

SPECIAL SHORT-WAVE FEATURES INSIDE

Popular Wireless & TELEVISION TIMES

HOW MANY VALVES ?

By

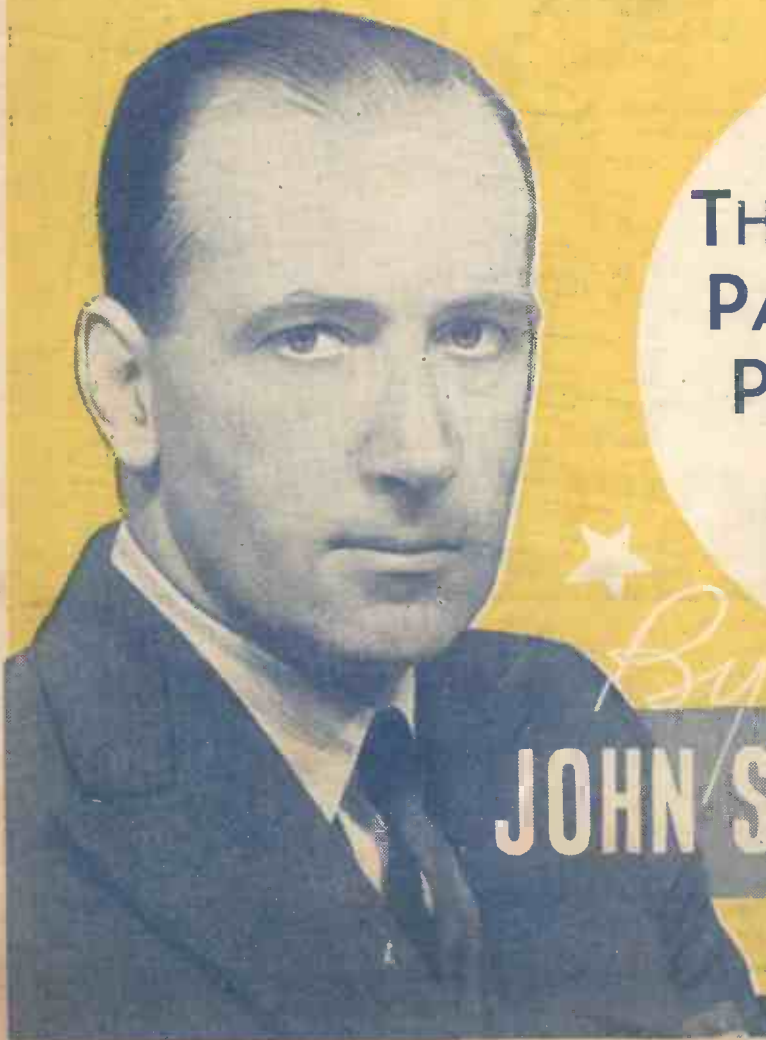
JOHN SCOTT-TAGGART

EVERY
WEDNESDAY
PRICE

3^D

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Oct. 9th, 1937.

A TELEVISION 3



FOR
THE ALEXANDRA
PALACE SOUND
PROGRAMMES

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DETAILS THIS WEEK

By
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1

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VERY MOVING
STAGSHAW WELCOME
TALKING POSTS

RADIO NOTES & NEWS

HASTY EXITS
AERIAL RIVALRY
HIS LAST FIRE

Fisherman's Phone

OUR ubiquitous telephone service has now extended itself to the radio-equipped coasters, trawlers, and other small vessels engaged in fishing and coasting. A short-range service having a normal range of 100 miles (and capable of considerably exceeding this in good conditions) is available to and from all subscribers in the United Kingdom.

The inclusive charge for a three-minute chin-wag is 7s., and the service is operated through two P.O. coast stations; Humber Radio takes the calls for ships near Grimsby, and Seaforth Radio for those near Liverpool. Calls can be made from any public or private phone in the ordinary way, the caller or subscriber asking for "Humber Ships Telephone" or "Seaforth Ships Telephone," as the case may be.

Nice work, this.

Very Moving

BUILDERS of cathedral organs and other acoustic experts have long known that powerful sound-waves can set up considerable strains, even in well-built structures. It is generally the deep bass notes that are found to cause strain and cracking, but there have been suggestions that the fall of the walls of Jericho was an acoustic effect due to the trumpets.

American public address engineers have now been measuring the effect on various buildings of very powerfully amplified music, and they have found that it is possible to cause vibrations of walls, floors, and the like, even when they are set in concrete.

So the old-fashioned terms that described a performance as "very moving" or "nearly brought the house down" were not so far wrong after all.

Old Comrades' Association

ALL wireless operators who served in the R.F.C. and R.A.F. up to 1919 are eligible for membership of the Royal Flying Corps Wireless Operators Old Comrades' Association. Started in 1930, to foster the friendly feeling of those early days, the Association holds its reunions on the second Tuesday of each month. Visits to places of interest are arranged, and all particulars will gladly be given by the Hon. Sec., 56, Regency Street, London, S.W.1.

This year's annual dinner is to be held at the First Avenue Hotel, High Holborn, on Saturday, October 30th.

Welcome to Stagshaw

WITH the opening of the new north-eastern station at Stagshaw, the B.B.C. engineers will be able to place another tick on their list of "something attempted, something done, which hath earned a night's repose." My first reports of tests from the new station indicate that it packs a Geordian wallop which makes the local loudspeakers frisk like fairies—a welcome change from the valiant whispers of the little Newcastle transmitter.

MY WORD

By THE EDITOR

THUS SPAKE . . .

COMMENTING upon a recent broadcast feature, Mrs. Goldie said: "The dumbfounding, the shattering thing about all this is that anybody should have believed, after reading this script and hearing it in rehearsal, that it would be clear enough to make a satisfactory programme."

But what is dumbfounding and shattering to me is that the above observation should appear in one of the B.B.C.'s own weekly journals and be written by one of its longest established regular contributors.

Why, instead of paying Mrs. Grace Wyndham Goldie to say such things after they've been inflicted on us listeners, don't the B.B.C. endeavour to engage her to give them the benefit of her advice beforehand?

And now we ought to learn more about that queer Newcastle blind spot, which played up the police radio transmissions. These were well received in most directions—southwards as far as Brighton and northwards up to about seventy miles—but "westward-ho they would not go, more than twenty miles or so."

Stagshaw's signals ought to show the cause of this freakish failure, as well as revitalise general radio reception in the north-east region.

Talking Posts and Posters

COMMUNITY listening in Germany is going to be put on a new basis when the two million new advertising pylons

now on order are erected throughout the country.

These pylons carry giant loudspeakers of the omni-directional-group variety, which are linked by concealed wiring to central radio amplifying equipment and microphones. Being centrally placed in towns and cities, all the loudspeakers of this nationwide system may be used together to convey a message from the Government to the people in time of emergency—a gigantic embodiment of "You're telling me!"

Beneath the loudspeakers is space for ordinary billposting, and it is calculated that the sale of this advertising space will pay for the community-address system.

Around and About

THE Portuguese Marconi Company recently opened a duplex radio-telephony service between Portugal and the British Isles, linking Portugal to all the world's telephones, via London.

* * *

Two new submarine cables have been laid across the North Channel to Northern Ireland, at a cost of about £32,000. And—talking of petty cash—it was recently disclosed that the Post Office is spending nearly £1,000,000 this year on long-distance underground cables.

He Saw the Start

IN a grave at Ballymena, Co. Antrim, there was recently buried the man who saw the beginnings of radio as an aid to police work. He was W. J. Whiteside, once chief operator at Father Point Wireless Station, Quebec Province; and he handled the wireless messages to and from the liner Montrose on which Dr. Crippen, accompanied by Miss Ethel le Neve, was attempting to escape to the New World when wanted in connection with the famous crime at Camden Town.

Mr. Whiteside also gave to a horrified world the news of the disaster to the Titanic in 1912. Nearly 1,500 lives were lost on that occasion, but the stricken ship's SOS prevented a much greater loss of life, and resulted in wireless being made compulsory on all large passenger vessels.

(Continued overleaf.)

S.T. 900!

OCT. 27TH!

THE FIREMAN'S SET THAT CAUGHT FIRE!

Dangers of Television

THOSE parts of the country which are not yet blessed with a television service may not cry so loudly for the facilities to be extended when they realise the possible dangers. The kind of danger that I have in mind is that connected with the visit of the television van to popular resorts, such as the Zoo, the race-course, or even the busy street, from which scenes can be televised.



At such places there are always one or two sinners enjoying themselves, and at the same time thinking up a good story to tell the missus about being detained at the office.

Even the most ingenious yarn will fail to carry conviction if your philanderings have been projected on to a large screen at your own fireside, and in the homes of all the neighbours.

Judge and Wireless Set Instalments

WHEN William Brannon was sued at Liverpool County Court for nine instalments of 10s. 6d. each, due on a wireless set which it was stated worked for only a few hours and could not be put right, Judge Dowdall, K.C., ordered payment at the rate of one shilling a month.

Pointing out that the agreement provided that whether the wireless set worked or not Mr. Brannon had to go on making regular payments for it, Judge Dowdall said that "Although the machine went wrong immediately he is without redress. He has had a radio set for one night, and he is liable to pay a finance company in London twelve guineas without redress against anybody. The system is one which ought to be thoroughly well advertised so that the public know what they are doing. A transaction should be looked into with care directly it appears that the machine sold is not the property of the man who sells it, and he is giving no guarantee, and the purchaser is incurring a liability to someone who is financing the maker."

What's In a Name?

THE handing out of contracts in connection with the new B.B.C. transmitting station which is to serve Aberdeen encourages the hope that next summer will see the station on its legs, to the great betterment of northern programmes.



Preparations are being made to erect a 250-ft. mast on the south side of the Dee, at Nigg.

I do hope that the sweet simplicity of this name will not tempt the B.B.C. to call the station Nigg, instead of Aberdeen. I hasten to assure my Scottish friends that I mean no disrespect to Nigg as Nigg, but I am thinking only of euphony.

There is—to the untutored ears of the South—a suggestion of half humorous abbreviation about anything called Nigg, which always makes us snigg. (See fig.)

"The Maid in the Garret"

IF you heard an old Scots song "The Maid in the Garret," from Glasgow on October 2nd, you will be interested to know how 58-year-old Mrs. M'Williams, the singer, made her debut in radio.

Last June she was on the Cameronia returning from a visit to a daughter who had emigrated to America thirteen years ago. During the voyage she was asked to sing

BROADCASTING TOPICALITIES

The first of a new and attractive series of presentations in song, music and story, entitled "I Bring You a Song," will be broadcast on the National wavelength on October 12. Others will follow at the end of October and at the beginning and end of December.

The theme of the features is of a romantic nature; although the face of the map has altered many times throughout the centuries, the peoples of the world have a common bond in the spirit of romance which, in its turn, embraces music and song. Each programme will be of thirty minutes' duration, and listeners will be taken, in imagination, to some part of the world, there to look upon some romantic scene or episode as portrayed in music. Featured in the broadcasts will be the voice of a well-known male singer.

The playwright responsible for the series is James Gilroy, whom listeners recently heard in the entertaining gramophone feature, "Going Places."

The first broadcast in the new edition of the popular "From the London Theatre" series (National, October 13) will take the form of extracts from "Victoria Regina," one of the most sensational stage successes of recent years. Bruce Belfrage has made special adaptations of four out of the nine short plays, each complete in itself, which are playing to packed houses at the Lyric Theatre. It was for him no easy matter to decide which of these playlets he should choose, but his motive was to give as complete a picture as possible of the intimate life of the Queen from girlhood to old age in the short space of time at his disposal.

Members of the cast of the London production, taking part in the broadcast will include: Pamela Stanley, Carl Desmond, Mabel Terry-Lewis, Ernest Milton and Jill Furze.

at a ship's concert, and in the audience were Sir Harry Lauder and a friend connected with the B.B.C.

Impressed by her singing, Sir Harry's friend asked Mrs. M'Williams to permit him to arrange a B.B.C. audition. This was done, and so successful was the test that the broadcast was fixed up right away.

Going Ahead

A three-years grant of £2,500 a year has been made by the New Zealand Government to further the work of the N.Z. Radio Research Committee, recently appointed. The Committee has begun its work.

Aberdeen police, already equipped with pocket radio sets and a radio car system, are now to have bicycles fitted with wireless.

Hasty Exits

TWO or three years ago one of the big broadcasting concerns of America commissioned a lady explorer to travel round the world for them, to learn how people work and play.

As many countries as possible were to be visited, the people spoken to, and the customs observed, to furnish material for a comprehensive series of radio talks.



Once started, the explorer found excitement aplenty—in China she came across an execution, in India stepped into a tiger hunt, and on one occasion was chased by an earnest and irate cobra.

Her radio travel talks, therefore, should be popular; and in every one she can lead up to that favourite American prelude to action—"C'mon, let's get outa here."

Aerial Rivalry

THE big lightning flash which put out of action the Scottish National and Regional programmes from Falkirk at the end of September was, I believe, the first time that lightning has well and truly tried conclusions with a B.B.C. aerial system.

There have been other "technical hitches" due to lightning, but in this one the full force of the flash sent the molten and charred aerial wires hurtling down from 500 feet, fouling the guy ropes and creating Old Harry all round.

Forty minutes afterwards the Scottish National programme was on the air again, and in a further half hour or so the Regional joined it, both going out from temporary aerials.

Considering the mess, this was remarkably good time for a clear-up to be effected, and the Scottish staff is to be congratulated on a nifty piece of emergency work.

His Last Fire

DID you hear the sad story of the retirement of the chief of the fire brigade from one of Canada's large towns? His pals, in token of his long service, wanted to give him a really good present, and they hit upon the idea of its being a powerful mains radio set.

He always had loved the idea of a good radio; so while his wife took with her to the new home a varied assortment of clocks, writing desks and other presents her husband's pals concentrated on fixing him up with the radio set, and giving the couple a final hectic ride round the city on the fire engine.

On their return they found that somebody had connected up the radio wrongly, and it had gone up in smoke—house and all!



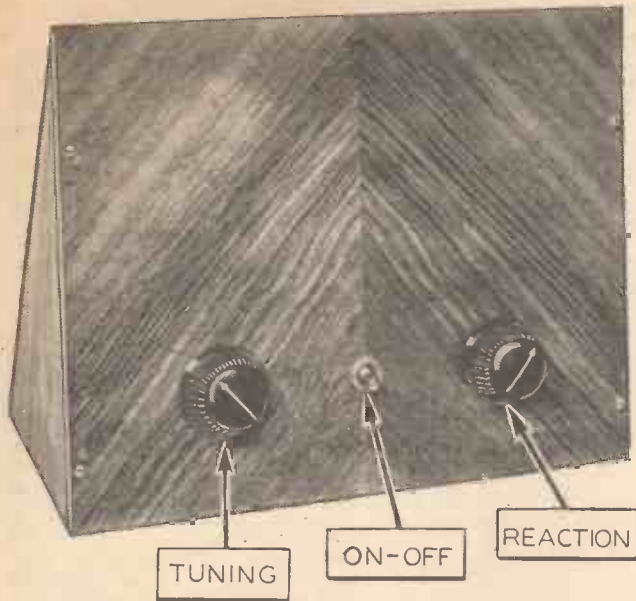
ARIEL

A TELEVISION THREE

FOR THE ALEXANDRA PALACE
SOUND PROGRAMMES

By JOHN SCOTT-TAGGART,

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



EIGHTY THOUSAND people visited the television demonstrations at Olympia recently—nearly half the attendance at the Exhibition. Considering the difficulties and the criticisms that could be directed against the method of giving the demonstrations, we can only draw the very clear conclusion that the public is at last becoming really interested in television. At any rate, they are willing to have a free look.

The time, however, is a long way off before a fraction of these people will ever own a television receiver of their own, but there is a very interesting field for the home constructor in picking up the sound portion of the programmes from Alexandra Palace.

The range of this station for sound is officially about 30 miles, but excellent reports have been received up to 70 miles, and even farther; while when I was recently in America the engineer in charge of development at the National Broadcasting Corporation told me that they had picked up the sound programme from Alexandra Palace.

A Valuable Adjunct

There are several excellent reasons why a complete television sound receiver is a valuable adjunct to an ordinary set. In the first place, there is no interference from other broadcast stations, and there is not the same reason for the B.B.C. to limit the side-bands (and therefore the quality of reproduction) as in the case of ordinary broadcasting, where if the side-bands were made too wide they would encroach on stations of neighbouring wavelength. A second reason is that from an experimental point of view, the 7-metre zone is exceptionally interesting, and few people know much about it, and nobody knows all about it. It is therefore possible for every constructor to learn interesting facts and contribute to the general knowledge on the subject.

A whole series of experiments may be carried out with different aerials and earths. You may find that two feet of wire inside your room gives as good results as your large

outdoor aerial. You may, on the other hand, find that it does nothing of the kind. The receiver which I have designed on this occasion will give very good results on the television sound programmes and no special aerial is required, but only the ordinary one usually employed. Nevertheless, it has worked quite well without an aerial at all, and the constructor will find he can carry out—at

practically no cost at all—innumerable experiments, all of which will throw some light on the peculiarities of these very short waves.

There are many questions, such as: How far do buildings screen these wavelengths? Does height above sea-level make much difference? Or does height of the aerial affect signal strength? Is there a best length for the aerial? How does a dipole compare with an ordinary aerial and earth?

Aerial experiments on ordinary wavelengths as used for broadcasting are not very useful as we know the rules. Also the lengths and heights are too great to be handled in comfort. When working on 7 metres, the difference can be noted when you move a 6-ft. aerial about a room. You can try it vertical or arrange it in a horizontal plane. You can try it with an earth or with the earth disconnected, or with another aerial used instead of the earth. If you are "pre-war" you may even be permitted to hitch

the set to the wiring of a bedstead—the only experiment with a crystal receiver I did not carry out in 1912, and which I feel has left a gap in my life. There was a slight recrudescence of bedstead aerials when broadcasting started, and no doubt television will bring its own collection of queer antennae.

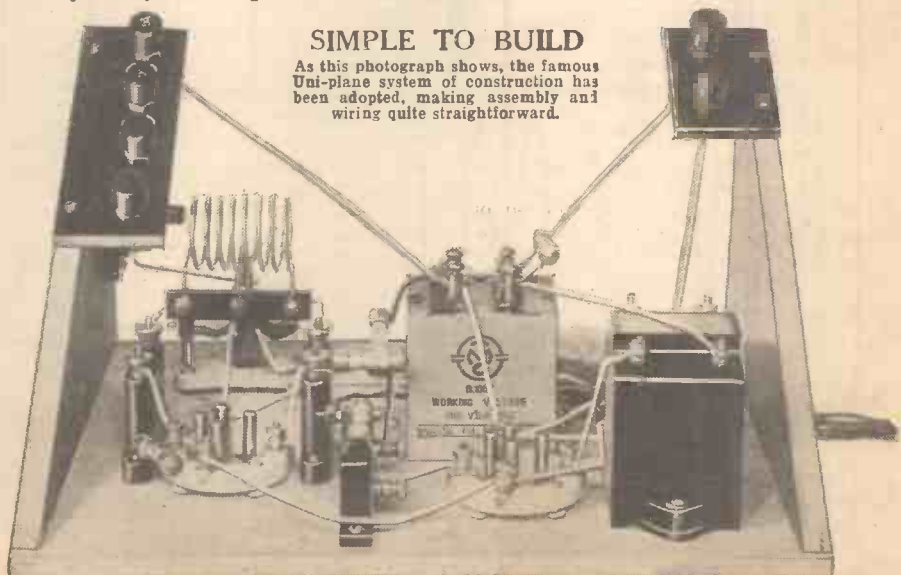
A Third Programme Choice

The third and, of course, most important of all the reasons why a television sound set is effective, is that it provides a really first-class programme by the B.B.C. of a kind which is not being radiated from the National or Regional stations. In other words, it is third choice of B.B.C. programmes. Admittedly, the times of working are not long, but this is obviously a matter which will automatically right itself. There are going to be no great sales of television sets on the strength of only one hour's programme in the evening which is when most people have the time to look and listen, so that we may expect an extension of this period before long. One has only to look and listen to television either in one's own home or at a demonstration to realise how enjoyable it can be, even without the pictorial aspect. If you build a set such as the one I am about to describe, or the "All-B.B.C." receiver which was described at the time of the Exhibition, you will find that what the eye does not see, the ear will not miss. There are, of course, occasional items such as fashion notes, or a lecture on village signs which will mean practically nothing without a cathode-ray tube to look at. But what about a demonstration of the bagpipes? Does not one instinctively want to close one's eyes in dreamy contentment?

(Continued overleaf.)

SIMPLE TO BUILD

As this photograph shows, the famous Uni-plane system of construction has been adopted, making assembly and wiring quite straightforward.



A TELEVISION THREE

(Continued from previous page.)

The short plays which are becoming such a feature of television are alone well worth a set to receive them. There is a great dearth of this class of entertainment on the ordinary broadcast wavebands, and very little is lost by not being able to see the performers.

If you occasionally feel thwarted and writhe in frustration at only hearing and not being able to see a conjurer, or if the description of a mannequin parade makes your tongue loll out, well, the only remedy is to go out and buy a complete television receiver.

A New Liveliness

But though on very rare occasions some people sometimes may miss something, yet everyone all the time will find a new life and liveliness about the television sound programmes, even though they do not see what is going on. This is no doubt because all the artists feel that they are being seen as well as heard, and that their whole personalities are being put over. They consequently have to be more full of pep, and their self-confidence is no doubt greater. The effect of an uninspiring microphone is notorious, so it is not surprising that everyone connected with television should feel rather more on his or her toes.

From a programme material point of view, no doubt television will have to be given the cream in order to give this new art the best chance. It will be these tit-bits that the television sound set constructor will be able to receive.

The reason for having a separate set is so as not to interfere with any existing receiver you may have. Moreover, it is easy to take about, and experiments can be readily carried out with it.

Let us now examine the arrangement I have designed: If you look at the circuit you will see that it is of the detector and two L.F. stage type. All three valves are triodes, the first being coupled to the second by means of a 30,000-ohm resistance, and the second to the third or output valve by a step-up iron-core transformer. Generous decoupling is used throughout so that the set may be used off a mains unit. There is a single tuned circuit consisting of an inductance coil tuned by a .000025-mfd. condenser. This tuned circuit is fed from the aerial through a preset mica condenser of .00005-mfd. maximum capacity, a "J.B." baseboard trimmer of that capacity

THE COMPONENTS YOU WILL NEED

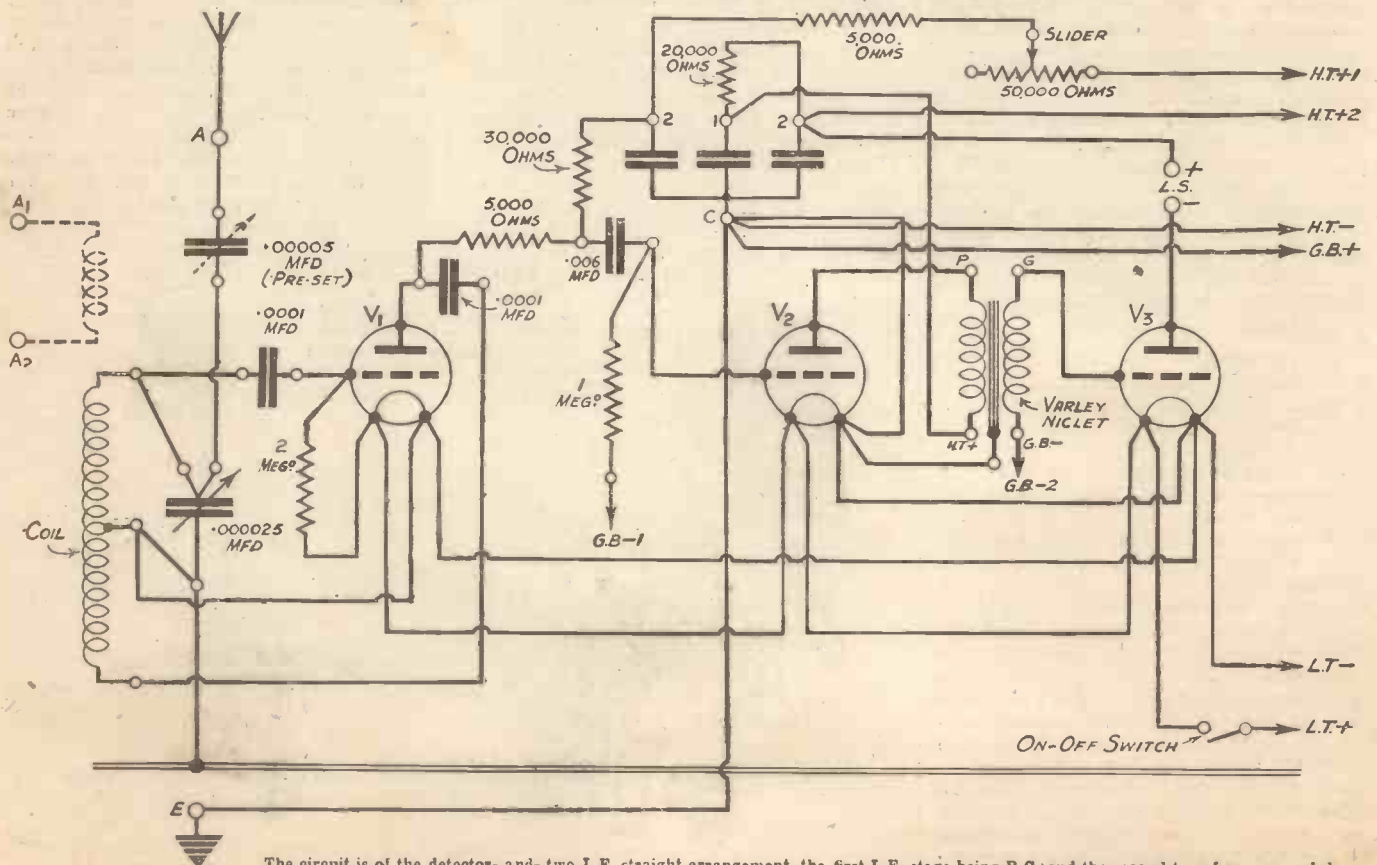
- 1 .000025-mfd. tuning condenser
- 1 .00005-mfd. baseboard pre-set condenser
- 1 Block condenser 2 + 2 + 1 mfd.
- 1 .006-mfd. mica fixed condenser
- 2 .0001-mfd. fixed condensers
- 1 50,000-ohm potentiometer
- 1 1-meg. resistor
- 1 2-meg. resistor
- 1 30,000-ohm resistor
- 1 20,000-ohm resistor
- 2 5,000-ohm resistors
- 1 L.F. transformer
- 1 Special coil
- 1 Toggle on/off switch
- 3 4-pin S.W. valve holders
- 1 Polished wood panel (Metaplex back)
- 2 Side-pieces
- 1 Ebonite terminal strip 4 in. x 1 1/2 in. x 1/8 in.
- 1 Ebonite terminal strip 2 in. x 1 1/2 in. x 1/8 in.
- 1 Battery lead clamping strip
- 6 feet 18 gauge T.C. wire
- 2 lengths 1 1/2 mm. insulating sleeving
- 6 Wander plugs marked Grid, + Grid - 1, Grid - 2, H.T. -, H.T. + 1, H.T. + 2
- 2 Accumulator connectors
- 6 Terminals marked A.1, A.2, A., E., L.S. -, L.S. +
- Screws, flex, etc.
- 2 Knobs
- B.T.S. type S.T.C.425
- J.B.
- T.M.C. type B.1007
- Lissen
- T.C.C. type 34
- Erie—without switch but with terminals
- Dubilier 1 watt
- Dubilier 1 watt
- Dubilier 1 watt
- Dubilier 1 watt
- Varley "Niclet" 3.5/1
- Colvern, as used in "Tele-sounder"
- Bulgin type S80
- B.T.S. type 4 C.H.
- Peto-Scott
- Peto-Scott
- Peto-Scott
- Peto-Scott
- Peto-Scott
- Belling and Lee midget type
- Belling and Lee
- Belling and Lee type R
- Peto-Scott
- Bulgin type K.20

VALVES

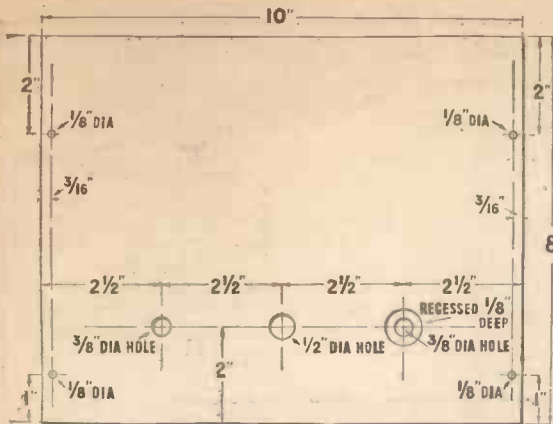
- V₁ Mazda L.2 (met.)
- V₂ Marconi or Osram L.21
- V₃ Hivac P.X.230

being employed. This pre-set should be screwed well out so that the plates are well apart, otherwise reaction may not be properly obtained. Moreover, on these very short wavelengths a very small aerial coupler is quite adequate. An alternative coupling coil may, however, be connected across terminals A₁ and A₂, which I have provided in the set, and this is to use when a di-pole aerial is used in place of an ordinary aerial and earth. In this case, a piece of insulated wire is wound for one or perhaps

A HIGH-EFFICIENCY "SNAG FREE" CIRCUIT IS EMPLOYED



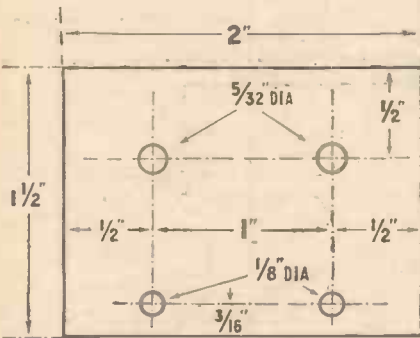
The circuit is of the detector- and-two-L.F. straight arrangement, the first L.F. stage being R.C. and the second transformer coupled.



How the panel is drilled. There are only seven holes in all.

two turns round the main tuning inductance, the ends of the wire being connected to the terminals A1 and A2, which normally have nothing connected to them. This coupling coil may be made to stand off the main tuning inductance by a quarter of an inch all round, i.e. its diameter may be $\frac{1}{4}$ in. greater. The set, however, will work off any ordinary aerial, and the extra terminals A1 and A2 are only for those of an experimental turn of mind.

Part of the coil is really the reaction coil, and it will be seen that this is connected to the anode of the first valve through a fixed condenser of .0001-mfd. capacity. In the anode circuit of this valve is a fixed resistance of 5,000 ohms, which acts as a choke and causes high-frequency currents to flow through the reaction coil. The adjustment of the amount of this reaction is produced by a rheostat in the anode circuit of the first valve. This rheostat is really a potentiometer used as a variable resistance, the maximum resistance being 50,000 ohms. A minimum resistance of



Details of the terminal strip which carries the two loudspeaker terminals.

5,000 ohms is included in the circuit, as otherwise there would be no decoupling with the potentiometer slider at one end.

This method of adjusting reaction gives exceptionally good results, and is extremely smooth and completely free from hand-capacity effects.

The general construction follows recent sets of mine in that a single panel is employed, the components being mounted on this panel. Two side-pieces are fitted to the panel to serve as supports, so that when looking from the front or from the side, the receiver looks complete, although the back is actually exposed. The constructor himself can elaborate this arrangement if he wishes, but it is certainly a very cheap arrangement and looks well.

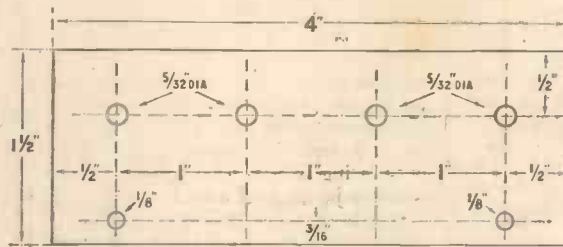
There are two terminal strips mounted on the side-pieces, and these carry on one side the loudspeaker terminals and on the other side aerial and earth terminals, and also the terminals A1 and A2 which are for connection to a coupling coil, if a di-pole aerial is used, as already explained.

The valves used are as follows:

- 1st valve (detector), L2;
- 2nd valve (L.F.), L21;
- 3rd valve (output), PX230.

This is the same combination of valves for the detector and low-frequency stages as used in the S.T.800 and the "All-B.B.C." sets, so that readers who may

have built these could use those valves. The coil is the Colvern version of the coil used in my "Telesounder," which should be mentioned when ordering. This was a 7-metre adaptor.



The aerial and earth terminals are carried on a terminal strip drilled in accordance with these dimensions.

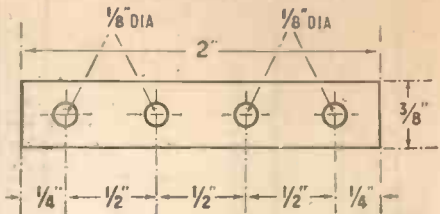
The spindle of the potentiometer specified is rather long and causes the knob to stand out from the panel. If this is not desired, half an inch of the spindle should be cut off by means of a hack saw.

The panel measures 10 in. x 8 in. x $\frac{1}{4}$ in., and is polished on the front and is metallised on the back.

The construction of the set is extremely simple, as the illustrations show, but departure from design is not to be recommended, especially on these short wave-

lengths, and under no circumstance should the constructor take connections from different terminals thinking that it will make no difference merely because several terminals are ultimately all joined together. This can produce very serious results indeed,

BATTERY LEAD CLAMP



This strip is used to take strain off the points where battery leads are joined to components.

even on ordinary broadcast wavebands, while on these very short wavelengths disastrous results are frequent. You should remember that short lengths of wire have quite important inductance and capacity, and all kinds of interaction may arise.

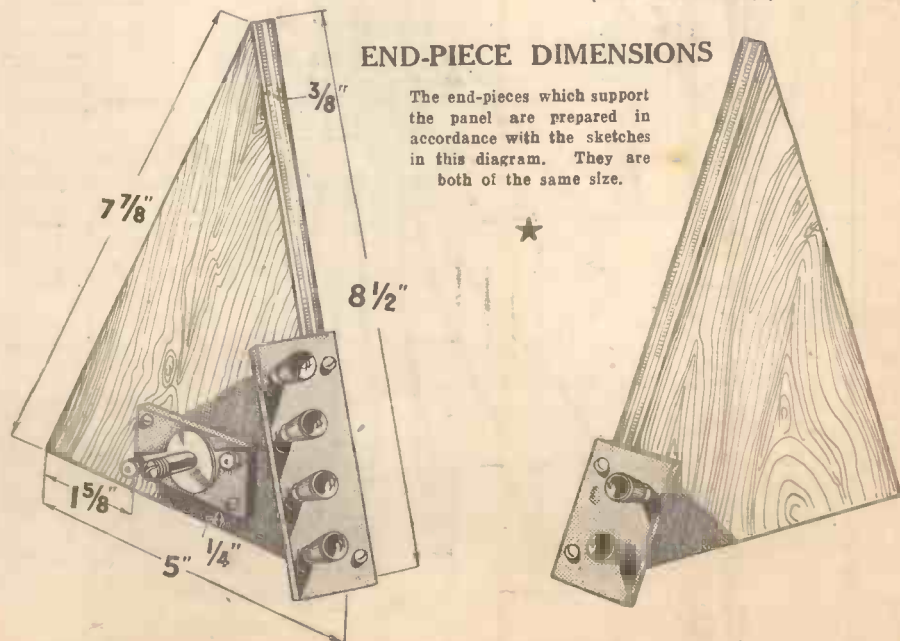
BUILDING THE SET

The following instructions will guide the constructor in the best way of going about the process of building his set: Prepare the panel, side-pieces, terminal strips and battery lead clamping strip, if not bought already prepared.

First mount the 50,000-ohms potentiometer and .000025-mfd. tuning condenser and on-off switch. This enables the position of other components to be more accurately located. Mount the valve holders, two .0001-mfd. fixed condensers, .006-mfd. fixed condenser, T.M.C. block condenser, L.F. transformer. Fit $\frac{1}{4}$ -in. 6 B.A. screw and nut to hole at top of .006-mfd. condenser. This is clearly indicated in the wiring diagram. Fit 2-meg. resistor between G and F + terminals of V1. Fit 1-meg. resistor between top terminal (in diagram) of .006-mfd. condenser and (Continued overleaf.)

END-PIECE DIMENSIONS

The end-pieces which support the panel are prepared in accordance with the sketches in this diagram. They are both of the same size.



A TELEVISION THREE

(Continued from previous page.)

anchoring screw. Fit 5,000-ohm resistor between bottom terminal of .006-mfd. condenser and top terminal of .0001-mfd. condenser. Fit 30,000-ohm resistor between bottom terminal of .006-mfd. condenser and right-hand terminal 2 of block condenser. Between this same terminal 2 and centre terminal of 50,000-ohm potentiometer, fit 5,000-ohm resistor.

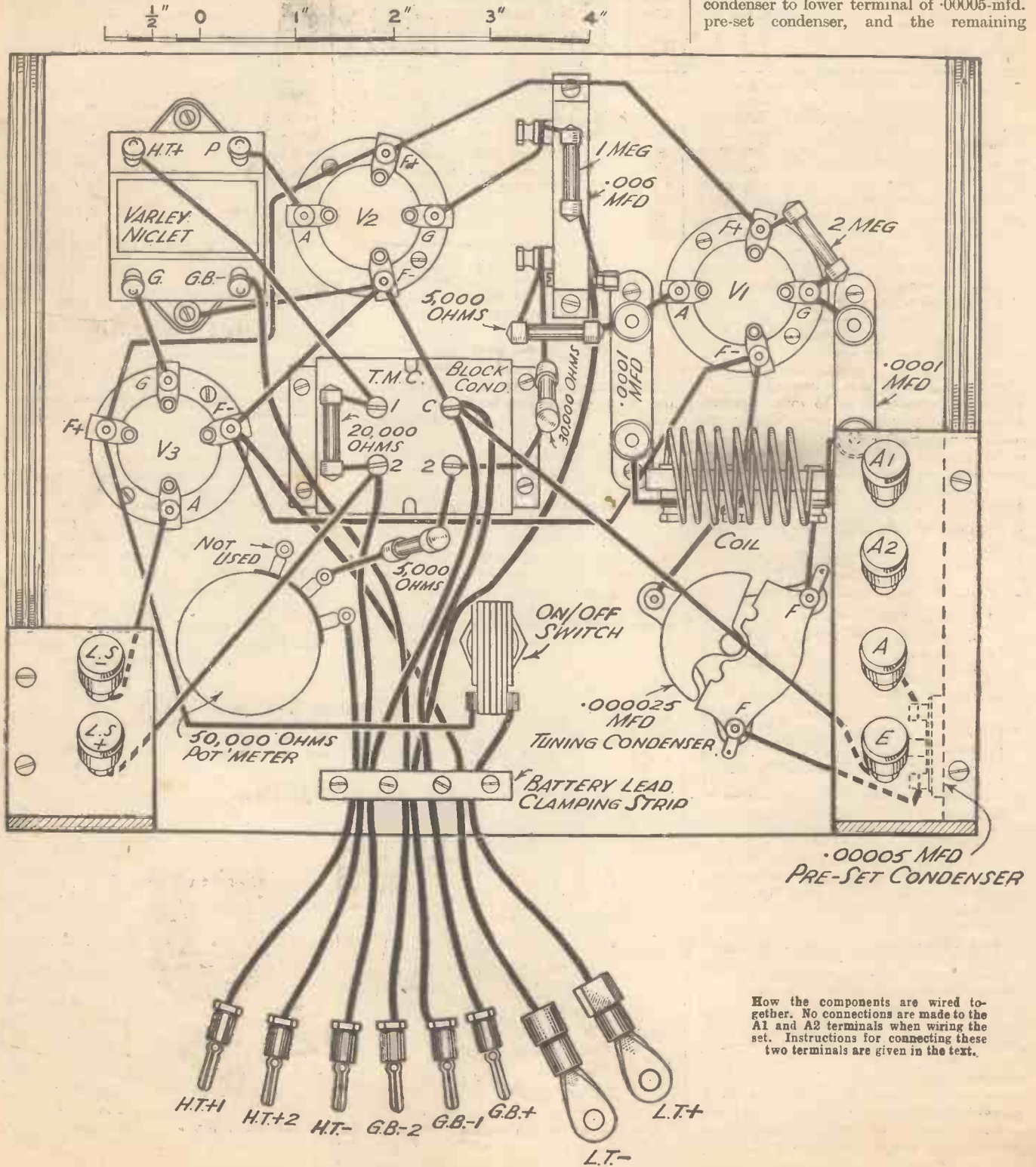
Fit 20,000-ohm resistor between left-

hand 2 terminal and 1 terminal of block condenser. Wire set except for leads to terminals, etc., on side-pieces. (These leads cannot be fitted until the side-pieces are fitted to the panel.)

Wiring is carried out in 18 gauge tinned copper wire, covered with 1/4-m.m. insulating sleeving. It is essential to use this thick wire in all places where there are H.F. currents, so use it throughout. Do not use 20 or 22 gauge because it is all you have lying about. Battery leads are 14/36 rubber-covered flex.

When the wiring has been done as far as

possible, fit the coil. This is supported by its wiring, and its position is quite clearly shown in the wiring diagram and photographs. Fit terminals to terminal strips. Fit terminal strips to side-pieces. Fit .00005-mfd. pre-set condenser to left-hand side-piece in position shown in diagram. Fit side-pieces on panel by means of 3/8-in. No. 4 round-head brass wood screws. Complete wiring by connecting A terminal of V3 to L.S. - terminal, left-hand 2 terminal of block condenser to L.S. +, C terminal of block condenser to E terminal on terminal strip, F of .000025-mfd. tuning condenser to lower terminal of .00005-mfd. pre-set condenser, and the remaining



How the components are wired together. No connections are made to the A1 and A2 terminals when wiring the set. Instructions for connecting these two terminals are given in the text.

terminal on this condenser to A terminal on terminal strip. The wiring is now completed.

Fit battery lead clamping strip by means of four $\frac{3}{8}$ -in. No. 4 round-head brass wood screws so that the battery leads are between the correct screws as shown in the wiring diagram. Fit accumulator connectors and wander-plugs to their correct leads.

Fitting the Knobs

Fit matched knobs to potentiometer and tuning condenser as follows: Turn potentiometer spindle fully anti-clockwise; fit knob so that arrow points to "7 o'clock."

Turn spindle of tuning condenser so that vanes are fully meshed; fit knob so that arrow is parallel to bottom of set and points to the right.

Battery connections. The batteries used are L.T. 2 volts, H.T. 120 volts, grid bias 16½ volts. The connections are as follows:

- H.T. - to negative of H.T. battery.
- H.T. + 1 to about + 60 volts.
- H.T. + 2 to + 120 volts.
- G.B. + to + of G.B. battery.
- G.B. - 1 to - 3 volts.
- G.B. - 2 to - 12 volts.

If 150-volt mains unit is used, G.B. - 2 should be increased to - 15 volts. Correct voltage for H.T. + 1 must be found by trial. It should be set so that control of reaction is obtained with the 50,000-ohm potentiometer reaction control. When a

THE POWER SUPPLY

Batteries: H.T. 120 v. — Drydex, G.E.C., Aerialite, Milnes H.T. Unit, Lissen, Fuller.
G.B. 16½ v. — Drydex, Lissen.
L.T. 2 v. — Exide, Lissen, Fuller.

Mains Units: Ekco, Atlas.

SUITABLE LOUDSPEAKERS

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

mains unit is used, one of the intermediate tappings should be used for H.T. + 1, and not the S.G. tapping.

The aerial is connected to terminal A, while the earth is connected to terminal E. The loudspeaker is connected to L.S. - and L.S. +. Terminals A1 and A2 are not normally used, but are employed when a di-pole aerial is employed.

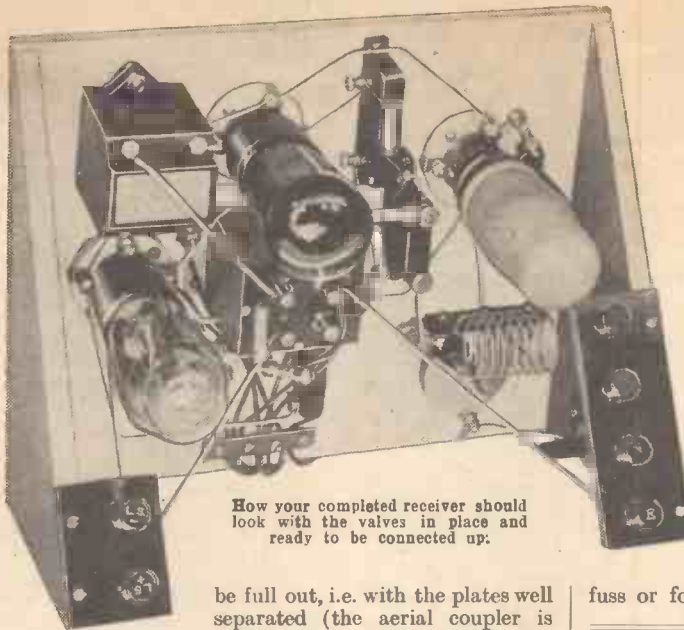
The left-hand knob, of course, is the tuning condenser, while the right-hand knob is the reaction control.

OPERATING THE RECEIVER

The operation of this set does not call for any special skill, and the tuning is not of that ultra-fine character that many readers may imagine it would be, especially when regard is had to the fine tuning on wavelengths of, say, 25 metres. The tuning condenser itself on this set is extremely small, and consequently there is no need for slow motion or special fiddling.

There are really only two points to notice, one is that the aerial coupler should

THE VALVES IN POSITION



How your completed receiver should look with the valves in place and ready to be connected up.

be full out, i.e. with the plates well separated (the aerial coupler is the small preset of J.B. type), and the other is that the set must be capable of oscillation with the slider of the potentiometer not at one extreme end.

What the Potentiometer Does

The idea of the slider is to vary the high-tension voltage on the detector valve and so to enable you to go through the stages of reaction until oscillation occurs, and then to enable you to go back again and so find the position of most efficient reception. If, to take a rather absurd case, you applied 500 volts to H.T. + 1, the potentiometer resistance would not be able to cut this down sufficiently to stop the first valve from oscillating, and so you would never get a proper reaction condition. To take the other extreme case, if you applied only 20 volts to H.T. + 1, you would never have enough H.T. voltage on the anode of the first valve to make it oscillate at all, and therefore you couldn't use the potentiometer resistance to stop it oscillating. There is no need for the knob of the reaction control to be exactly half-way when the valve starts oscillating and the usual rushing noise is heard, but you should certainly be able to go in and out of oscillation without getting too near one

end or the other of the potentiometer. Remember, also, that as your H.T. battery gets older you may need a different position for this H.T. + 1 plug. Provided you test the set during television hours, you need not worry about whether the valve is oscillating or not. The moment it oscillates and you turn the tuning condenser, you will hear the television signals in the form of a whistle. You will then turn down the reaction and tune accurately to the sound signals. Tuning and reaction are worked together as usual, of course.

Hours of Entertainment

If you build this set you will, I am sure, get many happy hours of entertainment from it. It is designed entirely for the 7-metre band and, as such, may be relied upon to give really excellent results without

fuss or forcing. J. S.-T.

ELIMINATING AN AERIAL WEAKNESS

In the best types of outdoor aerial construction, the aerial wire itself is made continuous with the downlead, there being no twisted or soldered joint between the two parts.

In some instances of aerial construction it is necessary to have a joint between the aerial wire proper and the downlead and, naturally enough, in order to maintain the electrical efficiency and durability of the aerial system, such a joint should be well soldered.

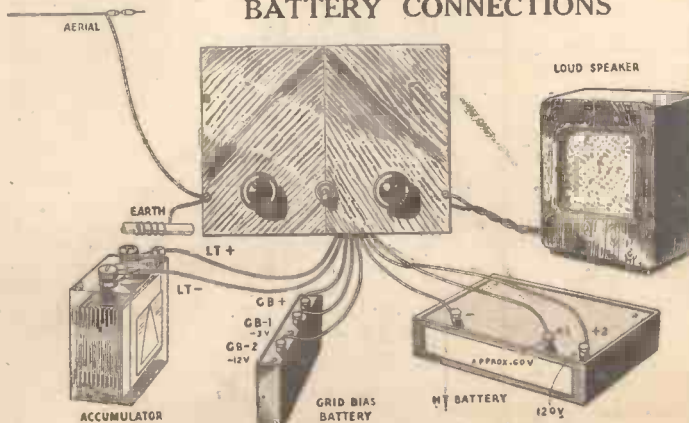
Even so, however, quite a number of amateurs make the mistake of bringing a soldered downlead directly down from the aerial wire and, sometimes, almost at right-angles to the latter. This type of construction invariably strains the soldered joint very severely, owing to the movement between the two parts under the influence of winds.

When a downlead is soldered near the end of an aerial wire, it is a very wise precaution to "loop" the downlead through the adjacent insulator. The downlead now descends to the receiver not directly from its soldered joint, but through the insulator. Under this type

of construction, there is no relative movement between the two parts of the soldered joint. Consequently, the joint will "hold" and retain its maximum electrical efficiency for quite an indefinite period.

Care should be taken, especially where short-wave working is concerned, to see that there are no ends of strands that can rub against the main wire, as these might produce crackles. J. F. S.

BATTERY CONNECTIONS



This pictorial sketch will simplify correct connection of the batteries, speaker, etc., and shows the voltages to apply.

THE DIAL REVOLVES

By Leslie W. Orton

ON 20 METRES :: TUNING-IN THE LOW-POWERED TRANSMISSIONS :: NEW SPANISH SHORT-WAVERS

IT is said that there is nothing so difficult as to search for a needle in a haystack.

Don't you believe it! Pay a visit to my locality and you will consider that child's play compared with pulling in a K6 here. Yes, I admit it—I cannot tell a lie! (Sez you!)—with my little set I can't pull in a Hawaiian amateur for toffee, or anything else.

Nevertheless, I'm holding my own in other fields. During the week I've heard quite a varied collection of stations on the 20-metre band, including E18L, G2BY, CE3CJ, OE4PJ, W1LI, W2ISY, W3AXL, W3AHY, W4DC, W5RZ, W7BZA and W2AWL, a 500-watt portable station located in New Jersey—heard him yet?

Between 7 and 8 a.m. conditions are particularly fine, and the Australian stations VK2XU, VK3BY, VK3AL and VK2AO can generally be relied upon to provide excellent entertainment.

On 10 metres a delightful state of affairs exists. W6's come in as easily as shelling peas, and W6HUM, W6MBD, W9DDF, LU7AG and many others have been particularly well heard.

Another drop and we find conditions equally entertaining on 5 metres. Careful tuning will bring in amateur stations whilst the television station is as reliable as a local.

A Challenge Answered

Remember the challenge thrown down by a gallant Yeovil knight of the dials in a recent "P.W."? Within an amazing list of low-powered C.W. and phone stations he set a ball rolling that certainly is gathering letters if not moss! Indeed, the G.P.O. has inaugurated a new postal delivery in my district. Maybe it's a coincidence, maybe not!

Bob Everard, of Sawbridgeworth, sends in a list chock full of record breakers. How is this for a start?

VS7JW, $7\frac{1}{2}$ watts; VK2BZ, VK7YL, VU2BU and VE3TY, all 10-watt; YR5IT, 12 watts; VU2QH, 14 watts; and YV5AM, a 15-watt station. All on phone, all verified. Truly Bob must have been born under a lucky star!

R. J., of Weymouth, suggests that I issue a certificate to the reader logging the greatest number of low-powered stations. Well, old man, I'm no Rockefeller, but I like the idea and will do as you suggest. Candidly, I think it's going to be a job to beat Bob, but perhaps I'm wrong! Come on, you DX hounds, send in your lists, we're going to have some fun!

Real Entertainment

The short-wave broadcasters have, in my humble opinion, been providing more thrills per second than Brooklands this week. My "bag" includes CR7BH at Lourenço Marques, Mozambique, on 25.5 metres; KKP, Hawaii, on 19.71 metres;

TGW A, Guatemala City on 31.75 metres, and OER 2, Vienna, on 25.42 metres.

North American stations are coming in well upon all bands, and W2XAF, Schenectady; W3XAU, Philadelphia; W1XK, Boston; W1XAL, Boston; W2XAD, Schenectady; W2XE, Wayne; W3XAL, Bound Brook; W8XK, Pittsburgh; W9XAZ, Milwaukee, and W6XKG, Los Angeles, have provided me with plenty of variety.

By the way, did you hear the N. B. C. broadcast dedicated to radio communication? It was extremely interesting. Re-broadcast of an amateur station; a talk with a pilot in an aeroplane high above the clouds, and a few words from the captain of the Queen Mary, then off Newfoundland, went to make it one of the "star" transmissions of the week.

Veri's From Spain

From war-racked Spain comes news of many new short-wave broadcasters, mostly

S.W. Station Identification

By F. A. Beane

AFRICAN STATIONS TO SEARCH FOR

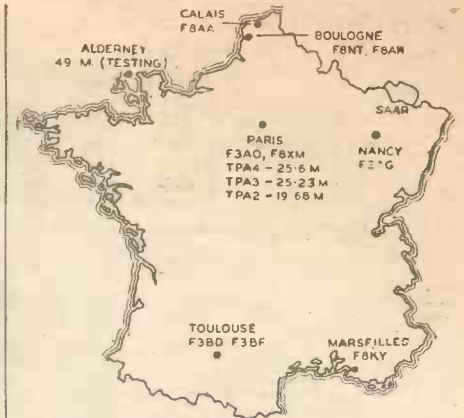
JOHANNESBURG, "The City of Gold," presents the elusive ZTJ on 49.2 m., which may rightly be termed a rare catch. During the last few years it has only been definitely identified on one occasion by your "guide," but other listeners have, perhaps, been more successful. To log it one must search very carefully between 14.00 and 21.00 G.M.T., although the presence of the comparatively powerful YUA on 49.18 m. necessitates a selective receiver. When heard ZTJ may be identified by its transmission of gramophone recordings; call "This is Johannesburg calling"; 6 "pip" time signal or concluding theme "God Save the King." English, of course, constitutes the major portion of all announcements and programmes.

Continuing Westwards we find CR6AA of Angola, situated in Lobito, on 31.06 m., where it occasionally thrusts a weak signal into Europe. This should be listened for either on a Wednesday or Saturday night from about 19.45 to 21.30 G.M.T., and may be identified by its use of Portuguese; occasional English announcements or the employment of three piano notes during intervals. Incidentally this station is sometimes reported to be on 41.7 m., but this is incorrect, as it has been on the 31-m. wavelength for about six months.

Other South African stations to search for are ZUD, "Radio Pretoria," on either 34.5 or 60 m., a Government station and the most powerful in South Africa; ZNB, Mafeking on 50 m. used to relay news to the District Commissioners; and ZEB and ZEC on 48.8 and 51.72 m. respectively, the former being at Bulawayo and the latter at Salisbury.

More Latin-American News

Before bringing to a close the week's tour we must revert to Chile in order to seek introduction to the new CB1170 which has recently appeared on 25.5 m., between DJD and GSD. To identify it one should listen



Some unexpected thrills emanate from France. How many of the above amateur and broadcast stations have you heard?

operated by the Insurgents. It is frequently a difficult matter to obtain details for a verification (sometimes raising tears as effectively as a Spanish onion!), but once you succeed you will be well rewarded by an attractive card and a whole batch of propaganda material!

Two "Japs" worth attention are JDY on 32.47 metres, and JVN on 28.14 metres. They have recently begun broadcasting from midday to 1 a.m. and from 7 to 9.30 p.m. approximately.

at 23.00 G.M.T. when the commencement of an "Anglo-American Hour" will be heard. The call is usually given thus: "Good-evening, everybody. This is station CB89 and CB1170 transmitting the Anglo-American Hour," the announcer being, undoubtedly, an Englishman. Dance recordings are played and interspersed with advertisements of cameras, etc., while reports are requested to be addressed to Casilla 706, Santiago, Chile.

On 25.2 m. approx. will be found another "mystery" signal which appears to originate from CB119, but so far nothing definite concerning it is known.

HP5A, Panama City, 25.64 m., may be heard signing on at 23.00 G.M.T. with the "Anvil Chorus," upon which are superimposed announcements in Spanish and English regarding the station's call, wavelength, the slogan "Radio Teatro Estrella de Panama," etc., given by the Spanish announcer. Shortly afterwards news in Spanish is given, and generally, a paso dobla at 23.15 and again at 23.30 between the news items; then at 23.32 the voice of Lieut. G. Williams, Station Manager, is heard requesting his audience to "Stop, Look and Listen" to his "news commentary," presented in the typical American manner and interrupted, somewhat amusingly, by motor oil advertisements.

The Ultra-Short Waves

Much activity is taking place below 10 m. On 9.454 m. one may log several stations, the best being W3XEY, "The Ultra High Frequency Station at Baltimore," with the "Red Network" N.B.C. programmes and 100 watts power; W9XPD of St. Louis relaying KSD and W2XDV with the C.B.S. programme as heard from W2XE. If the N.B.C. "Farm and Home Hour" programme is heard on 11.56 m. between 17.30 and 18.30 G.M.T. one may be prepared to hear the call W6XKG, Los Angeles, at 18.30, this station being well heard at times.

ON THE

SHORT

WAVES



THE "DE LUXE" MODEL

By W. L. S.

ANY motoring enthusiast will tell you that many motor manufacturers list two models of their cars, or some of their cars. One is the "standard" model, the other the "de luxe." The difference between the two lies in refinement of details—chromium plating, interior lighting, upholstery, ashtrays, etc. (or, looked at from the other point of view, the difference is about £10).

There is no lack of buyers for these "de luxe" models—in fact, I believe it is common experience that far more "de luxe" than "standard" models are sold. So obviously people appreciate little refinements, even if they have to pay for them.

I have often wondered why manufacturers of radio sets have not considered the same scheme. I am sure that many buyers would appreciate one or two little gadgets that the standard model didn't possess, and they would pay a reasonable extra figure to get them. But by far the majority of manufacturers don't encourage this sort of thing, which has therefore become the special privilege of the home constructor.

Incorporating Every Refinement

Once upon a time home construction was possible because it allowed one to save a whale of a lot of money. You could build a set far more cheaply than you could buy anything that would give similar results. But then that was when the prices of complete receivers were "way up"—and when they came down by leaps and bounds the position was changed.

Nowadays the chief advantage of home construction is that you can build yourself something that it is impossible to buy at any price. In other words, all home-built sets can be "de luxe" models, with every possible refinement that the owner wants. Instead of paying somebody some extra money to give him the said refinements, he just builds them in his own set, one by one, according to his inclinations and the state of his pocket.

Band-spreading is the one outstanding example of which everyone will think at once. It was absolutely non-existent in manufactured sets until long after every keen home constructor had been using it as a matter of course. Nowadays it isn't even a refinement—it's a plain necessity.

I am thinking now of such things as additional volume and tone controls, selectivity controls, provision for plugging

in the headphones to the last valve but one, and that sort of thing.

Incidentally, let's digress and discuss the diagram on this page. Last week a reader wrote to me and said, "I want to adopt your stunt of plugging the phones into the detector circuit, but I use choke filter output on the L.F. stage, and I've a strong objection to ruining my sensitive phones by putting D.C. through them. How can I transfer the choke-filter scheme to the detector?"

Well, I have thought out an alternative scheme which should meet this reader's

action. The speaker can then be left in circuit all the time, and it simply stops "speaking" when the phones are brought into use.

So much for that. How about a few other refinements? One that I am very keen on is an extra volume control in the form of a variable resistance across the phones or speaker. This method of control always seems to me to give a quieter background than any other, and even if you have a good volume control already on the set it may be worth while to install one of this kind and to play around with the two together.

Another whole array of refinements can take the form of adjustments for various voltages, such as those used on the screens of H.F. pentodes or tetrodes. Even if a triode detector is used, it is nice to have a potentiometer control over its anode voltage. Short-wave coils being what they are, it often happens that a detector will oscillate too hard for comfort with one coil in position and not hard enough with another. H.T. control is the most easy means of putting such a state of affairs right.

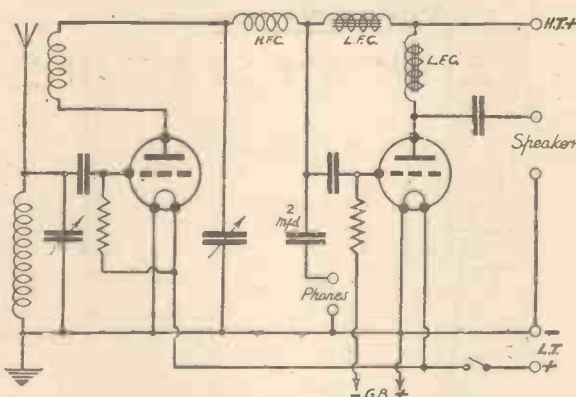
Grid-Leak Potentiometer

The days of sets that bristle with filament resistances are gone, of course. In fact, I suppose there are many of my readers who have never seen one of the old rheostats which used to be a feature even of commercially-built sets. While we're adding resistances, however, there is still the somewhat old-fashioned method of returning the grid leak, instead of to L.T. positive, to a potentiometer connected across the filament terminals of the detector valve. It's quite an idea, even in these days of smooth reaction—it sometimes improves matters quite a bit.

Yet another possibility is some form of variable aerial coupling, controlled from the front panel. An adjustable condenser can be fixed up "somewhere in the innards," and an extension rod brought out from it to a knob on the front panel. Such an adjustment will naturally alter tuning, and therefore can't be used to control selectivity while one is actually listening to something.

One could go on enumerating things like this for ever, and still a bright spark would write in and describe some absolutely indispensable gadget on his own set which hadn't been described. That is by way of being a hint that I would like to hear from readers about some of their gadgets.

PHONES OR SPEAKER



Here is a simple scheme permitting the use of phones in the detector circuit when it is desired to listen-in on one valve only.

requirements, and doubtless there are others who will be interested in it.

The set shown is a straight two-valver, with choke coupling between detector and L.F. stage. This is just as effective as the more common resistance coupling, and I have been taken to task quite recently for not giving it more attention. Why not use the choke in the detector plate circuit for two purposes? Coupling to the L.F. stage is one, and coupling to the headphones when necessary is the other. A 2-mfd. condenser taken from the "live" end of the choke to one side of a pair of terminals or a jack, the other side of which goes to earth, is all that is necessary. The phones can then be plugged in and the effect will be precisely that of a single-valve set with choke-filter output.

Using a Multi-Contact Jack

One can be clever, of course, and arrange a multi-contact jack in such a way that when the phones are plugged in, the L.F. stage is automatically cut out of

ON THE SHORT WAVES—Page 2.

POINTS from the POST-BAG

W.L.S. Replies to Correspondents

W. H. (Petersfield) reports things happening on the 10-metre band. He quotes the now-famous date of Sunday, Sept. 12th, which marked the official opening-up of the band for this season, as far as conditions were concerned. He heard sundry W6's and a VE4, together with a number of more common stations.

W. H. also mentions hearing W2OJ working with W10XDA on 20 metres. W10XDA, of course, is the famous schooner Effie Morrissey, and she was off Grey Island at the time.

The "Simplex" Three

J. H. P., who asked me for the scheme I described on the previous page, wants me to do a diagram of a "Simplex" Three de luxe, with band-spreading and a plug for cutting phones in on the detector. I will do my best to serve this up in reasonable time, as I think both refinements distinctly worth while. The "Simplex" didn't have band-spreading originally, chiefly because of its name, and the very fact that it was supposed to be a simple and cheap set. All the same, I think it would be a much better set with band-spreading, and I know that several readers who built it have incorporated this refinement, "off their own bats."

As I believe I have said before, however, there is absolutely no point in adding band-spreading to the H.F. control—it's only on the detector that it is necessary.

M. S. (S.W. 11) is interested in a circuit that I recently suggested for ultra-short-wave reception, and proposes to use a commercial television-band coil in it. I don't see any objections to this, and the circuit will not need any modifications. Then he asks about coupling a horizontal tuned di-pole. I think the only coupling method that is really satisfactory is a split coil, symmetrically coupled to the input circuit. The whole coil is tuned, and the centre point may be earthed.

Wants a Pre-selector Unit

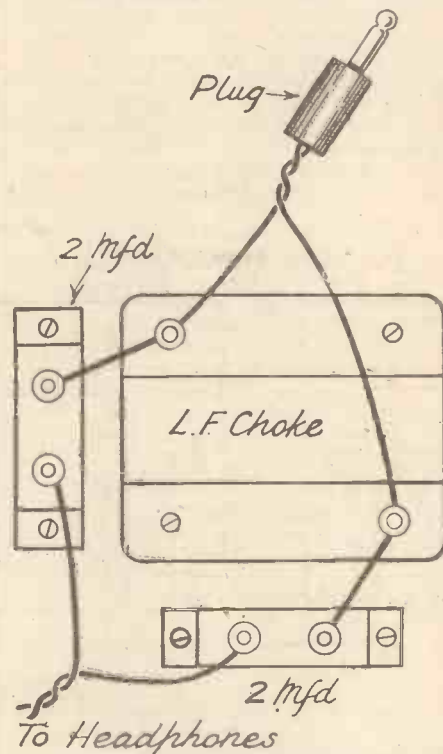
R. H. S. (Heswall) has a big commercial radio-gramophone in front of which he wants to use a pre-selector unit. My recent remarks about my own pre-selector caught his eye, and he is wondering whether it is commercial or "home-brewed." It is, of course, the home-made two-stage unit which is to be described in full detail in "P.W." I don't know of any commercially built pre-selector which will fulfil R. H. S.'s requirements, with the possible exceptions of two American models which are extensively used in front of single-signal superhets. One is the Miller and the other is styled the D.B. 20. D.B. stands for decibels, so you can guess the significance of the title.

W. McC. (Carlisle) has changed over from wooden panels to metal. Now he wants to build one of my standard base-board layouts and wants to know whether any insulation on the panel is necessary. Since I have always advocated series-tuned

circuits, the spindle of the reaction condenser is at earth potential, and it is therefore unnecessary to bush it or to insulate it in any way. W. McC. also brings up a query about some coils whose tuning ranges do not quite overlap. As the coils were designed for a certain make and certain size of condenser and he is using something different, I think the only thing to do is to add or subtract a few turns here and there until things come right.

This is a point that many correspondents have brought up from time to time, and I have often forced the issue myself by tuning with a .0001 a set of coils which are really designed for a .00015. The point is that the larger condenser generally gives a very substantial overlap, and the smaller one, with luck, will just about bring the edges of the bands together.

Returning to W. McC., I am interested to note that he has received a QSL-card from EA R R, the station in Franco's trenches



Readers who want to plug their phones into various parts of their set, or into more than one set, can avoid running D.C. through them by wiring up an L.F. choke and two fixed condensers as shown in this sketch. It is the choke which is plugged into the various anode circuits, and the phones never carry D.C.

outside Madrid! This station uses a power of 1 kilowatt on 7,229 kc. (about 41.5 metres), which is right in the amateur 40-metre band. It made contact with a few British amateurs. The QSL-card includes particulars of some of the Spanish stations regularly on the air, and no fewer than four are in the 40-metre band.

They are all transmitting news in English, and all will QSL reports if international reply coupons are sent. The address for reports is Radio Requete, Estudio, Avenida 27, San Sebastian.

G. M. (Edinburgh) reports good reception of Australians on 10 metres at 2 p.m., which is an hour at which I have never heard them. I find the Australians best between 8 a.m. and 10 a.m., usually peaking towards the latter hour.

Short-Wave NEWS

IT was interesting to note that the recent C.C.I.R. meeting at Bucharest, in the course of preparations for Cairo, discussed the important subject of the classification of radio waves. They have suggested a new scheme of nomenclature which will probably be adopted for general use before very long.

The designations according to frequency are those that concern us most; the suggestions for designation according to wavelength are hardly likely to be generally used. The following is the suggested classification: Wavelengths above 10,000 metres—myriametric or very low frequency; 1,000–10,000-kilometric or low frequency; 100–1,000—hectometric or intermediate frequency; 10–100—dekametric or high frequency; 1–10—metric or very high frequency; 0.1–1—decimetric or ultra-high frequency; 0.1–0.01—centimetric or super-high frequency.

Metric and Dekametric Waves

So, my friends and listeners, please bear in mind that you are most interested in metric and dekametric waves, or very high and high frequencies! Ultra-high frequencies are outside your province, so you will probably be taken up if you talk any more about ultra-short waves. Very short waves in future, please, for anything between one and ten metres.

Perhaps the most interesting thing about the above is that the wavelengths right down to 0.01 metres (one centimetre) have been taken into account at all.

Sundry new and "unknown" stations have been reported by listeners, among them the following: V Q 5 K L B, Uganda; V S 2 A K, Malay States; V Q 8 A S (believed to be Solomon Islands, Indian Ocean); Z Z 2 A (goodness knows where).

The report still goes round that someone in North Wales has heard VK 2 N O's phone on 5 metres. I think I know who it is, too, but I can't get confirmation or otherwise. VK 2 N O himself has written to say that the report checks perfectly with his log, and that he was putting 100 watts into a beam aerial at the time. Whether we shall ever hear any more of it I don't know. Perhaps someone will quietly jump up and claim an "18" Club Certificate for 5 metres only one of these days?

Good DX on 20 Metres

Amateur-band news nowadays is chiefly a story of 20-metre DX, with 10 metres, naturally, now coming in as a close second. I have on hand, however, no fewer than five letters from readers calling attention to the rotten state of the 40-metre band.

The DX on 20 metres is too numerous to mention. The broadcast bands have not been particularly exciting, however, just the same old stations rolling in day after day (and night after night). One station worthy of comment is W 2 X E, who, particularly on 19 metres, has been putting out a real walloping transmission that has rivalled that of W 2 X A D on many nights.

W. L. S.

SUCCESS WITH THE HARTLEY

At the second attempt, Mr. Chester obtains excellent results from a Hartley receiver of which he gives details on this page

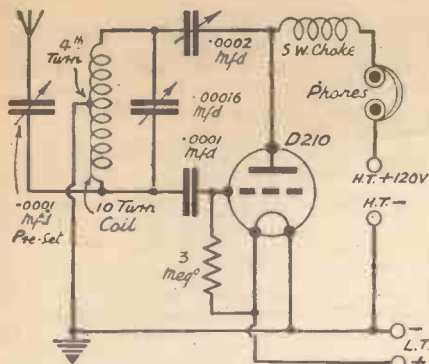


Fig. 1. This is the circuit employed in the experiments described this week.

HAVING admitted my folly over the Hartley circuit, I must now, in fairness to the jolly old ego, record a certain amount of success with this American invented method of oscillation. In fact, after my latest adventure, I can quite see why the circuit has been so popular—and, for some uses, still is.

I have undergone what the erudite leader writers would call a *volte face*—a complete turnabout in my view of the Hartley. By the way, you may possibly be amused to know that whenever I was attending my Latin classes at school I was invariably discovered by the classics master drawing circuit diagrams.

Simple in Construction

Possibly that is why I don't know any Latin except a few tags. And, when I come to think of it, *volte face* is rather closely connected with high tension. Or isn't it?

But this won't do (No, it won't!—Ed.). The Hartley circuit has the advantage that a single coil winding, with tapings, acts as both tuning and reaction coils at one and the same time. The whole winding is tuned by the condenser, while the part of the winding between the tap point and one end provides for the reaction coil.

Now if you are making your own coil this seems a "plus" point to me, since it simplifies the winding and also the subsequent connections. If you look at Fig. 1

COIL DETAILS

Soldered Right-angle Wire for Crocodile Clip

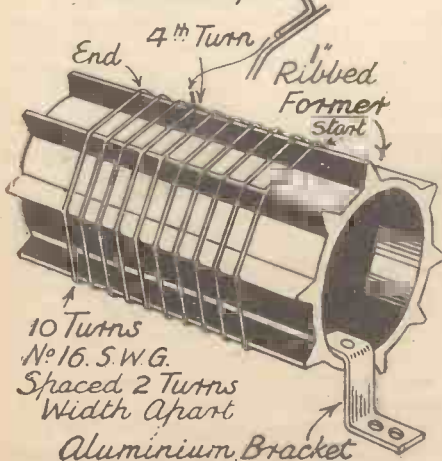


Fig. 2. The coil may have right-angled bits of wire staggered along three or four of the turns so that the crocodile clip may be tried in different positions.

for a moment you will see exactly the circuit I have been playing around with lately. Don't let the would-be smart arrangement fool you—it is the same old Hartley!

For the benefit of greenhorns (like me, for instance), let us analyse it a bit. The whole tuned coil with its tap (not at the centre, as I had imagined!) forms an arrangement that frankly fascinates me.

Each end of the coil and condenser oscillatory circuit is at high potential, one end going in the usual way through a grid condenser to the detector's valve grid, the other going through the usual 0.002 mfd. reaction condenser to the anode of the valve.

The degree of reaction produced depends, of course, on where you make your tap along the coil. If, as I did originally, you make it at the centre, you will have far too much reaction—in fact, the valve probably won't stop oscillating even when the reaction condenser is at minimum.

My experiments have been two-fold. First, to find the number of turns to give a useful waveband coverage with a 0.0016-mfd. tuning condenser. Secondly, to find the tap that gives enough reaction over the whole tunable range without being too hefty at any part.

Finally I got down to a 10-turn coil with the tap at the fourth turn from the reaction condenser end. Fig. 2 gives details of the home-made coil used, in case anyone wants to try my stunt. The turns should be spaced roughly two wires' width apart. I had thought it would be possible to make various taps with a crocodile clip this way, without the clip shorting the turns each side of it. But no, it is very tricky—and much simpler to solder a few short right-angled bits of wire "staggered" along the three or four turns in question.

Subsequent tireless tests indicate that, with a 0.001 mfd. pre-set as the aerial coupling to the grid condenser end of the Hartley coil, this particular coil has a coverage from about 16 metres up to well over 35 metres.

It was the Fig. 1 circuit I made up into my new Hartley one-valver, using a wooden panel and baseboard with a layout roughly as shown by Fig. 3. A wooden panel was used because of course neither end of the variable condenser can be earthed—and I dislike bushing metal panels to take an insulated spindle.

I have wired up the Fig. 3 layout because, oddly enough, quite a lot of readers who have been kind enough to write to me seem to prefer wiring-up from a practical rather than from a theoretical diagram. Why, I simply cannot imagine.

To me there is no comparison between

the simplicity of the Fig. 1 theoretical diagram and the apparent complication of the Fig. 3 layout. I wonder what the point is? Perhaps some amateur friend will let me know. For my part, I think it is half the battle to learn how to read a theoretical.

Constructional Points

One or two minor but important points about the layout. The pre-set is held "in the air" by a very short lead soldered direct to the near-by tag of the tuning condenser. This Polar job has tags on each side for the moving plates—a help in wiring, I find.

A flexible lead (in case you want to fool around with taps) is taken from the low tension negative terminal of the valve holder to a crocodile clip that, in my set, fastens on to the projecting bit of wire soldered to that fourth turn.

THE PRACTICAL LAYOUT

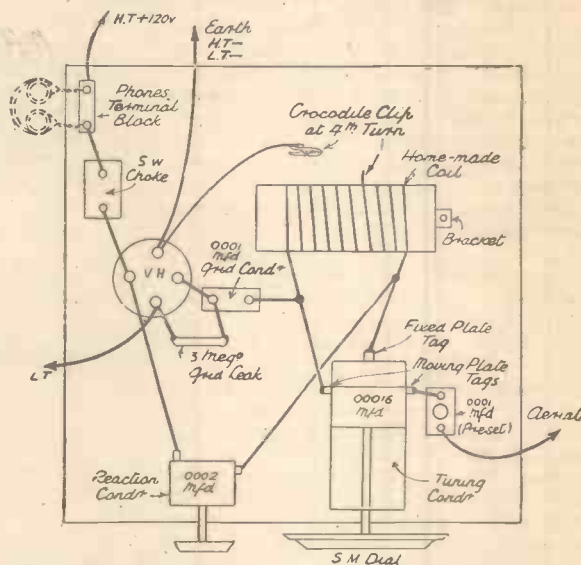


Fig. 3. The layout used by Mr. Chester. Some readers may prefer to wire-up from this diagram in preference to using the theoretical circuit.

By the way, I went into one of those emporiums where you can buy practically everything and found a counter with alligator clips, price 1d. each. But the genuine crocodile clip (we seem to be in deep waters here) cost me 2d. each, and are well worth the extra. Hm!

Well, I hope you have as much luck as I have had with the set. The first thing I heard was Herr Rosenberg tub-thumping at the Nazi Congress via one of the Zeesens. A pity, by the way, we Europeans don't copy the Americans in giving individual station identification calls—instead of lumping them all together.

It is a queer feeling, not knowing where you are tuning. But at about 4.55 p.m. I heard, to my delight, a rousing Sousa march that made me keep the tuning and reaction very still until the announcement confirmed my hopes: "This is station W2 X A D."

RANDOM RADIO REFLECTIONS

By VICTOR KING

SETS ARE CHEAP IN THE U.S.A. :: PROGRAMME TIMING—HERE AND IN AMERICA :: CHASED BY MOBILE COPS :: FINDING THOSE CRACKLES

PRICES IN AMERICA

I HAVE just been sent a two-hundred page catalogue by an American firm. It makes extremely interesting reading. What, for example, do you think of a five-valve all-mains set complete with cabinet and speaker for less than the equivalent of two pounds? Or a sixteen-valve outfit for less than ten pounds?

Or a thirteen-valve, automatic record-changing radiogram for less than twenty pounds?

Or a moving-coil loudspeaker for four shillings?

Not second-hand, but brand new!

Yes, radio is cheap in the States. There are two reasons: one that mass production has been developed to an extraordinary point of efficiency, and the other that competition is absolutely cut-throat.

Well, our manufacturing processes in this country are probably just as good nowadays and there is keen competition. But I am glad that the market isn't similar to that of our friends on the other side of the Atlantic.

Keen competition is good. It makes for progress. But there comes a point when it ceases to be advantageous either to industry or consumers. And, in my opinion, that point has been passed in the U.S.

However, if I pursue that topic much farther I am afraid I might begin to verge on politics!

PROGRAMME PAUSES

HAVE you noticed the tendency lately for there to be more and longer pauses between the items in the radio programmes?

I've found it somewhat disturbing. Not because I don't like waiting, but because it gives me the impression that there is slackness in the "Big House."

There is a noticeable difference between the service one obtains at a post-office and at an enterprising shop. You've all experienced it, no doubt. Well, it would seem to me that a little of the P.O. spirit is creeping over radio.

Maybe it becomes more apparent to one who, like myself, often listens to the American stations.

Boy, what timing! How they do it I simply do not know. Everything runs in to a split second. One item finishes and off they go with the next. No over-running, no interval signals.

Of course, we can't expect to get anything like that in this country, for the obvious reason that "time on the air" is a precious commodity in the U.S., whereas we have a semi-Government Department filling it up for us at their pleasure, and not always to our liking.

Still, on the whole, they don't do so badly, do they? Or do they?

I GET PINCHED

I HAVE realised my ambition. I've been chased by a police radio car and stopped by same on the King's Highway.

It happened like this: I was tooling peacefully along one of the bypass roads near London when I became aware of a large, shining outfit bearing swiftly down on me from the rear.

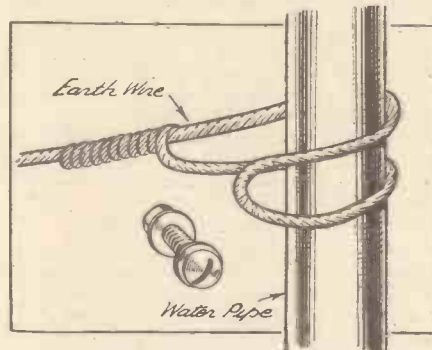
"O.K. Big Boy, I'll give you a run for your money," I said to myself, and stepped on it with all I'd got, which is about seventy, or a bit over, m.p.h.

Pause for morality insert. I don't "scrap" other cars on the road in the normal sense of that term. But on a clear two-track by-pass I've no objection to thrashing the jolly old road-metal.

Well, I pulled away nicely from the pace-maker on my tail. But he held on, and soon I was all out and not dropping him. I skated sedately round a roundabout and shot off along another stretch, but to my displeasure I could see that shining bonnet inexorably pulling closer. Then it drew out and crept along my offside.

CONTACT WITH EARTH

IF a suitable bonding clip is not at hand wire can be attached to the earth tube, water-pipe, or other chosen circuit to earth, by bolting it directly on.



A simple and effective method of making contact with a water-pipe. The pipe should be well cleaned first to ensure good electrical connection.

As the sketch shows, the end of the earth lead is doubled back to form a loop long enough to wind a certain distance round the pipe. By means of a bolt and nut, with a couple of small washers, it is then drawn tight.

E. E.

I saw it was full of peaked hats and what not. A police car! Still, what of it? My lily-white conscience told me I had nothing to fear, and so I kept my foot well down and hoped I'd beat the lads in blue up the incline that faced us.

But my old 'bus couldn't do it.

With a nice low moan the police car slid in front, pulled in, and an arm shot out. A screech of brakes and the cavalcade came to rest.

Doors opened and emitted cops—two of them. They marched down on me and ranged themselves one at each of the front doors of my 'bus.

But they only asked to see my licence and insurance certificate. All very polite. That formality over, they turned away.

"It goes well," said one of them sombrely, indicating my car.

I saw a cop in the police-car wearing headphones and writing down messages like anything, and wondered if one were to the effect that they needn't take further action against me as "he's really quite harmless."

DISTANT CONTROL

FINDING the cause of a crackle in a set can be rather trying at times. I mean one of those crackles which are obviously due to a bad contact somewhere. But where?

You touch a valve. There's a crackle. Bad pin contact? But it isn't. The point is that that crackle may be due to something a long way from any particular point which you find creates the crackle when you touch it.

Still, it never does any set any harm to give it a thorough run-over in such circumstances. I generally do that in preference to poking at it here and there. Anyway, it's often quicker in the long run.

Now we are on the subject of servicing, let me have a gentle poke at Mr. A. P. Herbert for saying, in *Punch*, that some other word or term is needed to replace "service." He suggests Radio Repair and Care.

I consider that the cheery A. P. H. is tilting at a windmill. Servicing has been too long in use in the radio trade easily to be rooted out. And in any case why should it be? It's a good enough word. I suppose A. P. H. would rather that some entirely new word were invented?

Certainly Repair and Care is all right—up to a point. But it doesn't quite get over. Can you see a wireless manufacturer using the word "repair" in connection with his new last-for-ever radio set? But "service"—that's different! Hi! I ought to change the subject. If A.P.H. sees this par. he'll have enough material for another whole article on the misuse of words.

Me! I never did trouble about literary rules and regulations. And I think you manage to understand me, don't you?

Going back for a moment to "servicing." What is really wrong is that good servicing is so rare a thing. I had all the "innards" of a commercial set landed on me by a friend the other day. Apparently the outfit had been in and out of two radio establishments, and was still in an unworkable condition. Or nearly so.

As soon as I had the thing connected up I could see (and hear) what was wrong. Burnt-out speaker field winding.

HOW MANY VALVES?

By

JOHN SCOTT-TAGGART

THE FAMOUS DESIGNER HERE DISCUSSES WHAT IS GENERALLY REGARDED AS AN ALL-IMPORTANT MATTER, BUT WHICH HE DISMISSES AS SECONDARY TO THE REAL PROBLEM OF MAXIMUM PERFORMANCE FOR THE LOWEST COST



JOHN SCOTT-TAGGART

VALVES are like the guns on a battleship. If we know their number, their size and their particular function, we can form a pretty good idea of the performance to expect. The age of valve miracles is not, I believe, over, but on the other hand there are a great many people who are satisfied with what valves will already do. A particular example of this is in the case of circuits where several valves are required for tone correction or for filter circuits separated by valves. Miracles in such circuits might be viewed with considerable distaste, and we have the example of America's using over a very considerable number of years valves which were definitely and intentionally poorer than they could have been made.

The number of valves in a receiver is therefore closely associated with the purposes for which the valves are used. If, for example, you are going to have a stage of high-frequency amplification, a valve detector and an output valve, the simplest arrangement is obviously a three-valve set. From this point we can elaborate by having more high-frequency stages, or more low-frequency stages. Sometimes, instead of doing this, we improve the valves themselves, which step may require an improvement in the circuits also and so get more out of each valve. But improving the valves, as I have hinted already, may not be a solution where we desire to separate selective devices or tone control devices by a valve stage. Several stages of radio-frequency amplification, for example, in-

volving a number of tuned circuits, may be regarded as a desirable system, in which case the stage-gain is not immensely important. If, however, you have only one stage of high-frequency amplification, you must arrange matters to get the maximum results from it.

From the constructor's point of view, the number of valves has always been an important matter. Perhaps the word "always" is wrong, because on special occasions he has jettisoned all prejudices and previous convictions, and adopted either two valves or six valves or ten valves according to what he is convinced is correct for that particular receiver. But taken over the whole country and over the fifteen years of broadcasting there has been a mass feeling about valves, and I wish to state what this has been, how it has arisen and how it has changed.

The first feeling of the constructor was unquestionably one that the fewer the valves the better. At the time of the S.T.100 the public was right in preferring a two-valve set of high performance. In those days valves took a large filament current—several times that of the modern valve. The price was also about four times that of the valve of to-day. The life was uncertain and frequently short. Manufacturers of complete receivers equally became chary of using many valves, an additional reason being that there was a very heavy patent royalty based on the number of valves used in the set. All these factors made it very much cheaper to keep the number of valves down. On cost alone, with valves at the prices then ruling, it is not surprising that the valve came to be regarded as something separate and mysterious and as an expensive and rather uncertain element in a receiver.

S.T.300 and S.T.400

The old views about valves still clung tenaciously through the years. In the spring of 1932, when I introduced the S.T.300, the big public in home construction were interested only in three-valve sets. To depart from the magical figure three was to court failure, and as I desired to develop my ideas gradually, and because I wished to keep my first set as cheap as possible, the S.T.300 was a three-valve set.

But the next—the S.T.400—was a very much better receiver and used four valves. The gravest apprehension was expressed by all who knew my intention to produce a four-valve receiver. They said that the public would not stand for it. Everyone knew, apparently, that it was impossible to have a success on a large scale unless three valves only were used. However, the S.T.400 was a very much greater success than the S.T.300, and the reason was simply that although the set was con-

siderably more expensive and elaborate, the results were very much better. The extra valve had done its job.

Now the cost of adding an extra valve to the S.T.300, without introducing any further features whatever, is quite small. There is first of all the cost of the valve and then there are the few components required to connect it into circuit. These components are a coupling resistor, a coupling condenser and a grid leak. In addition you require more efficient decoupling which calls for some added expense there. But the total additional cost is extremely reasonable and in return you get what is a truly enormous increase in signal strength and sensitivity on nearly all stations. Or if you wish to take the advantage in the form of using a very small aerial, you may do so. Even if you took the voltage amplification of only 10 per stage (an exceedingly low estimate), you would get signals one hundred times as loud. In other words, by plugging in a little device mostly made of glass and metal, costing about five shillings, you have turned your receiver into something you will regard as a hundred times as good.

In a Nutshell

What are the objections to having taken this step? The first is the initial cost of the valve. This, however, is incredibly small compared to what you get from it. If a valve were not so called, but were boxed in a tin or ebonite container with four terminals, and you were told that it would improve your set one hundred times, you would probably be willing to pay not five shillings but fifty shillings for it.

That really puts the matter in a nutshell. Valves were given a bad name in the early days and some of the mud then flung has stuck. People still regard the number of valves as an index of the extravagant nature of a receiver.

For example, a man who ordinarily has been using a three-valve set for years might think of a six-valve set as a ruinous and unnecessary extravagance. In his heart of hearts he may think that six valves sounds very fine, but he would continue to persuade himself that he had been well-satisfied with three valves and that they gave him all he wanted. Actually, one could buy six valves nowadays for the price of one in 1922, but the three-valve man would still feel somehow that six valves were the symbol of extravagance.

If you told him that it was really a three-valve set and that these three other glass things were not valves at all but vacuum enclosed transformers of a secret type giving amazing results, he would welcome the set with open arms.

Apart from the original high cost of

(Continued overleaf.)

HOW MANY VALVES?—Continued

valves and their unreliability, there is at the back of people's minds—certainly of many battery users—the question of running costs of an extra valve. With modern filaments the extra tenth of an ampere is going to make very little difference and the cost of charging accumulators is more or less fixed. The high-tension current is increased, but only slightly. In a resistance-coupled stage, the extra valve is never likely to take more than one milli-ampere. To all intents and purpose, it may be ignored. You will certainly get greater variations than this merely by changing different samples of your output valves.

Valves Tend To Outlive Sets

To those with mains units ("eliminators") there is not even the need to make this explanation. Valves nowadays tend to outlive the sets in which they are placed. Certainly I have known numerous cases where valves have remained untouched in receivers for two or three years. A consideration of these points certainly knock the bottom out of any suggestion that sets using five or six valves are unsuitable for battery users. They are eminently satisfactory under modern conditions. I would not hesitate myself to have a ten-valve battery set. In fact, I have used more than this number of valves for special purposes. Even in the days when valves were expensive and prejudice was strong and components costly, the public did not hesitate to build such receivers as the "Solodyne," a five-valve set, and the "Elstree Six," which used six valves. Both these were good receivers emanating from my own laboratories. The first won the first prize at the International Competition at the New York Radio Show, while the other set won a similar first prize at the Exhibition at Rotterdam. Other designers have had successes with multi-valve receivers. The Century Super, a super-heterodyne set designed by W. James for *Amateur Wireless*, had about half a dozen valves, and this did not prevent the set from appealing to the public in no uncertain manner.

We can therefore assume that the prejudice against many valves is either dead or dying, but the history of such a prejudice and the reason for it, which no longer apply, are highly interesting.

Where are we to stop in the number of valves? I think the answer is simply where performance ceases to follow cost. In other words, when the addition of a valve ceases to bring sufficient extra results to compensate for the admittedly small extra expense. Another limit would be reached if the valves were of the large power output type. Then, as for example where several valves were used in push-pull, you would be faced with the problem of current supply if batteries were to be used. As such freak sets would not in any case appeal to the public, the problem does not arise, and it is possible to say with confidence that the modern designer for the home-constructor bears in mind the twin

considerations of performance and cost. And while he is considering the question of performance he is undoubtedly alive to the fact that for a few shillings he can nearly always give better value and obtain a higher performance. The ordinary component makes use of energy supplied to it and may change its character, but a valve is the only suitable apparatus that exists to inject into the incoming signals the strychnine of the local energy which lies in your batteries.

The music and speech that come from your loudspeaker and the vast majority of the activities in your receiver do not come from the incoming wireless signal itself but from those bottles of glass and metal fed by your batteries. The signal that comes three thousand miles could not produce a whisper of its own accord. Its whole life blood comes from your own valves and batteries. Condensers, transformers and other gear coddle and modify electric currents, but when all is said and done it is the valve and the valve alone that

A MICROPHONE "BUFFER"



Radio artists sometimes tend to stand too near the mike, and in an attempt to keep them at the right distance the N.B.C. in America are trying out this scheme, in which the mike is suspended over the centre of a raised-off portion of the studio. Hence the artists have no alternative other than to stand at the correct distance from the microphone.

really adds to the set. And as valves are added, so in the hands of a competent designer is the sum total of enjoyment increased. The good big set will always beat the good little set. J. S.-T.

NEW B.B.C. STATION

OCTOBER 19th brings an event of major importance in the history of broadcasting in the North of England; a day specially to be remembered by listeners in the North-East. At three o'clock, the B.B.C.'s new transmitting station at Stagshaw is to be opened by the Duchess of Northumberland and the ceremony will be broadcast in the Northern and main Regional programmes. This giant transmitter, whose one huge mast (towering skywards for 480 feet on a hill which stands 700 feet above the sea) is itself the aerial, is to improve listening conditions in Northumberland, Durham, Cumberland, Westmorland and the North of Yorkshire.

A HANDBOOK FOR THE ENTHUSIAST

THE fifteenth edition of that excellent handbook the *Chronicle Wireless Annual* is now available. In it are full constructional designs of both battery and mains sets for all wavebands, and the radio enthusiast will find a galaxy of helpful and interesting information written by practical experts.

There are articles on valve design and man-made static as well as special short-wave and television sections.

The constructional designs include an S.G. Three using a reliable and well-tried circuit; a mains four-valver with two stages of H.F. and A.V.C.; a three-band two-valver and an all-wave three for the battery user.

There is also an Automatic Two—a simple set giving the choice of two programmes to those who are not interested in long-distance multi-station listening.

Another interesting receiver is the "H.Q. Local" which is specially designed for high-quality reproduction.

The short-wave fan is catered for in the "Prize-Winning" three-valver and an electron-coupled set which are both described fully. And if his interests extend below 10 metres—a fruitful field in these days of television, American police messages, etc.—there is an ultra short-wave three-valver capable of covering from 4-10 metres. A first-rate shilling's worth.

A USEFUL STAPLE HOLDER

WHEN fitting up a wireless workroom, or other experimental den, it is sometimes necessary to staple wire leads down

to some convenient portion of the woodwork. This home-made staple-holder will be found very useful for work of this nature, for by means of it staples may be driven into the most awkward of positions.

Procure a short length of iron rod. Place one end of it in the fire until it becomes bright, red hot. Then, removing it quickly from the fire, place it in some convenient holder, such as a vice, with its red-hot end upwards and, using a steel drift or punch, give the red-hot end a series of heavy blows with a hammer. As a result of this treatment, a depression or pocket will be formed in the end of the rod.

After the rod has cooled down, a little careful filing will enable the depression formed in its end, to be fashioned into a perfect fitting for a staple head.

In use the staple is held upright in its appointed position by means of the holder, and driven into the wood by means of one or two hammer blows on the upper end of the holder.

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The rod is easily installed by driving into soft earth and the heavy centre core affords good mechanical strength and is not readily turned aside by obstructions.

About 1½" of the rod is left exposed and the earth lead is simply clamped against the rod by means of the copper clamp ring and screw. No sweating or soldering is required. Supplied in two standard sizes, 18" and 24". Longer rods of similar type can be supplied, if desired, to meet special requirements.



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SALUTED BY ALL THE WORLD

The significance of research—Marconi as a friend saw him in New York—Characteristics of the man—His temperament and make-up—New miracles of radio—Television shows signs of promise—World-wide broadcasting gets under way—The Vatican's powerful short-wave transmitter—Marconi introduces the Pope in historic broadcast—Fourteen nations in globe-girdling broadcast honour Marconi on thirtieth anniversary of transatlantic signal—Tributes and Marconi's radio response from London—A dramatic moment on the air

THERE is no such thing as a summary of Marconi's achievement. There never will be, for as radio progresses as a symbol of doom for racial isolation, it spreads like the branches of a great tree of which Marconi's conception is the roots and the trunk is his work. Nature nurtures the invisible attributes of the Creator just as she does the oak.

In the words of the late H. D. Arnold¹: "Nature has pointed us to many if not all the principles which we use in our art."

"Research is not constructing and manipulating; it is not observing and accumulating data; it is not merely investigating or experimenting; it is not 'getting facts'; although each of those activities may have an indispensable part to play in it. Research is the effort of the mind to comprehend relationships which no one has previously known. And in its finest exemplifications it is practical as well as theoretical; trending always towards worth-while relationships—demanding common sense as well as uncommon ability. To have ideas and to share them—that makes civilization."

Guglielmo Marconi lived up to these ideals. As an interpreter of Nature, rich in common sense and uncommon ability, he shared his ideas and brought nations ear to ear as neighbours. In the vast emptiness of space between the hemispheres he demonstrated "that in great matters the world is more and more becoming a single organism." Wireless stimulates human solidarity.

Did this man Marconi really know the science of wireless or did he just happen to stumble upon it; stub a toe that actuated a scientific nerve, and then become internationally famous through publicity of a most spectacular kind? Indeed not!

He knew wireless, radio, broadcasting, radiocasting or anything one might call it, from A to Z. He answered questions pertaining to wireless as quick as a flash. There was no pondering over the answers. For example, he was asked what fields of radio he considered most fertile for the amateur experimenter and young engineer out of college. His ready reply was, "Short waves, directive transmission and television."

Marconi, the Edison of his field, in mood was quiet and modest. He had a calm, softly pitched voice and talked slowly

¹ Director of Research, Bell Telephone Laboratories, in lecture on "Research in Communication," Lowell Institute, January 5th, 1932.

with no show of egomania. When addressing a public gathering or delivering an after-dinner speech his words were carefully chosen. On the radio he was easily recognized by a characteristic of his speech; he dropped the "g" of words ending in "ing."

When he replied to questions a swift-running analysis of every problem was apparent. It was noticeable that he rarely expressed an opinion on anything but wireless although he related observations and cited facts in other fields. His memory was remarkable. He recalled names, dates, events and incidents of thirty years ago, as if imprinted on his mind only yesterday.

His manner was reserved, his carriage erect and his bearing confident. He impressed one as a man possessed of a great idea—an all-absorbing thought from the contemplation of which he detached himself with difficulty.

MAKING A PERSONAL TEST



The great inventor tests out the receiving apparatus at the Vatican station prior to its opening in 1931.

Rudyard Kipling might have had Marconi in mind when he wrote:

If you can dream—and not make dreams your master.

"What of the future?" he was once asked by a friend in a discussion.

"I live and work in the present," he answered quietly.

"And do you never dream of the future?"

"Yes, I dream sometimes."

"Of a world run by wireless?"

"Perhaps, but I live in the present and work in the present; that is sufficient."

Seeing Marconi for the first time, a reporter remarked: "I suppose he is highly technical, talking only ohms, watts and volts." But not so. While discussing experiments on the 15-metre wave someone inquired, "How many kilocycles is that?"

Marconi smiled shyly like a schoolboy who missed a lesson, and replied, "Oh, off-hand I don't know how many."

There was no bluff in Marconi's make-up, nor did he conceal what he didn't know in a maze of technical terms to baffle a layman.

He had neither the volatility of the Italian nor the cheery cordiality of the Irishman. He was of an intensely nervous and energetic temperament, easily rattled by trifles when in the stress of work or by miscarriage of his plans. He smoked cigarette after cigarette and held them limply between the lips as he talked.

Patience and acute observation were two parts of his make-up. If the door of the room creaked a bit or opened slightly, nervously his head turned quickly—like that of a lion hearing a rustle in the African grass. Adverse criticism did not bother him. He was determined to get the best results.

Electricity is a celestial gift with power to lift the life of man higher than any of us have yet dared to dream about. That is the way Dr. Pupin put it, and he added, "When man has achieved control of that power, the miracles of the present age will seem insignificant in comparison and man may at last achieve an existence akin to that of the Olympian gods."

Radio from 1927 to 1930 gave inklings of miracles ahead, but of paramount importance man was warned by science that he must have the faith to penetrate "the mysterious veil which covers the face of the space-time entity behind which is found the throne of a divinity which created the infinite and filled it with energy granules of the tiniest, liveliest sort."

The image of a woman's face, that of Mrs. Mia Howe, flickered across the sea in 1928 from London to New York in a television broadcast by John L. Baird. Herbert Hoover speaking in Washington was seen on a screen in New York. Outdoor scenes were televised and colour television introduced. The Byrd Expedition

(Please turn to page 114.)

CAUSES AND "EFFECTS"

All the Fun of the Fair
—In the B.B.C. Studios

SINCE the days when ladies were sawn in half before the eyes of a wondering audience, St. George's Hall, once Maskelyne's Theatre of Mystery, has seen the art of legitimate deception practised upon its stage in sound as it once was in vision.

The magician and his paraphernalia have gone; and transient radio shows take his place on the well-worn boards. Nowadays the audience of millions of listeners do not see any of the characters on the stage; but if they no longer have to discredit the evidence of the eye, they may excusably wonder if their ears play them false.

Think of a typical variety broadcast in which "atmosphere" plays an important part; the noises associated with the fair-ground, the river showboat or busy street may emerge with lifelike fidelity from loud-speakers in homes all over the country, yet it is obvious that the sounds must sometimes be created artificially.

Gramophone records have, of course, largely superseded "effects," so that listeners do frequently hear "potted" versions of countless everyday sounds, from the dawn crowing of Chanticleer to the crashing of car gears; but there remains a steady demand for noises which dexterous young men of the Effects Department ingeniously produce in studios.

To give one instance: At the height of the summer, Max Kester and Ernest Longstaffe, two variety producers, thought that they would like to broadcast a show, the theme of which would be a typical day trip by a steamer-load of Londoners down the Thames to the coast. So, as the plan developed, it was natural that they themselves should embark at Tower Pier, join a throng of happy-go-lucky Cockneys whose central idea was "a day aht," and collect essential atmosphere for their show.

Donkey rides, wheel-stalls, coconut shies, rifle ranges and roundabouts—as well as the steamer trip—gave them all the material they wanted.

Back in London, Max Kester wrote the script. Time came for rehearsals—rehearsals that meant lots of hard work not only for producer Longstaffe but for cast—and the Effects Department.

Picture the layout of the stage, which has been extended over the orchestral pit and above the spot where once stood the first few rows of the stalls. A well has been formed by the removal of some portable supports and the floor above them; and it accommodates the orchestra—violin, piano (a rather elderly upright) accordion and trumpet.

A ribbon microphone is poised above like a hooded cobra and a tall black "acoustic screen" stands just beyond it, so that the music may be localised by the technical producer, when two other dialogue and effects "mikes" are being used.

One of these, mounted on a stand with circular metal base, is twelve or fourteen feet away, ready to receive all the Buggins dialogue from Mabel Constanduros and John Rorke; the Cockney patter from Ethel Revnell and Grace West; the throaty songs of Sidney Burchall and the effervescent enthusiasm of everyone else.

The third microphone, on a swivel-arm, is suspended over a metal-lined tank filled with water—an important part of the effects equipment when the gurgling of the river, the murmur of the sea and the lazy lapping of waves have to be "arranged."

Watch the scene for a moment.

The steamer has reached its destination. Sidney Burchall's stentorian voice is bellowing into a megaphone: "Any more for the shore? Any mo-o-ore?"

As he shouts he stands at the edge of the

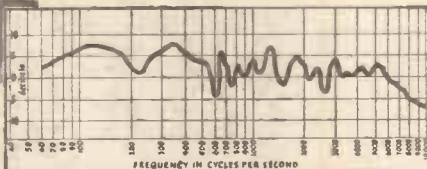
stage, several yards from the "mike" that is picking up his call, so that the natural reverberation of the hall adds just that essential echo to the output that listeners hear. It is lively instead of being dead and unconvincing.

Ernest Longstaffe, shirt-sleeved, hops with birdlike agility about the stage, a script in one hand, while with the other he gives cues in rapid gestures to each member of the cast. Now he points a warning finger to one of the effects staff, who at the exact spot indicated on his own marked script gives a quick twist to the handle of the "ship's telegraph."

The whole cast cluster round one "mike," jabbering, joking—an excited crowd waiting to scramble down the gangway. The producer "conducts" their conversation, as

(Please turn to page 115.)

Satisfied with your reproduction? **WAIT TILL YOU HEAR THIS!**



Mr. G. V. Dowding
(Editor of Popular
Wireless) says:

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

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

Another 600 cycles of top response—complete absence of 300 cycle peaks—slight gain in average sensitivity—it takes a keen ear to analyse this new smoothness and fidelity, but no ear can fail to detect it.

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DIFFERENT—& BETTER STILL

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

MARCONI—THE MAN AND HIS WIRELESS—(Continued from page 112.)

went into secluded Antarctica for a flight over the South Pole. Radio gave instantaneous contact with New York, 11,000 miles away.

King George V welcoming delegates to a London Naval Conference was heard in his first world-wide broadcast. German and Dutch programmes began to find their way to America. Premier Hamaguchi of Japan sent greetings to the United States in the first rebroadcast from the Orient. Benito Mussolini, Italian Premier, speaking into a microphone on his desk at the Palazzo Venezia in Rome, was heard distinctly throughout the world in a plea for peace.

Norway's celebration of the 900th anniversary of the introduction of Christianity in that country crossed the Atlantic. Provisional President Uriburu of the Argentine Republic addressed the North American people from Buenos Aires. The English Derby was described on the wings of short waves so all America could eavesdrop on the race at Epsom Downs. Spain and Siam joined the international radio circuit with special programmes. From Vienna music of the Philharmonic Orchestra was wafted westward across Europe and the Atlantic to entertain an American audience.

News of all this progress delighted Marconi, but another event of great significance to him, and possibly to the world, was in prospect.

Science and mankind had cause to rejoice with the fifty-six-year-old inventor on July 20, 1930, when he received congratulations from all quarters of the globe on the birth of his daughter Elettra. Authorities on heredity and genius assert that a man's ability is transmitted through his daughters, not through his sons. If Marconi's daughters get married and have sons—they will have this in their favour.

The scientist's wife gave birth to a daughter, her first-born, at the Villa of Prince Odescalchi at Civita Vecchia. Marconi had rented this country house which is on the edge of the sea, about an hour by motor from Rome. Queen Elena consented to be the godmother of the child, named Maria Elettra Elena Anna. The first name is that of the mother, the second that of the yacht, the third that of the Italian Queen, and the fourth after her paternal and maternal grandmothers.

Ten days later the babe was christened in the beautiful Villa Odescalchi. Cardinal Pacelli, the Papal Secretary of State, performed the ceremony and conveyed a special blessing from the Pope. After the christening, refreshments were served to numerous distinguished guests in the extensive park of pine, cypress and eucalyptus trees. Through the vista the Elettra, all gay with bunting, could be seen at anchor.

Within a short time Marconi was back on the deck to continue the experiments with short waves which were settling the stage for radio to accomplish one of the greatest triumphs of his life as far as personal satisfaction was concerned. Having supervised the erection of a powerful short-wave station in Vatican City, he was invited to participate in the inaugural ceremony, it being his honour to present

Pope Pius XI with the microphone through which he might speak to a countless audience in all parts of Christendom.

It was late in the afternoon in Italy; noon-time in New York on February 12, 1931. For the first time a Pope departed from the limited means of communication by encyclical letters to speak into a gold-mounted microphone to many millions of an unseen audience that eavesdropped on the most globe-girdling broadcast ever attempted.

Senatore Marconi, introducing the Pontiff, said:

"It is my very great honour and privilege to announce to you that within a very few moments the Supreme Pontiff, his Holiness, Pius XI, will inaugurate this radio station of the State of the Vatican City. The electric waves will carry his august words of peace and benediction throughout the world.

"For nearly twenty centuries the Roman



A CHARMING PICTURE
Marconi with his wife and little daughter
Elettra, born in 1930.

Pontiffs have given their inspired messages to all people, but this is the first time in history that the living voice of the Pope will have been heard simultaneously in all parts of the globe.

"With the help of Almighty God, who places such mysterious forces of nature at mankind's disposal, I have been able to prepare this instrument that will give to the faithful throughout the world the consolation of hearing the voice of the Holy Father."

Turning to the Pope, he said:

"Holy Father, I have to-day the happiness of consigning to your Holiness the work entrusted to me. Its completion is now consecrated by your august presence.

"Be pleased, I pray you, to let your voice be heard all over the world."

And it was in an instant!

As news the occasion was evaluated as "the crowning miracle, thus far, in man's transmission of human speech by radio."

Later, in reviewing this historic event, Marconi recalled:

"At the Jubilee of Pope Leo XIII in Rome, in 1903, the Pontiff's benediction was more or less clearly heard throughout St. Peter's, in which some 50,000 were massed. But now it is possible to speak to an audience of a million, five millions, or twenty millions, if need be, and every unit of that audience may be comfortably seated at home, or at sea in a ship, or in a train, or flying in an aeroplane separated from the speaker by tens or hundreds of miles.

"The developments made in wireless during the last few years destroy one's belief in the boundary of possibilities. Even to me they seem romantic and strange—or they would seem so, did I not know the scientific principles involved—and I can quite understand that the uninitiated must regard the developments in wireless as something bordering upon the supernatural. I think I may say that the people will cease to wonder at wireless. The only wonder will be that there was ever a time when it was unknown."

The King of Italy had made Marconi a Marquis on June 18, 1929, and Pope Pius made him a member of the Pontifical Academy of Science on February 12, 1931, further conferring the Grand Cross of the Order of Pius XI.

The King of Italy added to the honours by decorating him with Knight of the Grand Cross of the Order of Saints Maurice and Lazarus, a distinction second only to the Order of the Annunziata, on January 15, 1932.

The city of Philadelphia awarded him the famous John Scott Medal on March 10, 1932, and England, on May 3, 1932, presented the Kelvin Medal, one of the most highly prized of the engineering profession, awarded triennially in memory of Baron William Thompson Kelvin, the scientist.

Radio, now international in scope, was ready to honour its inventor in the most far-flung, cosmopolitan salute ever given to any human in the history of civilisation. Fourteen nations and insular possessions on four continents were invited to participate in world-wide festivities marking the thirtieth anniversary of the first transatlantic signal. The "ether" on December 12th, 1931, vibrated with voices of diplomats, scientists and communication chiefs, as their words couched in native tongues praised the Italian genius and crowned him the undisputed Monarch of Space.

What a miraculous change had come over wireless in thirty years!

In contrast with the feeble letter "S" of 1901 fame, this programme of 1931 was switched from country to country in no more time than was required to make the average telephone connection.

From New York to Washington to London to Brussels; from Paris to Berlin to Rome to Warsaw; from Rio to Tokyo to Manila to Caracas; from Buenos Aires to Honolulu to Ottawa and Montreal and back to New York, listeners were transported by ear through the medium of the greatest radio hook-up ever arranged. The ethereal envelope of the earth pulsed in honour of Marconi,

As one portion of the programme was

(Please turn to page 116.)

CAUSES AND "EFFECTS"

(Continued from page 113.)

he might an orchestra, bringing out the high-pitched chatter of the Cockney girl, the low grumbling of Grandma Buggins. Then with one sweeping gesture he checks the talk, spins on one toe and points to the orchestra who begin to play.

Above the stage, in a silence room, the technician is fading-in the band's microphone again.

Ashore, some of the party go paddling. Someone, of course, falls into the sea.

"Look out!" she cries. "I'm falling in—I'm—"

And an effects boy tips a bucket of water into the tank while Ethel Revnell (having "fallen in") puts a towel round her neck as she bends over a bowl full of water to which she puts her lips and cries for help. Upstairs it sounds as though she really is drowning.

Then the rifle range.

"Come on, guv'nor—'ave a pot at 'em. Five shots a tanner—"

Two effects assistants have a job to do.

One, standing at the edge of the stage, has before him a battered fibre suit-case standing on a thick sheet of metal, which in turn rests upon the rim of a big drum lying flat on the stage.

When the Gun Goes Off!

The other, standing by a tub-shaped tin, holds a small rod of metal.

"Take your aim, sir; careful nah!" bellows the Barker.

BANG!

Effects Assistant No. 1 brings down a wooden lath with a resounding whack upon the suit-case; his colleague taps the metal rod against the tin.

The rifle has been fired; its pellet found the target.

All very realistic—and very simple.

Next, the "dodgems."

In a concrete corridor running parallel with one side of the stage two office chairs are pushed about on metal sheets, rattling and banging—while on the stage the cast are being "conducted" in a crescendo of shrieks and laughter which is blended, at the mixing panel, with the crashes and bumps generated in the corridor.

Ask Ernest Longstaffe what he thinks of it all.

"Pretty hectic," he will say with a laugh.

"What impresses me so much in shows of this kind is that the artists who can justifiably claim to be "top-of-the-bill stars" are so enthusiastic that they happily act—quite voluntarily—as small part people, crowd and chorus, as well as playing their own characters. They really do put aside self for the good of the show; a wonderful spirit.

"The Effects staff, unpraised, unsung, never let you down. Tricky work, perhaps, but very efficiently done."

S.T.900!
Oct. 27th!

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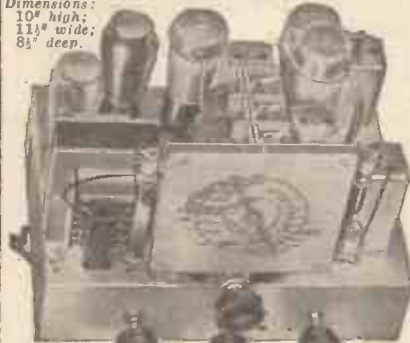
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NEW 5-Valve ALL-WAVE A.C. SUPERHET CHASSIS

With 5 British Valves

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

5 British Valves: Hexode as Detector and oscillator, Variable-mu H.F. Pentode as I.F. amplifier, Double-diode-triode for second detection, A.V.C. and 1st L.F. amplification, High slope output pentode. 4-position wavechange switch for 3 bands and grammo. Each band separately dial lighted. Provision for extension speaker. Combined on-off switch and volume control. Separate tone control. A.C. Mains: 200/250 volts, 50/100 cycles. Output 3 watts. Cash or C.O.D. £5/19/6, or 10/- down and 11 monthly payments of 13/-. If required with High-Fidelity Field-Energised 8" cone Moving-Coil Speaker, add £17/6 to Cash Price or 2/6 to Deposit and 2/6 to each monthly payment.

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WITH 4 BRITISH VALVES

3 WAVEBANDS: 18-52, 200-550, 900-2,100 metres



Overall dimensions: 8" high; 11" wide; 9" deep.

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● Bandpass Tuning ● Air-plane illuminated dial (stations and wavelengths) ● Slow-motion drive ● Rotary low-capacity switch ● FIRST SPECIFICATION: 4 British Valves: Variable-Mu H.F. Pentode, Screened Grid Detector, High Efficiency Output Pentode and Rectifying Valves. Steel Chassis. Sensitivity and volume control. 3 watts undistorted output. Gramophone Pick-up Sockets. For A.C. Mains only, 200-250 volts, 40/100 cycles. Cash or C.O.D. Carr. Pd. £4/19/6. Or 7/6 down and 12 monthly payments of 8/6. Or with High-Fidelity 2,500 ohms Energised Moving-Coil Speaker, £5/19/6 or 7/6 down and 12 monthly payments of 10/4.

7/6 DOWN

MARCONI—THE MAN AND HIS WIRELESS—(Continued from page 114.)

completed, the pick-up point was switched off, another plug was inserted in the main control board at New York, and another country, thousands of miles away, was pouring its words and music into the homes. Even the radio operators, in the habit of conversing with distant points of the globe, were visibly excited.

Marconi, in the London studios of the British Broadcasting Corporation, was plainly affected by the demonstration of what his life-work had made possible. His words came haltingly at times, as he sought to express his feelings, and to recall that it was chiefly in America that the announcement of his first transoceanic signal met with belief.

"The announcement of our success," said Marconi, actuating the London microphone, "was received with scepticism by most scientists, principally in Europe, but not so in America. Practically all the great American scientists believed in me, and the American Institute of Electrical Engineers was the first scientific body to endorse my statement.

"Naturally at this time my thoughts go back to the moment thirty years ago, when instead of sitting in a comfortable room in London sending signals which I know will be received and understood on the other side of the Atlantic, I was standing in a bitter cold room on the top of a hill in Newfoundland, wondering if I should be able to hear the simple letter 'S' transmitted from England.

"From the time of my earliest experience, I was always convinced that radio signals would some day be sent across the great distances of the earth, and that transatlantic radio would be feasible. My first problem, however, was to prove that waves could be sent across the ocean and be detected on the other side."

After recounting his experiences in Newfoundland, the inventor continued: "The fact of getting radio signals right across the Atlantic may properly be considered a discovery of cardinal importance. Although we already had the waves and the means, more or less, of detecting them at short distances, nobody knew or could have foreseen that in the electric waves we possessed means of instantaneously transmitting communication and broadcasting intelligence to the ends of the earth.

"No other forces produced by man have ever been perceived or detected without the aid of artificial conductors over a distance in any way approaching that which separates Europe and America.

"I am happy to know Mr. Kemp and Mr. Paget who were with me at Newfoundland are at my side again at this moment.² I wish to send my cordial greetings to all of you who are interested in radio. I feel sure you form the major portion of the great American public."

Then came the most dramatic moment of the broadcast—the reproduction in Morse code of Marconi's pioneer transatlantic signal. The difference effected by thirty years was strikingly illustrated.

"Perhaps it will interest you," said Marconi, "if I now repeat the Morse signal

² George S. Kemp, died January 2nd, 1933, in Southampton at the age of seventy-five.

of the letter 'S' as I first heard it across the Atlantic in 1901."

The master touched the key and the "S" girdled the earth as a sharp, vigorous signal compared with the faint three dots which ears were strained to catch thirty years ago.

Marconi added, "Good-afternoon, my American friends," and with that the programme switched back to New York, where Dr. Michael I. Pupin was waiting at the microphone.

"No message carried by electric waves from Europe to America had deeper meaning," said Pupin in reminiscence of the first transoceanic signal. "Marconi alone understood its full significance; to him alone the message announced the early dawn of a new epoch of transoceanic communications. This awakened in his prophetic mind the vision which guided his great efforts along the steep and arduous path which led to the greater triumphs in the radio art.

"Few of us understood the full meaning of Galileo's simple experiments of 300 years ago, when from the leaning tower of Pisa he dropped little weights and from their motion derived the laws which guide the motion of the planetary system.

"Few of us understand the full meaning of Marconi's vision. But just as all of us know and admire the sublime courage with

NEXT WEEK CHAPTER XXIII

Entranced by Tiny Waves

Micro-waves fascinate Marconi and others—Solving the mysteries of ultra-short waves—Strange antics of the miniature waves—New radio possibilities foreseen—Freak performances of micro-waves—A new hope for television—Nature's various influences on the "baby" waves—Marconi's tests on board the Elettra—Marconi goes to sea to experiment—He reports in detail on ultra-short-wave observations—Lessons learned from micro-ray tests across English Channel—Old "ether" theory discarded—Marconi's surprise announcement to the Royal Academy.

which Galileo defended his new science, so we admire Marconi's sublime courage which enabled him to transform his vision of thirty years ago into the beautiful reality of our present radio. Italy can be justly proud of her two great sons, Galileo and Marconi."

It was a long jump from New York to Manila, but radio made the leap in a flash and Vice-Governor G. C. Butte came on the air:

"The 13,000,000 people of the Philippine Islands bid you good-morning in Manila. (It was noon of another day in New York.) Beyond the green fields and through the fronds of the distant palms we can see the flaming tropical sun just above the horizon. It is Sunday morning. The deep-voiced church bells are calling the people to early mass. My radio audience in Europe and the Americas is hearing my voice yesterday. Surely Marconi's invention has annihilated time and distance!

"The Philippine people are indebted to him in a great degree. Our emerald isles

extend more than 1,200 miles from north to south. They are isolated by long stretches of water. Wireless is the only means by which a large fraction of our people keep in immediate touch with the capital and the outside world.

"I want to thank Mr. Marconi because his invention has banished all fear of that menace to inter-island navigation, the tropical typhoon. . . . It has done more than any other scientific agency to spread and to deepen the universal consciousness of the brotherhood of man."

Up from the Argentine came the next voice. Octavio Pico, Minister of the Interior, was speaking:

"To-day with rapid communication to all parts of the world, and within speaking distance of nine-tenths of all the telephones in existence, Argentina is better able to play her part in science and commerce, and to contribute to the harmonious welfare of all mankind than ever before. All the nations of the world owe a tribute of admiration not only to the illustrious inventor, but to his predecessors, who by their notable labours contributed to this magnificent realisation of which the present and future generations will take advantage by the more intimate relationship between the nations of the earth."

The tables were turned on May 14th, 1932, and Marconi participated in another international broadcast—this time in praise of a fellow inventor, on the centennial of the telegraph's invention.

"It is pleasant to find it recorded that although Morse's early years as an inventor were full of labour and the inevitable disappointments of pioneering, he reaped to the full success of his work in later life," said Marconi. "I would pledge my own tribute to his memory by saying that I am sure he would have rejoiced in the knowledge that it is on the foundation of his invention that we are building a bridge of peace and friendship across the Atlantic with radio. He would be happy to know that he has enabled the people of the two countries he knew so well—America and England—to exchange messages and greetings of good will both by the written and the spoken word."

"The man who invents a new machine makes millions.³ Maxwell and Hertz, who laid the basis of what is radio, made only reputations. . . . Neither Maxwell nor Hertz had the faintest inkling that his discoveries would enrich the world with a new means of communication and with broadcasting. What should be their reward were they still alive?"

³ The New York Times, February 11th, 1934.

A NEW RADIO REVUE

"You Never Know," a new revue by Muriel Levy, who is one of the best known broadcasters in the North, is to be broadcast on October 14th, in the Northern Programme. This promises to be a show full of bright burlesque. David Porter, who is the producer, has written the lyrics and the music is by Henry Reed. The artists will include Majorie Westbury, who is best known to listeners in the Midland Region. The Columbo Male Voice Choir will also be heard. Some of the sketches of this show are side-lights on life in a big department store.

SEEN ON THE AIR

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

L. MARSLAND GANDER

THE first essential this week is a word of encouragement to the B.B.C. regarding outside television broadcasts. Perhaps the B.B.C. do not need encouragement from me or anybody else. Perhaps they can meet Kipling's twin impostors triumph and disaster with equal phlegm. However, I feel impelled to say what is in my mind.

The B.B.C. have had two awkward flops. First the King's Cup Air Race transmissions from Hatfield failed because of untraced interference; then a similar fate befell projected transmissions from King George V Dock.

I say, "Well done, B.B.C.!" I am not applauding simple failure, which would be madness, but the enterprise and initiative which induced the B.B.C. to risk failure in order to try something new. Perhaps staff work was at fault in tackling a job without preliminary tests, though I, personally, am satisfied that there were reasons for this.

A Danger To Be Avoided

But now I am terrified. I am afraid that someone in the High Command will issue a ukase forbidding further doubtful experiments with television. This would be fatal in a new field of entertainment. There is a time-worn cliché which I am bold enough to revive with suitable apologies: "Nothing venture, nothing gain." The staid conservatism which has been characteristic of certain B.B.C. engineering activities may now gain the upper hand; but I would rather the B.B.C. had a hundred failures than become supine in television. Send the vans to all sorts of unlikely and impossible places, B.B.C., but do not be afraid to try.

I shall be told that I am thrashing the air; tilting at windmills. That the B.B.C. has no intention of changing its enterprising policy. Nevertheless, I am still afraid.

There is a type of mind which builds up a mountainous pile of difficulties before any new proposal; another which on the Marconi principle says, "Try it." My own choice is the second type. Time and again, "Try it" overturns theories and beats "It can't be done." All this does not, of course, mean that the B.B.C. in a spirit of insolent bravado should go again to Hatfield and invite a second flop by failure first to find the source of interference. It does not mean that I am charmed with the idea of broadcasting a series of pictures from the London Docks, which might be good, and again might not. But I do think most definitely that both ideas were well worth trying, and I should be alarmed if the B.B.C. conceived what I believe to be the wrong view that the Corporation is jeopardising a reputation for reliability by such efforts.

Televising Pinewood Studios

At the time of writing the most important undertakings of the mobile unit since the Coronation are about to take place, broadcasts from the Pinewood Film Studios. This is a first-class idea and is to be followed, I understand, by another series of broadcasts from the Denham studios of London Film Productions. The chief virtue of the idea is its "mountain and Mahomet" inspiration. Film stars are expensive people to bring to Alexandra Palace studios, so take television to the film stars. The sad part is that the B.B.C. cannot go on doing this sort of thing indefinitely. Showing bits and pieces from a film in the making, coupled with peeps behind the scenes at the machinery of production, can

only make a satisfactory programme once in a while. It cannot provide television with the staple diet which it needs so badly. Television can only thrive on stars and personalities, which brings us back to the mildewed topic of money, and I positively refuse to discuss it any more—for the moment.

Allusion to the Coronation, however, reminds me of an entertaining story which illustrates the risks and rewards of pioneer television. I do not vouch for gospel accuracy, but pass it on for what it is worth. Everybody knows that for the Coronation broadcast the B.B.C. had the worst possible luck in the matter of weather and visibility. But worse befell. Five minutes before the transmission the apparatus refused to function. There are, I believe, 256 valves in the equipment; a search for faults was unthinkable. Before a wave of panic submerged everything some cool spirit had done the only thing possible. With the palm of his hand he gave each of the panels a primitive thump; suddenly his efforts were rewarded by the sight of a perfect picture on the screen once again. And in spite of all, the Coronation broadcast was the most successful television item ever transmitted.

I hear there is some slight prospect of a change in the hours of transmission. Now that television sets are moving from demonstration rooms into the homes there is a feeling that the 3 to 4 p.m. transmission does not have as large an audience as the 9 to 10 p.m. Furthermore, the morning transmission does something to satisfy the trade by providing demonstration material.

Possible Transmission Changes

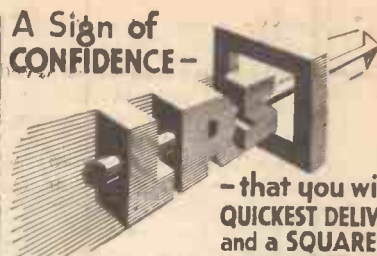
There is, therefore, a possibility that the present afternoon transmission will be shifted to 6.15 to 7.15. A "floating hour" at times not definitely fixed will be introduced with the transmission of the opening of Parliament for outside broadcasts of all kinds.

If funds allowed and it were possible to retain the afternoon as well, besides using fresh and "live" material for the morning transmission, viewers would have about four hours of transmission daily. This would be about as much as could be expected in the way of television entertainment for some years.

I think those viewers who anticipate that before long television will be "on tap" like broadcasting and that they will be able at any time to switch on and have pictures on the home screen are destined to disappointment. On the analogy of the cinema, a three or four hours' show per day is as much as can be expected. And it must be remembered that the cinema by repetition uses the same three hours of entertainment each week, while television must offer continuous variation.

I have to make the confession that absence on the tail-end of a summer holiday has caused me to miss half the programmes during the week I am writing about, but among those I have seen I pick out for special mention the cabaret in which charming Sheila Douglas-Pennant acted as the first television commère. Rudi Grasl in the same programme gave astonishing instrumental imitations.

The Home Secretary has given permission for the televising of the Cenotaph service on Armistice Day. It is hoped to begin transmission at 10.30 to enable viewers to see the waiting crowds and to watch the assembly of troops and the arrival of members of the Cabinet and His Majesty the King.



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AT this time of the year, when there is such an attractive display of new season's sets, many people are in a bit of a fix to know whether to go in for a new set and scrap their old one, or whether to buy one of the many secondhand sets which become available owing to other people having taken the plunge and gone in for new ones.

The question of investing in a second-hand set is always a difficult one, and it is one which is put up to me very often by readers and friends. Sometimes people tell me that they have a chance of buying a very good set which they have heard in operation, perhaps in a friend's house. Sometimes they say they have had the offer of a set which, although not a present-day model, is brand new in the sense that it has never been used.

Like Buying a Car

I think in buying a set you have to consider it in much the same way as you would the question of buying a car. Most people when they buy a car have one eye on the secondhand value, but if you do this you are not so free in your choice as you would be otherwise. Personally, I prefer to think entirely of what I want, that is, what satisfies my needs and also my fancy, and leave the question of secondhand value to look after itself. As a matter of fact, secondhand value, in regard to cars at any rate, and to a large extent in regard to radio sets, is not so important as it is made out to be. In regard to cars in particular I think the secondhand value is a myth; the only secondhand value of a car is its trading-value when you buy another.

TECHNICAL JOTTINGS

Items from an expert's notebook

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

Try It in Your Home First

With regard to a set which is, say, two or three years out of date but otherwise brand new, the best advice I can give you is to have the set installed in your own place (that is the advice I give you always with regard to any set, anyhow), and then if you really like it and it seems to do everything you want, and the price is right (or can be got right!), settle on it and don't worry too much about what you are likely to get for it when you come to sell it or exchange it.

Latest Improvements

Sets do improve year by year—it is no good pretending they do not—but they have been so good now for some years that a set bought two or three years ago should give you excellent service, notwithstanding that the corresponding set of this year's date will give you just so many extra refinements. If you are in a pecuniary position to afford these extra refinements then go to it and have a right up-to-the-minute set, but if pounds or shillings are an important consideration and you know what your radio requirements are and can find a cheaper set, secondhand or otherwise, which meets them, then there is no point in paying for refinements which you frankly cannot afford.

But whatever you do, whether you buy this year's or any other year's set, new or secondhand, do not go by what it sounds like in the dealer's shop or in somebody else's house: have the set brought up and installed in your own house in the place where you are going to use it, connected up exactly as you intend, and then make your final judgment. There are all sorts of things which can interfere with it which you never thought of. There may be, for instance, electrical disturbances in the neighbourhood, of which you may be quite unaware until you get a radio set, or even some particular radio set, installed in your house. These and a hundred and one other things come out in the wash.

Adjusting a Superhet

When making up a superhet receiver you can obtain intermediate-frequency transformers of which the trimmers are accurately adjusted by the makers before sending out. But in some cases this particular adjustment is not made, or not so accurately made, or the adjustment may, of course, have come unstuck for some reason or other. If this should be so, you will find the advantage of using a signal generator. I should say that, in any case, if you are doing much experimenting with superheterodyne circuits, it is a very great advantage to have (or to make up) a signal generator of your own; this is, in fact, almost indispensable.

You can, of course, buy a suitable generator at a cost of perhaps five pounds or more. This may seem rather a heavy item, and a good deal depends upon how much experimenting you are going to do, also upon whether shillings are scarce. But

(Continued on next page.)

TELEVISION 3

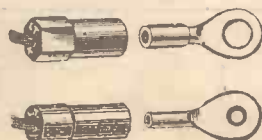
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CLUB NEWS

SOUTHEND RADIO SOCIETY

A FURTHER direction-finding contest in the successful series organised by the Southend Radio Society was held on Sunday, September 12th, when 36 members and friends took part in a search for a transmitter concealed near Nobles Green, Eastwood, Essex. Three parties succeeded in finding the transmitter within the prescribed time, the winners being Messrs. L. Pugh and J. Leggett.

The last open-air event of the 1937 series will be a night direction-finding contest, commencing at midnight on Saturday of this week (October 9th). Visiting teams who wish to take part should communicate immediately with the Hon. Secretary, Mr. F. S. Adams, 27, Eastern Avenue, Southend-on-Sea. Reports on the transmissions are invited and will be acknowledged. The wavelength is 155.8 m.

BRITISH S.W. LEAGUE

On Saturday, October 16th, at 22.30 G.M.T., a special programme dedicated to the British Short Wave League is to be broadcast from the League of Nations' short wave stations H B L (31.27 metres), and H B P (38.47 metres), at Geneva. Special verification cards will be issued to all listeners sending fully-detailed reports on this programme, together with 1½d. to help pay postage and production costs (or 3d. for the two verification cards if reports are sent on both stations). All reports should be sent to: J. R. Garrett Pegge, 2 A D G, BSW L 230, The Meades, Chesham, Bucks.

TECHNICAL JOTTINGS

(Continued from previous page.)

you will find it an exceedingly handy thing to have, and, if you can afford it, it is a worth-while investment.

Checking Transformers

To return to the question of adjusting the superheterodyne, you set the generator to the required intermediate frequency and then connect the output leads to the primary terminals of the second intermediate-frequency transformer. I should mention that a fixed condenser should be introduced into each of these leads, a suitable value for the condenser being usually .001 mfd.

Trimmers of Gang Condensers

After connecting up in this way, the trimmers of the second intermediate-frequency transformer should be adjusted until the maximum signal is obtained from the loudspeaker. The signal generator leads should then be disconnected from the second intermediate-frequency transformer and connected instead to the primary terminals of the first transformer and the same operation as above repeated, that is, the adjustments made until the maximum signal strength is received from the loudspeaker. By working carefully in this way you will arrive at the best adjustments for both the first and second intermediate-frequency stages.

The next step is to use the signal generator to feed signals into the aerial and earth terminals of the receiver and then you will be able to adjust the trimmers and the gang condensers in the same way.

Power Gain With Class B

The power gain which is obtained with Class B amplification is sometimes a little puzzling, especially to beginners. Readers often ask me questions which show that they do not quite understand where this gain comes from. At first sight it appears to be getting something out of nothing, like perpetual motion. Perhaps this impression is created, or sustained, by the fact that you often hear people say that you can operate a receiver, using Class B amplification, with a cheap high-tension battery consisting of small cells, where otherwise you would need a much more robust source of high-tension current.

Some Wrong Impressions

Without going at the moment into the advantages of the Class B arrangement, or the economy which results from its use, I should point out that the above-mentioned impression is quite misleading. In passing, I should never advise you in any circumstances, Class B or anything else, to use a cheap high-tension battery of small cells. It will always pay you better, whatever type of set you may be using, to go in for a good well-known British type of battery. The idea that you are getting something for nothing in the way of power is also wrong because people do not take into account the current which is needed for the Class B valve itself and the driver. Let us take an ordinary set, say a screen-grid H.F. amplifier and power output with Class B valve in addition, and you will see that this calls for increased high-tension current.

Quality or Economy

Perhaps we can look at the matter in another way. The circuit can be operated with a fairly low current, but this will almost certainly lead to distortion, and by the time you rearrange matters so that you get the desired quality of reproduction you will find that the power consumption has gone up.

The point I particularly want to make clear is that you should not jump to the conclusion that because you have Class B amplification you can use any old high-tension battery which would be incapable of operating an ordinary set and that the Class B is going to make up for all the delinquencies of the battery. Instead of thinking of the Class B amplification system as giving you economy in current and enabling you to use inferior batteries, it is better to think of it as giving you better results with the same kind of current consumption.

Design of Components

Those of you who go in much for set construction will, I am sure, agree with me when I say that there is room for a great deal of improvement in the design and make of radio components. You have only got to make up a single set and you will be in a position to write out quite a respectable list of suggestions to the manufacturers of the various parts which you use. You would almost get the idea sometimes that the people who make the components never actually use them themselves.

The same thing applies with a motor-car. Those of my readers who are motorists could make this, that or the other suggestion to the makers of their car, as to how the operation or driving or controls of the car could be improved. It is a constant source of wonder that car users can think of so many things which could be bettered, whilst these same points seem completely to have escaped the notice of the makers. One wonders, again, whether the manufacturers of motor-cars ever really drive the cars they make. If they drove them all day long they could hardly be unfamiliar with the various little points which, even on the best of cars, call for improvement.

Those Fixing Lugs

However, to come back to radio components, one of the first things is the bakelite or other moulded composition in which such components as chokes, transformers and so on are often encased. These frequently have holes for fixing screws without any metal eyelet being inserted at all. Sometimes lugs are provided, but these are quite unprotected by any metal inset. It goes without saying that if you take the slightest liberties with a small projecting lug in bakelite, or perhaps in some cheaper moulded composition, when screwing home the fixing screws you are going to split off a piece of the lug and the latter becomes useless. I don't suppose there is one of my readers who has ever screwed down components made in moulded composition who has not at some time or other had the experience I refer to.

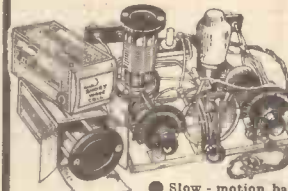
The proper way to do it is to make the holes for the fixing screws in some really solid and robust part of the moulding, or else to provide suitable metal insets to take the strain so that this will not fall upon the relatively brittle composition.

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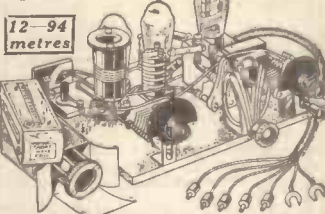
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EST. 1924

Questions and Answers

By K. D. Rogers

HOW A VARIABLE-MU VALVE WORKS

T. G. S. (Cromer).—How does the variable-mu valve work? Is it really so very different from the ordinary screen-grid valve?

To answer the second question first—No. The real difference is only one of grid design. In the ordinary screen-grid valve the grid control of the anode current is very steep; it does not take a great deal of grid bias increase to reduce the anode current to very small proportions. The slope of the grid-volts/anode-current curve becomes less as the negative bias is increased, but it soon becomes non-linear and rectification takes place.

In the variable-mu valve the grid is wound with a specially calculated mesh, often varying in pitch from one end to the other, and the result is that the mutual conductance of the valve can be varied as the bias is varied. In other words, the change of anode current per unit change of grid volts is controllable so that the signal can keep on a straight portion of the curve and yet the amplification given the valve can be cut down.

The valve is in other regards the same as the standard screen-grid valve, but the design of the grid enables the efficiency to be cut down as desired by the application of negative grid bias. The valve will take as big a grid input when biased "back" as it will when at normal bias, but the effect of the input is less than when normal bias is applied.

In the case of the standard, non-variable-mu valve, this feature does not exist, and the grid base is altered by the bias while the effect of the signal is the same. The same amplification takes place right up to the point at which kinks are reached in the curve and the valve commences to rectify.

RECTIFIER HUM

D. D. C. (Hackney, E.).—Why is it that the half-wave rectifier is smoother than the full wave?

It isn't. But don't immediately retort, "It is, I can hear it!" because what I call smoothness and what you call lack of hum may be two different things. When I say the half-wave rectifier gives as much hum as or is no smoother than the full-wave I mean that the residue of A.C. ripple from it is not less than that from the full-wave. Having the ripple and hearing a hum are two different things.

Listen to the A.C. hum on a set through a pair of phones and then through a good moving-coil speaker. You would say that the speaker hummed while the phones did not. The reason is obvious, of course; the phones do not reproduce notes of the low frequency of the hum, whereas the speaker does.

Now then, most speakers even to-day are more fond of reproducing notes of 100 cycles than they are of 50 cycles. The result is that a hum or A.C. ripple of 100 cycles will come through the speaker better than a ripple of 50 cycles. When you remember that a half-wave rectifier gives 50 cycle ripples and the full-wave rectifier gives 100 cycle ripples, you realise at once why the former is "quieter" than the latter.

Actually, of course, smoothing for smoothing, the output of the half-wave rectifier is more "humpy" than that of the full wave; it is because it gives out jerks of current at (the rate of one every fiftieth of a second (for 50-cycle A.C.) using each half wave, and not two every fiftieth of a second like the rectifier using both half waves does that you get the 50-cycle note instead of the 100-cycle note or hum. The illustration will make that clear, I hope.

(1) is the A.C. input; (2) is the full-wave output (note the two humps for each full wave); (3) is the half-wave output (note the one hump for each wave).

The reservoir condenser acts as a constant "head" or pressure supply of the impulses, so that the actual result of the half-wave rectifier is not so bad as it appears on the diagram, for the condenser "tank" obliterates much of the gap between the humps. Yet the ripple to some extent remains at the frequency of the humps, namely 50 per second.

DELAYED A.V.C.

W. F. (Chester).—What is the purpose of delayed A.V.C.? Does it mean that the signal is not cut down immediately it arrives? How does it work?

That is not exactly how W. F. put his questions, but I have shortened them for the sake of other readers, so I hope he will not mind.

The purpose of delayed A.V.C. is to enable weak signals to be amplified to the strength of strong ones before the control of the A.V.C. valve takes place. It is not anything to do with a time factor as you view it. If a strong signal arrives the A.V.C. operates immediately and cuts it down to a strength that is predetermined by the designer of the set.

Let us consider some facts. Suppose you have a set which has two H.F. valves (never mind if it is a

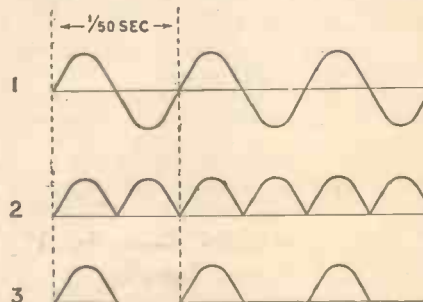
superhet or not for the sake of argument), a detector with A.V.C. control valve, and L.F. stage and an output stage. Also suppose that the output valve will carry sufficient input to give 3 watts output. Obviously, if you give it more input it will give more output, but the output will be distorted. So in operating the set you want to keep the input of that valve limited to that which is sufficient to give 3 watts output and to no more.

Suppose that we say that amount is 20 volts. Right. Now tune in to the local station. Even supposing that the strong signals from that station did not overload your H.F. valves, your detector, and your L.F. valve, they would, after amplification, overload your output valve. So you cut down either the input to your aerial by a resistance or the amplification of the H.F. valves by using variable-mu valves.

You are now shouting that you know all this, but please bear with me.

A hand-controlled volume control is a very useful but clumsy device. So some bright lad thought of

HALF-WAVE AND FULL-WAVE



These diagrams illustrate: (1) the A.C. input to a rectifier; (2) output from a full-wave rectifier; (3) output from a half-wave rectifier. See reply to D. D. C. (Hackney, E.).

automatic volume control. He so arranged his circuit that the arrival of an amplified signal on a certain diode valve generated a negative voltage. Then he took that voltage and applied it to the variable-mu H.F. valves and automatically cut down their amplification.

That is A.V.C., as you know. The signal arrives on the A.V.C. diode, and is made to cut down the amplification of the set.

In this way the limit of 20 volts on the output valve of your set can be set and never exceeded, no matter what the strength of the station to which you tune.

But there is a snag. What happens if you tune to a station that is not sufficiently strong to give the 20 volts even after amplification? You just don't get your full output. That's obvious. Nothing can be done about it unless you add more H.F. or L.F. valves. Yet there is something worse than that happening with our A.V.C. The signal, already not

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strong enough and needing all the amplification we can give it, IS NOT GETTING THE FULL AMPLIFICATION OF WHICH THE SET IS CAPABLE.

A terrible thought! The A.V.C. diode is getting some sort of signal—strong or weak—and it is using it to manufacture a negative voltage whose strength is in relation with the strength of the signal. BUT THAT VOLTAGE IS THERE TO SOME DEGREE,

AND IT IS BEING APPLIED TO THE H.F. VALVES.

The result of that is the cutting down by some amount of the amplification provided by those valves so that you are not even getting all the amplification that you might. Not as much as you would like.

That is where delayed A.V.C. comes in. It is a scheme for biasing the diode so that it does not start to work and to manufacture the negative bias until the signal it receives is strong enough to overcome an initial positive bias.

Suppose that by calculation or experiment it was found that in your set a signal of 3 volts on your detector was required to enable a 20-volt input to be provided for your output valve. And, despite the H.F. valves, there are many stations whose signals are not powerful enough to give those 3 volts.

What then? The A.V.C. diode is biased so that it does not come into operation and manufacture the controlling bias until it gets 3 volts on it. Then it begins to work. So you have delayed the operation of the A.V.C. until a voltage is reached at which the output valve can be fully loaded.

That means that the H.F. valves amplify fully all signals that will not overload the output valve and you get as much strength from distant stations as you possibly can with the valves you are using; the A.V.C. does not step in and reduce their sensitivity.

But as soon as you tune to a station that will, if unchecked, overload the output valve (or any other valve in the set, according to the design), the A.V.C. valve gets to work and checks the amplification. It will then keep the signal strength down to the required amount, but always not less than 3 volts at the detector when listening to a powerful station.

That is the theory of the delayed A.V.C. There are slight vagaries in practice, of course, and it is not so clean cut as it sounds in regard to that 3-volt limit. Obviously the diode cannot operate like a surgeon's knife and cut the strength off exactly at 3 volts. There must be a certain latitude allowed above it or below it. But the idea is as stated, and in practice it works very well indeed.

THE VANISHING SPOT

A London reader who gives no name or address writes to ask why the spot on his cathode-ray tube in his home-made scanner he is building vanishes a moment after the scanner is switched on. "I turn the tube unit on," he says, "and a broad, smudgy spot comes on the cathode-ray screen. Immediately it begins to fade and disappears altogether. I am afraid to mess about with the time base in case I ruin the tube. What is the trouble?"

I cannot say for certain, but it seems as if you have too much bias on your tube. I take it that you have the bias control on the tube-exciter unit turned so that you get full negative bias. Measure that bias with an electrostatic meter if you can. If not, make sure that the bias is turned fully on to the negative end, and then try switching the cathode-ray tube on with the bias turned to a slightly less negative position. The spot should then either stay in position as a small, fairly well focused spot or it should disappear less rapidly.

If by any chance it does not immediately start to disappear or to form into a small clear spot, remaining large and undefined, switch off at once. It means something serious is wrong and you may burn out the tube.

A disappearing spot is usually a sign of too much bias, provided, of course, that the spot disappears by melting away and not by going over to one side of the tube as if pulled by a section of the time base.

For the sake of other readers I am going to remark that this reader has a delay switch in his circuit and that no H.T. or bias is given to the tube until its heater is warm and until the time base is warmed up and working. That is why the spot suddenly forms and then, as the bias asserts itself, being formed by a tapping scheme in the H.T. circuit as soon as the H.T. circuit is completed by the switch and current has flowed through the resistances and into the various condensers.

If the exciter-unit were switched on when the tube was cold the bias would be fully generated by the time any spot was formed by the hot cathode, and it is doubtful if the phenomenon of the disappearing spot would take place. The reason for this would be that as soon as the heater began to give off electrons, the too-high negative potential on the screen would repulse them and prevent them getting through to the screen.

But—and this is important—the fact that the spot arrives in the centre of the tube and then melts away shows that either the reader is trying his tube without the time base or that the latter is out of action and is not "scanning" the tube properly. If it were working it should pull the spot—smudgy as it is—across the screen as soon as it appears.

The RADIO Bulletin

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

WITH the release of an A.C./D.C. version of the new all-wave "Superhet Six," the complete range of more than a score of G.E.C. receivers is now made available to the public.

The Universal All-Wave Super-Six has all the merits of the A.C. model. Its all-round performance, specially on the short-wave band, reaches a very high level.

The brightly edge-lit chromoscopic dial is 12 inches wide and has three-colour calibration of wavelengths and station names, which are extended even to the short-wave band.

A tunery tuning indicator ensures absolute accuracy of tuning.

The short-wave coverage is from 16.5-51 metres, and the circuit incorporates a pre-selector H.F. stage.

Osram international valves with self-locating base are fitted throughout, as are also a power line noise shield, iron cored coils for both H.F. and I.F. circuits and rubber mountings for chassis parts.

The undistorted output is 2-3 watts and the mains consumption is 85 watts (approx.).

The price of this new model is 15 guineas.

The G.E.C. have just put on the market two new headphones, one with an impedance of 4,000 ohms and the other 120 ohms. Both types are priced at 17/6 per pair.

Excellent sensitivity is assured by the use of cobalt steel magnets, and while robustly constructed throughout the phones are nevertheless light, the weight being only eight ounces.

There are no screws to loosen or get lost and no exposed connections. The earcaps are of bakelite and the self-locating double headband is of bright duralumin.

A six-foot braided connecting cord is fitted. Those who wish to use these headphones with their ordinary broadcast receivers, may connect them to the "Extension speaker" terminals, using a G.E.C. matching transformer costing five shillings. Volume controlling, if needed, can be carried out with a 5,000-10,000-ohm potentiometer joined across the output winding of the transformers:

* * *

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* * *

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13-93	Daventry	GSJ	10-50	28-99	Buenos Aires	LSX	12
13-94	Wayne, New Jersey	W2XE	10	29-04	Ruyssede, Belgium	ORK	9
13-97	Daventry	GSH	10-50	30-43	Madrid	EAQ	20
15-51	Bandoeng, Java	PMA	40	31-09	Lisbon	CT1AA	2
15-77	Bangkok	HS8PJ	5	31-25	Moscow	RW96	20
15-93	Bandoeng, Java	PLE	60	31-27	Radio Nations	HBL	20
16-56	Buenos Aires	—	12	31-28	Philadelphia, Pa.	W3XAU	10
16-86	Daventry	GSG	10-50	31-28	Sydney	VK2ME	20
16-87	Bound Brook	W3XAL	35	31-28	Huizen	PCJ	20
16-88	Huizen	PHI	23	31-32	Daventry	GSC	10-50
16-89	Zeesen	DJE	5-40	31-32	Lyndhurst, Australia	VK3LR	1
16-89	Wayne, New Jersey	W2XE	10	31-35	Millis, Mass.	W1XK	10
16-90	Hong Kong	ZBW5	2	31-37	Lima	OAX4T	10
19-52	Budapest	HAS3	20	31-38	Zeesen	DJA	5-40
19-57	Schenectady	W2XAD	18	31-41	Podebrady	OLR3A	30
19-60	Daventry	GSP	10-50	31-45	Zeesen	DJN	5-40
19-62	Buenos Aires	LRU	5	31-46	Suva	VPD2	2
19-63	Zeesen	DJQ	5-40	31-48	Jeloy	LKJI	1
19-65	Wayne, New Jersey	W2XE	10	31-48	Schenectady, New York	W2XAF	25
19-66	Daventry	GSI	10-50	31-51	Skamlebaek, Denmark	OZF	6
19-67	Boston, Mass.	W1XAL	20	31-55	Melbourne, Australia	VK3ME	1-5
19-68	Radio Colonial, Paris	TPA2	12	31-55	Daventry	GSB	10-50
19-70	Podebrady, Prague	OLR5A	30	31-58	Rio de Janeiro	PRF5	12
19-71	Huizen	PCJ	20	31-65	Madrid	EAQ2	20
19-72	Pittsburgh	W8XK	40	31-8	Havana, Cuba	COCH	10
19-74	Zeesen	DJB	5-40	32-88	Budapest	HAT4	5
19-75	Hong Kong	ZBW4	2	38-48	Radio Nations	HBP	20
19-76	Daventry	GSO	10	48-78	Winnipeg	CJRO	2
19-79	Tokio	JZK	50	48-86	Pittsburgh	W8XK	40
19-82	Daventry	GSF	10-50	49-02	Wayne, New Jersey	W2XE	10
19-84	Vatican City	HVJ	10	49-10	Daventry	GSL	10-50
19-85	Zeesen	DJL	5-40	49-18	Chicago, Ill.	W9XF	10
19-95	Moscow	RKI	25	49-18	Bound Brook	W3XAL	35
22-00	Warsaw	SPW	10	49-20	Johannesburg	ZTJ	5
24-52	Reykjavik	TFJ	7-5	49-26	Hong Kong	ZBW2	2
25-00	Moscow	RNE	20	49-31	Nairobi	BQ7LO	5
25-23	Radio Colonial, Paris	TPA3	12	49-33	Lima	OAX4Z	15
25-27	Pittsburgh	W8XK	40	49-50	Philadelphia, Pa.	W3XAU	10
25-29	Daventry	GSE	10-50	49-50	Cincinnati	W8XAL	10
25-31	Zeesen	DJP	5-40	49-59	Daventry	CSA	10-50
25-34	Podebrady	OLR4A	30	49-67	Miami	W4XB	2-5
25-36	Wayne, New Jersey	W2XE	10	49-67	Boston, Mass.	W1XAL	20
25-36	Lisbon	CT1AA	2	49-83	Zeesen	DJC	5-40
25-38	Daventry	GSN	10-50	49-92	Podebrady, Prague	OLR2A	30
25-40	Rome	I2RO4	25	49-96	Montreal, Canada	CFCX	6
25-42	Tokio	JZJ	50	50-00	Mexico City	XEBT	1
25-45	Boston, Mass.	W1XAL	20	50-26	Vatican City	HVJ	10
25-49	Zeesen	DJD	5-40	51-28	Maracaibo, Venezuela	YV1RB	25
25-53	Daventry	GSD	10-50	51-72	Caracas, Venezuela	YV5RC	1
25-57	Huizen	PHI	20	70-20	Kharbarovsk	RV15	20