certificate he can obtain an appointment in one of the many shore departments of radio and know that his training will enable him to rise high.

At both the Colwyn Bay and the Calmore, Southampton, colleges, a scheme is in operation which enables the training fee to be paid from the salary after the student is trained and has been placed in an appointment. This is a real practical guarantee of employment, for the payment of the fees depends upon this, obviously.

Radio's Rapid Growth

Radio has grown at a rate far greater than was anticipated by even the wildest optimists of a few years ago. Television is just being launched and the day is not far distant when every home will have its television receiver in addition to its "sound" equipment. These sets must be designed, manufactured, installed and serviced, and the men to do this work must be trained now. If your lad is interested in radio in any form you should write to either The Wireless College, Colwyn Bay, or to The Wireless College, Calmore, Southampton, for a free descriptive booklet of their training facilities, thus giving your son the opportunity of applying his interest along sound lines, and making for himself a profitable and interesting career.

SHIP'S APPARATUS AT COLWYN BAY



A quenched gap transmitter, receiving apparatus and charging panels of the standard types met with on board ship. A thorough knowledge of ship installations is essential in qualifying for the P.M.G. certificate.

at the best, be only a "first-aid" man, and can never rise to be a "specialist."

The largest and best known training centre for all branches of the radio profession is The Wireless College, Colwyn Bay, N. Wales, and from where large numbers of wireless operators and wireless engineers graduate each year. This college has been filled to capacity for some years, and, as they have been quite unable to supply anything like the number of trained men required, they have opened a new training centre at Calmore, Southampton, where they have installed apparatus of the latest type to train students for all branches of the profession. This new college can accommodate 150-200 resident students. It stands in its own grounds of 16 acres,

**'I always get
Drydex now. It
has Exide's name
behind it.'**



Drydex

DRY BATTERIES FOR RADIO

*'Still keep going when the rest
have stopped'*

DX155

Obtainable from all reputable dealers and Exide Service Stations.

EXIDE BATTERIES, Exide Works, Clifton Junction, near Manchester. Also at London, Manchester, Birmingham, Bristol, Glasgow, Dublin and Belfast.

WIRELESS
A CAREER WITH A FUTURE

**BRITAIN'S LEADING
RESIDENTIAL
TRAINING COLLEGES
FOR MARCONI AND
OTHER LEADING EMPLOYERS**

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WIRELESS—with its many branches: Marine, Aircraft, Television, Broadcasting, Designing, Service, etc.—offers a career with a real future to the properly trained man! Proper training suggests Britain's Leading Wireless Colleges.

**COLWYN BAY and
CALMORE, SOUTHAMPTON**

Marconi's and other first-class employers recommend these Colleges and are always ready to engage our successful students.

For this reason appointments are guaranteed. Both Colleges are fully equipped with the latest apparatus and give students a comprehensive training in all branches of the profession.

- ★ *Boarders accepted.*
- ★ *Organised sports and athletics in curriculum at both Colleges.*
- ★ *Licensed by H.M. Postmaster-General.*
- ★ *Own Swimming Pool.*
- ★ *Fees can be paid from salary after appointment secured.*
- ★ *Appointments guaranteed.*

On Wednesday, April 14th, Sir Ambrose Fleming, M.A., D.Sc., F.R.S., will visit the Wireless College at Calmore, Southampton, to perform the official opening Ceremony. A limited number of invitations are available and applications for same should be made immediately.

Call at, or write to, either College at once for fully descriptive Prospectus, post free.

The
WIRELESS
College,
COLWYN BAY,
NORTH WALES.
On Sea Front.

The
WIRELESS
College,
CALMORE,
SOUTHAMPTON.
Estate of 16 acres overlooking Southampton Water.

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4, Winton Avenue, N.11. Phone: BOWES, PARK 2897.
Available for interviews in "Home Counties."

SEEN ON THE AIR

News and Views on the Television Programmes

By our special radio-screen correspondent

L. MARSLAND GANDER

"CLEARING the decks for action" may be a cliché, but it succinctly describes the B.B.C.'s next moves at Alexandra Palace.

Hitherto only one large studio has been available for both transmissions and rehearsals on the 405-line standard. Inside the studio during transmissions the congestion has been almost comical. Trailing cables, camera and microphone trolleys, floodlights and other paraphernalia provided obstacles round and over which surged a mixed crowd of artists, technicians, and producers.

The producers developed the irascibility of Indian Army colonels as they strove with the elements, human and mechanical, in this heterogeneous collection.

Television has been hopelessly cramped from the start. In all the circumstances I admit frankly it is a high tribute to the producers to say that they have produced some first-rate entertainments.

More Studios Available

Two more studios, one as big as the original studio, will now be made available for 405-line transmissions. One on the same floor as the existing 405-line studio has hitherto been used for the 240-line standard. Its measurements are 70 ft. by 30 ft. by 25 ft. high. Then it is proposed to knock together the disused 240-line control-room and the room formerly used for 240-line telecinema apparatus. This will make a third medium-sized studio. The small "spotlight" studio on the same floor will probably be used for talks. What use will be made of the great 240-line transmitting hall below has not yet been decided. Owing to the fact that there are a number of pillars supporting the floor above it is not regarded as suitable for a studio. It may be used for additional office accommodation.

With four studios available instead of one, producers will find a new freedom. Alterations will, however, obviously take some time, particularly in the former transmitting hall on the ground floor.

As I write there is still hope that the Coronation ceremony may be televised from the Abbey. Since set prices were reduced, I am informed, sales have increased by 100 per cent. Televising of the Abbey ceremony will be the final spur to public interest which will make television a triumphant success. I fervently hope that no difficulty will be allowed to stand in the way. It is a singular opportunity for television which must not be allowed to slip.

But in any case viewers will see the

Coronation procession televised, as I am now informed, from Hyde Park Corner.

Plans for the Television Exhibition at the Science Museum are going ahead. The exhibition will open early in June, and will remain open for three months. All the chief British television manufacturers are co-operating with the R.M.A. and the B.B.C. to make the exhibition fully representative.

The exhibition will be partly historical, but besides showing the development of television will also demonstrate the recep-

the effect was at once entertaining and exhilarating. The eye turned from one corner of the café to another, from close-up to extended view. I was more interested in the technique than in the actual programme, for the possibilities are great. When three studios are in use, more elaborate sets can be built, and switching from one to another will make visual drama far more impressive than at present.

Still, Carmen del Rio, Ernest and Lotte Berk, and Anthony Holles all deserve full credit for their contributions to this vivacious transmission.

I, for one, greatly appreciate the scenes from Shakespeare, and have the warmest admiration for Henry Oscar's performances. Artists and talkers are rapidly falling into four classes.

(1) Those who are equally good at television and broadcasting. (2) and (3) Those who are better at one thing or the other. (4) Those who are no good at either.

A First-class Broadcaster

Mr. C. H. Middleton is in Class 1. He can illustrate his gardening talks admirably either at the blackboard or with plants brought into the studio. I like his material, his manner, his dry humour.

The trouble is that so many of the B.B.C. television artists are in Class 4.

In the current "Picture Page" three items were extremely good.

The three items which pleased me so vastly were by a retired Scotland Yard detective, a London statue cleaner, and a woman collector of hats. The inspector told of early flying-squad adventures, the statue cleaner was a born comic with a fund of anecdote, and the hat collector had interesting and unusual objects to show.

I am afraid the B.B.C. are still having difficulty in the hunt for films. There have been one or two moderately amusing cartoon films, and on the whole at the moment this seems the most likely line of country which the B.B.C. film department is exploring.

Among future programmes I am chiefly interested in Mr. Stephen Thomas's idea for March 2nd, based on tricks with the television camera. The other day the boys at A.P. found that Mr. Leslie Mitchell could be made to shake hands with himself simply by using two cameras together with one in electrical "reverse."

Now Mr. Thomas is going one better. Four cameras will be trained on Maude Lloyd while she dances to a Bach fugue. Four different Maude Lloyds will be seen on the screen simultaneously, and the effect should be most interesting.

TELEVISING "MR. PICKWICK" AT A.P.



The Inn Scene during the television performance of "Mr. Pickwick" at the Alexandra Palace. Note the Marconi-E.M.I. Emitron cameras in the foreground.

tion of B.B.C. programmes on modern receivers of various makes. A local transmitter will also be operated so that reception can be demonstrated out of normal B.B.C. programme hours. This transmitter will, I understand, transmit films only on the newly adopted standard of 405 lines interlaced. It will cost about £1,000—an earnest that no expense is being spared in this exhibition.

Easily the most ambitious and the most successful programme during the week I have under review was "Cosmopolitan Café." The idea is familiar to listeners in "Café Collette" and its successors. Vision will give the broadcasting café programme a vigorous new lease of life.

Extensive Use of Built-up Sets

It was the first occasion on which the B.B.C. had attempted use of built-up sets on a fairly extensive scale. Earlier I described the congestion which, usually prevails in the television studio, so that it may be imagined that the building of a life-size café with cocktail bar and other appurtenances was not a job to be lightly undertaken.

However, the viewer is not concerned with the trouble involved in a transmission, but only with the effect on his eye. And

A GREAT SET FOR WORLD-WIDE RECEPTION

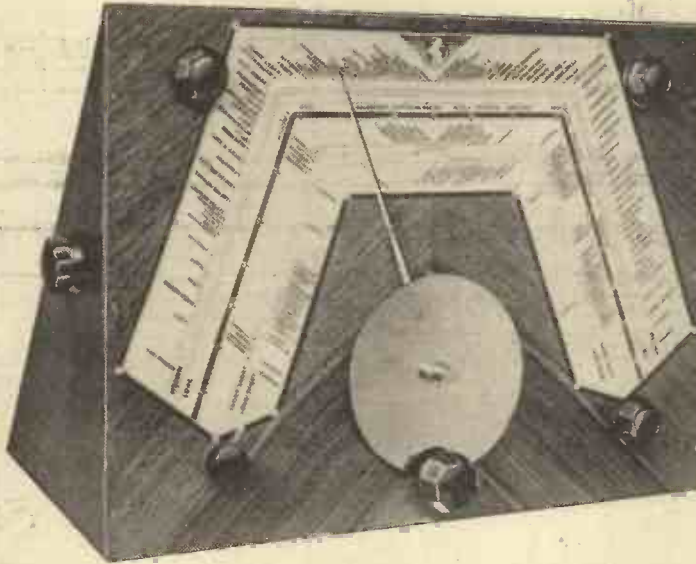


THE repetition of the S.T.800 constructional details rather speaks for itself. The success of this set is considerably greater than that of last year's receiver—the S.T.700, itself a very popular model. There are always many constructors who miss the special issue containing details and are met with a sepulchral "sold out" when they belatedly apply for a copy.

This week you will find the essential "meat" from the original article. The trimmings have been shorn off, editorial flamboyance smothered, and my own description chopped down from 5,000 to 500 words. But the essence remains, and the set is as fresh as paint to-day as it was on November 4th last.

The chief difference is that now the rush is over the late-comers can get immediate deliveries of components. The great and sudden demand threw the manufacturers—as it usually does—out of gear. The natural disgust of everyone is being replaced by delight with the excellent results obtainable from the S.T.800.

There has been a deliberate editorial attempt to curb further interest in the S.T.800 by not writing about it and not publishing letters from constructors who are pleased with the set. If new interest had been aroused the position would have been far worse as regards delivery of components. But now the "silence conspiracy" about the S.T.800 can be



note that the detector valve **MUST** be a Mazda L2 metalised and not the detector valve of the S.T.700. On the short waves the detector valve is all-important.

The delivery delays have resulted in components being substituted in some kits. It should be an infallible rule to check up each component and valve with my own published list. If you accept anything else it is absolutely your own affair. I have refused to authorise any substitutions whatever. If you have been told you can change later to specified components you should emphatically do so. I shall always completely wash my hands of any set containing departures from my list.

The gravest consequences may unexpectedly result from such a

step, however insignificant your or the trade may think the change. And remember, it will be *you*, and not the trade, who will suffer if the set "mysteriously" does not work. Only

THE S.T.800

abandoned, and some letters of appreciation are published to-day. Needless to say, such letters are some recompense for the amount of work I put into these annual sets, and each of such letters is personally acknowledged by myself.

Important Points to Note

There are one or two special points to note. You must use 18-gauge wire, not 20-gauge. This is because of the short-wave side of the set. Those who convert from S.T.700 to S.T.800 must especially

yesterday I received a letter from a constructor complaining about a celluloid dial for the S.T.800. He had just blindly ignored the repeated instructions about the only authorised and checked version and bought one I've never seen—far less, approved.

My final advice, therefore, to new readers is to build the set according to my instructions. Remember that I've worked on the set for months, day and night. I've tried and rejected just those little changes you or the trade are burning to make. Make a duplicate of my set and raise Cain if anyone tries to stop you. J. S.-T.

S.T.800: READ WHAT THESE CONSTRUCTORS SAY

PERFECT TONE

Dear Sir,—Please accept my thanks for designing such a fine all-wave receiver. I have now had the S.T.800 working for the last two weeks, and it does all you vouch for it, and the tone is perfect on any waveband.

I switched it on at 10.30 p.m. for the first time, on the short waves, and, not looking to see exactly where I was, was surprised to hear the voice of an American announcer say, "Kellogg is on the air." I have since heard programmes on all wavebands, and I am real proud of this set. I should like to add that I have made a simple cabinet, so that the set lies like a writing desk, and it greatly adds to the comfort of tuning, and looks good.

I must also bring to your notice the most business-like and efficient system run for constructors by the London Radio Co., of Oat Lane, London. My order was executed in two days, and everything as specified.

With very best wishes from a very satisfied "P.W." constructor.

C. J. THIMBLEBY.

13, Caesar's Walk, Mitcham, Surrey.

AMAZING PERFORMANCE

Dear Sir,—May I offer my thanks and appreciation of your S.T.800. I have only just received the coil after waiting two months, but it has been well worth waiting for. I am truly amazed at the performance of the set, especially as I am working below ground level with a poor aerial and within fifty yards of an electric light power station. I have received dozens of stations on all waves; in fact, I logged 60 stations with the greatest of ease and all at loudspeaker strength. As I say, I am 7 feet below ground level, and I feel convinced that if I can receive this number of stations

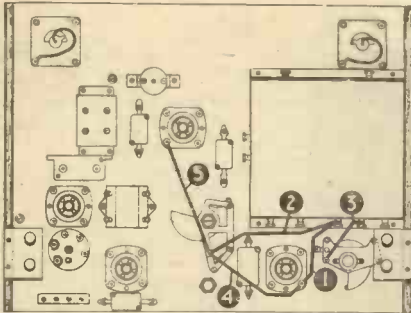
working under my conditions, that S.T. supporters are in for a real fine time when working under normal conditions.

I have been a keen follower of the Scott-Taggart sets since the issue of the S.T.300. There is, however, no comparison between the 600 and the 800—it is like chalk and cheese. If at any time I can help "Popular Wireless" readers who may be in any difficulty I shall be pleased to do so, and if one follows the specified kit of parts there is no reason for not getting real radio from a real and mighty set.

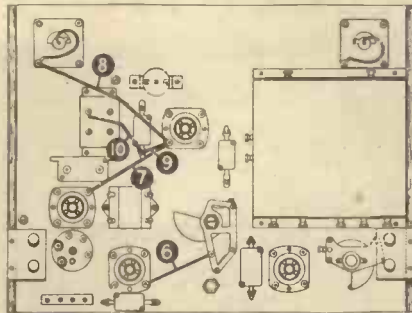
Thanking Scott-Taggart for producing a set within the reach of the working-man's pocket. So many sets on the market to-day only try for the stations; the S.T.800 definitely gets them. Once again, success to Scott-Taggart and all his productions.

Yours faithfully, F. W. POOLE.
49, Bankside, Southwark Bridge, London, S.E.1.

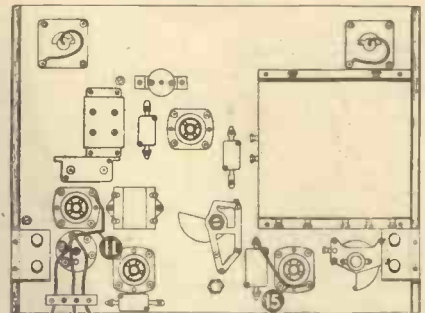
S.T.800 HI-SPEED WIRING DIAGRAMS



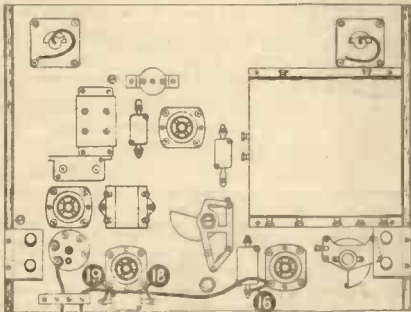
WIRES 1, 2, 3, 4, 5. Every wire in every diagram should go absolutely straight between terminals or by quickest route (no bending near terminals) unless otherwise stated. Wire (1) must clear every part of aerial balancer by $\frac{1}{2}$ in.



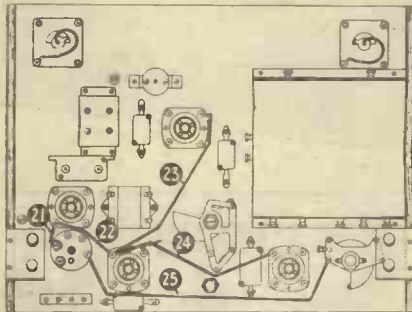
WIRES 6, 7, 8, 9, 10. Wire (6) horizontal $1\frac{1}{2}$ in., then slopes to valve holder. Wire (3) straight but bends where touches condenser block case.



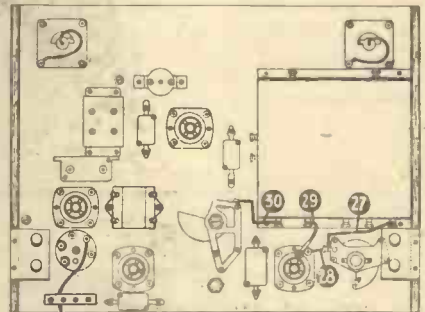
WIRES 11, 12, 13, 14, 15. Wires (11) (12), (13), (14) to go exactly as shown. Wire (15) goes quickest way. Make certain correct wander-plugs used, and accumulator "spade" on (12). (13) is 21 in., (14) is 21 in.



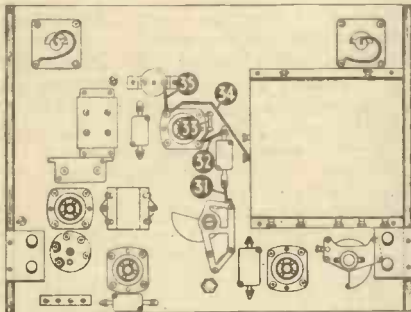
WIRES 16, 17, 18, 19, 20. Make sure correct wander-plugs attached; accumulator connection on (20) must be correct. (20) is 20 in., (17) is 27 in.



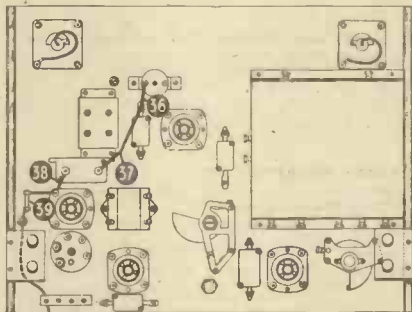
WIRES 21, 22, 23, 24, 25. Wire (22) as shown. Wire (23) as shown and flat against panel. Wire (24) as shown. Wire (25) as shown but steadily sloping all way up to aerial balancer.



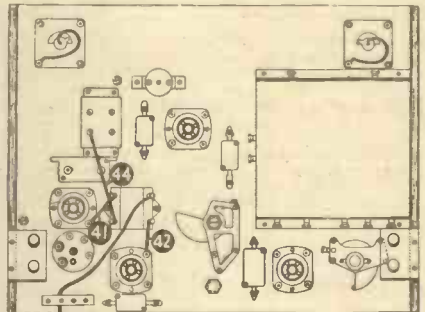
WIRES 26, 27, 28, 29, 30. Correct wander-plug must go on (26). Wire (27) must clear terminals 2 and 3 and aerial balancer. Wire (29) vertically for 4 in. up from terminal and then across to anode. Wire (30) must not touch case. (26) is 21 in.



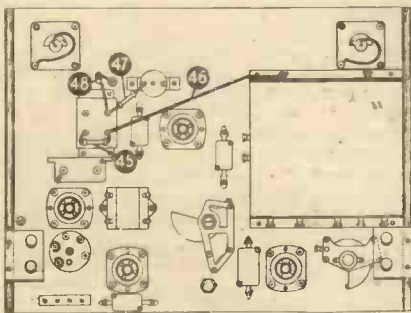
WIRES 31, 32, 33, 34, 35. Wire (34) clears terminal on the way. Wire (35) horizontal $\frac{1}{2}$ in. at choke end.



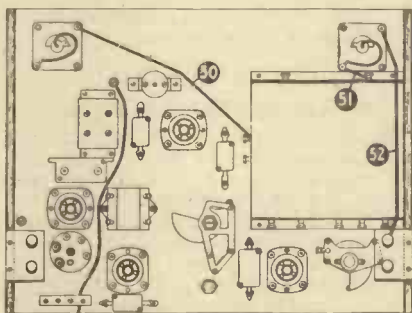
WIRES 36, 37, 38, 39, 40. Wire (36) horizontal $\frac{3}{4}$ in. at choke end. Wire (37) as shown. Wire (39), note anchoring screw (connections must be looped between two washers). Wire (40) along surface of panel. Correct wander-plug on (40). (40) is 22 in.



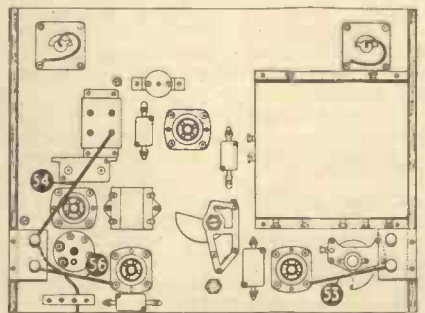
WIRES 41, 42, 43, 44. Wire (42) quickest route. Wire (43) quickest route. Wire (44) just clears terminal P on Nide. (43) is 24 in.



WIRES 45, 46, 47, 48. Wire (45) as shown (resistor must not touch container of condenser). Wire (46) quickest route. Resistor (47) must clear container. Note anchoring screw. Lower end of wire must be between two washers.



WIRES 49, 50, 51, 52. Wire (49) as shown and on surface of panel. Note anchoring screw: wire must be between two washers. Correct wander-plug on (49). (49) is 28 in.



WIRES 53, 54, 55, 56. Wire (53) straight but must clear moving vanes, when out, by $\frac{1}{2}$ in. Wire (54) slight bend half-way to permit clearing valve by $\frac{1}{2}$ in. and to allow withdrawal of valve. (55) is 25 in.

THE S.T.800

RAPID CONSTRUCTION GUIDE

THIS rapid construction guide is based on the same principles as those in previous years. Experience has shown that not only is the absolute novice assisted, but even the experienced constructor, by being told exactly what to do and when. Actually, you can build the S.T.800 from the wiring diagram alone, but for extra speed and certainty of success, you cannot do better than follow the rapid guide in detail. Naturally, the guide is based on the actual components used in my original set.

If you have bought a complete author's kit, including the panel and side-pieces, or if you have bought a kit of the panel and side-pieces, cross out sections (C), (D), (E).
 (A) Collect and examine required components. If you have an author's specification kit, check each item to see that it corresponds to my list of parts actually used. Handle J.B. tuning condenser with care, keeping moving vanes closed. Bending of vanes would affect calibration of station names.

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

(C) Using Fig. 4, mark out on the front (not back) of panel the position of the holes. With a fine-pointed bradawl prick all the hole positions. Using a 1/8-in. twist drill, start each 1/8-in. hole carefully, using light pressure and turning the drill in a reverse direction at first; this is to avoid splitting the veneer. Continue drilling these 1/8-in. holes in the ordinary way. Centre bits are recommended for all the remaining large holes in panel, but twist drills may be used. Drill these holes.

(D) Drill 3/8-in. hole in a side-piece, as shown in Fig. 3.

(E) Drill terminal strips and battery lead clamping strip according to Figs. 1 and 2.

(F) Fit terminals to terminal strips.

(G) Screw terminal strips to side-pieces. The terminal strips are screwed at the bottoms of the back edges of the side-pieces (this is not obvious from the wiring diagram which shows the plan view), the terminal strip containing the aerial terminal being fixed to the side-piece with the hole in it.

(H) To each of the four T.C.C. Type M condensers (.0001 mfd., .0005 mfd., .0005 mfd., .004 mfd.) fit a pair of 1/4-in. 6 B.A. screws and nuts, unless already fitted.

(I) Four bare wires are now fixed to terminals on the coil unit as follows: A 4-in. 18 gauge wire

SIMPLE STEP-BY-STEP DETAILS WHICH WILL GUARANTEE SUCCESS

through the appropriate hole in the panel, holding the condenser up against the back of the panel. Fit bush of slow-motion driving spindle through its appropriate hole in panel from the front so that the remaining hole in the metal spacing strip slips over the main bush of the tuning condenser. If this upper hole does not slip over the main bush, it indicates that the distance between the two holes in the wooden panel is not accurate, and you will require to elongate the lower hole in the appropriate direction to rectify matters, e.g. with a round file. Fit the fixing nut to the main bush of the main tuning condenser at the front of the panel. Fit fixing nut to bush of driving spindle at the back of the panel.

THIS COMPLETES THE FIXING OF COMPONENTS.
 Now you are going to wire the components. For this you need the wiring diagram and the Hi-Speed series of wiring diagrams on facing page. Use the Hi-Speed drawings to help find wire on wiring diagram and the Hi-Speed instructions (under the drawings) as guide to the shape, when this is necessary. You also place a tick against wire numbers below Hi-Speed diagram as each wire is completed. The wiring diagram is always the final authority.

Lay panel face downwards, resting it on two books or cloth-covered blocks of wood; this is to prevent scratching of the veneer and to prevent pressure on control spindles.

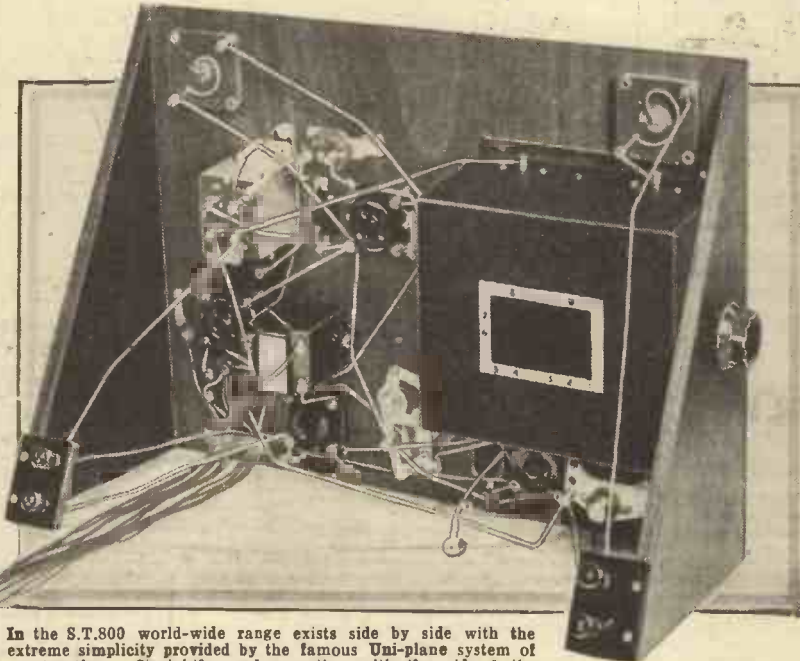
TURN TO HI-SPEED WIRING SERIES.
 This series consists of a number of pictures of back of panel showing the connecting wires divided into small groups in their order of wiring. This system makes it possible to find any wire immediately on the wiring diagram. The wires in all my diagrams are numbered strictly in their order of connection, which has been carefully worked out for speed and simplicity of construction. Note the hints under the Hi-Speed diagrams regarding certain of the wires. The side-pieces are shown in position on all the Hi-Speed drawings, but actually they are not fixed until after wire (51) has been fixed.

The recommended wire is S.W.G. 18 tinned copper wire. Over each wire connection is slipped a suitable length of 1 mm. insulating sleeving. It is important to use this wire for all high-frequency circuits for technical reasons in connection with short waves, and therefore it is best to wire the whole set with this wire. Incidentally, the method of wiring is just as easy, if not easier, than any other method.

(J) Lay the panel face downwards on a cloth-covered table to avoid scratching veneer. Lay the following components on the panel in the positions shown in the wiring diagram, and prick through on the panel the fixing holes of these components; the bradawl actually going through the fixing holes in the components themselves: Coil unit, valve-holders, H.F. choke, Varley Niclet, Lissen .006 mfd. coupling condenser, T.C.C. Type M .004 mfd. condenser, .0005 mfd. T.C.C. Type M condenser, .0005 mfd. Type M T.C.C. condenser, .0001 mfd. T.C.C. Type M condenser, T.M.C. Block condenser.

(K) Screw the following components on the back of panel, using the sizes of screws indicated (remembering that if you use too long a screw, it would project through the panel). At the end of the list are two anchoring screws whose positions are given in the wiring diagram and may be traced by following wires 40 and 49. Coil unit (four 1/4-in. No. 3 round-head brass screws), valve-holders (each is fixed on with two 1/4-in. No. 4 round-head brass screws), B.T.S. H.F. choke (two 1/4-in. No. 4 round-head brass screws), Varley Niclet (two 1/4-in. No. 4 round-head brass screws), Lissen .006 mfd. condenser (1/4-in. No. 4 round-head brass screws), T.C.C. .004 mfd. condenser (two 1/4-in. No. 4 round-head brass screws), T.C.C. .0005 mfd. condenser (two 1/4-in. No. 4 round-head brass screws), T.C.C. .0005 mfd. condenser (two 1/4-in. No. 4 round-head brass screws), T.C.C. .0001 mfd. condenser (two 1/4-in. No. 4 round-head brass screws), T.M.C. Block condenser (four 1/4-in. No. 4 round-head brass screws). Insert, but not fully, two 1/4-in. No. 4 round-head brass screws, each screw passing through two 1/4-in. brass washers with 1/4-in. hole, one of these screws being later used for anchoring H.T. + 2 flex lead (i.e. wire 49) and also a 5,000 ohm resistor (No. 48) and the other screw anchors (39) and (40). Fit battery lead clamping strip (four 1/4-in. No. 4 round-head brass screws).

(L) Fit aerial coupler condenser, anode reaction condenser and turret switch, having removed knobs in each case. Remove knob, pointer and pointer locking-nut of the aerial balancing condenser (.0005 mfd. Polar slow-motion air condenser). Remove fixing nut and fit condenser to panel, replacing fixing nut on front of panel. Remove fixing nut from bush of slow-motion driving spindle. Remove fixing nut from the main J.B. tuning condenser and pass the fixing bush on the condenser



In the S.T.800 world-wide range exists side by side with the extreme simplicity provided by the famous Uni-plane system of construction. Straightforward operation with the aid of the 4-band Auto-dial is also a feature of the receiver.

of the coil unit, and pointing a little towards terminal No. 4. These wires are all in the general direction they will ultimately occupy in the original set, as shown by the wiring diagram.

(J) Lay the panel face downwards on a cloth-covered table to avoid scratching veneer. Lay the following components on the panel in the positions shown in the wiring diagram, and prick through on the panel the fixing holes of these components; the bradawl actually going through the fixing holes in the components themselves: Coil unit, valve-holders, H.F. choke, Varley Niclet, Lissen .006 mfd. coupling condenser, T.C.C. Type M .004 mfd. condenser, .0005 mfd. T.C.C. Type M condenser, .0005 mfd. Type M T.C.C. condenser, .0001 mfd. T.C.C. Type M condenser, T.M.C. Block condenser.

(K) Screw the following components on the back of panel, using the sizes of screws indicated (remembering that if you use too long a screw, it would project through the panel). At the end of the list are two anchoring screws whose positions are given in the wiring diagram and may be traced by following wires 40 and 49. Coil unit (four 1/4-in. No. 3 round-head brass screws), valve-holders (each is fixed on with two 1/4-in. No. 4 round-head brass screws), B.T.S. H.F. choke (two 1/4-in. No. 4 round-head brass screws), Varley Niclet (two 1/4-in. No. 4 round-head brass screws), Lissen .006 mfd. condenser (1/4-in. No. 4 round-head brass screws), T.C.C. .004 mfd. condenser (two 1/4-in. No. 4 round-head brass screws), T.C.C. .0005 mfd. condenser (two 1/4-in. No. 4 round-head brass screws), T.C.C. .0005 mfd. condenser (two 1/4-in. No. 4 round-head brass screws), T.C.C. .0001 mfd. condenser (two 1/4-in. No. 4 round-head brass screws), T.M.C. Block condenser (four 1/4-in. No. 4 round-head brass screws). Insert, but not fully, two 1/4-in. No. 4 round-head brass screws, each screw passing through two 1/4-in. brass washers with 1/4-in. hole, one of these screws being later used for anchoring H.T. + 2 flex lead (i.e. wire 49) and also a 5,000 ohm resistor (No. 48) and the other screw anchors (39) and (40). Fit battery lead clamping strip (four 1/4-in. No. 4 round-head brass screws).

(L) Fit aerial coupler condenser, anode reaction condenser and turret switch, having removed knobs in each case. Remove knob, pointer and pointer locking-nut of the aerial balancing condenser (.0005 mfd. Polar slow-motion air condenser). Remove fixing nut and fit condenser to panel, replacing fixing nut on front of panel. Remove fixing nut from bush of slow-motion driving spindle. Remove fixing nut from the main J.B. tuning condenser and pass the fixing bush on the condenser

TERMINAL STRIPS

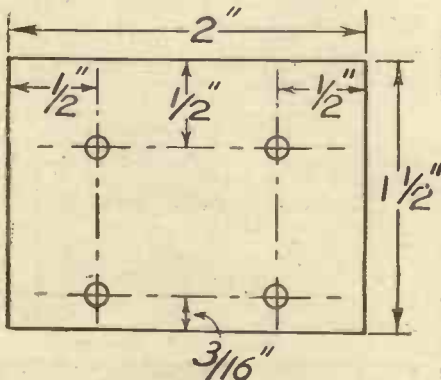


Fig. 1.—Both the terminal strips of ebonite are identical and are prepared in accordance with these dimensions.

has one end connected to terminal No. 1 on the coil unit, this wire coming out towards No. 2 terminal. A 3-in. wire is connected to terminal No. 2, this wire pointing vertically towards the top of the can of the coil unit. A 6-in. wire is connected to terminal No. 3, and points towards terminal No. 4. A 4-in. wire is also connected to terminal No. 3 on the coil unit, but this wire points outwards from the can

BATTERY-LEAD CLAMP

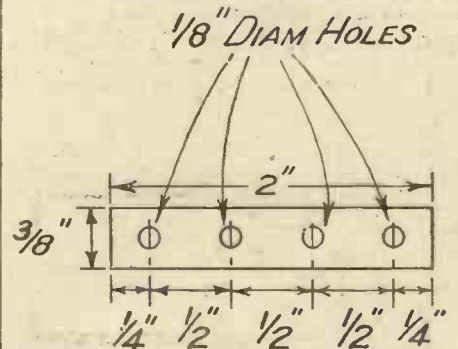


Fig. 2.—A piece of fibre, drilled and cut as above, is used to secure the battery leads and remove all strain from the points where they join components.

The best procedure for wiring is as follows: Lay a length of sleeving in the position which will ultimately be occupied by the wire itself between the two terminals. Cut the sleeving to the required length. The wire itself requires a little stretching to take out the kinks. This can be done in several ways; you can hold one end in a vice and pull on

(Continued overleaf.)

THE S.T.800 RAPID CONSTRUCTION GUIDE

(Continued from previous page.)

the other end of the wire. The wire should be pulled sufficiently hard till you feel it "gives" a little, after which it will be found that the wire is stiff and straight. The wire may also be stretched straight between two persons, each having an end wrapped round pliers or a piece of wood. Cut the wire into approximately three-foot lengths for easy handling. When wiring up two points in the set, slip the correct length of sleeving, as described above, over a three-foot length of the wire. Now cut the wire so that it projects outside the sleeving at each end by $\frac{1}{2}$ in. This method of wiring makes it necessary for the initial length of sleeving to be correct, and the measurement of the sleeving should therefore always be done accurately from the side of one terminal to the side of the other terminal, following the line of the wiring as shown in the illustrations. The $\frac{1}{2}$ in. at each end should be shaped into a round loop. Now have a cup of tea.

(M) USING WIRING DIAGRAM AND HI-SPEED DIAGRAMS (reading notes beneath them) **WIRE UP THE SET UP TO WIRE (51).** The lengths of battery leads (40), (13), (26), (43), (20), (12), (55), (14), (49), (17) are suggested under the Hi-Speed diagrams. It is vitally important to get the right wander-plugs on the right wires.

In tightening the terminals on condenser block, avoid over-tightening as this will cut wire; do not finally tighten these or any other terminals till all the wires are on.

The leads going to the grid-bias battery, the H.T. battery and the accumulator may be 14/36 single rubber-covered flex or "Maxamp" wire, which latter is stiff wire with insulation which may be slipped back. Leave $\frac{1}{2}$ in. bare at each end of each wire. Bend one of the ends $\frac{1}{2}$ in. from the end back on itself and push the loop so formed into the hole in the side of the appropriate Belling and Lee Midget wander-plug, having loosened the head of wander-plug. Tighten head of wander-plug. Fit other end of wire to correct component.

None of the wander-plugs is in the actual list of components of the set, because constructors will already have these. The make specified is specially recommended.

(N) Having completed wire (51), remove knob on wave change spindle of coil unit and **FIT THE SIDE-PIECES** shown in the drawings. Now complete the wiring by adding wires (52), (53), (54), (55), (56) Check the whole of the wiring of the set by the method suggested at the end of this guide. Make certain the battery leads are correctly labelled. A mistake is highly likely and may burn out your valves.

(O) FITTING THE DIAL: Place the dial in the approximate position it will occupy on the panel. The outside corners should be the same distance from the sides of the panel. A degree scale will be found between the long-wave station names and the short-wave station names. At the left side will be

found a line corresponding to 0 degrees. This line should be exactly $3\frac{1}{2}$ in. up from the bottom of the panel, while the 180 degrees mark in the corresponding position on the other side should also be $3\frac{1}{2}$ in. from the bottom of the panel. Prepare ten ordinary plated brass pins (if a pin is of a type that could be bent it can be used) by cutting them diagonally with wirecutters or pincers about $\frac{1}{4}$ in. from their heads. You have now ten very short and pointed pins. Any other type of very short miniature nails may be used.

There are ten small white circles with black centres along the border of the dial. Keeping the dial flat on panel, start with the two top circles and prick through centre of circles with some thin pointed instrument (I used a drawing pin) for about $\frac{1}{8}$ in. into the wood. Insert a prepared pin into this hole and push pin with any hard, flat-sh-edged instrument (I used the handle of a screwdriver). Then fix two pins in the two holes on the inside border opposite the two upper pins already fitted. Now fit pins in the two lowest holes, i.e. at each extreme pointed end. Fit the other pins in any order desired.

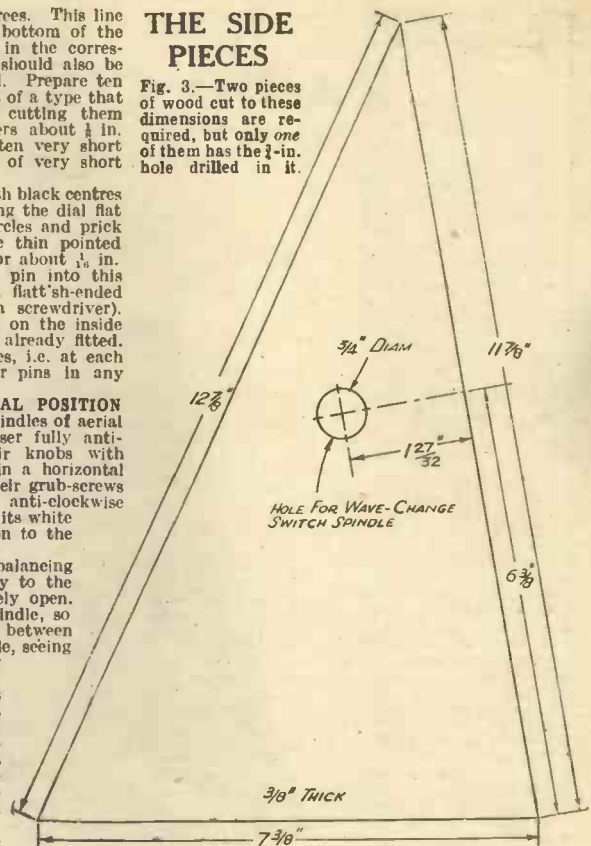
(P) STAND SET IN ITS NORMAL POSITION WITH DIAL FACING YOU. Turn spindles of aerial coupler and anode reaction condenser fully anti-clockwise (fully to left). Fit their knobs with their white spots pointing exactly in a horizontal direction to the left. Tighten up their grub-screws. Turn spindle of turret switch fully anti-clockwise (fully to the left). Fit knob with its white spot pointing in a horizontal direction to the left. Tighten up the grub-screw.

Turn the spindle of the aerial balancing condenser fully anti-clockwise (fully to the left) so that the vanes are completely open. Screw on pointer to the screwed spindle, so that $\frac{1}{2}$ in. of the spindle is exposed between the pointer and the end of the spindle, seeing that the pointer points exactly horizontally to the left. Fit the lock-nut to the end of the spindle, thus locking the pointer, taking care that the pointer is not moved round from its correct horizontal position pointing to the left, as the lock nut is tightened the pointer being held to prevent this occurring. Now set the knob of the plain (as distinguished from the screwed) spindle.

Remove the knob from the driving spindle of the slow-motion drive. Remove spring and sleeve washer from spindle of drive. Turn main spindle fully anti-clockwise (fully to the left) so the condenser vanes are fully open. Place pointer disc on spindle of condenser with the pointer pointing exactly to the line marked 0 degrees on the dial, care having been taken that the pointer disc just rests on the flange of the driving spindle. Now tighten the grub screw in boss of pointer-disc. Replace sleeve washer on drive spindle. Place spring over this washer. Place knob on drive spindle and press down an appropriate amount and tighten grub screw. The correct pressure for the drive for best results may be found by varying the pressure of the knob. Fit knob on wavechange spindle of coil unit.

THE SIDE PIECES

Fig. 3.—Two pieces of wood cut to these dimensions are required, but only one of them has the $\frac{1}{2}$ -in. hole drilled in it.



YOUR SET IS NOW COMPLETE. (See separate section on installation and operation. It is desirable to check the wiring before attempting to install.)

THE S.T.800 WIRING CHECK INSTRUCTIONS

PROVIDED great care is taken, the best way for a constructor to check his wiring is to take each wire in order from the Hi-Speed series and then to look at his own set and see whether the wire connects the same points. This has to be done very conscientiously, one wire at a time, making sure that the wire goes to the right side of each component, and where there are two components of a similar kind, such as valveholders, making certain that you have got hold of the right component.

Having found the wire correct on the set, you should then have another glance at the Hi-Speed diagram as a final check.

Each wire thus checked may be ticked off or written down.

It is possible that, although you have all the wires correctly in place, you have added one or more wires unnecessarily. The way to look for this is to write down a list of all the components in the set, and also the four terminals, A, E, L.S.+, L.S.-. Against each component and the terminals mentioned, write down the number of wires that go to it; this information is obtained from the wiring diagram. Then take each component in your set and count the number of wires that go to it. You will thus find out which components have an extra connection. This can then be removed. This check, of course, is not really necessary unless your set definitely does not work, or there is a short-circuit.

The checking with the Hi-Speed diagrams, however, is recommended in all cases, before any attempt is made to install the set.

THE S.T.800 DIAL

A handsome celluloid dial for the S.T.800 is obtainable for 2s. 6d., post free, from Celluloid Printers, Ltd., Kingston By-pass Road, Surbiton, Surrey.

This is the only dial approved and checked by the designer of the S.T.800.

S.T.800 PANEL DRILLING DIMENSIONS

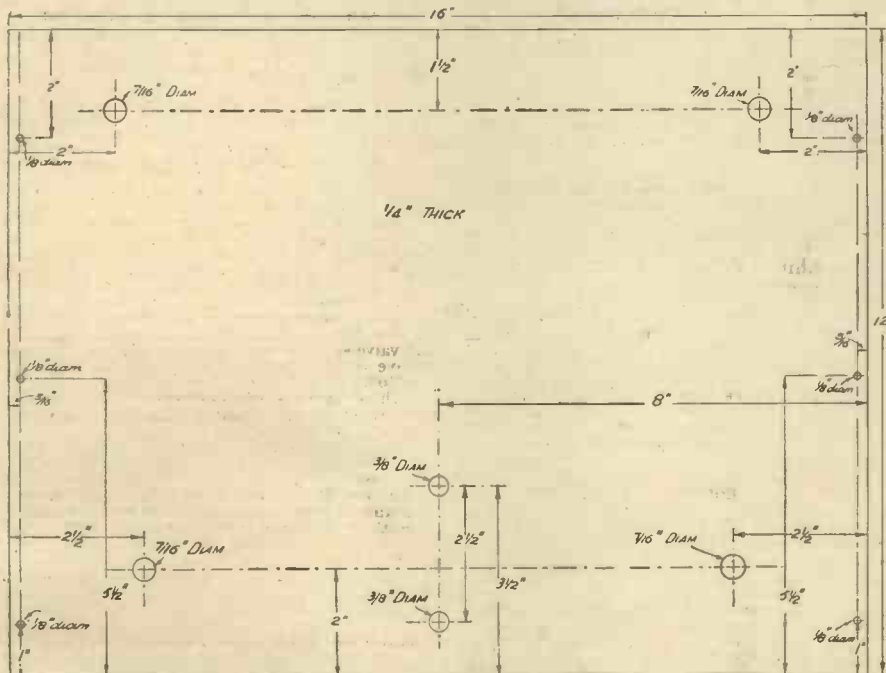


Fig. 4.—The positions of the various holes in the panel are given here. When marking out the drilling centres, the instructions given under section "C" in the Rapid Construction Guide should be followed carefully.

HOW TO BUILD THE TRIPLE EXTRACTOR

If you use .0005-mfd. air condensers of other makes, you will most probably need a larger box. You must not fit your condensers closer together than described, and the coil assembly should not be nearer to the side of box or nearer to condensers. If you use the S.T.800 Extractor coil, together with a single Colvern medium-wave Extractor (which costs 5s.), the same precautions should be taken.

N.B.—The Extractor condenser used in S.T.800 should not be used; but the better Ormond condensers (e.g. as used in S.T.300, S.T.400, and S.T.500) are all right. The efficiency of the condensers is of extreme importance; for that reason I have given as alternatives to Polar only condensers proved on measurement to be satisfactory.

(A) Collect and examine (handling carefully) the three specified .0005-mfd. air variable condensers and the Wearite Triple Extractor coil assembly which I designed for my sets.

(B) Using Fig. 1 and Fig. 2, mark out and prepare the wooden top and sides of box, unless bought prepared. The wiring diagram is only to show wiring and not dimensions.

(C) You are now going to build the box. Lay one end-piece of box, face upwards, on a table. Knock in about 1/4 in. deep four 3/4-in. ordinary nails at the points indicated in Fig. 2. Hold one side-piece vertical on end. Driving in two of the nails in the prepared end-piece, nail end-piece to side-piece. Drive the other two nails through into the end of the other side-piece which is held vertical on end.

Drive four ordinary 3/4-in. nails 1/2 in. into other end-piece in the same way and complete frame of box. Now lay drilled wooden panel right way up on the table and knock in about 1/4 in. deep six 3/4-in. ordinary nails in positions marked on Fig. 1. Lay panel on box frame and hammer in the nails. Sandpaper any rough edges and, if desired, stain. (I used Jackson's of Mitcham, Surrey—oil varnish stain, walnut shade, a size 6 tin being more than enough for both set and Triple Extractor.)

(D) Using two 3/4-in. No. 6B.A. countersunk head brass screws and nuts, fix the Triple Extractor coil assembly inside the box the right way round. Fit

- Wire (5). A1 terminal joins coil terminal 4.
 - Wire (6). Coil terminal 4 joins C3 moving vanes terminal on top.
 - Wire (7). Coil terminal 3 joins C2 moving vanes terminal on top.
 - Wire (8). Coil terminal 2 joins C1 moving vanes terminal on top.
 - (F) Check wiring by asking a friend to read out the above wiring instructions while you look at Triple Extractor. In case of error, correct at once.
 - (G) Fit knobs of condensers.
- THIS COMPLETES TRIPLE EXTRACTOR.**

INSTALLING THE S.T.800

These instructions are as precise and accurate in detail as those for building the set.

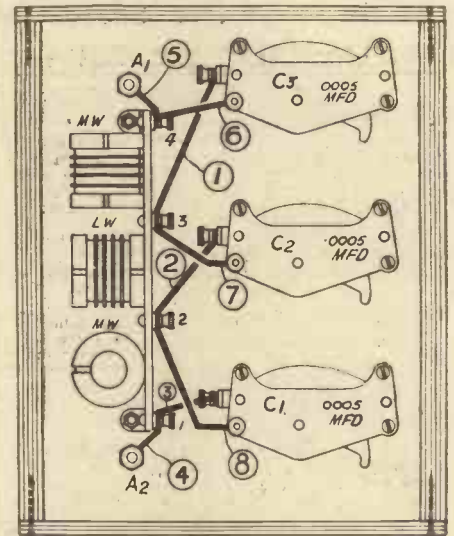
BEFORE connecting any batteries to the S.T.800 see that the free end of lead (29), which is for later connection to the anode, i.e. top of H.F. pentode valve, is "in the air." If it touches any metal it may cause a short-circuit when the batteries are first connected. An extra precaution would be to wrap the free end in paper temporarily.

Turn set (without valves) with dial facing you. Place loudspeaker on right of set and preferably not pointing directly towards it. The Triple Extractor is not connected at this stage, or not connected at all unless swamping is experienced. The two-volt accumulator is placed behind the left-hand end of set. The high-tension battery, which should be of the 120-volt type (the bigger capacity types are always cheaper in the long run), is placed behind the right-hand end of set. The grid-bias battery can be placed between the accumulator and the high-tension battery—the position of these batteries is not very important, but the leads should not be long. Long leads to the accumulator especially may result in a drop of voltage at the valveholders. Suggested lengths are given under the Hi-Speed diagrams.

Connect the aerial lead (after scraping or sandpapering) to terminal A on one of the terminal strips and connect the earth lead (a short earth lead is desirable, if possible)—after similar treatment—to terminal E. The loudspeaker is connected to terminals L.S.+ and L.S.—

There is no special way round in the case of a moving-coil loudspeaker. All connections to wander-plugs should be absolutely perfect. Many troubles, cracks, and often disconnections altogether are due to faulty connections in wander-plugs. I strongly favour testing all leads by the aid of a voltmeter or a flash-lamp battery and bulb, or other method, as much more trouble than you imagine is caused by faulty contacts in leads.

Join the L.T.+ and L.T.— to the correct terminals on the accumulator. Insert



TRIPLE EXTRACTOR UNIT
VIEW FROM UNDERNEATH

This is the wiring for the Triple Extractor which effectively kills local station swamping.

the H.T.— plug in the negative socket of 120-volt H.T. battery. Insert H.T.+1 plug in + 72 volts (or near voltage) socket. Insert H.T.+2 in socket just below the maximum socket (i.e. usually 108 volts). The constructor can experiment with this tapping if he wishes, and if the H.T. begins to run down he may have to use a higher voltage on the H.T.+2 which goes to the detector anode.

Insert H.T.+3 in + 120-volt socket. The grid-bias plugs are fitted as follows: G.B.+ is inserted in the G.B.+ of the battery, which should be of the 16 2/3-volts type; the G.B.—1 is connected in — 4 1/2 volts; this position can be altered according to the degree of selectivity required; the G.B.—2 is inserted in — 3 volts; the G.B.—3 is inserted in — 12 volts, the exact position of this being dependent upon the desire for H.T. economy. Actually, the higher voltage you can make this the better from the point of view of H.T. economy, provided distortion is not noticed.

Check all the above connections most carefully preferably getting someone to read them out slowly to you while you follow the wires. An astonishingly large number of constructors get their leads on to the wrong terminals; this may cause a serious short-circuit, or may affect the efficiency of the set, and the constructor may not know of it for weeks. There is no excuse for this on the S.T.800, as all the plugs and terminals are easily identified, and none of them is duplicated. All terminals should be firmly tightened up. The plugs should also make good contact and should not be smeared with bitumen.

Switch on by turning the switch in the bottom right-hand corner of the panel fully to the right.

A good precaution now is to connect a voltmeter or flash-lamp bulb across the filament terminals on each valveholder in turn, taking care that it is across the filament terminals.

The lamp should light up normally. If a very bright light is obtained, or the bulb is fused, external wiring, and if necessary internal wiring, should be checked. If a voltmeter is used, it should read about two volts. If it reads much more, wiring should be checked.

Switch off set by turning switch fully to the left. Take out the H.T.— plug from the H.T. battery.

Insert H.F. pentode (Hivac VP 215 Met.) in valveholder nearest aerial terminal of set. Connect free end of wire (29) which has been "in the air" to top of this valve. Insert detector triode valve (Mazda L.2. Met.) in valveholder nearest terminal 7 of coil unit. Check this carefully, as the type of detector valve is important in this set. Insert "first L.F." valve (Osram or Marconi L21, clear or metallised) in valveholder nearest L.S.+ terminal. Insert power valve (Hivac PX230) into valveholder nearest bottom edge of panel.

Check valves to see that they are in their correct valveholders. Constructors often get poor results by having valves in their wrong valveholders.

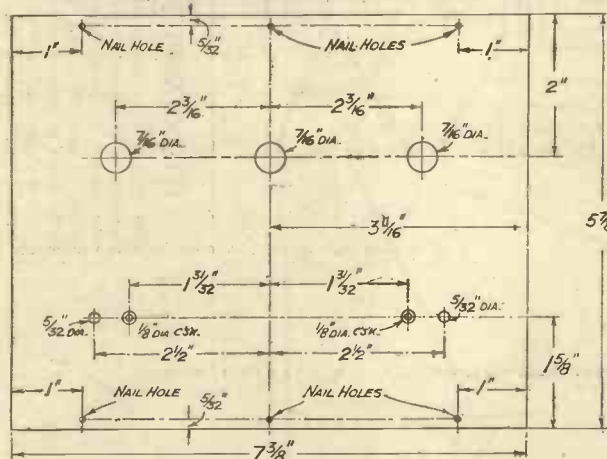
Check once again all battery voltages, including that of the grid-bias plugs. A vast amount of trouble is caused by grid-bias plugs being in their wrong positions, and yet frequently quite good results are obtainable even when these plugs are in their wrong positions, the constructor not realising for that reason that he could get much better results if the plugs were correctly placed.

Put H.T.— plug back into H.T.— socket on H.T. battery.

The aerial lead, it should be noticed, should be kept away from the loudspeaker and high-tension battery side of the set, and similarly the leads to the loudspeaker should not trail round the left-hand side of the set. The aerial lead should always be kept away from the earth lead.

(Continued overleaf.)

PLAN OF UPPER SIDE OF EXTRACTOR PANEL — 3/16" PLYWOOD.



DETAILS OF EXTRACTOR PANEL.

Fig. 1 (above).—The drilling dimensions for the Extractor panel. Fig. 2 (right) shows how the wooden end pieces and sides are made.

terminals A1 and A2. Fit the three Polar .0005-mfd. condensers. Write with a pencil the markings C1, C2 and C3 on the ends (not vanes) of condensers in order shown on the wiring diagram. This will enable you to identify each condenser.

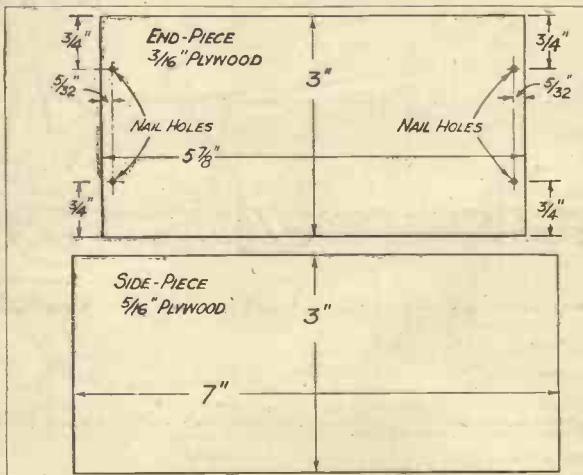
(E) Preferably using "Maxamp" wire, wire-up as follows: (Do not confuse coil numbers with wire numbers: wire numbers are in circles.) Tick off wire numbers in list as connections are completed.

Wire (1). C3 fixed vanes terminal at side joins coil terminal 3.

Wire (2). C2 fixed vanes terminal at side joins coil terminal 2.

Wire (3). C1 fixed vanes terminal at side joins coil terminal 1.

Wire (4). A2 terminal joins coil terminal 1.



INSTALLING THE S.T.800

(Continued from previous page.)

Set the pointer of your main tuning condenser to a local Regional station name. Turn the wave-change switch to the medium waveband, i.e. next to the full right-hand position looking at the set from the left. Turn the aerial coupler about half-way. Turn anode reaction fully anti-clockwise (fully to the left). Turn aerial balancer knob so that the pointer points in a direction approximately parallel with the direction of the main pointer. Turn turret switch fully right to switch on set at full signal strength.

If it is found that the pointer points a little to

either side of the name of an identified station, about the centre of the dial, the position of the pointer-disc on the main spindle can be altered by slackening the grub-screw, holding the vanes, and turning the disc one way or the other to a small extent by turning the driver knob. Then tighten grub-screw.

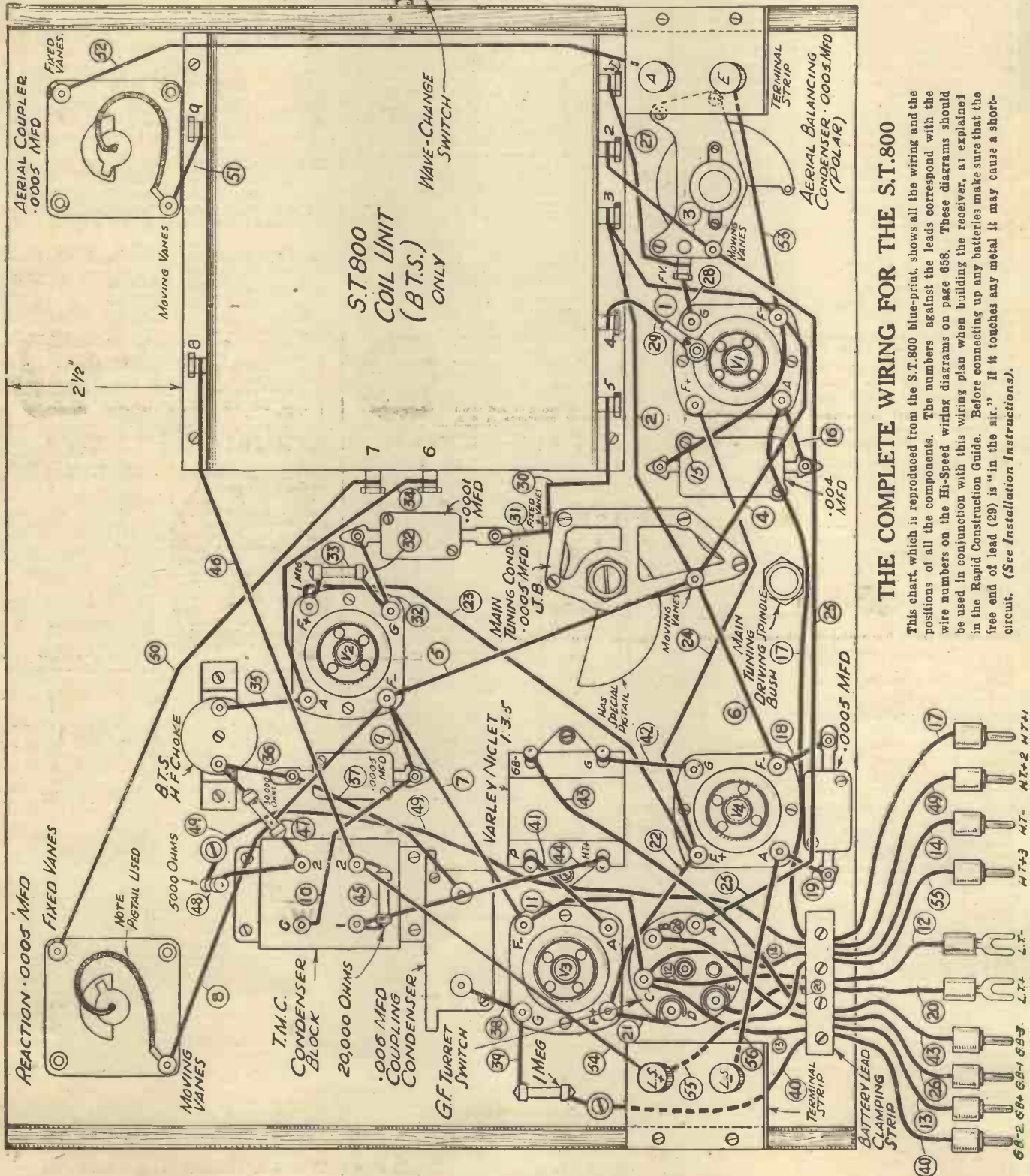
Use of Mains Units. If a mains unit is employed, the H.T. +1 connection is taken to the S.G. socket on the mains unit; if there is a high voltage S.G. socket, this is generally to be preferred. The H.T. +2 connection is taken to the highest of the intermediate tapings. The H.T. +3, of course, goes to the maximum socket on the mains unit. As many mains units will give 150 volts, the maximum grid bias may be increased to 15 volts.

(Please turn to page 664.)



SOME S.T.800 FEATURES

ENORMOUS SENSITIVITY—
ALL-WAVE RECEPTION—
RAZOR-EDGE SELECTIVITY—
GORGEOUS TONE—
MAJESTIC VOLUME—NO
HAND CAPACITY—SIMPLE
OPERATION—UNI-PLANE
CONSTRUCTION.



THE COMPLETE WIRING FOR THE S.T.800

This chart, which is reproduced from the S.T.800 blue-print, shows all the wiring and the positions of all the components. The numbers against the leads correspond with the wire numbers on the Hi-Speed wiring diagrams on page 658. These diagrams should be used in conjunction with this wiring plan when building the receiver, as explained in the Rapid Construction Guide. Before connecting up any batteries make sure that the free end of lead (29) is "in the air." If it touches any metal it may cause a short-circuit. (See Installation Instructions).

1936 BROADCASTING REVIEWED
Northern Ireland

OUTSTANDING among all events in broadcasting in Northern Ireland during the year 1936 was the opening of the Lisnagarvey transmitter by His Grace the Governor, The Duke of Abercorn, on March 20th. Until then the Northern Ireland Region had a transmitter in Belfast of only 1½ kilowatts in power. This was inadequate to serve listeners except in Belfast and the immediate neighbourhood, but with the opening of Lisnagarvey, with a power of 100 kilowatts, broadcasting was taken to every corner of the six counties which constitute the Northern Ireland Region.

When Lisnagarvey came into operation, programme development followed rapidly. Until that time there was little object in seeking the raw material of radio outside that area which was served by the old transmitter, but after Lisnagarvey was completed the programme staff went out into the distant parts of the Region to seek material.

The Provincial Journey Series

Notable examples of this extension of what might be called the programme area are to be found in the Provincial Journey series, in which the microphone was taken to various towns for local talent of all kinds, for local history, and local life and work.

Equipment at the studios in Linenhall Street was modified and added to during the year. A new and up-to-date Dramatic Control Panel has greatly facilitated the production of plays and feature programmes and other items in which the multi-studio technique is used, and a new and up-to-date Talks Studio and an Announcing Studio were completed during 1936.

All this activity was reflected primarily in a considerably increased output of programmes, not only for the Northern Ireland Region, but also for its contribution to the National and Regional Pools; in this respect it is worthy of special note that the Northern Ireland Region now contributes to the National and Regional Pools on the same basis and to the same extent as the other and larger Regions.

Public Concerts Series

Among the programmes of outstanding interest during the year may be mentioned the two series of public concerts given in co-operation with the City of Belfast Corporation and the Belfast City Y.M.C.A. During the first quarter of 1936, two concerts in each series were given, representing the second half of the 1935-1936 winter season, and the two series for the 1936-1937 winter season have both begun under auspicious circumstances, and hold every promise of being a record.

Talks in Northern Ireland were considerably increased during the year, and some series of outstanding interest were given. In the first quarter, six talks under the general title "Six Men Went Forth" created great interest; in these the lives and work of six Ulstermen who had gone forth from their native land to achieve fame and distinction elsewhere were dealt with by their descendants or by people who had made a special study of their subject. During the last quarter of 1936, Mr. E. Maxwell Fry, distinguished London architect and town-planning authority, toured Northern Ireland and gave a series of six talks on Town Planning. This series, which was given under the auspices of the Government of Northern Ireland, aroused widespread interest, not only among architects and local authorities, but among the general public.

(To be continued.)

PETO-SCOTT PILOT AUTHOR KITS
Exact to Specification
S.T. 800 KIT "A" 70/- OR **YOURS FOR 7/-**

Deposit 7/-; Balance in 11 monthly payments of 6/4.

IMMEDIATE DELIVERY-CASH-C.O.D. or H.P.

KIT "A" Complete Kit of Components exactly as FIRST specified and used by Mr. J. Scott-Taggart, with Konecakit (Gratis with Complete Kit) but less wander plugs, accumulator connectors, valves, Extractor Kit, Cabinet and Speaker. Cash or C.O.D. Carr. Pd. £3:10:0 or 7/- down and 11 monthly payments of 6/4.

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As for Kit "A," but including FIRST SPECIFIED valves and Peto-Scott S.T. 800 Console cabinet only, with speaker baffle, and battery shelf, but less speaker, etc.

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Carriage Paid
Or yours for 10/6 down and 11 monthly payments of 10/6.

As for Kit "A," but including FIRST SPECIFIED valves and Peto-Scott S.T. 800 table cabinet only, less speaker, etc.

KIT "CLL" Cash or C.O.D. £6:14:0
Carriage Paid
Or yours for 12/3 down and 11 monthly payments of 12/3.

As for Kit "A," but including FIRST SPECIFIED valves and Peto-Scott Console cabinet, Type "LL" only, with speaker baffle, but less speaker, etc.

* S.T. 800 EXTRACTOR is available as a kit of parts or ready-built at the same price, £14/0. Cash or C.O.D., or add 2/3 to deposit and each monthly payment. Please state which is required when ordering.
* If the above Kits are required complete with 8 wander plugs and 2 accumulator connectors, as specified, ADD 1/9 to Cash or C.O.D. prices or 1/9 to the deposit.

S.T. 700 to S.T. 800 CONVERSION KIT

COMPLETE SET of parts necessary to convert your S.T. 700 to the all-wave S.T. 800, exactly as recommended by Mr. Scott-Taggart on Page 247 of "Popular Wireless," dated Nov. 7, '36.

Comprising: B.T.S. Quadwave Tuner, aerial balancer, condenser, turret switch, B.T.S. H.F. choke, 3 1/2-watt resistors, 5,000 ohms, and 2 1-megohm, 2 mica fixed condensers, .0001 and .0005-mfd. Cash or C.O.D. Carr. Pd. 36/6, or 2/6 down and 6 monthly payments of 4/3.



IMMEDIATE DELIVERY B.T.S. S.T. 800 QUADWAVE TUNER

Exclusively specified by Mr. John Scott-Taggart, who says: "No other possible." In Black crystalline metal case and ready for instant mounting. Cash or C.O.D. 23/6 Post Free, or 2/6 down and 11 monthly payments of 2/3.

B.T.S. H.F. CHOKES also exclusively specified by Mr. John Scott-Taggart. 1/9. Post 3d. extra. **TUNER AND CHOKES.** Cash or C.O.D. 25/3 Post Free, or 2/6 down and 10 monthly payments of 2/6.



S.T. 800 FINISHED INSTRUMENTS IMMEDIATE DELIVERY

EXACT TO MR. JOHN SCOTT-TAGGART'S FIRST SPECIFICATION



TABLE MODEL

Battery Version. Built by Peto-Scott's expert technicians. Complete with FOUR FIRST SPECIFIED valves and Peto-Scott walnut table cabinet (illustrated on left), less batteries.

SEVERAL DIMENSIONS:

Width 18" Height 14" Depth 12". Cash or C.O.D. Carriage Paid £7/5/0, or 13/3 down and 11 monthly payments of 13/3.



CONSOLETTTE



Battery Version. Complete with FIRST SPECIFIED valves. Peto-Scott Type 101 matched speaker and walnut Console cabinet with Australian veneered front and wings (illustrated on left). Dimensions: 20" wide, 24" high, 12" deep, less batteries. Cash or C.O.D. Carr. Paid

£9/2/0, or 16/9 down and 11 monthly payments of 16/9.



A.C. S.T. 800 KIT "A" Comprises complete kit of components as FIRST SPECIFIED and used by Mr. J. Scott-Taggart, including Peto-Scott ready-drilled and polished walnut plywood panel, ready-drilled terminal strips, aluminium brackets, mains lead, nuts and bolts, less valves, cabinet, speaker and Extractor Kit. Cash or C.O.D. Carriage Paid £9/19/0, or 18/3 down and 11 monthly payments of 18/3.

SUPER CENTURION KIT "A" £2:18:9 Yours for **5/- DOWN**

Complete Kit of components exactly as specified by Mr. John Scott-Taggart, with ready-drilled panel and Esbit cabinet parts, but less valves, cabinet and extractor. Cash or C.O.D. Carriage Paid £2/18/9. Or 5/- down and 11 monthly payments of 5/6.

KIT "B" As for Kit "A," but including set of 3 specified valves. CASH or C.O.D. Carr. Paid £3/19/0, or 7/3 down and 11 monthly payments of 7/3.
KIT "CT" As for Kit "A," but including set of 3 specified valves and S.T. 800 type Table model cabinet (above). CASH or C.O.D. Carr. Pd. £4/16/6, or 8/9 down and 11 monthly payments of 8/9.
KIT "CC" As for Kit "A," but including set of 3 specified valves and S.T. 800 type Console cabinet (above). Cash or C.O.D. Carr. Pd. £5/14/0, or 10/6 down and 11 monthly payments of 10/6.

SUPER CENTURION EXTRACTOR is available as a kit of parts or ready-built at the same price, £14/0. Cash or C.O.D., or add 2/3 to dep. and each monthly payment. Please state which is required when ordering.

Peto-Scott 1937 ALL-WAVE S.G.3 KIT

4 Wavebands: 16-29; 27-57; 200-550; 900-2,100 metres. World-wide programmes on all wavelengths. Every constructor should build this all-wave set and enjoy the thrill of All-World listening. Peto-Scott offer you a Kit which is, in the words of a famous designer, "An amazingly efficient yet simple to build kit set."
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Complete Kit of components, less valves and cabinet.
KIT "B" As for Kit "A," but with valves. Cash or C.O.D. Carriage Paid £5/0/3, or 9/- down and 11 monthly payments of 9/3.



All postal orders should be crossed and made payable to Peto-Scott Co., Ltd. All currency must be registered.
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West End Showrooms: 62 (P.W. 19), High Holborn, London W.C.1. Holborn 3248.

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HOW TO OPERATE THE S.T.800

REMEMBER there are two tuned circuits. The first has its selectivity affected by the aerial coupler and its tuning by the aerial balancer (bottom left-hand knob). The second circuit, tuned by the main knob with long pointer, is made more selective by having turret switch at the first "on" position (half-way), while the reaction knob also improves selectivity greatly.

Aerial Coupler. Normally about a third from the left. Turn left for reducing signal strength or improving selectivity. Turn right for stronger signals (but selectivity is reduced). Tuning is not appreciably affected. Main dial not affected at all, but very slight readjustment on aerial balancer may improve signals after alteration of aerial coupler.

Aerial Balancer. As this tunes the aerial circuit it is a vital control; if not accurately tuned you will not properly receive the desired station. You do not, however, need to know or remember its position. Its pointer will point approximately parallel to (or a little to the left of) the main tuning pointer. Tuning is done *after* main pointer has been set.

On-off and Selectivity Switch. (Bottom right-hand corner.) When full left, set is off. When first position to right, set is at ultra-selective, but set is not fully sensitive. When switch

knob is full right signals are loudest but selectivity is only normal.

Main Tuning Knob. Tunes the second circuit, i.e. the anode circuit. Alteration of reaction should be followed by *slight* readjustment of this knob.

Wave-change Switch. On left side of set. Looking from the left side when the knob is turned fully left (anti-clockwise) you are on the short-short-waves. First position to right

first and reduce their strength, e.g. by turning aerial coupler to left and selectivity switch half-way. Apply reaction so as to get a fine tuning point. The aerial balancer should be tuned to give loudest signals, its pointer being approximately parallel or a little to left of main pointer. Mark a dot in pencil where main pointer crosses the dot-line nearest the outer ring of stations. Join dot by pencil line to end of station name.

If the pointer does not point at the station name you can slightly slacken grub screw which holds condenser drive disc to the condenser spindle. The pointer disc can then be turned a little to left or right as the case requires; the grub screw is then tightened.

Having marked your local, you can always go back to it by setting the main pointer to it and then turning the aerial balancer until the station comes in. (Do not forget to adjust the aerial balancer.) Repeat the process on other easily recognised medium-wave stations. Intermediate stations are easily found by noting the general angle of the junction lines to the station names.

When the set is not in its most selective condition it is possible for the main pointer to be set at a foreign station and the aerial balancer as it is turned may bring in some other station, due to its not being correctly adjusted. For example, the local station may come in. You rapidly learn to ignore these stations and continue to turn the aerial balancer until the actual station wanted comes in. The final test to make sure you have the wanted station is to move the main pointer to each side of its correct position. Signals should weaken which

(Continued on next page.)

S.T.800

THE POWER SUPPLY

Batteries: H.T. 120 v.—Drydex, G.E.C.,
Aerialite, Milnes H.T. Unit,
Lissen, Fuller.
G.B. 16.5 v.—Drydex, Lissen.
L.T. 2 v.—Exide, Lissen, Fuller.

Mains Units: Ekco, Atlas.

SUITABLE LOUDSPEAKERS

W.B., Rola, Blue Spot, Amplion, Wharfedale.
(No significance attaches to the order of makes.) J. S.-T.

is long-short waveband. Next position is medium waveband. Fully to right (clockwise) you are on the long waves (Droitwich, etc.).

Calibrating the S.T.800. You should start logging as soon as possible so as to get a few easily recognised stations marked with a dot. As the aerial balancer is not calibrated, "old hands" may find things a little strange at first, but this feeling disappears rapidly as you mark up a few stations. Pick up your locals

LIST OF COMPONENTS FOR THE S.T.800 BATTERY MODEL

Component	Make Used by Designer	Suitable Alternative Makes
1 Coil unit for S.T.800	B.T.S.	No other possible.
1 Main tuning condenser, .0005 mfd., with silent pigtail and with pointer for S.T.800	J.B.	No other fits dial.
1 Aerial balancer, .0005-mfd., air-tuning condenser for S.T.800	POLAR	
1 Aerial coupler, .0005-mfd., with silent pigtail and flanged nut for S.T.800	GRAHAM FARISH Little's log-mid-line	B.T.S. (mention S.T.800).
1 Reaction condenser, .0005-mfd., with silent pigtail and flanged nut for S.T.800	GRAHAM FARISH	B.T.S. (mention S.T.800).
1 Turret switch with flanged nut (look for it before purchase)	GRAHAM FARISH	B.T.S. (mention S.T.800).
1 Block condenser (2 mfd. + 2 mfd. + 1 mfd.), similar to that used in S.T.700	T.M.C. B.1007	Or separate condensers by Dubilier, type B.B.; T.C.C., type 50; T.M.C., type 30; B.I.C., Amplion, Ferranti.
1 L.F. transformer	VARLEY Niclet Standard 1 : 3.5	
1 H.F. choke for S.T.800	B.T.S.	No other possible.
4 4-pin valve holders	BENJAMIN Vibrolders	No alternative recommended.
1 30,000-ohm ½-watt resistor	BULGIN	Ferranti G.5, Dubilier, Erie 1 watt, Polar N.S.F. 1 watt.
1 5,000-ohm ½-watt resistor	BULGIN	Ferranti G.5, Dubilier, Erie 1 watt, Polar N.S.F. 1 watt.
1 20,000-ohm ½-watt resistor	BULGIN	Ferranti G.5, Dubilier, Erie 1 watt, Polar N.S.F. 1 watt.
2 1-megohm ½-watt resistors	BULGIN	Ferranti G.5, Dubilier, Erie 1 watt, Polar N.S.F. 1 watt.
1 .004-mfd. condenser	T.C.C., type M.	Lissen Mica, Dubilier type 610.
1 .0001-mfd. condenser	T.C.C., type M.	Lissen Mica, Dubilier type 610.
2 .0005-mfd. condensers	T.C.C., type M.	Lissen Mica, Dubilier type 620.
1 .006-mfd. condenser	LISSEN Mica	T.C.C. type M. mica, Dubilier type 610 mica.
4 Terminals (A, E, L.S., L.S.—)	BELLING-LEE type R.	Clix type A, Bulgin type-T.L.
2 Terminal strips (Ebonite 2 in. x 1½ in. x ¼ in.)	PETO-SCOTT	
1 Panel, 16 in. x 12 in.	" "	
2 Side pieces	" "	
1 Fibre battery-lead clamping strip	" "	
OPTIONAL		
8 Wander plugs, H.T.—, H.T. + 1, H.T. + 2, H.T. + 3, G.B. +, G.B.—, 1, G.B.—, 2, G.B.—, 3	BELLING-LEE	Clix, Bulgin
2 Accumulator connectors, L.T. +, L.T.—	BELLING-LEE	Clix, Bulgin.

TRIPLE EXTRACTOR UNIT

1 Triple Extractor iron-core coil	WEARITE	
3 .0005-mfd. air-variable condensers	POLAR No. 4 with knob (mention S.T.800)	J.B. "Popular Log" (without dial or slow motion, but with small knob), Ormond R.483 (log condenser), with small knob (only really efficient air condensers may be used).
1 Wooden box—5 wood pieces	PETO-SCOTT	
2 Terminals, A1, A2	BELLING-LEE, type R.	Clix type A, Bulgin type T.L.

VALVES

V.P.215 met.—HIVAC. L.2 met.—MAZDA. L.21—OSRAM, MARCONI. P.X.230—HIVAC.

MISCELLANEOUS REQUISITES FOR S.T.800.

(Rapid Construction Guide shows where these are used).

WIRE.—20 feet of 18 S.W.G. bare tinned copper.

SLEEVING.—5 three-foot lengths 1 mm. insulating sleeving.

WASHERS.—4 brass ¼ in. with ¼ in. hole.

FLEX.—20 feet 14/36 single rubber-covered flex.

SCREWS.—10 ¼ in. No. 4 round-head brass.

14 ½ in. No. 4 " " "

8 1 in. No. 4 " " "

4 ¼ in. No. 3 " " "

10 ½ in. No. 4 " " "

J. S.-T.

HOW TO OPERATE THE S.T.800

(Continued from previous page.)

ever way you move the main pointer. If they do not weaken (unless signals are already very strong) it means you are on the wrong station, due to an incorrect setting of the aerial balancer.

The simplest way of tuning is to set your main pointer to the station dot, make the set oscillate with reaction. You will no doubt hear a whistle. Then turn the aerial balancer to a point where the whistle suddenly changes note. Loosen reaction and there is your station. This system, although fool-proof, is only used for logging very weak stations, but the system can be recommended for short waves owing to sharpness of tuning on those bands.

Tuning the Short Waves. 1st method. The short waves may be received with aerial balancer pointer fully to the left, tuning being accomplished with the main pointer and reaction, the selectivity switch being turned fully to right. The set may be made to oscillate with the reaction and the main pointer turned to around the middle of a group of short-wave stations. Heterodyne whistles will be heard. Gradually reduce reaction until set stops oscillating, and by careful tuning on main pointer and by keeping reaction critical you will pick up a number of stations.

2nd method. Having received a station you can make it much louder by turning the aerial balancer knob until the signal comes into tune on the balancer. You may find that as it does this the set oscillates. In that case you will have to reduce the reaction. This second method is usually only advised when the short-wave signals are strong.

BENJAMIN VIBROLDERS

Messrs. Benjamin Electric Ltd., inform us that the Benjamin "Vibrolders" (as specified for the S.T. 800) are available from the British Radio Gramophone Co. Ltd., to whom all enquiries should be addressed.

3rd method. Make the set oscillate by use of plenty of reaction (use more than is necessary just to start oscillation). Keep the aerial balancer pointer more or less parallel, but a little to the left of the main pointer. Pick up a station on the main pointer by its heterodyne whistle. Leave go of the main tuning control and turn the aerial balancer either way until the whistle suddenly changes character. This will only occur at one point. You will find that you can get a silent point adjustment on the aerial balancer and that if you tune the balancer to either side the note of the whistle will rise. At the silent point the aerial balancer may be regarded as in tune. Leave it alone. Now go back to the main tuning knob and adjust it while reducing reaction to the normal critical non-oscillating condition. In this process you will hear the whistle appear again, and you should not "lose" it by over-rapid alteration of either reaction or main tuning knob. It will be found that the reaction knob will affect tuning somewhat, but if you keep the whistle or the clear station itself within hearing by suitable tuning of the main pointer this will cause no ill-effect.

4th method. A final polish for the satisfaction of experts may be given as follows: Tune a trifle below the station on the aerial balancer and get the station at its loudest by trial "swinging" of the main tuning control. Then tune very slightly higher on the aerial balancer, repeating the swinging. Signal should be louder. Keep on with this process till signals are at their loudest. If you over-tune on the aerial balancer signals will begin to fall off in strength. During these tests (which actually only take a second or two) reaction should be kept critical.

Note. As usual on straight sets, as you tune higher up the dial more reaction is needed, this applying to all wavebands. Another point useful to note is that an increase of reaction may require tuning down a trifle on the main pointer, and vice versa.

How to Adjust the Triple Extractor. Connect Triple Extractor Unit between aerial lead and aerial terminal of set. Aerial lead goes to A1 on Triple Extractor, while A2 on Triple

Extractor is joined by a wire to aerial terminal on set.

(a) At first have all three extractor condenser knobs turned fully clockwise (to right).

(b) Tune the S.T.800 set to receive your local National medium-wave station, or your relay station if this causes swamping. Signals should be loud but not made unnecessarily so. Reduce aerial coupler and volume control if necessary. Now slowly alter that knob on the Triple Extractor which is nearest terminal A1, until the local National is cut out. On either side of the silent point the National will become louder.

(c) Tune S.T.800 to receive your other medium-wave local—the Regional. Signals should be loud but not be allowed to overload set. Reduce volume control and aerial coupler if necessary. Now slowly turn that knob on the Triple Extractor nearest to terminal A2 until Regional disappears.

(d) Switch S.T.800 to long waveband and tune in Droitwich in the ordinary way, not permitting it to overload the set. Reduce volume if necessary. Now slowly turn middle knob

on Triple Extractor until Droitwich disappears.

(e) You can now slightly readjust any of the three knobs to allow just as much B.B.C. signal to get through to main set as you wish. Remember which station each Triple Extractor knob controls.

(f) Never let the Triple Extractor knobs be "just anywhere." They may be extracting the very station you are looking for. Midland Regional listeners may set both outside Extractor knobs to Midland Regional. When not needed, it is best to take the whole Triple Extractor out of circuit. Its extreme usefulness will, however, be appreciated in all districts suffering from B.B.C. swamping. J. S-T.

JOHN SCOTT - TAGGART'S
FAMOUS SET DESIGNS ARE
DESCRIBED EXCLUSIVELY
IN "POPULAR WIRELESS"

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ALL-BRITISH
CONDENSERS

SPECIFIED FOR THE S.T. 800

T.C.C. condensers are specified because of their DEPENDABILITY. Dependability is the result of specialised experience and

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BATTERY MODEL

Each
1 .004-mfd. T.C.C. type M, 1/-
1 .0001-mfd. T.C.C. type M, 8d.
2 .0005-mfd. T.C.C. type M, 9d.
*1 .1-mfd. tubular T.C.C.
type 250 - - - - 1/4
(*Incorporated in the coil unit)

A.C. MAINS MODEL

Each
2 0.5-mfd. T.C.C. type 250, 2/-
2 0.1-mfd. T.C.C. type 250, 1/4
3 1-mfd. T.C.C. type 50, 2/6
1 50-mfd. Electrolytic
T.C.C. type FW - - - 2/3
2 8-mfd. Electrolytic (wet)
T.C.C. type 802 - - - 6/-



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ACTON, W.3

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“RIDCO” SHORT WAVE UNIT



“RANGER” MODEL 15-85 metres. Suitable for any type of A.C. Mains or Battery receiver.

AMERICAN RECEPTION GUARANTEED ON ANY RECEIVER.

Price 27/6 (less valve) Price 37/6 (with valve)

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“Cub”



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

MANUFACTURERS PLEASE NOTE

THE commercial and technical department of the Leicester City Libraries is engaged in building up a collection of manufacturers' catalogues. Firms are invited to supply a complete set of their current publications, which will be indexed in the card catalogue both under the firms' names and the particular productions in which they specialise.

LUXURY SETS FOR INDIA

What are believed to be the most expensive radio sets ever built are those which have just been sent to India for the Maharajah of Patiala. The receivers in question have been specially constructed by Philips Radio, and are remarkable for the beauty of their outward appearance. The cabinets are made of the costliest kind of wood, whilst the dial holders and control knobs are of carved ivory.

In order to make the sets easily transportable in the halls of the palace, they are placed on chromium sledges provided with small wheels. A costly kind of leather has been used for the handles on the sledges. The rear panels of the sets are, with the exception of the control knobs, identical with the front panels, so that the receivers present the same high finish when viewed from all sides.

The sets have been built on a low sledge, it is explained, in order to adapt them to the customs of the country, for in Patiala no chairs are used, and it is usual to sit on a carpet or cushions.

FOR HOME CHARGING

Gordons Equipment Limited have produced a compact and inexpensive charger for those wishing to charge their own accumulators at home. Having a consumption of approximately 5 watts, the “Gnome” charger, as it is called, gives an output of ½ ampere at 2 volts. A metal rectifier is employed, the charger, of course, being for A.C. mains. The price is 13s. 6d.

NEW FIRE H.Q. EQUIPMENT

The Westinghouse Brake and Signal Co., whose metal rectifiers are world famous, have been awarded the contract by the L.C.C. for the whole of the new battery-charging equipment for the fire appliance batteries at Fire Brigade Headquarters.

AT THE B.I.F.

Overseas visitors to the British Industries Fair, which closes on Friday of this week

have been provided with special facilities for sending telegrams to any part of the world, due to the foresight of Cable and Wireless Limited in opening a special office in the fair.

Those interested in the transmission and reception of messages on the beam wireless system have been able to see working demonstrations of the automatic apparatus used.

Another feature of the Cable and Wireless exhibit is a large revolving and illuminated globe, eight feet in diameter, showing the world-wide overseas telegraph services controlled by this firm.

NEW EVER READY SETS

Here are some new set releases.

First, two new Ever Ready models—an all-wave table superhet, and an A.C. transportable.

The all-wave superhet has six valves (including rectifier) and costs 18 guineas. Designed for A.C. mains, it covers the usual medium and long wavebands, and in addition two short wavebands of 13-33 metres and 30-82 metres. A visual tuning indicator is provided as is also a two-speed tuning control, selectivity tone control and a sensitivity control. The loudspeaker is a moving coil of the non-focusing type.

The A.C. transportable is priced at 10½ guineas, and incorporates four valves, including the rectifier. It is a medium and long-wave broadcast receiver and has a full vision tuning scale calibrated in wavelengths and station names.

The aerial is built into the receiver, the cabinet being mounted on a turntable so that full advantage may be taken of the directional properties of the aerial.

Provision is made for an external aerial to be used if desired. The weight of this receiver is 29 lb.

LATEST DECCA RELEASES

The Decca Gramophone Co., Ltd., also announce two new models. One is an all mains six-valve universal portable and the other an all mains six-valve universal table model.

Both models employ the same type of circuit, namely a superhet giving three waveband tuning, the wavebands being 19-49 metres, together with the usual medium and long-wave ranges. Delayed A.V.C. is fitted and the tuning dial is calibrated in metres, kilocycles and station names.

In the case of the portable model provision is made for headphones, and an external speaker can be used, if desired, with the table model.

The portable, which is known as the Model “55,” costs 8½ guineas and is available in three different colours, namely, blue, black or maroon leather finish. It has a carrying handle at the top and the weight is 12½ lb.

The table model, called the Model “66” is 9½ guineas.

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Essential for all-wave sets. Makes your aerial adjustable at the turn of a knob. Complete with cut-out switch, from all dealers or post free from:

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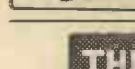
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Highly efficient, self adhesive aluminium strip—gives wonderful pick-up clear of interference—fixed in a jiffy without tools—just press it and it sticks.

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Double Length
36

TECHNICAL JOTTINGS

Some items of interest

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

Aerial Transformer

AN interesting new invention is an all-wave aerial transformer. The transformer is enclosed in a completely weatherproof case, and externally looks for all the world like a somewhat-larger-than-usual aerial insulator. It may be used with any set, but those that have no built-in set transformer need an extra companion unit. It is claimed that this accessory is efficient on all waves, and provides the maximum elimination of extraneous noise. It has to be completely weatherproof, inasmuch as it is connected directly, outdoors, to the aerial. The aerial is divided at the centre, and the aerial transformer is introduced at the junction, the down-lead then being taken from the transformer.

Cathode-Ray Tubes

The cathode-ray tube, like so many radio components, seems to find ever-increasing uses in directions sometimes relatively removed from radio.

As an example of this, some tests have recently been made in America with a new cathode-ray direction-finder for aircraft. These tests were carried out over all kinds of country, mountainous and flat, as well as over water, and in the daytime and at night. It was found that reliable bearings could be obtained even through heavy atmospheric disturbances and interference from other radio signals on the same frequency as the observed station did not seriously upset the operation.

For Direction-Finding

When this cathode-ray direction-finder is in use, the cathode-ray pattern gradually opens from a vertical line into an ellipse on approaching a station until finally, when directly over the radio station, an almost perfectly circular pattern is obtained. This "directional sense" is quite automatic, and the approach to any broadcast or beacon station is readily observed.

In addition to its use as a radio direction-finder or "homing" device, right-and-left indicator and so on, this cathode-ray device was also found to give a very accurate bearing and directional indications of electrical storms.

Safety in the Air

The equipment uses two separate amplifying channels, one utilising the energy from a simple vertical aerial, and the other amplifying the signals from a rotatable loop.

It is stated that commercial air lines in America will probably soon be fitting cathode-ray equipment of this type standard, as it is claimed to be one of the most important contributions to safety in air travel.

Traffic Control

We are all by now familiar with the loudspeakers in the London Tube lifts which tell us to "Stand clear of the gates, please", and this arrangement is now being tried out in connection with traffic crossings. In some recent tests, whenever the light turned red in one direction the loudspeaker

announced a warning something like this: "This is a busy and dangerous crossing. Several people have been killed or injured at this crossing because they did not observe the traffic signals. Wait till the light turns green before stepping off the pavement."

The authorities found that, whereas the drivers of vehicles realise their responsibility to observe traffic signals, the pedestrians as a general rule either do not appreciate that they also should obey the traffic signals, or else are completely oblivious to them. It is obviously necessary for the organisation of the crossing traffic that drivers and pedestrians should observe the signals. If it is found that this double warning draws much greater attention to the traffic lights, and has the effect of materially reducing accidents, it will be adopted in other dangerous spots.

Improvements in Electrolytics

Electrolytic condensers which made their appearance a few years ago have proved a great boon in that they enable us to obtain an enormously greater electrostatic capacity in a given space than we could obtain by the ordinary condenser consisting of layers of tinfoil and waxed paper. Electrolytic condensers, as you probably know, have a definite polarity and therefore cannot be used for all purposes for which ordinary laminated condensers are used. However, it so happens that the particular cases in which we require very high capacities in a radio set, namely, for the smoothing of rectified current and other smoothing generally, are cases where the polarity is no drawback, and so the electrolytic type of condenser fills the bill.

Not content with the extraordinary
(Continued on next page.)

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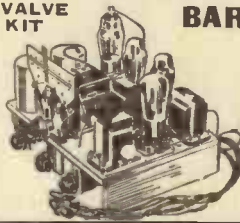
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● Latest Class "B" Circuit built on METAPLEX. ● 4 Stages.
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WITH 4 BRITISH VALVES

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● Variable-Mu H.F. Pentode, Rectifying Detector, Class "B" Driver and Class "B" Output Valves.
● Slow-motion tuning. ● Illuminated circular air-plane dial.
● Wavelengths 200-550 and 900-2,100 metres.

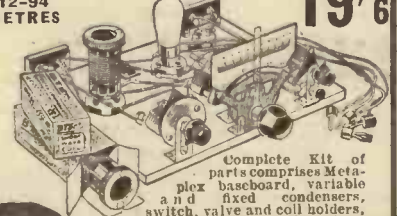
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TECHNICAL JOTTINGS

(Continued from previous page.)

condensing property of the electrolytic condenser, radio scientists have been working to reduce still further the size of this type of condenser or, if you like, to cram still more capacity in the same size.

High Capacity Condensers

You probably know that the electrolytic condenser owes its special condensing property to the fact that the aluminium plates form a layer of oxide on their surface when current tries to pass through one way, this layer being formed in exceedingly close contact with—or rather proximity to—the metal. We all “learnt at school” that the capacity of a condenser *increases* as the distance separating the plates *decreases*, and so if we can arrange plates exceedingly close together we shall be able to get a very high capacity with a relatively small plate area. Using actual metal plates it is quite impossible to get them into anything like such close proximity as that of the film of oxide and the aluminium sheet.

Special Plates

The secret of the newest developments, by which the electrostatic capacity of these condensers has been still further increased, is the use of special types of plate. Until recently “dry electrolytic” condenser plates were formed of smooth polished metal. The effective area of the metal was simply the product of its linear dimensions. Since the capacity of the condenser, however, is controlled by the effective area of the plate, if we can find any simple means of increasing the effective area without increasing the overall size, we shall gain to that extent. The answer to this has been found in a form of *etched* plate construction in which rolls of polished aluminium are passed through an acid bath so as to produce a roughened surface. The polished finish of the aluminium is converted into a kind of fine sandpaper-like surface which, when viewed under a powerful microscope, is seen to be in the form of innumerable hills and dales. As a result of this, an etched-plate condenser having a given rating as to life and capacity can be built into a container only about one-quarter the size of the more usual type of electrolytic condenser.

Ribbon Armatures

A new kind of microphone, of the so-called “velocity” type, has been produced, using a ribbon armature. This new microphone is claimed to be so much more sensitive than its predecessors that it will give the same performance as others with one stage less of amplification. The microphone is of the high-impedance type and no transformer is required and in this way at least one source of trouble due to the pick-up of hum is eliminated.

Another advantage of the microphone is that it is highly directional, so that in this way it escapes to a large extent unwanted sounds and is relatively free from acoustic feed-back which, as you know, is so liable to set up a howl with a sensitive microphone. It can also be used for speaking very close without the usual “boomy” effects present in other velocity microphones with good frequency response.

As regards the design of the new microphone, it employs eight thin aluminium-foil

ribbons which are placed loosely across an insulated perforated metal plate. This metal plate and the ribbons thus form a condenser which normally has a capacity of about 500 micro-microfarads. The ribbons are anchored at each end and the unit is mounted in a protective case.

Eliminating Inertia

In operation, a polarising voltage is applied to the ribbons, through a resistance network, and when sound vibrations fall upon the microphone and vibrate the ribbons the effect is to vary the capacity between the ribbons and the fixed plate, thus causing corresponding variations in the minute charging current flowing through the resistance network. The aluminium ribbons are only about one-thousandth of an inch in thickness and so have very small inertia at ordinary audio frequencies.

Looking for Trouble

I don't know whether you have ever had the experience of a transformer with a broken wire inside which sometimes makes contact and sometimes doesn't? You often hear about this sort of thing and it sounds rather improbable but in point of fact it actually happens a good deal more frequently than you might think. I had a case myself only a few days ago. The set would work all right for a time, then there would be an awful crackling, then it wouldn't work at all; sometimes it would “come on,” sometimes go off. If you come across this kind of thing it is almost a certain indication of a broken wire, either in a transformer or sometimes even in the soldered connections in the wiring. A simple test is to give the cabinet of the set a fairly sharp bang with your fist—not so hard, of course, as to damage the valves—and if this results in a grating noise or in a set coming on when it was previously off, or going off when it was previously on, you can guess that there is a broken wire somewhere about.

Incidentally, quite often such a break occurs at the end of a winding where the thin wire joins a thicker leading-out wire.

RANDOM RADIO REFLECTIONS

(Continued from page 653.)

these will be working before the end of the year if the cable that has already reached Birmingham proves successful, and there is no reason to believe otherwise.

Although I have a complete television receiving outfit working at home, I often merely listen. Looking is too distracting for a busy man like myself. I can get on with my jobs while only the sound side is on, but when I switch on the C.R. Tube, then I have to drop everything and give myself over to viewing.

No, the novelty appeal hasn't worn off, or perhaps it's truer to say that it has given way to solid entertainment appeal. I particularly like the News Reel. A very successful item was the Peterson-Neusel fight. Having this brought right into one's own parlour, as it were, was thrilling to the extreme. I could no more do without my television now than I could face giving up reading, driving, or smoking.

But I can assure you that many of the items make good listening. You ought to cash in on the new service, at least to some extent.

FROM OUR READERS

(Continued from page 649.)

quite proud of. It was a battery, Class B, arrangement run on an eliminator. While putting on a record he gabbed away about the quality it could produce, but when I heard it I was utterly disgusted to think that a man who had been at radio since 1921 or 1922 could build a receiver with such an appalling output. About all I heard were the beats of the drums—it was a jazz record. All the while he kept saying to me: “Listen to that bass!” I could do nothing else; there was nothing else!

If I had gone into another room and shut the door all I would have heard would have been, thump, thump, thump! That is not quality. A quality amplifier is one which gives even response on all frequencies. And set manufacturers are nearly as bad. You need only walk through a built-up area any evening. And what do you hear? I'll tell you! The “boiled-shirted” gentleman from the B.B.C. giving the news, etc., “reicht dahn in t' cellar-oyle.” Those are the fruits of putting so-called tone-controls on to receivers which I prefer to call “top-cutters.”

It is pitiful to hear the excellent quality which the B.B.C. puts out ruined in this way. I think this state of affairs has arisen through the squeaky tones of the loudspeakers we used in the “good old days” (?). Mind you, I'm no lover of the “light-coloured” set. NO! I condemn that as much as the “cut-top” set. I like to be able to hear everything.

Yours faithfully,
F. W. COOK (2 C I T).

3, Airedale Cliff,
Pollard Lane,
Bramley, Leeds.

GOOD-BYE, OLD PAL!

The Editor “Popular Wireless.”

Dear Sir,—I read, not without a certain sadness, the decision of the Television Advisory Committee to adopt the E.M.I. transmissions for television. Though these transmissions are better, both in sound and vision, one feels sorry for the pioneer, John Logie Baird and his, perhaps, wasted apparatus. I understand that the E.M.I. camera is much more adaptable to the different lights, atmospheres and treatment than the Baird camera.

It seems to me that even though this system has been thrown down, private experiments could still doubtless be carried on, and some further important technical developments take place to put Baird's system once more on top.

In conclusion, I should like to say that I think they might give the Baird System a royal “send-off” at the very least.

Wishing “P.W.” every success in all its branches.

Yours faithfully,
JOHN ADDISON.

Cranborne Vicarage,
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CONNECTING TWO H.T. BATTERIES

A point to remember

I STUMBLED across a case quite recently which demonstrated very clearly that in spite of the enormous amount of information that has been propagated in connection with wireless, there is still a great deal of ignorance existing concerning the use of wireless apparatus. A man had installed a perfectly straightforward receiver, very simple to operate, and in the set provision had been made for two positive H.T. tappings in addition to the negative.

Being unaware of his real requirements he had purchased a 60-volt H.T. dry battery and successfully inserted the H.T. plugs into the sockets the correct way round, H.T. +1 being about 40 and H.T. +2 60. As readers would expect, his reception was rather poor from the point of view of quality and volume, so he had called in a friend to give advice.

Parallel Instead of Series

After an examination this friend rightly told him that he had insufficient H.T. voltage, and advised him to buy another 60-volt unit to use in conjunction with his present one, and matters would be rectified.

The advice was taken, but after placing the extra battery in circuit and switching on, no difference was noticed. Naturally, the friend was duly informed and, making a further examination, he found that the new 60-volt unit had been joined in parallel with the first one, i.e. leads connected together the two positive and two negative extremities of the batteries, while the two original H.T. leads had been left in the same sockets as previously.

Easily-Made Mistake

The perpetrator of this thought he was quite right in joining positive to positive and negative to negative, and the occasion served as an opportunity for a short dissertation on that vexed question of series and parallel, not only with reference to batteries, but also coils, resistances, condensers, etc.

It was the work of a moment to rectify matters and put the batteries in series, and since then the set has given no trouble, but the incident is recorded to show how easy it is for the newcomer to wireless to make little mistakes which to the more experienced seem to savour of the ridiculous.

H. J.

HENRY HALL'S HOUR

New programme developments will take place in connection with Henry Hall's Hour, starting on Saturday, March 13, on which date the B.B.C. Dance Orchestra completes five years of broadcasting.

It is intended that each of the Saturday night programmes shall include one or two examples of modern rhythmic compositions by British, American and Continental composers, many of the British contributions to the series being new works specially written for the B.B.C. Dance Orchestra. In this way Henry Hall hopes to stimulate the British composer in a field which has been exploited almost exclusively by the famous names of American rhythmic music, and the scheme will undoubtedly create a new interest for listeners.

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AMERICAN VALVES. A full range of valves for all American receivers, 6/- each.

MISCELLANEOUS BARGAINS.—All brand new in original sealed cartons: Telsen A.C./D.C. Multimeters, test anything radio or electrical, 8/6. Telsen 2-range Voltmeters, 3/-; 3-range meters, including milliamps., 4/-. Ace (P.O.) Microphones, with transformer ready for use with any receiver, 4/6; 36 assorted Tru-ohm Resistances, 1 watt, colour-coded and marked, 36 on card, 6/- per card. Bell Transformers, 200/250 volts input, 3, 5 and 8 volts output, 3/6; Morse Signal Units, incorporating buzzer, tapper and flash with international code, complete with batteries and bulb, 3/9 each. Varley Square Peak Coils, B.P.5, 2/-; Marconi V.24 and Q type valves (useful for short-wave experiments), 4/6; glass insulators, 4d. Light weight headphones, double pole, 4,000 ohms each ear piece, 3/- pair. A.C. Trickle Chargers, for 2, 4 and 6 volts, 17/6.

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SOUTHERN RADIO, 323, Euston Road, London, N.W.1 (Near Warren St. Tube). Phone: Euston 3775.

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INSENSITIVITY

This fault divides itself into three main heads. Carry on from the one which applies to the case under consideration

1
Volume all right but few stations are heard!

Examine aerial and earth systems. Check connections from and to isolator. Test joints

Check over voltages of any batteries used

Check over all plug and socket connections (including valve pins and holders) for sound and clean contact

Test valves (including rectifier in case of a mains set) for lost emission

IF STRAIGHT CIRCUIT

Check over continuity of reaction circuit

IF SUPERHET CIRCUIT

Test windings of oscillator coils

Test tuning coils for continuity and check condensers for proper trimming

IF MAINS SET

Test bias condenser and bias resistance or potentiometer of H.F. valve

2
Few stations heard and with little volume

Follow up No. 1 first, and if results are not then carry on with No. 3

3
Plenty of stations heard but with little volume

Test L.F. coupling components— anode resistance—grid leak—grid condenser—stopper resistance—transformer—coupling condenser

Try another loudspeaker with new loudspeaker leads

Apply following tests to detector anode circuit and following stages

Apply following tests to detector grid circuit and preceding stages

Test end of each lead for dry joint or dirty contact

Test by substitution all fixed condensers not already dealt with

Test or replace, one at a time, all components not yet tested

THE POPULAR WIRELESS "SPEEDY-RIGHT" FAULT-FINDING CHARTS
No. 2.— INSENSITIVITY