

BIGGER TELEVISION PICTURES? (SEE PAGE 451)

Popular & Wireless TELEVISION TIMES

ALL ABOUT
SOLDERING

EVERY
WEDNESDAY
PRICE

3^D

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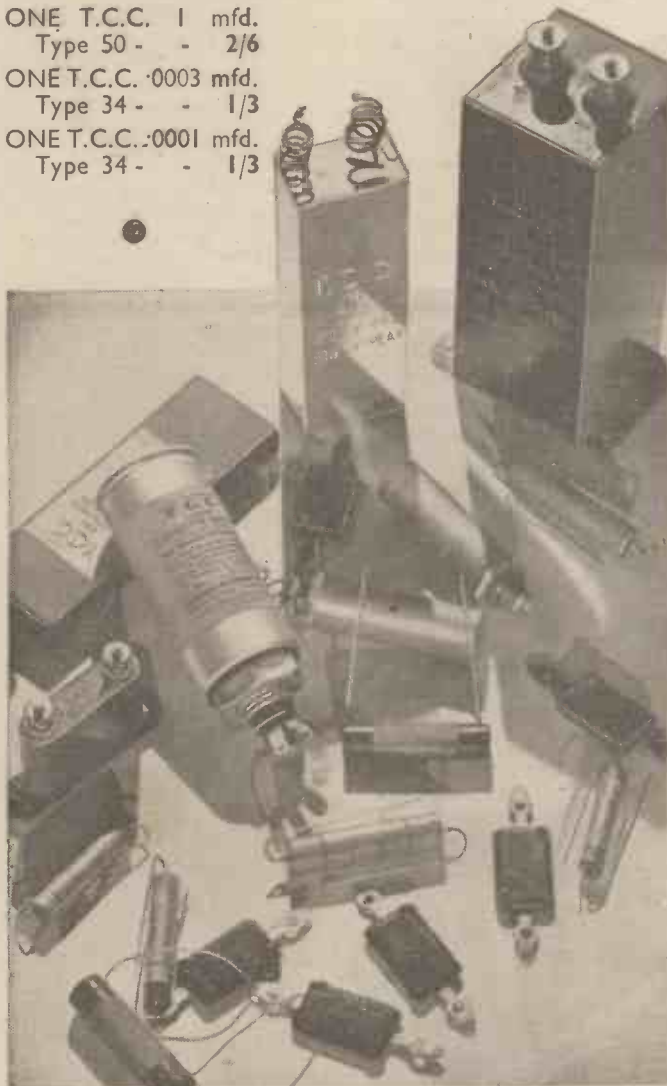


TELEVISION *Is it Here?*
By JOHN SCOTT-TAGGART



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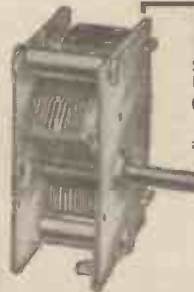
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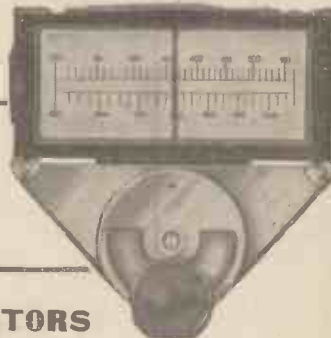


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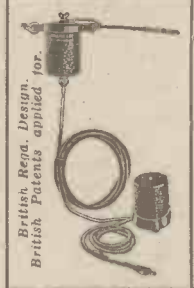
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B.B.C. POSTS
P.O. EXHIBITION
STATION NEWS

RADIO NOTES & NEWS

ENTERTAINING!
THE "GIRL PAT"
DID YOU KNOW?

En Avant!

A HAPPY New Year to you all. The late 1936 has gone down in the history books, and our grandchildren's grandchildren will precociously recall it (the too-knowing little wretches), when they are asked to give the date that a daily television service started.

What has young 1937 got up his sleeve for us, I wonder? Whatever it may be, you can be sure that the importance of radio science will continue to increase, in spreading, recording, and to an increasing extent in shaping human affairs. Our King's proclamation has been heard by radio throughout the world; it was to the radio that the Duke of Windsor turned in the first moment of his freedom from the cares of State.

Most of us took up radio because of its novelty, its powers of entertainment, or its scientific lure; but we caught a Tartar, for radio has proved to be a Minister of State. You and I, fellow listeners, have elected wireless to the position of World-Politician No. 1.

The Flying Word

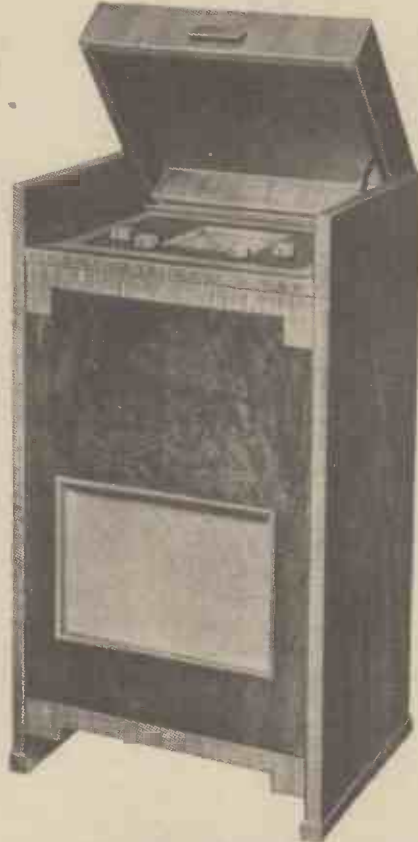
IF you remembered to test your set's powers as a universal eavesdropper during the recent constitutional crisis you must have been a bit staggered to find how all nations were talking about British affairs. The world was ringing with familiar names in unfamiliar pronunciations—with Edouard, Georges, Meesta Baldween, and the like.

Incidentally, did you notice the impressive list of countries that were hooked up to listen to that final dramatic broadcast? Fifty million Americans, for example, were listening—more, then, than on any previous occasion; and Lowell Thomas, their star commentator, called it the greatest broadcast of all time."

New Appointments

MISS ROSE TEMPLE, who has joined the B.B.C. staff as an assistant in the London Regional Children's Hour, is a niece of the Archbishop of York, Dr. Temple. She was formerly assistant stage manager at the Old Vic.

More than 800 applicants were turned down in favour of Sir Richard Maconachie, the new B.B.C. Director of Talks. This was the first important position on the B.B.C. to be advertised, and the selection



The new McMichael all-wave console to which reference was made in the Radio Bulletin last week. It costs 17½ guineas.

was made by a representative board, including persons outside the B.B.C.

Mr. T. M. Rose-Troup, who had been carrying on as acting Talks Director, has been appointed Assistant Director of Programme Administration.

Fun in the Holidays

FATHERS and mothers whose holiday-making offspring present them with an Unemployed Problem until the schools open again will be only too glad to know of somewhere to park the young hopefuls in safety and content. Well, what about the Imperial Institute, Kensington?

The Post Office is staging an exhibition there, which will remain open until January 9th. It's not so much an exhibition as a boy's heaven on earth. Various telegraph and telephone instruments which visitors can have a go at, recording apparatus, speaking into a "mike" and then having a loudspeaker address you in your own voice—these are but some of the attractions.

There's a cinema, working models of mail-train apparatus, and one of the actual P.O. trains which runs underground between Paddington and Whitechapel without passengers, drivers or guards. If there's half a chance I shall stagger along there myself to see this imperially-instituted enchantment.

Around the Stations

THE extensive alterations at the Athlone station are now nearing completion. It is hoped to have the station working on the increased power of 100 kw. "early in the New Year."

Hong Kong has a new short-waver working, under four call-signs: Z B W-2, 49-26 m.; Z B W-3, 31-49 m.; Z B W-4, 19-75 m.; and Z B W-5, 16-9 m. On Tuesdays, Wednesdays, Fridays and Saturdays, transmissions are from midnight G.M.T. till 7 a.m. On Mondays and Thursdays from 1 a.m. till 7 a.m. The Postmaster-General of Hong Kong will be glad to know if you hear the programmes, which are in English and Chinese.

The N.B.C.'s new mast-aerial has been installed at Boundbrook, New Jersey, and accounts for the extra kick which has been noted behind the recent broadcasts of W J Z. The power is 50 kw., but an increase to 500 has been applied for.

(Continued overleaf.)

NEXT WEEK: THE "EVERY-BAND" THREE THE VERY FIRST SET OF ITS KIND

VACANCIES FOR SEA-GOING WIRELESS OPERATORS

Norway's New Short-Waver

THE Oslo postmen have delivered to the broadcasting authorities so many letters bearing foreign stamps and praising the Jeloy short-wave programmes that it has been decided to hot up that already lively little station. At first there was talk of piecemeal improvements, but now the Norwegians have decided to go the whole hog and install a complete new transmitter at Jeloy. There had even been talk of getting it going by the end of 1936, but Mr. S. Claus has been far too busy lately, and so young 1937 will have to attend to the job instead.



Very Entertaining

WHEN it's night time in Italy the radio enthusiast is not restricted to the joys of the local station's broadcasting programme, for there is a big drive on to popularise the radio-gramophone. To encourage brightness and jollity the authorities are putting out a special line of low-priced records; and believe me, boys and girls, those records are a novelty.

Any time the good citizen has a few minutes to spare he can put one of these records on, and hear, not dance music nor such frivolities, but a straight-from-the-shoulder talk about What To Do In An Air Raid! The advantages of the good-sized sewer are pointed out with great crispness and detail, and the listener is advised to eye with favour the deep ditch and the old drain!

Fortunately, listeners are paying no attention whatever, and the authorities will have to give the darned records away with a pound of spaghetti if they want to clear their stocks.

Impromptu Interviews

AMONG the promising ideas for brightening programmes is a scheme for impromptu interviews, where people sit in front of the microphone and an announcer asks them unexpected questions, to which they must reply promptly. It causes no end of fun, especially if a quick-witted announcer makes the most of his chances.

One of the U.S. announcers recently had, among the others, a handsome young lady from the country to interview, so he turned suddenly to her and said, "When was your last kiss? And how did you like it?"

Without a second's hesitation the maiden popped out of her chair and gave him a resounding, rustic salute, with the reply, "Right now! How did you like it?"

And was his face red?



The "Girl Pat"

AFTER her amazing adventures the "Girl Pat" is to have a wireless set. A new captain and crew recently sailed from Dover, taking with them a Marconi wireless telephone installation, which will enable the naughty girl to keep in touch with other vessels when on her voyage home.

She is not coming straight home—oh, dear no! She proposes to cruise in the West Indies awhile, then on to the Philippine Islands, then to New York. Unless

BROADCASTING TOPICALITIES

An excerpt from the pantomime "Dick Whittington" will be heard from the Theatre Royal, Birmingham, in the Midland programme on January 8th. It is presented by Tom Arnold for Julian Wylie Productions, Ltd., and keeps closer to tradition than most pantomimes on the same theme. For instance, the knight of Dick by Richard II is included. Helen Breen is the principal boy, Barbara Wood the principal girl, and Johnny Fuller the Cat. The chief comedians are George Formby and Jack Williams.

During the summer there are Arcadian Follies concert parties in Blackpool, Morecambe, Colwyn Bay and Fleetwood. Three of these have broadcast regularly in the Northern programmes. In the winter an Arcadian Follies concert party, comprising members of the other four parties, goes on tour, and this is to be broadcast from the Alexandra Theatre, Hull, on January 7th.

All Britain will hear an hour's programme of popular music on January 8th, played by the Rutland Square and New Victoria Orchestra, directed by Norman Austin. The programme will come from the New Victoria Cinema, Edinburgh, and includes: Scottish March, "Tartan Parade," by Montague Ewing; Valse, "Close to Me," by Peter de Rose; Fantasia, "Ballads of the Nineteenth Century," arranged Austin and Moy; Foxtrot, "Man of My Dreams," by Meskill and Ray; Entracte, "Angel's Whisper," by Geoffrey Henman; Symphonic Diversion, "Tommy Atkins," arranged Henry Geehl; Medley, "Melodies of the Moment," arranged Langdon; Humoreske, "Penny in the Slot," by Ashworth Hope; Selection, "Parade of Paris," arranged Zalva; and Eightsome Reel, "Shiehallion," by Armstrong.

she changes her wayward mind she will then make for the Azores, Canaries, and Portugal. She is expected to show up at Plymouth in the spring, but no date has been fixed—you can't expect a girl on a cruise to worry about keeping time!

A Life on the Ocean Wave

WOULD you like to go down to the sea again, to the lonely sea and the sky; and get a job on a tall ship, and watch the world go by? Well, the chances are pretty rosy at the moment, for a pal of mine who is right in the know tells me that there will be at least 250 vacancies for wireless operators in the Marconi Company alone during 1937.

Before signing on a ship you have to get the Postmaster-General's certificate of proficiency, and the training for this can be done in one of the schools approved by the P.M.G., where they will teach you the necessary groundwork in ship's apparatus and telegraphy.

Conditions of service and so forth are obtainable from the Traffic Manager, Marconi's International Marine Communication Co., Ltd., Electra House, London, W.C.2.

"Listeners Hear No Good..."

THE ancient belief that listeners hear no good of themselves is certainly true in the vicinity of one Cuban station, where the programme director is trying out a series of Get-It-Off-Your-Chest programmes for the repressed.

The idea is that instead of nurturing hatred or contempt in your bosom you should write out exactly what you would like to say to some individual—the boss or the missus, perhaps—and then have it broadcast. You listen-in for it, and hope that the individual in question will do the same, though of course it is not addressed to anybody in particular.

Consequently a listener with a guilty conscience may go to his set, tune in, and hear an accusing voice say, "So you would double-cross your partner, eh? I see your little game, you subnormal skunk! But if you don't play straight I'll blow the gaff about that forged cheque, you should-be-in-goalbird!"

It must be a pleasurable change from the poetry readings and chamber music.

Did You Know...?

JACK PAYNE was originally intended to be a doctor, but when the 1914-18 Difference of Opinion broke out he ran away from school and joined the Royal Flying Corps—always at home in the air, was Jack.

Mr. V. A. Bulow of the B.B.C. has gone to Baghdad to plan and supervise the building of the Chifflig Broadcasting Station. His salary, according to the "Manchester Guardian Commercial," makes him the commercial guardian of £100 a month.

Another Record for N.Z.

ON more than one occasion I have called attention to the way in which the wily New Zealander collects radio records of all kinds—from claiming the youngest babe in the radio cradle to the oldest dad who can still fumble out the Morse code.

Now Wellington comes forward with another claim of unusual interest. It is this. By virtue of her 950 licensed amateur transmitters, New Zealand has one amateur transmitting station to every 1,500 persons in the country, which is a higher percentage than obtains in any other country in the world.

Mother's brother Samuel (Uncle Sam to you) has been rubbing his eyes over this claim ever since it was put forward, but so far a hurried counting of scalps and of licences has left the New Zealanders cock-a-hoop.

ARIEL.



TELEVISION

Is It Here?

By
JOHN SCOTT-TAGGART

SOME day, somehow, television will settle down. Have you seen a demonstration yet? You certainly would be deeply impressed by the possibilities if not by the actualities.

It must be obvious that television will become the standard system of broadcasting and that the present system will be regarded as really "blind broadcasting," on the analogy of "silent films."

Nowadays the idea of silent films seems fantastic. The dumb miming of strong but very-silent men seems just laughable. The position as regards television and blind broadcasting can never be so ludicrous because film entertainment has been almost entirely dramatic, which makes it seem absurd that we tolerated the "silents" for so long.

But radio is rarely dramatic. True we have plays which could provide very dramatic material for the screen, but many items will be televised boredom. We have had silent film dramas which are pictures without sounds. We have also had remarkably good radio drama which is sound without pictures.

Television will give us both. We may miss some of the technical dodges used at present but new ones will no doubt be invented. The talkies may not provide the technique—as television may not afford the time for a full-length picture.

The Strain of Watching

But much material on the television programme will hardly be stuff to watch. This will be a relief, because I don't think anyone could stand the strain of watching a long programme even if the results were flawless. At present it would be torture to watch for two hours.

That watching will not be essential for the greater part of the programme is already clear. There is a great deal of entertainment on the "sound" wavelength of Alexandra Palace. We shall watch when we want and occasionally when we must. I have no great fears that housewives will

neglect their housework, but I hope Mr. Gerald Cock will do his best to make them.

We shall certainly get some queer television programmes. But at last they will be able to illustrate a clay pigeon shooting contest. The shoots will all look alike, but that would never daunt the B.B.C. I reproduce below the verbatim running commentary of the last clay pigeon shooting competition. I took down all that was said. Here it is:

Lovely kill. Nice kill. Very nice kill, indeed. Splendid kill. Lovely kill again. Good kill, sir. Splendid kill, sir. Oh, lovely kill. Perfect kill. Oh, good kill. Two very nice kills. Two perfect kills. Two splendid kills. Two lovely kills.

I then switched off. I could have killed the commentator—a lovely kill.

A Colossal Task

I think it is obvious that the B.B.C. will seek to make their television programmes visually compelling. There are signs of this already. But I refuse, myself,

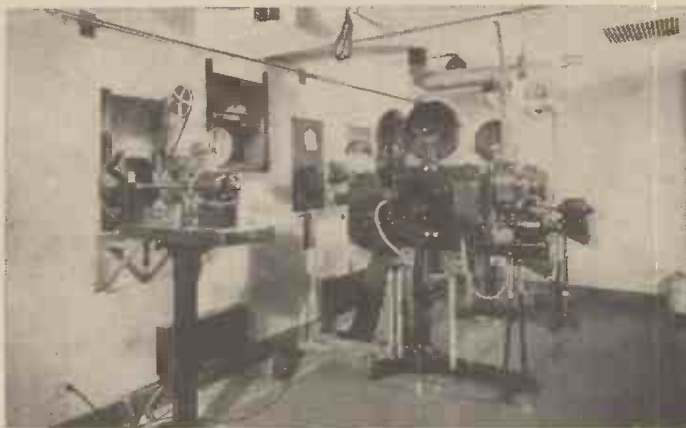
to be compelled by shivering inn signs and rickety crockery. A "still" view—i.e., a plain picture of a motionless object—is still a great problem and it is far more impressive to show action pictures.

But the provision of interesting material is going to be a colossal task. If it is difficult to concoct a radio programme (I don't profess to know how it is done, but some say that items are shaken up in a hat), it will be ten times more difficult to produce a television programme.

Have we the men? Can the B.B.C. afford to pay them? No genius has arisen in the ordinary radio programme assembly shops. That is because an infinity of pains is not necessary to produce a reasonably good evening. Some listeners themselves complain of an infinity of pains, but on the whole we do pretty well.

But television is going to offend the eye as well as the ear. A prima donna may sing like an angel but she can also look like an elephant. It is said that Grace Moore is the first Carmen to weigh less than the bull. We may only dislike a speaker's politics, but we may loathe his face. No, I would not seek the post of director of television programmes.

TELEVISION FILMS AT THE N.B.C.



That the similarity between "talkies" and television holds good on the mechanical side as well as in programme presentation is well illustrated in this view of the scanning room at the American N.B.C. television laboratories. When films are used on the big projection machine they are run off just as they would be in a cinema except that the image is focused on to an "Iconoscope" camera instead of being enlarged on a screen.

THE ALEXANDRA PALACE TRANSMISSIONS

The B.B.C. television programmes from the Alexandra Palace are at present transmitted daily from 3-4 o'clock in the afternoon and 9-10 in the evening (Sundays excepted).

The wavelength for vision is 6.67 metres and for sound 7.23 metres.

The Baird and Marconi-E.M.I. systems are employed on alternate weeks.

The "Talkie" Analogy

Of course, there will be enormous opportunities for brilliance. The opportunities will, no doubt, produce the men. The similarity to "talkies" will prove a boon. But can the B.B.C. afford good talkie men? I do not think so. Nor would they pay them much even if they had the money. The cinema world is bloated with fat, s-feed directors. So what? Perhaps the B.B.C. will take or train beginners or recruit those rejected by the film world.

You cannot escape the talkie analogy. Television may not be exactly an automatic home talkie, but it will be mighty like it. Ordinary radio broadcasting has produced its own men cheaply. They are experts in the special exclusive field. If they get the sack they are not fully equipped for anything else.

(Continued overleaf.)

SAFEGUARDING AIRCRAFT

Some interesting facts concerning the ultra-short-wave radio beacons which have been installed at Croydon airport.

THE Air Ministry's investigation of means for providing further wireless aids to aircraft approaching aerodromes in conditions of bad visibility has now reached the stage of practical test. Three different systems of ultra-short-wave radio beacons have been installed at Croydon Airport: the Lorenz, the Plessey and the Marconi.

These radio approach systems are designed to give automatic navigational assistance to aircraft approaching an aerodrome in bad visibility, with a view to their landing safely under all conditions except when the surface of the aerodrome is invisible from a height of over 50 feet. They should be a valuable complement to the normal D.F. ground organisation, which is designed only to lead aircraft to the immediate proximity of an aerodrome.

Ultra-Short Waves Used

The peculiar properties of ultra-short waves make them particularly suitable for this purpose and their employment has the additional advantage of providing extra channels which cannot be made available in the already congested medium waveband allocated to aircraft use.

The complete system comprises three principal units:

(a) A main beacon, working on a wavelength of 9 metres, which gives a defined path of approach to the aerodrome from a distance of 10 to 15 miles.

(b) A "distant" or "outer" marker beacon, working on a wavelength of 7.89 metres, which throws up a vertical fan-shaped radio screen across the main approach path. This distant beacon is sited $1\frac{1}{2}$ to 2 miles from the aerodrome and gives a fixed point of reference on the approach path.

(c) An "aerodrome" or "inner" marker beacon also working on a wavelength of 7.89 metres, which throws up a similar screen and provides a second and final point of reference on the approach path at a distance of about 300 yards from the edge of the aerodrome.

In the case of an aircraft equipped for aural or visual reception use of the beacons should therefore enable the aeroplane to be brought direct to the aerodrome and landed safely when the aerodrome is not completely obscured.

For Low Cloud or Fog Use

Further development and experience will certainly be required, however, before the present type of beacons can be used for landing in conditions when the surface of the landing area is invisible from low altitudes. Fortunately it is only on rare occasions that the landing area cannot be seen from a height of 50 ft., while the incidence of occasions when the clouds are low, but above 50 to 100 ft., or the visibility is otherwise poor, is much greater; thus the radio beacon system offers a valuable contribution towards securing a high standard of regularity. For the present, the three systems will be used for experimental purposes only.

In addition to these short-wave aids, the medium-wave beacon situated in the north-west corner of the aerodrome has been modified for aural operation and various technical adjustments to this beacon have been carried out. It is hoped that the transmissions of this beacon will now be of value for aircraft not provided with ultra-short-wave apparatus.



Miss Bebe Daniels, famous American film star, caught by the camera during a rehearsal at the B.B.C.

TELEVISION: IS IT HERE?

(Continued from previous page.)

That is one reason why people do not leave the B.B.C. in a hurry and why they are inadequately paid. But television and talkie technique will be merged, the chief difference being that the B.B.C. can afford to bore while the cinemas cannot. As regards staff it will be interesting to see where the money comes to pay them, or alternatively where the men without financial ambitions will come from.

What is going to be televised? Some wonderful exclusive items like coronations, no doubt. One such item a month would alone make a television set worth-while. So would a Mickey Mouse cartoon. So would one act of a successful play. But, of course, technique must improve. Remarkable it is at present, but obviously inadequate. The pictures are too small, anyway. I think a picture two-foot square is a reasonable minimum size. The picture is now usually obtained on the end of an evacuated bulb. The pressure of the air on the glass may run into tons. This alone may limit the size of pictures obtained with cathode-ray tubes. If so, television based on cathode-ray technique may not have arrived at all. It may prove a false start. There are, of course, other systems in the field. It is certainly too early to say that television has mounted several rungs of the ladder of success. It may have to start up an entirely different ladder.

If the present picture is too small—and I am absolutely certain that everyone will

PRESERVING PLASTIC WOOD

A practical tip worth knowing

MANY radio constructors make use of plastic wood, this material having numerous applications in home constructional work of all kinds.

Unfortunately, however, many tubes of plastic wood, once they have been opened, deteriorate in storage owing to the slow but steady evaporation of the solvent even when the cap of the tube has been screwed tightly in place.

An opened tube of plastic wood may be stored for a long length of time merely by screwing the cap tightly down over the nozzle of the tube and then plunging the tube nozzle into a mass of plasticine or other soft modelling composition.

An Alternative Method

Such a precaution will absolutely prevent the evaporation of the volatile contents of the plastic wood tube, with the result that the product will remain in good and workable condition almost indefinitely.

Another method of achieving the same end consists in dipping the nozzle of the tube (after the cap has been screwed tightly down) in molten wax, and thus building up a wax "blob" around the nozzle.

The plasticine method, however, is more easily applied and is less messy. Moreover, the plasticine is more readily removed from the nozzle of the tube when further quantities of the plastic wood are required.

J. F. S.

ultimately agree with me that it is—why have we barked up this particular tree? Probably because it is better to bark up the wrong tree than not to bark at all.

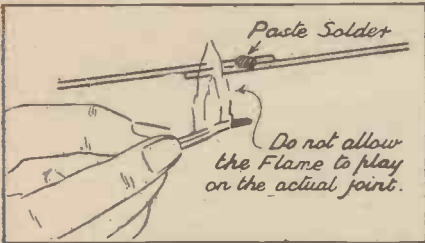
Baird's pioneer work gave a picture not much bigger than a cigarette card. If he had delayed announcing anything until he had produced a large and perfect picture, television would never have had the wonderful publicity that launched it. No one wanted television. No one wants it desperately even now. The public never wants anything unless it is pushed under their noses as a *fait accompli*. All engineers will have to qualify anew for their jobs: many grimly realise that there is a deuce of a lot to learn about television and few sources from which to learn it. Radio manufacturers are frankly hostile, have issued pamphlets denouncing it as the creation of the devil. They think the industry will go to pieces through people holding off from the purchase of ordinary radio sets—which after all provide them with their toast and caviare.

Television is an unwanted baby deposited on the doorsteps of an unready public and an unwilling industry. Let us honour John Logie Baird for forcing the unwanted child upon us. Soon enough we shall grow to love the little brat. As he grows more comely we shall look upon him with glowing pride. The industry will find—just as it is collapsing under the strain of over-production and cut-throat competition—that television is a heaven-sent blessing forcing, ultimately, eight million people to stop listening and start looking.

J. S.-T.

ALL ABOUT SOLDERING

A practical article of value to every home constructor



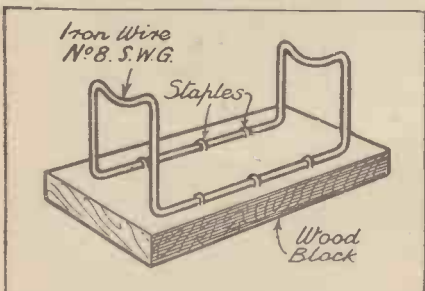
Simple joints can be made with the aid of paste solder, the heat from a lighted match often being sufficient to unite the two metal surfaces.

SOLDERING may be described as a method of uniting pieces of metal by an alloying process, a thin film of a suitable alloy being interposed between the surfaces to be joined and made to adhere firmly to the metals. The processes employed in the use of "hard" solder fall outside the scope of this article, the operations to be dealt with here being connected only with "soft" or "tinman's" solder, which requires a relatively low temperature for joining.

Raising the Temperature

In soldering pieces of metal together, or in "tinning" them, that is to say covering them with a thin layer of solder, we must momentarily raise the temperature of the metal to the melting-point of the solder. It is also essential that the surface of the metal on which the solder is to get its hold, or "take," be absolutely clean. When these conditions are fulfilled the solder will run on to the surface of the metal and it will become so firmly attached to it, when cooled, that only such drastic methods as scraping or filing will remove it. Even if we maintained the heating sufficiently to keep the solder molten, we should find it difficult, once the solder had taken, to remove all traces of it without taking away some of the metal at the same time. From this it will be obvious that if two pieces of metal, as, for instance, two wires, are each covered with a layer of solder and then brought into contact with each other in the presence of a source of heat, the solder on the two wires will fuse into a homogeneous mass, firmly adhering to the wires, and so joining them securely together. As a conductor of electric currents the joint will be continuous without even the smallest air gap between the wires.

SUPPORTING THE IRON



Some sort of support for a hot iron is necessary. A length of No. 8 S.W.G. iron wire, bent as shown, forms a satisfactory rest. Similar wire will also do for a rest for the iron while it is being heated.

Now from the foregoing statements it may appear to be an extremely simple matter to clean and heat the pieces of metal to be joined and to apply the solder

at the right point when the required temperature has been reached. In actual fact the heating of the metal introduces a certain complication. When a metal is heated in the presence of air, it combines with the oxygen in the air, to a greater or less degree according to its nature, and an oxide of the metal is formed. This process is in effect a form of combustion of the metal, a thin film of oxide forming on the surface of the metal as soon as it is heated.

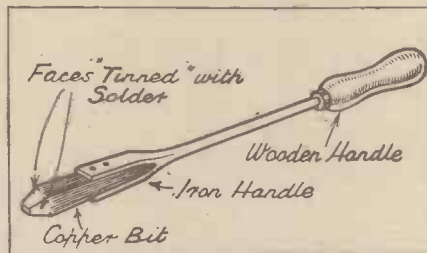
Oxidisation actually takes place at normal temperatures, but the action is accelerated by the application of heat. This is unfortunate, because when the film of oxide forms the surface of the metal is no longer clean enough for the solder to "take" on it. Copper and brass,

of the set this may easily cause leakages by forming semi-conducting paths where no such paths should exist.

There are several substances that can be used as the flux. Of these resin is the most generally satisfactory for soldering small brass and copper parts. Resin, besides being cheap, has the great advantage in wireless work of being non-corrosive and a reasonably good insulator. It sets hard when cold, and so does not tend to pick up dust to any appreciable extent.

Thus, no harm is likely to result if excess of this flux is used and if some remains on the work after the completion of the joint. Procure the coarse resin in lumps and crush it to a fine powder before using it. Keep one or two lumps as well, as they are useful for tinning the iron and for large joints.

THE STANDARD TYPE



A soldering iron consists of a copper bit attached to an iron handle. Soldering irons are obtainable in various weights. For radio work an iron of from three to six ounces will be found suitable.

the metals most commonly used in wireless work, oxidise fairly readily. Iron and steel exhibit this tendency to a greater extent, while aluminium oxidises so rapidly that satisfactory soldering of this metal demands special treatment. We cannot so far interfere with the forces of nature as to prevent the formation of the oxide. The remedy which we adopt is to call to our assistance a deoxidising substance, known as a "flux." If we apply this flux to the properly heated surface of the solder and the metal we are soldering, the result is a perfectly sound electrical joint due to the alloying of the solder with the metal.

Cleaning Advisable First

It is not sound practice in electrical work to rely solely on the flux to run the solder and make satisfactory joints without previous careful cleaning of the work. With acids or powerful deoxidising agents it is possible to make soldered joints even on rusty iron or heavily oxidised brass, without any preliminary scraping or filing. This is not to be recommended in wireless receivers, since it is no easy matter to get rid of all traces of the flux afterwards. Any that remains will be sure to corrode the metal parts of the components with which it comes in contact.

Whatever flux is used take great care to see that any superfluous flux is removed from the completed work. If you leave bits of paste flux on the various portions

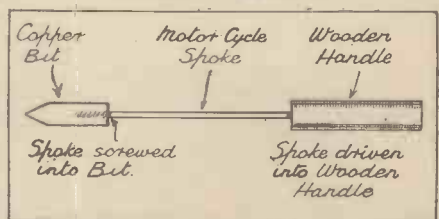
A Core of Resin

A special type of solder is obtainable in the form of long thin tubes, with resin as the core of the tube. This is extremely handy for small work, as the flux is applied automatically at the same time as the solder.

If you are using resin as the flux you must be sure to clean the work very thoroughly before tinning it. This is more important with resin than with other fluxes. The heat applied to the work must also be increased slightly when resin is used. These disadvantages are more than outweighed by the inherent cleanliness and non-corrosive properties of this flux.

Solder can be obtained as the solid metal, or in paste form, ready to apply direct to the work. This paste usually consists of finely ground metallic solder mixed into a stiff paste with some kind of flux. In use it is heated on the work to be soldered until all the flux has disappeared. When the correct temperature is reached the particles of solder melt and fuse together into a homogeneous mass, which alloys with the metal in the usual way.

EASILY MADE



The constructor can quite easily make his own soldering iron by adopting the method illustrated here.

For small joints, such as the jointing of thin wires, this paste is very simple to handle. Put a trace of it on the wires and hold a lighted match under one end of the joint till the solder runs. Do not allow the flame to play on the centre of the joint or it will deposit soot on the wires and prevent the solder from taking.

(Continued overleaf.)

ALL ABOUT SOLDERING

(Continued from previous page.)

Always stir the paste well before applying any to the work. If this is not done there is a likelihood, when the paste is fresh, that too much flux will be picked up, so that difficulty may be experienced in making good, clean joints; while, as the paste is used up, the last remaining part of it will be deficient in flux, and so will not take readily on the work.

Fluxes are also obtainable in paste form, and these can be recommended for use on wireless apparatus, provided only that a non-corrosive variety is selected. "Fluxite" is particularly to be recommended for all classes of work. It is convenient to use in that it is easy to apply a small portion of it to the work. Be sure to go over the joints when the work is done and wipe them clean with a rag. For awkward corners, where a rag will not easily penetrate, use a fairly stiff paste brush. A few drops of methylated spirits on the rag or brush will dissolve away any grease or sticky substance.

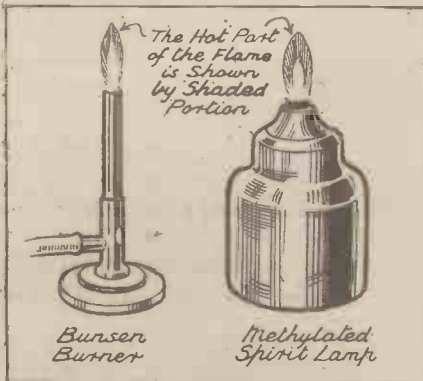
For "External" Use

Now just a few words about sal-ammoniac and "killed spirits." These fluxes are not recommended for use in any part of the receiver itself, though they can safely be employed for work outside the receiver. Sal-ammoniac is useful for cleaning the iron preparatory to tinning it, especially if it has been allowed to get very foul.

"Killed spirits" is the name given to "commercial," that is to say, unrefined, hydrochloric acid (Spirits of Salts), which has been "killed" by the addition of metallic zinc, zinc chloride being formed and hydrogen given off in the process.

Beware of using killed spirits in the wiring of a receiver. When the iron is applied to a joint, the spirits will splutter and drops will be scattered round in a fine spray. This spray is certain to fall on some of the adjacent metal parts, and the result will be rapid corrosion. It is difficult to remove all traces of killed spirits from the inside of a receiver, because a rag will not easily pick up the drops. Used sparingly, it is handy for tinning the iron and also for jobs outside the receiver—for anything, in fact, which can be thoroughly washed afterwards to remove every trace of the flux. Never use it on flexible wires,

A POINT TO NOTE



The mistake is often made of placing the bit well down into the centre of the flame, under the impression that in this way the iron will be heated more rapidly. The bit should always rest in the top of the flame.

since it is practically impossible to be certain that there is none left between the strands of wire or under the end of the insulation.

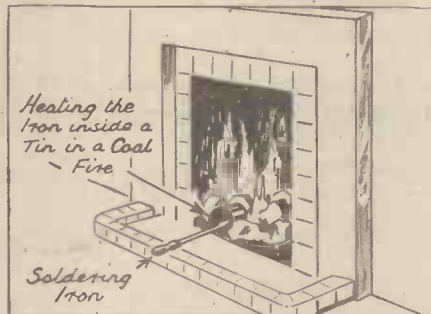
If in doubt, avoid killed spirits altogether and rely on one of the safer fluxes, even though they involve a little extra trouble in cleaning and preparing the work.

Raising the Temperature

For any soldering operation heat must be applied to the work, in order to raise its temperature at least to that of the melting-point of the solder. Small work may sometimes be done direct in a flame. We obviously cannot use a flame for making the joints in the wiring of a receiver. There will be many joints which we shall be unable to deal with, because of the risk of damage to neighbouring components. Furthermore, a flame is not really clean enough for the purpose, since minute particles of carbon will be deposited from it on the work and may prevent the solder from taking.

We have to find some other means of heating the work. A soldering iron is used for this purpose. This consists simply of a square or round bar of copper, tapered at one end. To the other end is secured an iron rod of smaller cross section a few

WORTH KNOWING



When using a coal fire for heating the iron, place it inside a tin so as to prevent the bit from coming into direct contact with the fire itself, otherwise you will have endless difficulty in cleaning it.

inches long, with a wooden handle at the end remote from the bit. The copper "bit" or "bolt" is heated in any convenient manner and then applied to the work, thereby transferring the necessary heat without any smoke or dirt. The reason for making the bit of copper is that this metal retains heat well, so that an iron of fair size can be used for making several joints without requiring to be reheated.

The weights and shapes of soldering irons vary considerably, according to the purposes for which they are designed. For small work on wireless instruments a weight of from three to six ounces will be found suitable.

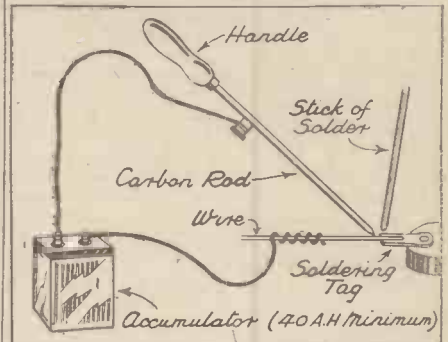
Tinning the Bit

All the surfaces of the bit of the soldering iron must be kept scrupulously clean. The bit has to be tinned before use, and the solder will not take on it unless it is clean. Further, it is impossible to do satisfactory soldering work with a "dirty" iron, because the soot or oxide on the faces of the bit will to a great extent insulate the bit from the work with which it is brought in contact, and the heat will not be transferred from the one to the other without

prolonged application of the iron, and quite possibly not sufficiently even to melt the solder.

Examine an iron which has been allowed to get into bad condition. You will find

USING AN ARC



Soldering by means of an arc formed by the current passing across the carbon rod-soldering tag junction. Only large accumulators suitable for heavy discharge work should be used.

a thick layer of "scale," the term applied to the accumulation of oxide and dirt, on the bit. This can be chipped off with an old chisel, but care must be taken not to cut into the metallic copper. An alternative method of removing the scale, which has the merit of avoiding any risk of cutting the bit, is to heat it red-hot and plunge it into cold water, when the scale will flake off easily; the treatment may be repeated if the scale proves stubborn.

How to Deal with Pits

When you have removed the scale in this way, you will find that the metallic surface of the bit is pitted with small holes, crusted with oxide. Go to work with an old file, reserved for the purpose, and brighten up the surfaces from about an inch from the point of the bit. Do not file away more metal than you need, as this is a somewhat drastic measure, which would in time, if it had to be done often, noticeably reduce the size.

Frequent clearing of the file with a wire brush will be necessary, since the soft copper will clog it up and impair its cutting properties. There will be no need to file out all the small pits and to make dead smooth surfaces. The application of flux to the bit during the process of tinning it will help the solder to flow evenly and take as it should.

Now that the iron is clean and ready for service, you next have to consider how you are going to heat it. The method adopted will most likely depend on the conveniences available.

If you are going to use a flame, as distinct from a fire in a grate or brazier, you must use a "clean" flame, that is to say one which will not tend to deposit an unreasonable amount of soot on the bit. For this reason the flame of a candle or a wick oil lamp is unsuitable. With these and kindred sources of predominantly luminous heat the bit would rapidly become covered with a layer of carbon. This would foul the bit and prevent the full heat of the flame from reaching it.

An ordinary gas-jet or "bat's-wing" burner is also useless for the same reason. Gas stoves and Bunsen burners, on the other hand, are excellent. Those who are not familiar with the Bunsen burner should note

(Please turn to page 466.)

ENLARGING THE PICTURE

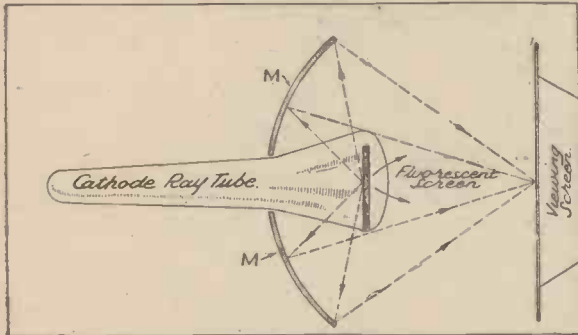


Fig. 1. A method of enlarging the picture by means of concave mirror and without losing its brilliance.

THE picture produced by a cathode-ray receiver is first of all limited by the size of the tube, because the fluorescent screen must be mounted inside the glass bulb where the electron stream can reach it. Secondly, the fluorescent "glow" out of which the picture is built up is of low intensity as compared, say, with the direct light from a lamp.

The use of ordinary magnifying-lenses is therefore handicapped by the fact that what one gains in picture "size" is offset by a corresponding loss in brightness and definition. It is not worth while trying to increase the size of the tube much beyond its present dimensions—so that it may take a larger screen—because larger tubes are both costly to make and difficult to operate. The walls, for instance, must be made of thicker glass, to stand up to the greater air-pressure, whilst excessively high voltages would be required to scan a large screen in straight lines.

Nor does it seem possible in the ordinary way to obtain a more intense light from the screen itself—though some interesting experiments are being made in this direction. One suggestion is to use the electron stream to produce "heat" instead of fluorescence, so as to throw up the picture in the red and white colours of incandescence.

According to this scheme the usual fluorescent screen is replaced by one of thin black metal, which is pre-heated by a separate battery to a point just below that at which it begins to glow. The extra heat produced by the impact of the scanning-stream is then sufficient to raise the local temperature in spots where the high-lights of the picture appear as white-hot, the half-tones as a red glow, whilst the blacks remain black.

A Point Sometimes Overlooked

Coming back to the fluorescent screen, there is one point that is sometimes overlooked. The coating of zinc or calcium salt which is used to produce the luminous glow is always laid over the surface of the screen which faces towards the cathode end of the tube, so that the electron stream can sweep directly across it. But the picture itself is viewed from the opposite side of the screen, i.e. the side which faces towards the bulb end of the tube. A certain amount of the fluorescent light is therefore lost in passing through the thickness of the glass backing-plate.

Fig. 1 shows how a spherical mirror can

Details of the latest ideas for increasing the size of television pictures produced by electronic scanning.

By J. C. JEVONS

be arranged to magnify the picture from the side of the screen at which the fluorescent light is produced, thus making the most of all the illumination that is available.

As will be seen, the narrow end of the cathode-ray tube is inserted through an aperture in the centre of the mirror M, so that the latter faces the "business end" of the fluorescent screen, where it collects the light coming from it over a wide angle. For instance, when the scanning spot is at the centre of the screen, the rays from it are picked up over the whole surface of the mirror, as shown by the dotted lines. Because of its curvature the mirror reflects them back along the arrows, and focuses them on a corresponding point in the centre of the larger viewing screen. The same applies to each point on the fluorescent screen, so that there is very little loss in the overall illumination of the magnified picture.

Here is Another Method

A different way of approaching the same problem is to avoid the limitation due to the size of the tube by building-up the picture outside, instead of inside it. This may seem at first sight to be easier said than done, but there are ways and means of tackling it.

Suppose, for example, that the fluorescent screen is replaced by an electrode built up of many small light "cells," which are normally "closed," so that they prevent the passage of a beam of light projected

to an external viewing screen, and so bit by bit build up a complete picture.

Fig. 2 shows how it can be done. The "cell" screen or electrode is set at an angle across the bulb of the tube, so that it can be scanned by the electron stream from the cathode in the usual way. At the same time it lies between a powerful arc lamp and a viewing screen on which the picture is to be built up.

Using a Crystal Screen

Certain doubly-refracting substances, such as quartz, tourmaline, and Rochelle salt, are known to have the power of rotating the plane of a ray of polarized light, the degree of rotation depending upon the strength of an applied electric field. This occurs, for instance, when the well-known Kerr cell is used as a light valve.

One side of the screen-electrode inside the bulb is accordingly covered with a large number of small crystals, each insulated from the other, and each acting as a miniature Kerr cell, which "opens" as the scanning stream passes over it and then promptly "closes" again. It must be remembered, in this connection, that electrons are simply small particles of electricity which actually create a momentary field of force across each cell as they strike against it.

In front of the arc lamp is a bank of Nicol prisms, which are used to polarize the light in one direction. On the opposite side of the bulb there is a second bank of Nicol prisms, these being "crossed" relatively to the first. The arrangement is such that if the cathode-ray tube were moved out of the way, no light would get through from the arc lamp to the viewing screen, because the polarized light passed by the first bank of Nicols is completely wiped out by the second bank of "reversed" Nicols.

Opening Up the "Cells"

Suppose now that the tube is replaced, and the electron beam starts to scan the cell electrode. If no signals are being received, the intensity of the scanning beam remains constant, and each "cell" is opened up, momentarily, to the same degree. The result will be that a single spot of light from the arc lamp will run to and fro over the viewing screen, keeping step with the movement of the electron stream over the crystalline cell electrode. Owing, however, to the high speed of scanning, the viewing screen will appear to be uniformly lit up.

But directly television signals are applied to the control grid G of the tube, the intensity of the scanning beam begins to vary from point to point. The cells on the screen electrode are accordingly "opened up" to different degrees, so that, in turn, they pass more or less light through from the arc lamp. In this way the varying lights and shades of the received picture are built up on the external viewing screen.

FOR LIGHT CONTROL

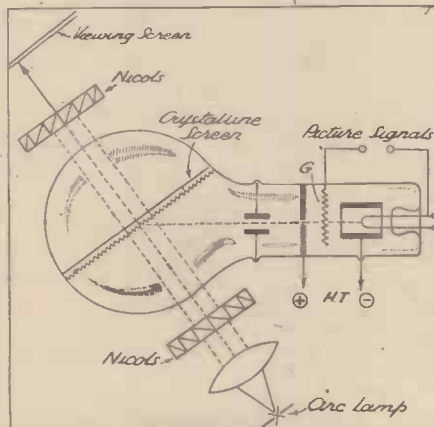


Fig. 2. An electronically-controlled light valve for projected-television work.

upon them from outside the tube. Now further imagine that the electron beam from the cathode is able to "open" each of the cells in turn as it passes in its scanning movement. When this happens each cell will allow a ray of light to pass through on

FROM OUR READERS

THINK OF THOSE FIRST EXPERIMENTERS!

A young reader puts forward an interesting point concerning pioneer radio inventors

—||—

The Editor, POPULAR WIRELESS.

Dear Sir,—It is, I fear, perhaps rather presumptuous of me—one of the “babes and sucklings”—to discourse on a rather well-worn topic. But I feel a word must be said to the modern man to remind him of what the earlier experimenters went through.

I know that their discoveries were marvellous enough, but think of the ridicule and scorn they must have endured while trying to convince a sceptic world of the possibilities of wireless telegraphy!

When one learns about an invention discovered in the early days, I think the thing to do is not to consider the talent needed to produce it but the way it must have been thought out and the initiative needed to break away from old superstitions concerning such things.

Another thing is: how did they conceive the ideas? If you had suggested (among scientific circles) about twenty years ago, the idea of sending pictures through the ether you would have been thought a genius for having thought of the idea, even though you hadn't the faintest notion how it was to be done.

All you hard-boiled, technical radio experimenters (as I suppose you would call yourselves) take such a lot for granted. Think of the first experimenters struggling to achieve miracles—and when they did so, to be met with jeers and allusions to the state of their minds. They must have been bitter experiences.

But now the answer to a claim such as to be able to send solid bodies through the ether would not be “You're mad,” as in the earlier days, but “How do you do it?”

The inventor has an easier time now than he did in the nineteenth century, whatever Mr. K. T. Hardman would have us believe.

Though I have been interested in wireless for over half my life (sounds a big statement, but I'm only fourteen), I still marvel at some of the inventions I have come across.

Might I add a word about your paper? I think it describes technicalities clearly and yet doesn't seem too technical (now figure that out).

Yours faithfully,

J. A. YATES.

Hill Dormitory, Wellington College, Berks.

SEEING WHERE YOU ARE

The Editor, “Popular Wireless.”

Dear Sir,—The controls of my radio are round bakelite ones of half-inch thickness, with milled edges. Markings which are stamped on the face could not be read unless one “peered” closely. To remedy this, I cut shallow channels in the outer edge of the wave-change control, and inserted strips of coloured celluloid, a different colour for each marking. Control can now be read with ease in almost any light.

Yours faithfully,

JOHN HIGGINS.

132, Ramsden Square, Cambridge.

“THE PLAY'S THE THING.”

The Editor, POPULAR WIRELESS.

Dear Sir,—We recently had a radio play entitled “Hawks Abroad,” obviously inspired by “In Town To-night” and “The Mutiny on the Bounty.” The opening words being, “Hawks Abroad, Hawks Abroad,” shouted by various voices, in the same manner as “In Town To-night,” which has become a little boring in its original use.

The period of the play was about the middle of the 18th century, in spite of which, one of the chief characters remarked to another one, “Huh, so you won't talk, eh!” Later, we heard the guard being turned out by someone blowing a modern police whistle, and finally the mob being dispersed by rapid machine-gun fire.

Only from the B.B.C. could we obtain such a “happy blend” of ancient and modern.

A very touching episode was that where a countryman's wife was supposed to be appealing to the cruel captain to release her husband, who had been seized by the press gang. If you will pitch your voice falsetto, and as high as possible, and repeat the following exactly as it is spelled, you will get some idea of what it sounded like.

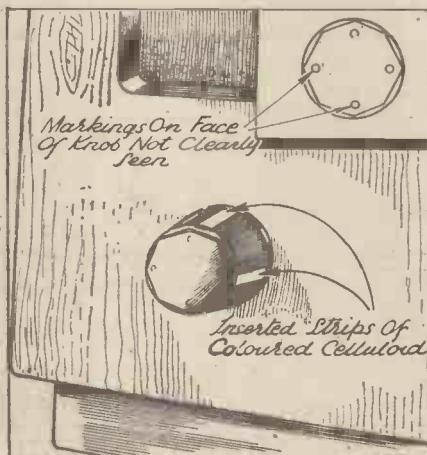
“Oh, sir, I bleg you, for Glod's sake, don't take my husband from me. He's a good man, my husband is, and our little bloy is slick and gloin' to die. Oh, sir, splare him. He is a husband and a ffather.”

To which the cruel captain replies, in the true Charles Laughton manner:

“My good woman, your husband is needed by his Majesty, and sails at midnight.” (Aside to the sentry, “Take her away.”) I must not be unfair to the lady who played this part. Maybe, as the scene of the play was laid in Liverpool, we are intended to suppose that the wife was speaking Lancashire dialect. But somehow the combination of the police whistle, the machine-gun, the cruel captain's American talkie slang, and the wife's strange “accent” hardly proved convincing. I therefore regret Mr. King's decision not to go forward with his intention to present a Radio Broadcast Play, for if he wrote it with his pen grasped by his left big toe, and after a full week's debauch on cocaine and cocktails, he might still turn out something immeasurably better than we now have worked off on us.

“Which only goes to show you,” as the char-

POSITION INDICATION



The idea adopted by Mr. John Higgins for his wave-change switch.

lady might remark, “what a fine thing it is to be in with the gang.”

With respects,

K. T. HARDMAN.

110, Singleton Avenue, Birkenhead.

A GUINEA FOR YOU!

Each week “Popular Wireless” awards a guinea for the letter which, in the opinion of the Editor, is the best of that week's batch.

All you have to do is to sit down and write to us on some radio subject which you think will interest other readers. Tell us about your experiences, give your views on matters connected with the programmes, or with television. Everybody stands an equal chance, so send your effort along. This week the guinea goes to Mr. John Higgins.

HOW DID THE CRACKLES ARRIVE?

The Editor, “Popular Wireless.”

Dear Sir,—Having recently become a regular reader of “P.W.” and read some of your readers' letters, I should like to forward what I think is rather a strange incident.

My three-valve receiver, which consists of a screened grid, detector, and pentode valves, used to stand on a small table just behind the kitchen door. The chassis was housed in a small cabinet, while the speaker, which was of the moving-coil type, was mounted on a baffle 24 in. x 24 in., and situated some 14 ft. distant, over the other side of the room and about 10 ft. from the floor.

The leads I used were the ordinary electric lighting flex, and these ran from the chassis down to the floor, across the doorway, and from there they sloped up, passing behind a mirror which stood on the mantelpiece, to the speaker.

I now go back roughly eighteen months. It was during the interval of the London Regional programme, to which my set was then tuned, that my sister happened to comb her hair in front of the mirror.

Immediately she started doing this a terrific crackling issued from the speaker. The faster she combed the louder grew the crackling. I altered the wavelength of the receiver, but that had no effect whatever. When she moved a short distance from the mirror the crackles gradually diminished until she reached the opposite wall, when they were not audible at all.

It seems that the only possible solution is, that the electricity caused by the friction of combing the hair was picked up by the leads to the speaker.

Yours truly,

R. DUNN.

7, Alington Street, Finsbury Park, London.

SERVICE SALESMEN

The Editor, POPULAR WIRELESS.

Dear Sir,—After reading your very interesting postbag, there are several points I should like to pass my opinion on.

First, Mr. Preston's letter re Service Salesmen. Mr. Preston seems, for some reason, to have the opinion that all wireless dealers are mugs, with little or no technical experience.

As a service engineer I should like to correct this misapprehension. I and several of my colleagues have had, in the first place, a course of training at a recognised Wireless School and experience in manufacturers' service departments. We have passed exams to enable us to write sundry letters after our names in professional style.

And as for lack of interest in helping amateur constructors, let me add that I am, and for that matter so are most service engineers of my acquaintance, keen short-wave transmitters.

Re “Curious” letter, this phenomenon which he has noted is, I believe, called the Luxembourg effect, and I know no remedy yet, but I have noticed the same effect on stations above 400 metres, notably the more powerful German stations, on whose carrier Luxembourg programmes can be heard quite clearly during intervals. I am very curious about it, also I know of several explanations of how it happens, but I should like a good cure for it.

Yours faithfully,

R. S. BROWN.

Pittville House, Cheltenham, Glos.

ON THE SHORT WAVES



IDEAS FOR THE EXPERIMENTER

W.L.S. discusses some interesting detector circuits.

FOR some obscure reason we all like to think of ourselves as "experimenters." Perhaps some of us are. Most of us are just absurd short-wave fanatics, taking an insane pleasure in playing around with our pet hobby, even if we haven't the remotest idea of what we're doing or why we're doing it.

Just lately I have had a particularly bad attack of experimentitis. The main cause of the outbreak was a tendency on the part of my own receiver to be a little bit unstable on the lower end of the short-waves.

Of course, we know that that's nothing much to worry about. Quite recently I handled a receiver that was appallingly unstable on 19 metres—and that was supposed to be a really "super" affair.

The average detector circuit, however, is prone to do funny things by the time it gets down to 12 metres, at which wavelength the coils are becoming really small, and it is sometimes very difficult to know what to do about it.

A Circuit Change

In my own case I decided to change the circuit. I was already using a screened-grid detector, so that it was quite natural that I should choose upon the so-called "electron-coupled" detector circuit which has been very much in the news of late.

This is well known to be a very stable circuit indeed, and is used a great deal for short-wave working. Fig. 1 shows it in its best-known form. I have shown an indirectly heated valve in use, since that makes the circuit easier to arrange—and in any case my own receiver, with which I am chiefly concerned, is A.C.-operated.

The oscillatory circuit consists of a single coil between grid and H.T.—, with a tap, about one-third of the way up from the "bottom" end, for the cathode.

Thus the three electrodes of the oscillator are the grid, the cathode, and the screen, which is "tied down" to "earth" potential (speaking in terms of H.F., of course) by the usual by-pass condenser.

That latter fact is the crux of the whole matter. The screen is the electrode nearest to the anode, from which the detector's output is taken. but it is, nevertheless, at

earth potential, so that it "protects," as it were, the other electrodes from any changes in the loading of the anode circuit.

With such an oscillator, properly constructed and adjusted, one can do funny

Programmes featuring typical Cuban music, with announcements in English, German, French and Spanish, are now being broadcast between 10 and 11 p.m. (Greenwich time) from Havana, station COCD (250 watts, 48.92 metres, 6,130 kilocycles). As this station has a comparatively low transmission power, it would be interesting to know if many listeners are able to pick it up.

things. One can set it to a certain beat-note with a signal and then jump the anode and screen voltages up and down without varying the beat by a perceptible amount.

The form in which the circuit was first

used was that shown in Fig. 1, but many variations are possible. For instance, it will oscillate if a simple coil is connected between grid and "earth," and another one, with about one-third of the number of turns, between cathode and earth. (Fig. 2.)

STABLE IN OPERATION

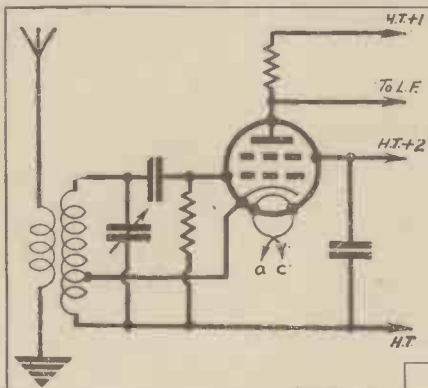


Fig. 1 (above). A stable circuit using an indirectly-heated valve. The cathode tap is about one-third of the way up the coil. Fig. 2 (right). A variation of Fig. 1 consisting of a simple coil L1 in the grid circuit and a small coil L2 connected directly in the cathode lead. It will oscillate over a wide range of wavelengths without changing L2.

There is no need to provide any coupling between the two coils, and the circuit can be made to oscillate over a wide range of wavelengths with a single coil in the cathode circuit. A small H.F. choke will suffice, for instance.

And now we come to a means of using our standard four-pin coils. The fact that a specially tapped coil is needed has scared many people away from this circuit. Just why that should be, I don't know. Some people seem to want their radio made jolly easy for them these days. What's the objection to doing a little coil-winding on the kitchen table?

Anyhow, we can use our four-pin (or six-pin) coils if we arrange things as in Fig. 3, to study which, I am afraid, you will have to go to the trouble of turning to the next page. This is simply a modification of Fig. 2, but the cathode coil now happens to be wound on the same former as the grid coil, and therefore a certain amount of coupling is fixed for you, whether you like it or not.

Wiring-up the Reaction

The connections are important. The top of the grid winding goes to the grid, as usual, and the bottom to earth. But the top of the reaction winding (i.e. the turn nearest to the grid winding) does not go to earth or to H.T., as it would in the normal oscillating detector circuit. Instead, it goes to the cathode, and the bottom end of the usual reaction winding goes to earth:

This may look wrong on paper, but it works right on a baseboard.

In all these arrangements it is impossible to control reaction by means of a condenser. It may be done in two ways. The screen voltage may be varied—a method I don't like—or the anode voltage may be varied by a resistance or a potentiometer.

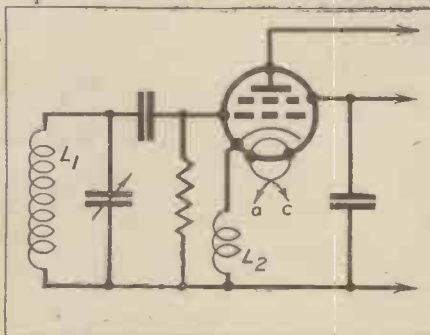
The latter method works well, but one should use a good quality potentiometer that doesn't emit granulated noises when it is turned. Further, to help things, the potentiometer should be shunted by a condenser of 2 mfd.

In passing, I might as well mention that, although it looks funny, there's no possible reason why one shouldn't fit a perfectly good slow-motion dial even to the humblest of potentiometers. I do not like to have a set without a slow-motion control for its reaction—and, of course, there's no need to.

If you want to try other funny detector circuits, there's practically no limit to the arrangements you can rig up. The old Hartley and the more modern split-Hartley; the Colpitts and its cousin the Hoffman; the Ultraudion; and all the hybrids evolved by combining them can be arranged very easily with the standard four-pin coils. Next week I will show a few more of them, and you can play cat's-cradle to your hearts' content.

Meanwhile, you will be well advised to rig up one of the three arrangements I have shown in the sketches, and if you don't like it—well, you can go back to what you were using before

OSCILLATES FREELY



ON THE SHORT WAVES—Page 2.

POINTS from the POST-BAG

W. L. S. Replies to Correspondents

J. R. R. (Elgin) is starting up on short waves for the first time, and wants me to advise him on what set to begin with. I suggest that he starts with the W.L.S. Adaptor, described in "P.W." for August 29th and September 5th, 1936. Whatever broadcast set he has (and I presume that he does possess one), he will find that the Adaptor will combine with it to give him a nicely behaved short-waver.

J. G. T. (Beeston) wrote some time ago lamenting the fact that he had a converter and a broadcast receiver which he couldn't use "all out" because the whole thing went into a howl when he "turned the wick up." He now writes again to tell me that he has cured the whole works by mounting the converter on four rubber feet. In other words, the loudspeaker was causing the converter to vibrate, and the howl was really a kind of microphonic effect. Others in similar trouble, please note!

"P.W." Certificate Holders

J. G. T. also inquires when the next list of "P.W." Certificate holders is going to be published. I hope to print a revised list very soon. They still haven't reached the three-figure mark, so that certificate seems to be worth having.

E. K. (Weymouth) is rather anxious about using resistances in place of H.F. chokes in the anode circuits of H.F. stages. He wants to know whether a 5,000- or 10,000-ohm resistance will do the job. Well, I often use them instead of an ordinary reaction choke for a detector, but I can't even say that I've tried them for an H.F. stage. I suggest that E. K. does this for me, and then writes again to tell me all about it! I imagine that he will find everything O.K.

A. S. (Farnborough) has built a "standard baseboard" lay-out and doesn't seem to be getting on too well with it. All he seems to get is "plops" and "rushing noises." His trouble sounds to me like one of two things—a dud valve or a dud component of the smaller variety, such as the grid condenser, grid leak, H.F. choke, or something of that sort.

Difficult to Deal With

Cases like this, where hardly any details are given, are almost impossible to solve through the post, except by the medium of a chance lucky shot. If only I could see and handle the set for a minute or two, I should probably get a clue right away. Let's hope my vague suggestions sometimes turn out right.

J. A. H. (Carlisle) sends me a blueprint of a commercially made short-wave adaptor which he has been using with pretty good results. He wants to know whether I advise him to change to a screened-grid valve. Candidly, I must say that my usual advice in these cases is "Leave well alone." I know I give circuits and lay-outs for changing from a triode to a screened-grid valve, but they are more for the man who is always fiddling about

and isn't happy unless he can find something new to play with.

If your interest is chiefly in the listening aspect, and your set works, don't worry about changes just yet!

L. K. H. (Bromley Common) insists that he is not trying to put over any "sob-stuff," but he tells me frankly that he is unemployed, and certainly can't afford to buy a Radio Amateur Call-Book. If any reader has an old edition that he feels he can spare, he will be doing a real good turn if he will let L. K. H. have it. He will, of course, pay postage. But drop a card to L. K. H. before sending the book.

L. K. H. has received over two hundred amateurs on the 40- and 80-metre bands, and is rather grieved because so few of them announce their location with their call-sign. He comments on the absence of British calls with an "e" in them. Quite so—none are allotted! The G.P.O., I believe, have an idea that one little dot might easily be mislaid or otherwise overlooked, and they have never allotted a call with an "e" in it. Anyone heard with such a call is a *pirate*, and there are quite a few of them about!

UNCONVENTIONAL

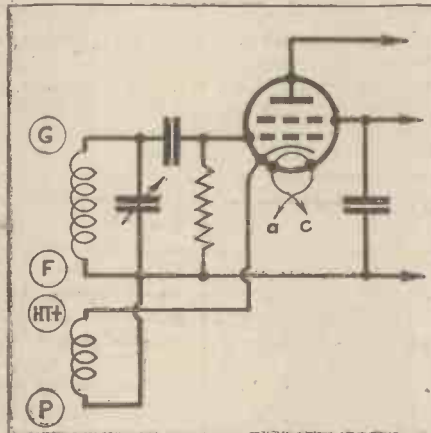


Fig. 3.—A modification of Fig. 2. The letters in the circles represent the pins on the normal four-pin coil former. Note that the reaction winding connections are different from the usual ones.

L. K. H.'s full address, by the way, is L. K. Harper, 9, Brewery Road, Bromley Common, Kent.

H. B. (Hampstead) has built the set that I described under the title of "An Ideal Detector Circuit," and he uses it as an adaptor with two L.F. stages. He now wants to make the reaction control just a *little* less "touchy," and asks whether I advise the addition of a buffer or an H.F. stage.

I think that H. B. will be very pleased if he adds a proper tuned H.F. stage to it on the lines that I have so often described. It certainly does improve reaction control, hand-capacity, and all the other things that may be very good but not *just* right.

Change That Grid Condenser

G. H. H. (Caithness) had a band-spread three-valver which was perfectly O.K. He made a few minor alterations with a view to improving it, and now can't get sufficient reaction. Since one of the alterations he mentions is the substitution of a .0001 grid condenser for the original .0003, I suggest that he puts back the .0003 without loss of time!

AMATEUR BAND NEWS

OF course, it is stale news that conditions on the 10-metre band are really good again, but what is news is the fact that for a week or so they have been better than ever. All the "P.W." staff seem to have been finding things extra good down there, and the tales I have been hearing of "R9 Yanks" are only matched by the "R9 Yanks" that I've been hearing myself.

Take it from me, if your set won't cover the 10-metre band, you're missing one of the biggest thrills of radio just at present.

Life Saved by Amateur Radio

News comes from Canada of a life saved by amateur radio. Elmer Asselin, an invalid and a keen short-wave listener, who lives in Montreal, heard a call from VE2GB in Berthierville, Quebec. VE2GB was calling "CQ Montreal Emergency." Mr. Asselin phoned up a local transmitter, VE2HT, who immediately got on the air and contacted VE2GB.

It appeared that a tree had fallen on a lumberjack, breaking his back. The local doctor (also a "ham") wanted authorisation for a plane to fetch the injured man to Montreal without loss of time. This was obtained, thanks to the prompt co-operation of the amateurs. Hospital authorities stated that delay would have been fatal. Just another little item in an amateur's day, but it saved a human life.

Look out for South African stations during the four week-ends of January on all amateur bands. The South African Radio Relay League is running a worldwide DX Contest this month, in which South African "hams" have to contact as many other countries as they can.

Power From an Old Ford

From the States comes a tale of a real enthusiast in the backwoods. How would you like to crank up a Ford engine every time you wanted juice for a transmission? W7AHX does that to supply the power to his final stage—cold mornings and all! He may be a long time "coming back," but he gets there just the same, having worked all continents with his flivver-driven generator delivering the watts!

I once knew someone who had a mad scheme for hanging weights out of his window and winding them up by manpower before each transmission, but I should think the cranking-up of an ancient Ford would be even better for the biceps!

A new country for some of these DX-hounds: Reunion Island, near Mauritius, is on the air, and the "ham" who puts it there has the call-sign FR8VX. You will find him at the high-frequency end of the 20-metre band.

Two other "good ones" are PZ1AB (Dutch Guiana) and VR4JD (British Solomon Islands).

Most of this really new DX is to be found on 20 metres; 10 metres is also full of good stuff, but not many of these isolated spots seem to break out down there as yet.

W. L. S.

SECRET WIRELESS

How radio messages may be transmitted so that they are unintelligible to those for whom they are not intended. Such a procedure would, of course, be necessary in wartime

By J. F. STIRLING

DURING the next war, if, unfortunately, civilised nations are ever so foolish as to permit such a calamity, the subject of secret wireless will occupy the close attention of many clever minds. For, to a large extent, we may expect all future wars to be directed by radio and it is only to be expected that methods by means of which radio messages can be transmitted over long or short distances without fear of their being picked up by any unauthorised persons will be much sought-after.

The subject of secret wireless has not received an enormous amount of attention up to the present. Yet there exist two or three fairly well-known methods of transmitting and receiving radio messages in secrecy, and, no doubt, an outline description of them will be of interest to the reader.

Introducing a "Noise" Signal

The first of these systems of secret radio transmission is a fairly obvious one. It consists in introducing a loud noise into the transmitted speech, the noise being allowed to enter the transmitting microphone at the same time as the speech or music. The noise, of course, is one of definite frequency, and when the transmitter sound-impulses—noise and speech—are dealt with at the receiving end, a special type of frequency filter eliminates the noise almost completely, leaving the speech perfectly intelligible to the listener.

Such an arrangement of secret wireless transmission and reception could fairly readily be "broken into" by anyone possessing a lengthy series of frequency filters. Consequently, more elaborate methods have been devised to ensure secrecy in radio transmission.

A highly interesting method of secret radio working is that which we may term the "changing-wavelength" method. In this method, the radio messages are transmitted on a wavelength which is continually changing from one value to another. An unauthorised person picking up such transmissions would hear nothing but a mere babel of noise, but received by a station possessed of the necessary special type of apparatus, the transmissions could be as plain and intelligible as any ordinary broadcast.

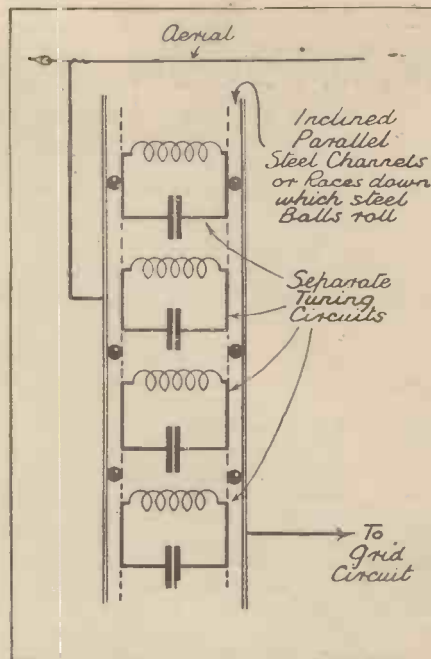
The radio transmitter used in the "changing-wavelength" method of secret radio is more or less of the conventional type, but it possesses three or four separate tuning circuits, by means of which three or four different wavelengths can be sent out. These wavelengths should be fairly widely spaced.

Some type of moving switch is provided to put the three or four different tuning circuits consecutively into circuit with the rest of the apparatus. The result is that the transmitted matter is sent out for a second or two on one wavelength, then for another second or two on another wavelength, and so on until the first wavelength tuner is automatically returned into circuit.

At the receiving end, a similar moving switch working in synchrony with the one at the transmitting station brings the received waves into their respective tunings, and thus renders the messages plainly intelligible.

Considerable ingenuity has been exercised in the design of the changing wavelength switch at both the transmitting and the receiving ends of such secret radio installations.

One of the most interesting of these



Steel balls which move in special races form the basis of this ingenious wave-changing device.

switches or contacting devices consists of two parallel inclined steel channels down which steel balls run slowly and at constant speed. As they run down the parallel inclines the steel balls complete an electrical circuit between the separate tuners and the remainder of the transmitting apparatus.

Ball-Bearing Wavechanging

The balls are released by a ratchet mechanism, one pair of balls being released, say, every second. At the same instant the ratchet mechanism is also made to generate an impulse of current which is fed to the transmitter and transmitted along with the normal transmission. These ratchet-generated current-impulses serve as synchronising currents, for, upon arrival at the receiving end, they are fed into a relay which operates a similar ratchet device and causes a pair of steel spheres to be released and to run down steel inclines exactly similar to the ones at the transmitting end.

Thus the steel balls travel down the inclines at the transmitting and the receiving ends of the secret radio system in exact synchrony, and, since the attraction of gravity is, to all practical intents and purposes, constant, their rate of running down the incline is also the same. Hence, at the transmitting and receiving ends of the system the different tuning circuits are switched in and out of circuit at exactly the same instant and, as a consequence, perfectly intelligible wireless communication is effected between the two stations to the exclusion of all others.

Various complications may be introduced into the system in order to render detection of the transmitted messages by any unauthorised person even more difficult, but, usually, with each additional complication of the apparatus, synchronisation between transmitter and receiver is rendered a more delicate and uncertain task.

A still more complicated mode of secret wireless transmission consists, briefly, in causing the microphone impulses at the

(Please turn to page 465)

A CONE-SPEAKER HINT

THE cone nuts of some older types of loudspeakers are sometimes apt to become loose owing to the influence of diaphragm vibration. When this trouble occurs the diaphragm tension becomes relaxed and the quality of the reproduction immediately suffers in consequence.

In nine cases out of ten this annoyance may be remedied by a very simple procedure. Merely take a wax taper, a candle-end or a chunk of paraffin-wax and, after tightening up the speaker cone nut, rub the wax well into any of the exposed threads of the cone bolt. The wax film will adhere tenaciously to the threads and its presence will be sufficient to resist the loosening tendencies of the cone nut.

Be sure, however, that the wax is not rubbed into the threads of the nut itself—for, in this instance, the wax would act as a lubricant and would, therefore, actually aid the annoying loosening propensities of the nut. It is only the "unwanted"

threads of the cone bolt upon which the nut screws that should be waxed.

J. F. S.



The wax from a taper or candle-end is rubbed well into the exposed threads of the cone bolt.

RANDOM RADIO REFLECTIONS

By Victor King

Increased Wages in Radio Industry—Skilled Men are Hard to Get—Radio Drama. B.B.C. Versus Their Own Critic!

OTHER PEOPLE'S EARNINGS

A PARAGRAPH I wrote some time ago dealing with the salaries of crooners, announcers and other radio folk, caused considerable interest and so I now propose to give you a second instalment. This time, the radio industry.

Here there is even greater fluctuation. Rearmament is causing the figures to climb. For example, girls winding coils used to be glad to accept 7d. per hour, but now 11d. and even more has to be paid.

Boys employed as "capstan minders" (watching simple lathe operations) can get 1s. 4d. an hour, as against 8d. or 9d.

And first-class tool-makers are hard to find at 2s. 6d. per hour, although a year or two ago 1s. 6d. per hour was considered quite good.

Set-testers in factories are paid 1s. 1d. per hour, while a first-class service man will receive £4 per week, plus expenses (for car, etc.).

Of course, a large number of manufacturers adopt "piece-rates" in their factories, and on this system really good workers can knock up three or four pounds per week at quite simple jobs.

On the selling side salesmen receive from £2 to £3 per week, plus a percentage on sales and travelling expenses for those on the road. The total amount they manage to make, on an average, depends largely upon whether they are with wholesalers or retailers. A traveller for a wholesale concern may coin as much as £50 per month in commission.

There are firms who do not pay salaries, but only travelling expenses. These aren't so popular with the "knights of the road." Of course, there is the important point as to the brand of goods handled. Some sell more readily than others with a consequent better average of earnings for the salesman.

JOB HUNTERS

QUITE a sizable proportion of my mail comprises letters from people who want jobs, either because they are out of work or because they are dissatisfied with their present ones.

Unfortunately, I can't do much for most of them. It is true that I sometimes hear of opportunities, but they are mostly for skilled or creative workers (or both).

And it is my opinion that it isn't hard for men of outstanding ability to get fixed up comfortably in the trades and professions I have dealings with.

For example, one friend of mine wants some skilled tool-makers and tracers. Another is in the market for assemblers. Yet another is prepared to pay quite handsome salaries for draughtsmen and artists.

They simply can't get them. Not good ones with ability and experience. Hundreds, if not thousands, of "raw hands" or "not quites" seem to be knocking about. Which all points to considerable haphazardness in the system, don't you think?

I generally get rather cross when a big employer of labour waves his cigar in front of me and says "We must have trained men." And I usually say something like this:

"If a man can't get a job without experience and a man can't gain experience without a job—it seems to me the answer's a lemon, and you're the lemon!"

Which is the sort of thing one pops out with when one sees a band on a smoking cigar!

"FAIR PLAY"

FROM Mr. Hardman, that hardy patent protagonist, comes a letter commenting on the subject of radio plays.

He has some very strong things to say about the "high brows" of the B.B.C., and the drama they put on the air.

And I find myself in general agreement with him. So, strangely enough, does the radio drama critic who writes for one of the B.B.C.'s own organs. Or so it appears, for this "official critic" has made some very caustic comments concerning certain of the recent productions.

One play in particular was torn to ribbons by the "official critic." Half a page was devoted to it and there was not one single word of praise. According to this "official criticism" the play was just plain bad from every point of view.

Then why on earth was it broadcast? Wouldn't it be sane for the B.B.C. to let their critic help to choose their plays; rather than to work in such absurd independence?

NEXT WEEK

First details of the very first set of its kind. The "EVERY-BAND THREE," for Ultra, Short, Medium and Long Waves with simple switching.



It's great fun tuning in stations from all parts of the world and then finding their geographical positions on one of those fascinating globe maps. And there is no difficulty in getting the stations on this H.M.V. six-valve all-wave superhet. It is the Model 482 and costs 16 guineas.

As it is, it would seem that they broadcast plays first and wait until afterwards for one of their own experts to tell them in print how poor they are?

It all seems so potty that I am quite bewildered. One could laugh were it not that we listeners are the "onions." Now if they'd let their critic loose on their plays before they were broadcast that would be amusing without giving us the knock.

Why not precede each production with a pre-view criticism. On these lines:

"Ladies and gentlemen, you will now hear 'Love's Carpet Slippers,' a play especially written for broadcasting by Mr. Benjamin Snoop. Concerning this play our radio drama critic says: 'In my opinion it is a dire failure. The dialogue is heavy and the characters lack any kind of charm. It nearly breaks my heart that such fine actors are to be so wasted. The author has taken his piece at once too seriously and not seriously enough.' That, ladies and gentlemen, is what our drama critic says, now we——" At that point we all switch off.

Lest you think I am unduly exaggerating, let me tell you that the above words are substantially the same as those used by the B.B.C. Broadcast Drama critic about a recent play after it had been put on the air! So either the B.B.C. Drama Dept. or the B.B.C. Drama critic was wrong. They couldn't both be right. Unless, terrible thought, the B.B.C. think we ought to have some bad plays!

The TELEVISION Two

ON reading the description of the "A.P." A.C. Three in last week's and the preceding issue of "P.W.," many constructors no doubt said to themselves, "When is our turn coming?" We realise that a very large number of "P.W."-ites are battery users and, moreover, for various reasons prefer the smaller type of set, desiring no more in the way of broadcast-reception than a couple of B.B.C. medium-wave locals, Droitwich, and, say, a round dozen of the more powerful foreigners.

This week we are describing just the set for these constructors—a set that fulfils all these requirements and in addition will receive the television sound transmissions.

Splendid Entertainment

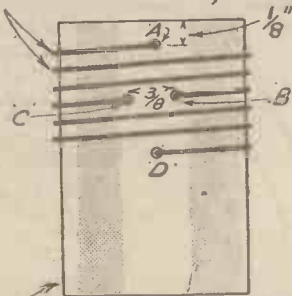
There is no need for us to go into the advantages of being in a position to receive these television programmes: these were fully explained in the first article on the "A.P." A.C. Three and also in other articles. There is without question a splendid new field of entertainment to be picked up on the B.B.C. television sound wavelength of 7.23 metres, and as has been pointed out before, the tuning, contrary to what many believe, is not difficult on this particular wavelength.

Moreover, it is an undeniable fact that the television programmes come over with a clear-cut quality which is definitely an improvement on ordinary broadcasting.

At the moment it is true that only two hours a day are being given up to television broadcasts, but in the future these programmes will be considerably extended, until eventually they will be available during the best part or the whole of the day.

COIL DETAILS

$\frac{1}{8}$ " From Centre Of One Turn To Centre Of Next.



Former, $1\frac{1}{2}$ " Long 1" diam Paxolin

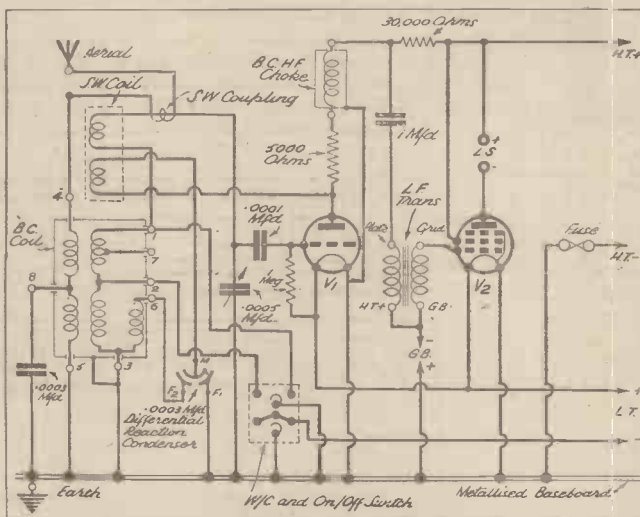
Here are the details for making the 7-metre coil. The wire used is No. 18-gauge tinned copper.

A simple and amazingly efficient low-cost battery two, for ordinary broadcasting and the television sound programmes. Described by A. Johnson Randall.

At the moment also there is only one station, namely, at the Alexandra Palace, and its range is estimated at 25 miles, although this distance has been greatly

At this point we should like to mention the method of coupling the aerial to the grid winding on this 7-metre coil. If you turn for a moment to the wiring diagram you will notice that the lead from the aerial terminal at the back of the baseboard passes across the baseboard and runs along and parallel to the .0001-mfd. fixed condenser between the B.C. coil and the valve holder V_1 . When it reaches the terminal on the .0001-mfd. fixed condenser, which is nearer the panel of the set, you will notice that it is twisted round it and then taken direct to terminal 4 on the B.C. coil. Now this loop round the fixed condenser terminal forms the coupling between the aerial and the ultra-short-wave coil. The lead in question is, of course, an insulated one, and when the set is wired up it is twisted round the .0001-mfd. condenser terminal twice before being joined to terminal 4 on the B.C. coil. This provides a simple capacity coupling on to the grid lead which is joined to the grid winding of the home-made 7-metre coil. Extraordinarily simple, isn't it? and yet very effective in practice.

DETECTOR AND L.F. PENTODE



The circuit embodies a straightforward grid-leak detector, followed by a pentode. It will be noticed that the wavechange and on-off switches are combined. This switch is of the home-made type, and details of its construction are given in this article.

exceeded and the programmes received satisfactorily in districts well outside this estimated area.

The "Television" Two is basically a straight detector followed by one stage of transformer-coupled L.F., the output valve being a pentode. The L.F. stage is parallel-fed, a method which gives very excellent reproduction. On the H.F. side the aerial circuit is coupled to the grid circuit of the detector valve via an H.F. transformer (marked B.C. coil in the diagrams) in so far as the reception of broadcasting on the medium or long waves is concerned.

For the 7-metre reception there is a separate coil consisting of two windings, one a grid circuit winding and the other for reaction. This coil is home-made, and full details of the size of former and the arrangement of the windings are given in a separate diagram.

Ingenuous Reaction Scheme

The reaction scheme is that which our Research Department originally evolved for the "Television" Three, and which was also used for the "A.P." A.C. Three. It is an ingenious scheme, one side of a differential reaction condenser being used for the ordinary broadcast wavelengths and the other section being employed for the television sound broadcasts.

Referring to the theoretical circuit—when the moving vanes M are turned so that they mesh with the fixed vanes F_2

(Continued overleaf.)



★ ★
There are only two controls apart from the wavechange switch. The reaction control is on the left of the panel and the tuning knob in the centre.
★ ★



This photograph clearly depicts the method of coupling the aerial to the television coil. It will be seen that the wire from the aerial terminal to the B.C. coil is twisted round the terminal on the .0001-mfd. fixed condenser.

And now we can turn to the construction.

The first item is the switch disc and its associated parts. The switch disc is 3 in. in diameter and is cut from a piece of 3-16th in. ebonite. Along its periphery are four "V"-shaped slots, and a semi-circular slot for finger control. The "V"-shaped slots should be made with a triangular file and the semi-circular slot can be cut with an ordinary rat-tail file.

Arrange the "V" slots so that they are positioned exactly as shown in the diagram. Drill the disc to take the five 6 B.A. cheese-head screws. These screws, each with a soldering tag, are passed through the disc and secured firmly with six B.A. nuts on the under side. The points of the screws are cleaned with a fine file.

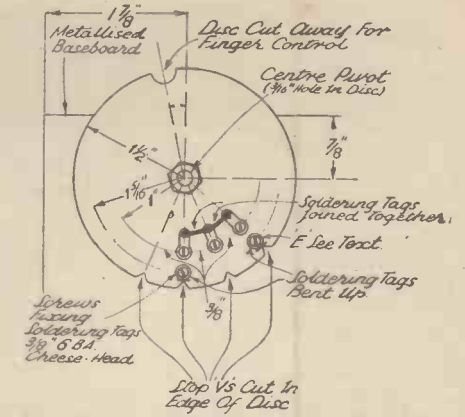


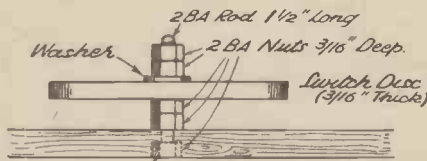
Diagram Showing Dimensions Of Switch Disc, And Position On Baseboard

The centre of the switch disc is 1 1/2 in. from the edge of the baseboard.

Then prepare the two contact clips. These are mounted in position on the baseboard to the dimensions given in the diagram. These contact clips consist of two pieces of springy brass fashioned on the same lines as those marked A and D in

reaction is applied to the B.C. coil reaction winding. Conversely, when the moving vanes are in mesh with the fixed vanes F₁ reaction is applied to the 7-metre coil, thus one reaction condenser does two jobs.

Readers will notice also that we have used a home-made wavechange switch of somewhat similar design to that used



Showing Mounting Of Switch Disc To Baseboard.

The top and bottom nuts are locked together so that the disc rotates freely.

on the "A.P." A.C. Three. It provides instantaneous switching from one waveband to the other, and in the case of this particular set it acts as an on-off switch for the L.T. battery as well. There are thus four positions: off, medium waves, long waves and television.

The primary winding of the B.C. coil has no medium/long-wave switching. Instead, a condenser of .0003-mfd is joined from the common connection

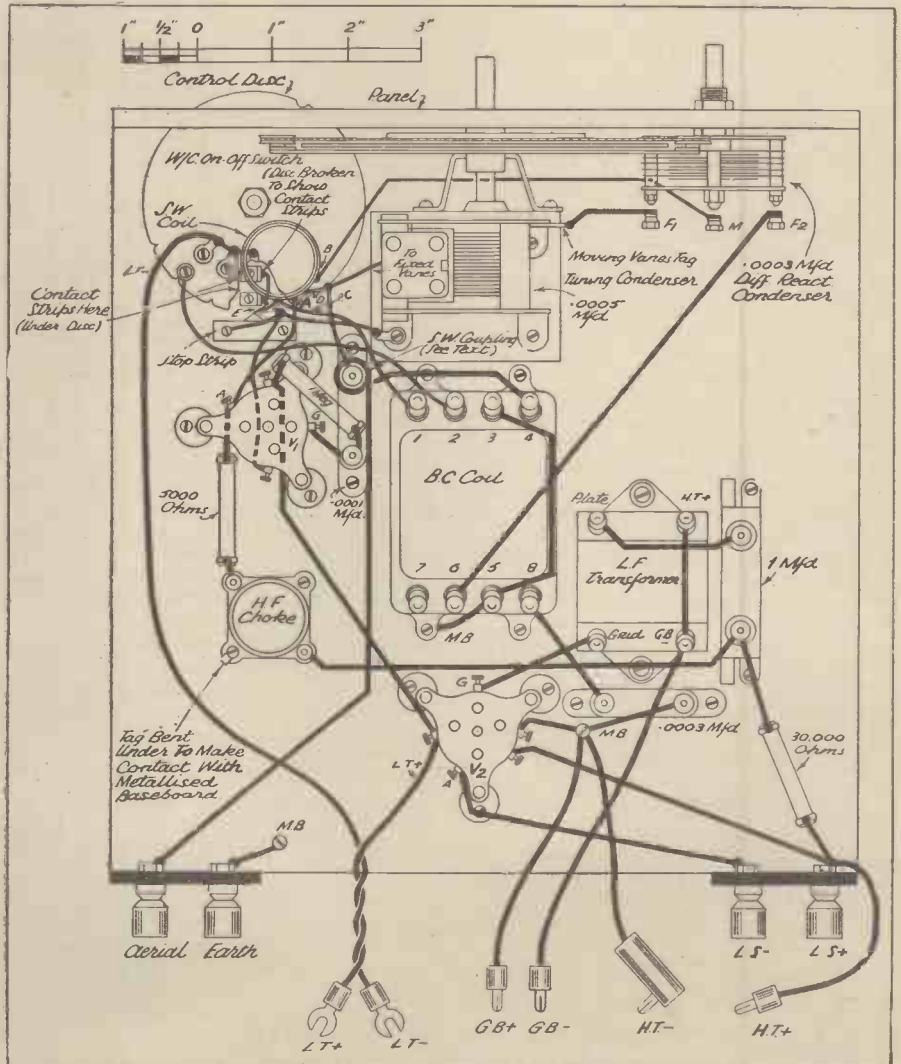
VALVES AND ACCESSORIES

- V1: Marconi or Osrarn, L 21
- V2: Hivac, Y 220

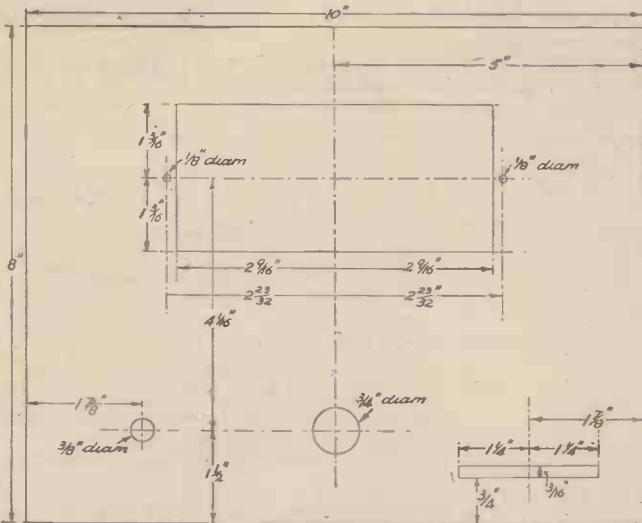
- L.T.—2 volts. Exide
- H.T.—120 volts. Drydex
- G.B.—4½ volts. Drydex

between the medium- and long-wave windings and earth. This condenser performs two functions. First, it partially short-circuits the long-wave primary when the set is switched over to the medium waves, and, secondly, it prevents break-through when long-wave stations are being received.

ALL THE WIRING IS SHOWN HERE

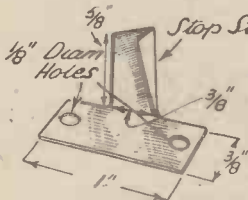


The lettered leads to the short-wave coil correspond with those on the diagram of the coil which appears on the preceding page. The lead marked "E" goes to the similarly marked screw on the switch disc. Point-to-point wiring of the coil-leads is given in the text.



The positions of the holes for the tuning scale and controls on the panel.

the diagram on page 436 of last week's issue. These two clips have to make contact with the screws which pass through the switch disc, and it will be noted that they are self-cleaning owing to the rubbing action between the screws and the clips when the switch is rotated. These clips, incidentally, can be made from the metal contact tongues on old flash-lamp batteries.



Dimensions for the metal stop which engages with the "V" shaped slots on the switch disc.

The four "V" slots in the switch disc engage with the stop strip, which is made from a piece of thin brass to the dimensions given in the diagram above.

Before the switch disc is assembled in position the two contact clips must be screwed to the baseboard and joined together with a short length of copper wire. Also, it is advisable to join the three innermost soldering tags on the switch disc together and to a length of flexible wire for L.T. — (see wiring diagram).

The stop strip is screwed in position so that it bears firmly against the outside of the switch disc, engaging with each of the "V" slots in turn when these are opposite it.

The next item is the television coil (marked S.W. coil in the diagrams). This consists of two windings, each of three turns. These windings are wound with

18-gauge bare tinned copper wire on a 1 1/2 in. x 1 in.-diameter "Paxolin" former—a dimensioned sketch of the coil appears on the first page.

Before the coil can be connected, it is necessary to solder certain leads on to the points A, B, C and D.

The point-to-point wiring for these leads is as follows:

(a) Join wire from point A on the coil to terminal A on the valve holder V1.

(b) Join wire from B on the coil to M on the differential reaction condenser.

(c) Join two wires to C on the coil: one

goes to terminal (1) on the B.C. coil, and the other to the screw marked "E" on the switch disc.

(d) Join wire marked D on coil to fixed vanes of tuning condenser and to terminal of .0001 mfd. fixed condenser nearer the tuning condenser. This terminal is the one around which the wire from the aerial terminal is twisted in order to provide the short-wave aerial coupling.

It is advisable to solder these lengths of wire on to the television coil before any attempt is made to mount it in position. They can be cut to length and joined up to their respective components when the wiring of this part of the set is being carried out.

There is a further bunch of wires in connection with the switch which we will refer to now.

The two contact clips, as already stated, are joined together and from this common join a lead is taken to one of the holding-

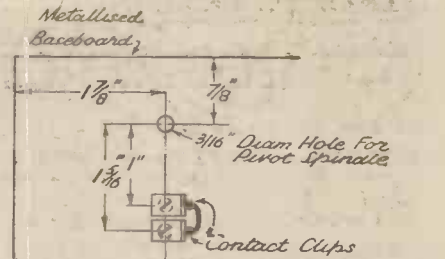
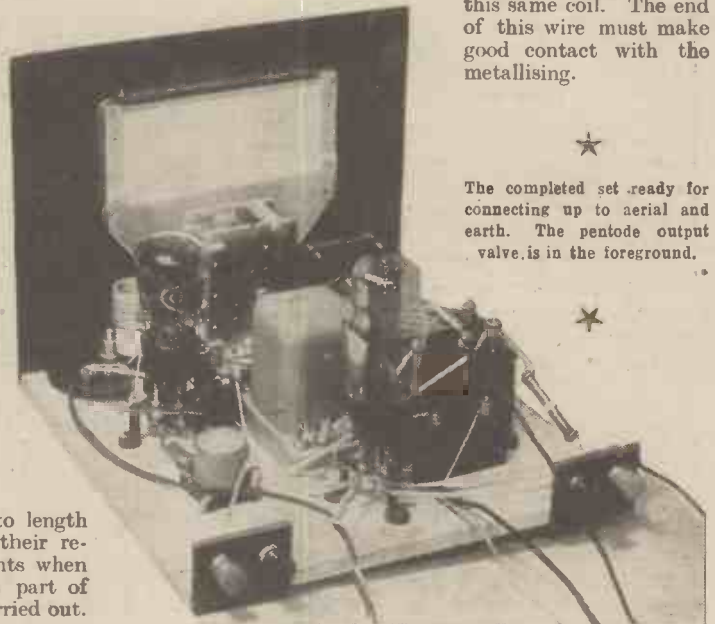


Diagram Showing Position Of Pivot Spindle And Contact Strips On Baseboard

The two contact clips on the baseboard are cut from strips of springy brass and bent to the shape and size given in the diagram on page 436 of last week's issue for the contact strips A and D.

down screws on the stop strip; to one filament terminal of the valve holder V1, and to a soldering tag secured to one of the holding-down screws on the tuning condenser. If you will refer to the wiring diagram you will have no difficulty in following these various leads.

Note also that certain wires make contact with the metallising on the baseboard. For example, there is one lead going from terminal 5 on the B.C. coil to one of the holding-down screws on this same coil. The end of this wire must make good contact with the metallising.



The completed set ready for connecting up to aerial and earth. The pentode output valve is in the foreground.

Then there are four leads, namely, G.B.+, H.T.—, the lead to the .0003 fixed condenser and a further lead to the F-terminal on the valve holder V2; each has its end secured to the metal baseboard by means of a wood screw.

The earth terminal is also joined directly to the metal baseboard.

A further constructional point is the use of a block of wood between the tuning condenser and the baseboard. The block supports the condenser and is cut to 2 1/2 in. long x 2 in. deep x 3/8 in. thick.

Now a few words about controls. Reverting to the switch with its four "V" shaped slots. These represent the four positions giving off, medium waves, long waves and television in that order.

You will notice that one of the "V" shaped slots on the switch disc has no contact screws opposite it. When this

(Continued on page 465.)

THE PARTS USED IN THE ORIGINAL SET

- 1 Polar bar-type .0005-mfd. tuning condenser.
- 1 Polar V.P. horizontal drive for above (marked in degrees).
- 1 Clix 4-pin valve holder, short-wave, leg-supported baseboard type.
- 1 Clix 5-pin valve holder, short-wave, leg-supported baseboard type.
- 1 Wearite "Unigen" coil.
- 1 Varley "Nicore II" L.F. transformer.
- 1 Polar-N.S.F. 1-meg. resistance, 1-watt type.
- 1 Polar-N.S.F. 30,000-ohm resistance, 1-watt type.
- 1 Polar-N.S.F. 5,000-ohm resistance, 1-watt type.
- 1 T.C.C. 1-mfd. fixed condenser, type 50.
- 1 T.C.C. .0003-mfd. fixed condenser, type 34.
- 1 T.C.C. .0001-mfd. fixed condenser, type 34.

- 1 Wearite H.F. choke, type H.F.J.
- 1 J.B. differential-reaction condenser, .0003 mfd.
- 1 "Metaplex" baseboard, 10 in. x 10 in. (Peto-Scott).
- 1 wood panel, 10 in. x 8 in. x 1/4 in. (Peto-Scott).
- 1 piece ebonite, 3/8 in. thick, to make 3-in. diameter disc (Peto-Scott).
- 1 1 1/2 in. length, 1 in.-diameter "Paxolin" former (Peto-Scott).
- 3 lengths 1 1/2-in. insulating sleeving (Peto-Scott).
- 10 ft. 18-S.W.G. tinned copper wire (Peto-Scott).
- 4 Clix indicating terminals, type B.
- 2 ebonite terminal strips, 2 in. x 1 1/2 in. x 1/8 in. (Peto-Scott).

Screws, flex, etc.

INTERFERENCE FROM A POWER TRANSFORMER

I have had a long letter from a Ripon reader who is suffering from A.C. hum from a power transformer situated fifteen feet away from his aerial. He cannot get his aerial any farther from the transformer and he states that the hum is worse on certain days, especially when the weather is foggy and frosty. The hum comes down the aerial, so he thinks, but is present when there is no aerial at all. The noise is sufficient to drown all radio reception.

The only thing I can suggest is that he gets in touch with the Post Office about it. He might try using the set with different earths, and perhaps with a combination of different earths (at different distances away from the set and the power transformer, which is pretty close) and indoor aerials.

It might be worth while rigging up a vertical aerial, but as the trouble persists without any aerial at all it is difficult to see what can be done. There are high-tension cables running near the house and at an angle of forty-five degrees to the aerial being used.

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

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

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

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

On the set installed it is not possible to use a frame aerial, so that type is out of the question, I am afraid. Perhaps other readers who have experienced trouble from power transformers connected with the grid system will put their thinking caps on, or write in and tell me if they have been able to get rid of such interference and how they have done it.

In this case the trouble does not commence or finish at any regular time, will exist on several consecutive days, and does not seem to be controlled by the time of day. The only clue we have is that it has been exceptionally bad during foggy and frosty weather. What about it, some of you amateur sleuths?

A MAGNET PROBLEM

T. H. B. (Bridgewood).—With an electric magnet having a movable iron core I find D.C. current causes the iron to be drawn into the coil. But when I connect A.C. the iron core does not go in and out. As A.C. alters its direction every time, should not the core wobble in and out?

No. You will find that when you are using a non-polarised core (as you are) the D.C. current will draw it into the coil, no matter which way you connect the source of current. That is, no matter which way you pass the current through the coil. So obviously the A.C. current will have the same effect, each half cycle will cause the iron to be drawn into the coil, and no in-and-out motion will be obtained.

If the core were made of steel and was magnetised, making a permanent magnet, then you would be able to draw it in or force it out of the coil by altering the direction of flow of the D.C. current, and if the core were light enough to respond to the rapid changes of A.C. you would get your wobbling effect. That is what happens with an ordinary telephone earpiece. The magnets are permanent magnets, and the direction of the speech currents changes as does A.C. The result is that the magnetism of the magnets is varied and the diaphragm is made to wobble.

A very inefficient form of this wobbling would be set up with your scheme—if the core were composed of a permanent magnet. Then at one moment the North and South poles of the magnet would

correspond in polarity with the adjacent poles of the coil and the next moment they would be opposite in polarity to the poles of the coil. But you would probably find that the rapid changing of polarising force through the coil would tend to demagnetise the core and you would be left eventually with a piece of steel that retained very little of its original magnetism.

H.T. FROM L.T.

R. S. (Guildford).—I have the parts for an H.T. vibrator, and would like the circuit diagram for it. Also can I get one of the 2-volt transformers such as are fitted in commercial sets?

I am afraid I cannot give you the diagram for your vibrator here, as I do not know what parts you have on hand. Let us know what you have already and we shall be able to help you further.

As regards the transformer, you cannot get one of the transformers actually made by the commercial set manufacturers, but you can get any type of transformer if you write to Messrs. F. C. Heyberd & Co., Ltd., 10, Finsbury Street, London, E.C.2. Tell them what you want to do and how much output you want from your unit, and they will be able to quote you for a transformer to suit it.

It should be remembered that the H.T. from L.T. business wants proper handling. You cannot hook together any old junk and get good results. You must have the vibrator working smoothly, and you must be prepared to rectify the output and to smooth it properly after rectification.

A badly working vibrator system is a terrible thing. It will give rise to all sorts of noises, and I feel it is only right to warn you about it before you go further into the matter.

Do not imagine from this that the vibrator is not any good. It is, and has been proved so by the fact that commercial sets are being built with the scheme incorporated. But you must not be disappointed if you get doubtful results at first. Let us know what you are going to use and where you got the materials before you proceed.

I AM DISAPPOINTED

A. Stansfield, of Birmingham, has sent a book and blue print to one of our readers after a request had been "broadcast" in "P.W." for it. He has also sent a letter to the reader asking if he has received the book. So far, after many weeks he has no acknowledgment. I AM disappointed. It is the first such complaint I have received and it may not be so justified as it sounds. The reader who wanted the books, etc., may be ill, he may be away, but I hope he will see this and erase the small blot that has appeared on our blue and gold escutcheon. Just a short note to A. S. and the blot will disappear, but if we collect other blemishes I am afraid

I shall not be able to put these SOS's in our columns.

AN OBSOLETE VALVE

B. D. (Mansfield Woodhouse).—I have a mains set using one of the output pentodes with a terminal on the side. I am told that the valve is now obsolete and its five-pin brother has been substituted. Is my set going to be useless?

I do not think you need worry about that yet a bit. Most of the valve makers keep stocks of the old types of valves for replacements or have others that are sufficiently near in characteristics to be used in their stead.

If you are only worried about the change from side terminal to five-pin I should get in touch with someone like A. F. Bulgin, Ltd., who will be able to supply you with an adaptor that will enable you to plug in a five-pin valve on your four-pin socket, the fifth socket on the adaptor being connected to the piece of flex that now goes to the side terminal.

But I am sorry to say that I cannot tell you exactly what your position is, because you do not state what type of valve you are using at present. It might be some unusual type that has been completely superseded, though I should think that doubtful.

TESTING VALVE EMISSION

T. G. (Leeds).—How can I test a valve's emission without the use of expensive apparatus?

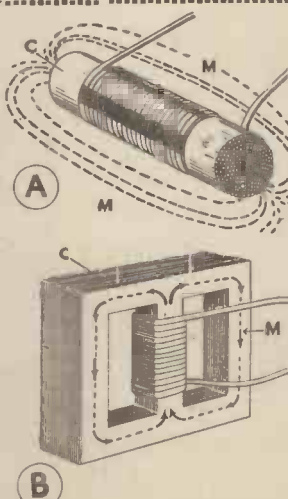
That depends on what you call expensive apparatus. To do the job properly you must have a milliammeter, but this need not cost more than a few shillings. You cannot test the emission without such a meter other than finding out that the valve is passing some sort of anode current.

But the meter need not be dead accurate. If it is a matter of a milliamp out of 15 milliamps, it will not affect a rough test and you will be able to judge the conditions of the valves quite well with it. You should be able to pick up a milliammeter for a matter of 10s. or even less.

EARTHED EXTENSIONS

V. M. H. (Broxbourne).—I want to run a single wire from the set to the extension speaker and to use a common earth scheme as the return. Can I do this?

Yes, you can do that quite well, provided you take care that no high tension leakage can result. What you want to do is to take the extension lead from your set through a condenser on the anode or high-tension side, then to connect the return of the speaker to a good earth connection somewhere. It should be perfectly satisfactory, but you must use the usual speaker matching transformer at the loud-speaker end so that the speaker is matched with the output of the set. The condenser should be situated close up to the set itself.



TECHNICALITIES EXPLAINED—No. 35

OPEN AND CLOSED CORES

There are two types of cores used in iron-cored inductances—open and closed. The two types are shown in the sketches. "A" is the open core, so called because the iron wires or laminations are left open at the end. In other words, the core finishes at each end of the inductance. The result is that the magnetic lines of force "M" go through the core "C," and then have to go through the air outside and round to the core again as shown. This is wasteful in magnetic energy, and therefore wasteful in the efficiency of the coil. A better plan is to use a closed core in which the magnetic lines of force "M" have a closed or constant iron path right through the coil and round the outside and back to the inside again. Such a coil is shown in Diagram "B."

All modern L.F. power transformers and chokes are built on the closed core principle.

TELEVISION TOPICS—Collected by A. S. Clark

Technicalities, Personalities and News from all parts of the World make this "Popular Wireless" feature the finest medium by which readers can keep right in touch with all aspects of development in television.

"TELEFRAMES"

Items of General Interest

EIFFEL TOWER TO STAY

PLANS to demolish the Eiffel Tower in France have now been dropped. It is to be rejuvenated for use for ultra-short-wave television.

This decision was arrived at in view of the desirability of a high location of the transmitting aerial for a good service.

SIGNIFICANT

Several regular lookers have stated that they find themselves quite bored by the news reels at the cinema after having already seen the same items on their television receivers. There is a dual significance to this.

First, it shows that there is obviously nothing much lacking in the television reproduction. Otherwise there would be a keenness to see certain points on the screen.

And secondly, as television grows, it cannot be expected that the film companies will entirely pass over this "de-interestizing" of their news reels, at present one of the most popular features of a film show. And then what happens? More money wanted!

BAIRD ON MARCONI-E.M.I.

Surprising though it may seem, it is possible for pictures transmitted on the Baird system to be received with the set switched to Marconi-E.M.I. Such is the compelling power of synchronising pulses.

This effect recently occurred when the wife of a viewer complained to her husband that she had had difficulty in getting the afternoon pictures. The only fault in them when they were received being, apparently, that the picture-size ratio was distorted.

G.E.C. RECEIVERS

G.E.C. television receivers are now in quantity production, and a complete testing equipment has been set up at Coventry to ensure the reliability and the satisfactory operation in service of the commercial product. Every receiver sent out is tested in a special building in the London area on the B.B.C. transmissions from Alexandra Palace and also on signals from the experimental transmitter at Wembley. A fully qualified technical staff has been trained for the necessary installation work.

TELEVISION TELESCOPE

Astronomers are watching television with great interest. It is possible that it may

provide a means of magnification for them in the future.

Television converts light rays into electric pulses which can be amplified many times. A

scheme whereby television would aid the examination of the sun's corona during an eclipse was worked out some time ago.

EKCO'S NEW AERIAL

A 120-foot mast has been erected alongside the Ekco works at Southend. The top ten feet or so of the slender metal mast is to be used as a television aerial. It is copper plated and insulated from the remainder of the mast.

We understand the engineers are confident of picking up a satisfactory signal from Alexandra Palace, especially as special

always occur at the same point and it at all bright may result in a burned screen.

A separate on-off switch in the primary winding of the mains transformer will do the trick. This will be closed only after the time-base has had time to warm up and start working.

OSCILLOGRAPH CONSCIOUS

NO one can work with television apparatus for long without becoming violently oscillograph conscious. Once the idea behind the cathode-ray tube as an oscillograph has been appreciated, its possibilities in experimental work and fault-finding seem almost overwhelming.

What makes the oscillograph so attractive is that it gives an actual picture of what normally is an imagined state of affairs in the mind. It gives concrete and direct evidence of what is going on in a circuit.

A Valuable Instrument

As a matter of fact, an oscillograph can be most useful in the design and operation of television apparatus itself. It enables the degree of smoothing given by various components or in different parts of the circuit to be visually inspected.

Other points which immediately occur to one as capable of being checked up, are the saw-tooth form of the scanning circuits, the operation of the sync. isolating valve, and with the aid of special arrangements, the actual response curve of the receivers' tuned and intermediate circuits. Once the oscillograph's value has been experienced, it seems impossible to get along without it.

For many tests, the television time-base and cathode-ray tube in its normal form may be employed, but a separate oscillograph is best of all.

In a separate unit the circuits can be given more suitable values for the work they are to do. Of course, the tube used for television purposes can be changed over to the oscillograph unit, but a small tube permanently kept in the oscillograph is better.

Using Cheaper Tubes

Such tubes with a diameter around 3 ins. are cheap in comparison with the large television tubes and work with voltages of the order of 500, so that fairly normal and inexpensive components can be utilised.

Normally only a single time-base will be required, applied to two of the electrodes, to move the spot backwards and forwards across the screen. The "work" or currents to be investigated are then applied to the other pair of electrodes, and by obtaining a suitable time-base speed and using a little sync. if necessary a pattern of the voltage variations is obtained.

RECEIVER ASSEMBLY AT COSSOR'S



Showing the final assembly of the units employed in Cossor television receivers at the works of this firm.

precautions to filter out all local interference have been taken.

PREVENTING SCREEN BURNING

Those experimenting with cathode-ray tubes should remember it is advisable to start the time-base running before producing the spot on the screen. The spot will

VAL ROSING AT A.P.

An experiment in "sweet swing" music will be made by Val Rosing on Saturday of this week, when he brings an entirely new combination to the television studio, consisting of piano, bass, guitar, saxophone and trumpet. Famous as the first vocalist with the B.B.C. Dance Orchestra and for his own dance band ensembles, Val Rosing needs no introduction to listeners and televiewers. He will sing various popular numbers during his four sessions in the afternoon and evening transmissions from Alexandra Palace, and with him will be Ann Lenner, the popular vocalist.

Comedy numbers will also be presented, featuring members of this miniature band. Val Rosing believes that swing music can be successfully tackled even by small bands if the component parts are carefully chosen.

TELEVISION TOPICS—Continued

THE SAME STORY

ALTHOUGH America, when it learnt of the opening of Alexandra Palace, tried to suggest that such "experiments" were premature, and that "television for all" would be achieved in one fell swoop in that country, it nevertheless seems to be conforming more and more to similar lines of development as we have experienced here.

There is no doubt that the starting of our service has shaken things up in the States. The public and Press are continually asking: "When shall we have television?" And just as it was in this country, they cannot get a definite answer.

The "still just round the corner" outlook is as popular as it was over here. The same facts about television are being discussed as found prominence over here—television will introduce new technique for artists—films, especially news items, will play a big part—who is going to pay for the programmes and stations?—sets will be expensive at first—and so on.

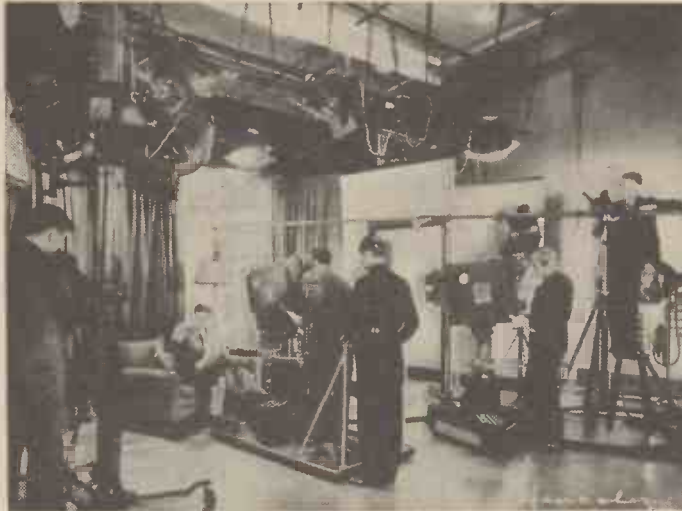
It is all terribly familiar to us. But let us see just what the present state of affairs is, and what the immediate future is likely to hold for television development in the States.

Test transmissions are now being conducted in a big way from a fully equipped station in the Empire State building. This is under joint R.C.A. and N.B.C. control, and transmits programmes originating in Radio City.

So far no public demonstrations have been given, only engineers in different parts having receivers. The Press have seen demonstrations and the general opinion is that results are good enough.

As a matter of fact studio technique, rather

IN THE NEW YORK STUDIO



An item being televised in a studio of Radio City, New York. The similarity of the cameras and lighting with our own at Alexandra Palace is most marked.

than transmitter and receiver details, is receiving most attention from engineers at present. The studio picture on this page shows how closely their work is following (or copying) the B.B.C.'s.

Sponsored Programmes Probable

The main desire at present is to start television off as a commercial proposition as soon as it is introduced to the public. Sponsored programmes seem to be the idea.

But no date can be given, because the sponsor will have to pay heavily, and in return wants many viewers. This needs cheap sets and many repeater stations, both of which seem out of the question for a kick-off. Hence the reluctance for anyone to give a commencing date.

Repeater stations would have to occur every thirty miles or so. Although the range of the transmitter on the Empire State Building has a useful distance of forty-five miles, this is put down largely to the great height of the aerial. At present a coaxial cable is being tried between New York and Philadelphia.

So much for the present; what about the immediate future? In spite of ambitions there is strong argument being put forward that television will start soon in a small way and grow slowly but steadily.

The price of \$400 (somewhere around £80) is often quoted as the price of the first production television receivers. And stations in New York and Philadelphia are suggested as a suitable and likely start.

TELEVISION FOR BEGINNERS

G. Stevens explains how the signal is applied to the cathode-ray tube

IN the last article we saw how the modulation was applied to the grid of the tube in such a way that an increase in signal gave an increased brightness, while the synchronising signal only carried the bias further beyond the cut-off point and thus gave no effect on the screen. Now we might consider the actual means by which the signal is applied to the grid in order that the fluctuations in carrier amplitude may affect the overall brightness of the screen.

A Marked Similarity

Those of you who have studied valve curves will have noticed the similarity between the curve of the tube (in last week's diagram) and the anode current—grid volts curve of an ordinary valve. It is this similarity which has led experimenters to try if the tube itself could not be made to rectify the signal and thus act as its own "detector."

This would mean that the radio signal would be amplified by several stages and then applied to the grid of the tube direct. The tube would then be biased to act as an "anode-bend" detector and the rectified signal would appear as variations in brightness on the screen.

This scheme is quite possible, but it has the drawback that it is not very efficient, i.e. for a given signal we do not get the maximum variation in brightness. This is because the current in the beam cannot be raised above a certain amount without losing sharpness in the line definition. Normally, when the tube is adjusted for best reproduction, this value of beam current is that which corresponds to the brightest parts of the picture, but when the tube is its own rectifier, two things happen.

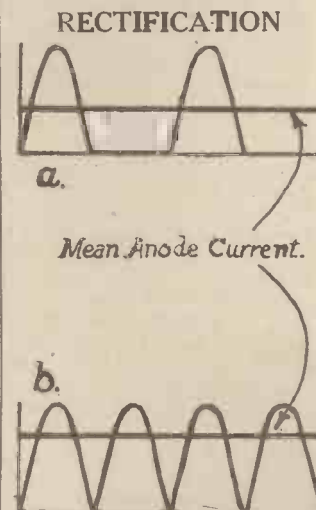
First, only half of each wave is used, as the grid is biased back to the cut-off point. Second, the average current in the beam does not rise to a very high value as the tube is behaving as a half-wave rectifier with gaps in between the pulses of current. This means that the average current in the beam is well below the maximum value which corresponds to a maximum brightness.

Less Contrast

The pictures seen on a tube which was connected to act as a radio-frequency rectifier would be dimmer than the normal and the contrast would be less.

An improvement would be made in the brightness of the picture if we rectified the signal

before it was applied to the grid by means of an ordinary full-wave diode valve. Then we should have a double pulse applied to the grid of the tube and the average beam current and brightness would be increased.



The difference between half-wave and full-wave rectification is shown here.

The difference in effect between half- and full-wave rectification is shown in the diagram. Assuming (a) to represent the first condition with the tube as its own rectifier, the average of the pulses of beam current is given by the

thick line. Now, if the full wave is rectified and then applied to the tube, the pulses become as (b) and the mean current is increased to correspond.

You will find that the usual method of applying the signal to the tube is to feed the radio-frequency to a diode-valve after it has been amplified and to connect the output from this valve to a resistance in the grid circuit of the tube. The changes in grid voltage across this resistance alter the bias and hence the brightness.

Practical Difficulties

There are one or two practical snags in this method, the principal one being that one is liable to get all sorts of shocks if the diode is not well insulated from the rest of the circuit. This is because the grid of the tube is usually "live" to the chassis by the full voltage of the tube supply. It is usual in tube working to connect the H.T. + to earth instead of H.T. —, as is more common the case. This has advantages, but it is apt to worry the radio experimenter who is used to the other way of working.

By the way, the use of the words "beam current" may puzzle some of those who are not familiar with electrons and their ways. Since the beam of the tube is composed of electrons we have to all intents and purposes a steady current flowing up the tube towards the screen as though there were an actual conductor in the tube. This is the beam current.

RADIO IN NEW ZEALAND

How a change in the control of broadcasting in New Zealand has found a new use for it is described in this article

A NEW conception of the function of broadcasting in a British community was given by the Hon. F. Jones, Postmaster-General in New Zealand, when introducing the new Broadcasting Bill into the Dominion's House of Representatives.

Claiming that the newspaper press of the country had been unfair in its treatment of the Labour Opposition in the last Parliament, and was continuing this treatment with the new Labour Government, the Postmaster-General, speaking on behalf of the Government for the new Bill, has stated that the broadcasting of Parliamentary news will be a feature of all national stations under the new control.

Entitled To Know!

"The people," states the Postmaster-General, "are entitled to know the best and the worst. They should know exactly what Parliament is doing and what the Government intends to do. The Government has a duty to the people not to keep them in the dark. What the newspapers neglect to do the broadcasting service will do. We have a far-reaching programme, and we want the people to come with us everywhere. The Government is going to be the master of publicity, and we are not going to wait for the newspapers or the Opposition to tell the people what we are doing."

Claiming there are still 200,000 homes in the country without wireless receivers, the Minister states it is the aim of the Labour Government to bring the benefits of broadcasting into every home as soon as possible. The wireless set, he says, is a necessary adjunct to every home, the same as gas, electricity or water supply, and the question of price represents the barrier between many homes and the benefit of a wireless set.

A People's Set?

To overcome this barrier, the Government is investigating the question of royalties, and is experimenting with a view to designing a cheap set that can be manufactured locally and sold at a low price. Doubtless there will be an outcry against this proposal as soon as its implications impress themselves on the 1,500 radio dealers and factories in the Dominion. The Minister further claims that the B.B.C. has been investigating a similar scheme in Germany, whereby the German Government and the manufacturers have co-operated in the production of a cheap but efficient standard set.

Having brought broadcasting under State control, if the Labour Government implements this scheme to provide every home with a wireless set, it will be more or less independent of the newspapers for publishing its Parliamentary news.

A further step has been to abolish the Broadcasting Board, on which various

By
RALPH L.
SANGSTER

★

interests have been represented, and bring the service under the control of a Director of Broadcasting, who will work directly under the Postmaster-General. Private, or "B"

stations, which now number twenty-one, with limited hours of broadcasting on powers less than 100 watts, will receive subsidies from the Government. Some of these may be acquired for the new Commercial, or "C" stations, which are to be started by the Government and run as a commercial venture. Apparently these will be, in effect, radio news magazines supported by advertising revenue from the air. It is anticipated one of their main functions will be the reporting of Parliamentary news to the people as the Government considers it should be reported.



This studio building of 1 Y A, Auckland, New Zealand, is a pleasing example of how clever architectural design can overcome the absence of windows. The mast is that of station 1 Y X, the 500-ft. mast of 1 Y A being 15 miles distant.

powerful national or "Y A" stations during the currency of the Board have been sustained and general. Specifically, critics grumbled at: (1) No alternative service during majority of daylight hours; (2) services from main stations not truly alternative; (3) programmes of a stereotyped nature with little variation in the general offering and practically no originality, so that the "B" stations, it is claimed, were in many cases actually preferred to the national stations for which listeners were subscribing; (4) silent periods with no alternative broadcasting; (5) severe restriction on the number of hours "B" stations could provide a free service to the public; (6) no assistance to the private stations enjoyed by many listeners.

ONE OF THE ANNOUNCING STUDIOS



Modern furniture is a feature of this Auckland announcers' studio. Note the sound-proof glass windows.

The whole plan of the Labour Government is, of course, a means whereby the broadcasting service will become the official organ of the Party; leaving the newspapers, one supposes, to remain the official organs of the Conservative (Reform) Opposition. How popular this move will prove remains to be seen.

An impartial survey, however, suggests the move may not be unpopular, even if only on the grounds that any change is better than none.

Criticisms of the broadcasting by the four

Broadcasting Debates

Even if the new régime provides for the increase in the number of broadcasts of Parliamentary debates from main stations, this will not necessarily make for unpopularity so long as it is kept within bounds and an alternative station kept going. All important debates on Bills have been broadcast, there being three Government, two Opposition, and one Independent speaker in each debate. These broadcasts straight from the House of Representatives have proved extremely popular with all sections of the community, and have brought one or two unforeseen results—such as criticisms of Members' English!

Features of the new Bill, which has already become law, which will please listeners are: (1) Increase in stations, which seems certain; (2) extension therefore of hours of broadcasting; (3) a real desire, seeming to be fairly general, for a continuance of the Parliamentary debates; and (4) the proposed measure of support for "B" stations which are struggling to keep on the air, and which will now be assured of an income. "B" stations undoubtedly pioneered broadcasting in New Zealand, are in some cases

(Continued overleaf.)

RADIO IN NEW ZEALAND

(Continued from previous page.)

ranking higher in public esteem, and it seems are undoubtedly desired by listeners.

Whether advertising from the proposed "C" stations of the Government will be welcomed or not is an open question. On the face of it, it is difficult to see any great difference between this and advertising in newspapers.

New Zealand is an awkward country to serve by radio, consisting as it does of three islands extending practically north and south for over 1,000 miles, while being little more than 100 miles wide at best. Although the area, therefore, is little more than that of Britain, being only 103,000 square miles, it takes four stations, each of 10,000 watts, to give national coverage. In addition to these, about twenty small "B" stations are dotted about. Each of the four main, or "YA" stations, has also a "YX" or secondary station which provides a simultaneous service mostly during evenings and Saturday afternoons.

A New Station

Building now is a new station expected to give national coverage in daylight. The power will be 60 kw., and the wavelength presumably as near as feasible to 600 metres to assist the daylight range. Such is to be the efficiency of this new station that its range will extend over very wide areas indeed. This station will act as Government station for emergency, in case of interruption of telegraph communications by earthquake, other natural causes, or industrial unrest.

Despite the criticism of the broadcasting in New Zealand, it is only fair to say that there has been built up a good service under difficulty. In the early days listeners were few and the service in private hands. When the Broadcasting Board took over on behalf of the Government, paying some £58,000 for the private company's stations and offices, a new station had to be erected in three of the four cities, except Wellington.

Since that time three model 10 kw. stations have been erected—models for efficiency, and for the beautiful studios which are show places for the towns concerned. The studio building at Auckland, it is considered, is externally and internally one of the most beautiful in the world. With the careful use of brick design, the architect has overcome the handicap offered by a windowless exterior and produced a building of novel and attractive appearance.

Incorporating All Modern Ideas

Inside, advantage has been taken of modern ideas of lighting, acoustics and decoration. The walls and ceilings are moulded to the shape, and possess the surface necessary for the right amount of echo in the concert and orchestral studios; while the studios for lectures and other talks have, of course, the requisite "deadness" for clear audition.

Decoration of interiors is supplied in the best way possible—that is, by proportion and design in the architecture; finish is given by the smartness and quality of the fixtures—doors, signal lamps, rails, stand-lamps, and flooring. The doors themselves are hand-inlaid marquetry, many New Zealand woods being used, and are reported to have cost £18 apiece.

The control panel is very flexible, and such is the efficiency of design that provision

is made for every possible emergency. There the lines from studios and relays are caught up and switched, duplications of channels affording adequate safety margins. The amplified output is sent over special lines to the broadcasting station proper, situated fifteen miles away. There the incoming signals are again amplified and fed into the main transmitter. The station employs an aerial of the umbrella type, supported from a 500-ft. steel lattice mast resting on glass insulators.

THE MAIN CONCERT STUDIO



The main concert studio at Auckland. The dais for the orchestra and choir is at the front of this picture. The walls are constructed of a specially soft material which, with the columns and roof, controls echo effects.

Programmes From Britain

Some of the most interesting items broadcast from our main stations are the re-broadcasts from the Homeland. On these occasions friends gather round the radio, the centre of attraction, and many are the longing thoughts that fly back through the ether to the Homeland. To the listeners in Britain, whose hard-earned cash pays for these "breaths of home" for the colonial listeners, we out here owe a debt of gratitude. Undoubtedly these broadcasts are having a marked effect in strengthening the bonds of mutual interest that bind together our great Empire. Listeners in New Zealand hope these broadcasts to the Colonies will continue to bring them closer to the Mother Country, that land always referred to as Home!

SEEN ON THE AIR

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

L. Marsland Gander

AT this prophetic season of the year I feel constrained to line up with the other Old Moores and foretell the future of television in the New Year.

First of all I think that, yielding to public demand, the B.B.C. will spend more money on the programmes, increase the staff and hours of transmission, and possibly (though this is the most doubtful point) extend the premises at Alexandra Palace.

Then I think that before the end of the year we shall begin to see glimpses of finality in television, we shall begin to see what the next step must be and what ideal definition should be.

Televising the Coronation

Then, with the new van, outside television broadcasting will begin in earnest. The Coronation will put television prominently before the public. Sporting transmissions of various kinds will be practicable; there is a possibility, though not a robust one, that we shall see the Derby; certainly there should be cricket and tennis transmissions next summer.

Towards the end of the year I expect the Television Advisory Committee will tackle the awkward task of choosing between the two rival systems of Baird and Marconi-

E.M.I. Incidentally, a demand has arisen in certain quarters for an immediate choice to be made. I unhesitatingly describe this as altogether premature.

Official programmes have been running for two months only. The B.B.C. engineers and the research experts of the two companies have been learning almost daily. Considerable changes have been made, others will be made. There is no doubt whatever that the Television Committee intend to allow a much longer trial—probably six months at least—before coming to any drastic decision.

Good Results From Baird Cameras

I need quote only one example of change and progress to give an indication of the position. Throughout the whole week under review Baird electron cameras were being used in preference to the intermediate film system. In the Saturday night transmission from the studio the pictures were particularly good on a G.E.C. receiver. Advantages of these cameras over the intermediate film lie in details of production which have an important psychological effect in the watching eye, and also in the contrast and outlines of the pictures.

Incidentally, during this programme a curious thing happened. My wife, an experienced viewer, said that the picture had ceased to flicker. I said that as only 25 pictures a second were being transmitted, that was impossible. But when I looked at the screen it certainly seemed to be the case. What had happened was that our eyes had become so accustomed to the flicker that they no longer registered it on

(Continued on next page.)

SEEN ON THE AIR

(Continued from previous page.)

the darker pictures, but it was discernible when a caption with a white background came on the screen.

During the week under review programmes from the Alexandra Palace, which, as I have said lately, showed some signs of improvement, have had a relapse. Unhappily for the B.B.C. this coincides with considerable unrest among manufacturers and dealers.

The matter has been privately under discussion by the Radio Manufacturers' Association. Publicly it was stated by Mr. J. H. Thomas, general manager of the Cossor Co., that the programmes were "footling." He said that they were not giving television a chance, and he contrasted the position now with that when "officialdom" was virtually accusing the manufacturers of holding television back. Now the boot was on the other foot (he said). The B.B.C. spent half an hour putting in a pane of glass and televising the process.

Give Television a Fair Deal

I gather that the R.M.A. have been making approaches to the B.B.C. urging them to do something about it. The contention of manufacturers and dealers is that potential customers are being scared off by the programmes.

Already the B.B.C. has made its own side of the case fairly widely known—it may be summarised briefly as "no staff, no room, no money." The public will insist that all these matters be attended to in the New Year. Television must have a fair deal.

To particularise about the week's programmes. The B.B.C. inquiry and the Parliamentary debate had kept me busy until the week-end, and then, in the crude but expressive vernacular, I had a basinful. Mr. David Seth-Smith brought some penguins from the London Zoo. I suppose there were few members of his invisible audience who had not seen penguins before. Entertainment value was therefore small.

Eric Wild and his Tea-timers then gave an entertainment which, at any rate, had the advantage of being lively. A film followed dealing with the habits and customs of the hermit crab and other undersea denizens. Wild heartbeats and sex appeal in this.

Could Have Been an Aural Item

I cordially welcome Yvonne Arnaud and all such front-rank artists to the television screen. But I regretted that she appeared in the less usual role of solo pianist. It was purely an aural item which might have been appreciated equally well without the aid of vision.

On the Saturday, which should have provided the peak programmes of the week, 35 minutes of variety given in the afternoon was repeated in most respects in the evening. This occupied more than half the total time devoted to television on that day. It was an entertainment for a past generation on a machine of the future.

The remainder of the time was mainly filled with two films, one describing the breeding and training of racehorses for the Kentucky Derby, and the other with various winter sports. No comment.

SECRET WIRELESS

(Continued from page 455.)

transmitting station to modulate a constant frequency note of, say, 3,000 cycles. A portion of the resulting current impulses is eliminated by means of a specially designed frequency filter, and the remaining impulses are caused to modulate the ordinary carrier wave of the transmitter.

At the receiving station the above process is reversed. The received waves are caused to modulate a constant frequency note identical with the one at the transmitting end of the system, and finally a portion of the resulting current impulses are filtered out, leaving the impulses corresponding to those of the original transmitted matter. In this manner the speech signals, after having been effectively disguised for the purpose of transmission, are, as it were, automatically de-coded by the receiver and translated back into intelligible signals.

Speech is usually the matter which is transmitted and received by systems of secret wireless, but, despite this fact, all such systems are capable of being operated perfectly well on music signals and other matter.

The majority of the various systems of secret radio have been worked out in America, in which country the scope for such systems is naturally far greater than it is over here. Nevertheless, as mentioned at the beginning of this article, in time of war such secret wireless systems would amount to a necessity, and there is no doubt of the fact that during any such national catastrophe all such systems of secret radio transmission would vie with one another for ingenuity of design and efficiency in action.

THE TELEVISION TWO

(Continued from page 459.)

"V" is engaged with the stop strip, the set is switched off. The next position of the disc gives medium waves, then comes long waves and lastly television.

When the set is switched on to the medium or long waves the reaction condenser knob should be turned anti-clockwise. Reaction is obtained on the television sound wavelength when the knob is turned clockwise. But, in any case, you will find these two points out for yourself directly you begin to operate the set.

Now with regard to the H.T. and grid-bias voltages. The H.T.+ wander plug should be plugged into the full voltage of the H.T. battery, which should be of the 120-volt type, and the G.B.—wander plug should be plugged into the -3 volt tapping on the grid-bias battery.

This receiver is designed for use with a normal aerial, preferably of the outdoor type. It must be borne in mind that the best results can only be obtained with an efficient aerial system. This applies far more to a small set of this nature than to a larger and more sensitive receiver. Erect the best aerial you can and use a good earth—one which goes direct to the main water-supply pipe by the shortest route, or alternatively an earth of the buried variety. Given these desirable factors, you should get excellent reception.

A. J. R.

PETO-SCOTT

S.T.800 BATTERY VERSION KIT "A" Carriage Paid 67'6

Complete Kit of Components exactly as FIRST specified and used by Mr. John Scott-Taggart, with Konectakit (Gratis with Complete Kit) but less wander plugs, accumulator connectors, valves Extractor Kit Cabinet and Speaker.

KIT "B" Carriage Paid £4:14:0

As for Kit "A," but including set of 4 FIRST specified valves only, less cabinet and speaker, etc.

KIT "CT" As for Kit "A," but with valves and Peto-Scott S.T.800 Table Cabinet only, less speaker, etc. Carriage Paid £5/11/6.

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KIT "CLL" As for Kit "A," but with valves and Peto-Scott Consolette Cabinet, Type "LL" only, with speaker baffle, less speaker, etc. Carriage Paid £6/11/6.

★ If Extractor Kit is required with any of the above Kits add £1/4/0 to Cash Price.

★ If the above kits are required complete with 8 wander plugs and 2 accumulator connectors as specified add 1/9 to Cash Price.

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

COMPLETE SET of parts necessary to convert your S.T.700 to the all-wave S.T.800, exactly as recommended by Mr. Scott-Taggart. Comprising: B.T.S. "Quad-wave" tuning unit, aerial balancer condenser, turret switch, B.T.S. H.F. choke, 3 1-watt resistors, 5,000 ohms, and 2 1-megohm, 2 mica fixed condensers, .0001 and .0005-mfd. Carriage Paid 33/6.

STRUCTAKIT I

COMPRISES: Peto-Scott drilled and polished walnut finished panel, 2 polished side pieces, 2 drilled ebonite terminal strips, battery lead clamping strip, all necessary screws for fixing above. CASH ONLY 5/9 POST FREE

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As Structakit I, but including drilled and polished wood parts for Mr. J. Scott-Taggart's Easi-cabinet, LESS the triangular shaped side pieces. CASH ONLY 8/6 POST FREE

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KIT "A" Complete kit of components as FIRST SPECIFIED and used by Mr. J. Scott-Taggart, including Peto-Scott ready-drilled and polished walnut plywood panel, ready-drilled terminal strips, aluminium brackets, mains lead, nuts and bolts, less valves, cabinet, speaker and Extractor Kit. Carriage Paid £9:16:6

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KIT "A" Author's Kit of first specified parts, less valves. Cash or C.O.D. Carriage Paid £8/5/6, or 12 monthly payments of 15/3. With 4 specified valves, £10/14/6, or 12 monthly payments of 19/9.

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KIT "A" Cash or C.O.D. Carriage Paid £2/12/6, or 5/- deposit and 10 monthly payments of 5/3. Author's Kit of first specified parts, less valves. With 2 specified valves. Cash or C.O.D. Carriage Paid £3/6/9, or 12 monthly payments of 6/-.

HEAR the TELEVISION broadcasts on your present set with Mr. J. Scott-Taggart's

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KIT "A" Cash or C.O.D. Carriage Paid 38/6, or 5/- down and 8 monthly payments of 4/6. Complete Kit of parts as specified by Mr. J. Scott-Taggart, less valves. With specified valve, Cash or C.O.D. Carriage Paid, £2/3/3, or 5/- down and 9 monthly payments of 4/9.

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Telephone: Clissold 9875.

West End: 62 (P.W.11), High Holborn, London, W.C.1. EST. 1919.

ALL ABOUT SOLDERING

(Continued from page 450.)

that the collar at the base of the upright tube, which controls the supply of air to the flame, should be set so that plenty of air is admitted. The flame should then be of a pale blue colour, tinged with pink; a luminous yellow flame should be avoided.

The mistake is often made with spirit lamps and gas burners of putting the bit well down in the flame, under the impression that in this way it will be heated more rapidly. The bit should rest in the top part of the flame. Put the thick part of the bit in the flame, leaving the top to project beyond it. In this way you will avoid unnecessary fouling of the tip and the re-tinning which would otherwise be frequently needed.

When Heating in a Coal Fire

If the heating of your iron is to be done in a coal fire, avoid putting the iron direct in the fire, or you will have endless trouble cleaning the ashes off it and probably re-tinning it every time you take it out for use.

A clear fire is desirable, with a good heap of red-hot coals, so that there shall not be too much smoke. Into the heart of the fire put an old tin, with the open end towards you, and place the bit inside this to heat it. No extra cleaning of the iron will then be necessary, but the iron must not be allowed to get anywhere near red-hot; if it gets too hot, the bit will be "burned," and the oxide scale will have to be chipped off before it can be used again. The surface of a bit which has been overheated looks dark in colour, even though no soot is deposited on it. The metal changes colour where the oxidation has taken place, and if the overheating is prolonged a thick crust of oxide will form.

Electrically heated soldering irons possess the great advantage of cleanliness. These irons can be obtained to work off the house electric-lighting system, being plugged into a wall or lamp socket.

Another electrical device for soldering makes use of the heat generated by an arc

of fairly high amperage. The "iron" in this outfit is not heated at all, except incidentally. It consists of a carbon rod with a handle and a flexible wire lead. Suppose that we wish to solder a wire to a tag in a receiver. A lead from one terminal of an accumulator is twisted round the wire, and the wire is placed in position on the tag.

Then the carbon rod is connected by its flex lead to the other terminal of the accumulator, and is touched rapidly on the joint several times, a stick of solder and the necessary flux being applied simultaneously. The heat of the arc raises the temperature of the metal in the immediate neighbourhood of the point of contact of the wire and the tag.

With this device it is advisable to employ an accumulator of not less than 40 ampere hours capacity (actual), as the cells are really momentarily short-circuited and a heavy current is taken. No damage is likely to result, however, so long as the carbon rod is kept "dancing" on the work and is not rested on it for an appreciable period.

We come now to the practical details of soldering, and the first operation is to prepare the iron for work by tinning the faces of the bit.

FOR ALL WAVES



The Belling-Lee "Eliminoise" aerial.

The mains-borne noises still existed, and separate filters were used to stop those, but I said good-bye to the sounds of my neighbours' motor-cars starting up and drowning the American programmes.

Fitting the aerial is not easy if you are incurably lazy. You have to do a little mechanical and electrical fitting.

But once the aerial is fitted the freedom from interference is remarkable. I tried it for a week. I had two aerials put up, side by side. An ordinary aerial and the "Eliminoise." Both were so arranged that they were as far from the source of interference—the road—as possible. Then I switched from the ordinary aerial to the "Eliminoise" to note the difference.

At home the effect was miraculous. Every vestige of the trouble disappeared when the "Eliminoise" was switched in.

Next I took the two aerials—so as to keep the whole system as constant as possible—and the set to a friend. He lives on tram lines. We spent a Saturday afternoon fitting up the two aerials and then in the evening we got down to listening. You

It is advisable to tin all the faces of the bit, since in this way it is comparatively easy to keep the iron in good condition. The corners of a square bit should receive special attention, to prevent oxidation setting in there.

Assuming that the iron has been cleaned, as already described, put it in the flame or fire and leave it for a minute or two. Then take it out and put a little flux, which may be any of those mentioned previously, on one of the faces. This will melt, if it is a solid substance, and run all over the face. Now take a stick of solder and touch one end on the bit. If it shows no signs of melting, put the iron back and wait for a short time for it to get hotter.

At a certain point in the heating you will find that the solder will melt slowly when it is pressed against the bit, and the molten part remaining on the iron will present a sort of sticky appearance. This means that the iron is nearly hot enough. After a little more heating, you will find that as soon as the solder is applied to the bit it will melt quickly on to the surface.

Judging How Hot the Iron Is

A very fair idea of the state of the iron may be gathered from what happens when the flux is put on. If the flux burns away slowly, the iron is not hot enough. When it is ready the flux will "fizz" off in a moment, and the solder can then be run on easily.

You may notice that the solder does not at once flow evenly over the surface of the bit; in fact, it usually will not do so. In this case melt a small blob of solder on to it, put on another trace of flux, and rub the molten solder well into the face of the bit with a piece of stout wire, until the whole of the tapered part of the bit right up to the tip is well tinned.

When you have become accustomed to the behaviour of an iron which is of correct temperature for tinning, avoid putting on the flux before the bit is hot enough for use. This warning also applies to the use of an excessive amount of flux, either on the bit or on a joint. The burning of the superfluous flux will tend to foul the work instead of cleaning it.

have no idea what a noise those trams made, or if you are on tram lines yourself perhaps you do.

Anyhow, the noise was deafening. There was no hope of getting America and very little of getting many of the European stations on the ordinary aerial. We had run it at right angles to the trams and as far away as we could (about thirty feet at the nearest point I should think).

We switched over to the Belling-Lee aerial. There was not dead silence, but the noise was so reduced that we could listen in comfort to stations like Vienna, Madrid (still going then), Fécamp. And on the American short-wave stations we could get quite an enjoyable programme. There was noise there, I must admit, but probably we could have eliminated it altogether if we had spent more time in finding the best location for the "Eliminoise." As it was the aerial was well worth its money for it enabled us to listen and enjoy the programmes, whereas previously there were no programmes at all—only trams.

I won't labour the point. I carried out a number of similar tests. I silenced the mains internally by suppressors each time to make sure that nothing crept in that way. And I took the "Eliminoise" all over the place. I tried trams, motor-cars, electrical machinery in a nearby printing works, and the usual charging apparatus that the local garage is so fond of doing a little broadcasting with. I even took a vacuum cleaner out under the aerial and rigged up a small transmitting aerial from it so that it should radiate well. Without the Belling-Lee system the noise was terrible. With it—well, it did not exist.

One more word, in case you should think I was using an insensitive set. I may say that it was a superhet with an output of 5 watts and it was FULL OUT all the time.

K. D. R.

"PRAY, SILENCE!"

Cut out that "man-made" static and increase your enjoyment of broadcasting

I HAVE recently been carrying out tests with the Belling-Lee "Eliminoise" aerial. My duty is to test all sorts and conditions of wireless gear. I get good, bad and indifferent things to test. Of the bad ones you hear nothing. The good ones I write up with unstinting praise so that you may gain advantage of the tests and be given the chance of trying the things out yourselves.

The "Eliminoise" is one of these good things. I like it and believe it will do a great deal to solve your interference problem IF YOU WILL ONLY GO TO THE TROUBLE OF TRYING IT.

I am not going to say that it will definitely cure everybody's interference troubles, but it will go a long way towards solving the "man-made" static troubles, and it will certainly cure the trouble in many cases.

The theory on which the aerial works has been described to you before, in "P.W." No. 737. Read that carefully and decide for yourself if the noise you are troubled with is likely to be reduced or removed by the aerial. I found that in my own tests more than 90 per cent. of the noise I was suffering from on a short-wave receiver vanished when the "Eliminoise" was fitted.

TECHNICAL JOTTINGS

Items of interest to all

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

Instruments for Measuring Work

If you are doing much experimental work it is very important to have a number of suitable measuring instruments; in fact, it is difficult to see how anybody could carry on much experimental work without. However, instruments are not the cheapest things to buy, and if you can make one instrument serve two or three purposes, so much to the good.

Resistance values can often be measured by means of a milliammeter, if you have one handy, on the simple basis of Ohm's law, that is, applying a known voltage and observing the current which it produces. Suppose, for instance, you want to check up the value of a high resistance reputed to be 100,000 ohms. If you have a battery of 100 volts (which, incidentally, should be checked up with the high resistance voltmeter), then all you have to do is to connect this known voltage in series with the resistance which is to be tested, and in series also with the accurate reading milliam-

meter, when you will at once be able to observe the current and work out the resistance by means of Ohm's law. If the resistance is 100,000 ohms, then 100 volts will produce one-thousandth of an ampere, that is, 1 milliamp. If the 100 volts applied give a reading of 10 milliamps, the resistance is 10,000 ohms. You will notice that the "resistance" which is measured by this arrangement is the total resistance in the circuit, including the internal resistance of the high-tension battery and the internal resistance of the milliammeter.

The Question of Internal Resistance

I am assuming that the internal resistance of the battery is very small, which it will be if the battery is in good condition, whilst the internal resistance of the milliammeter will certainly be small compared to 100,000 ohms, or even 10,000 ohms, so for all practical purposes this gives you a reasonably accurate estimate of the value of the resistance you are measuring; at any rate it will be quite as accurate as your reading of the milliammeter.

Just one point of caution: In applying 100 volts to a resistance of this kind, don't keep the voltage on any longer than necessary, because it may be that the resistance is not intended to have such a high voltage applied to it and it will not be able to carry the resulting current. Two or three seconds ought to be quite sufficient for you to get the reading, and the voltage should not be kept on any longer. If you cannot read it the first time, have two or three shots, with a few seconds interval.

Checking Voltages

In the above we have assumed that the voltage is known and the resistance is unknown, but if you have a known resistance you can then determine an unknown voltage by precisely the same method. All you have to do is to connect the three in series and read the current, and Ohm's law will then give you the voltage which was applied. For instance, if the resistance is known to be 100 ohms, and when the battery is connected a current of 10 milliamps results, then obviously the voltage must have been 100 volts.

Where Do You Use Your Set?

The old dodge of running an earth wire to some cold-water pipe is often very inconvenient, because the nearest available waterpipe may be a long distance from the room where the set is operated.

Consequently, in a great percentage of cases a buried earth just below a convenient window is the most suitable. There are various kinds of metal earth rods now available on the market, some of them having a number of prongs or tentacles which branch out in different directions independently of one another, and so embrace a large

(Continued overleaf.)

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MODERN BOY

Every Saturday at all Newsagents **2d**

3 L R CALLING

Below we give the English Zone programmes for the remainder of the week from the Australian station 3 L R at Lyndhurst. All times are G.M.T. and the wavelength is 31.34 metres (9.58 megacycles).

DECEMBER 30th

- P.M.
1.45: Melbourne Central Post Office Chimes. Novelty Violin Recital (E. Giannacini).
2.0: Melbourne Central Post Office Chimes. Recital by John Robertson, Trumpet, and W. E. Clarkson, Baritone.
2.30: Ballad Recital by J. Howard King, Baritone.
2.45: National Anthem.
Close Down.

DECEMBER 31st

- P.M.
1.45: Melbourne Central Post Office Chimes. Ceremony of the Blessing of the Fishing Fleet at Queenscliff Victoria, by his Lordship the Bishop of Riverina.
2.45: Close Down.

JANUARY 1st

- P.M.
1.45: Melbourne Central Post Office Chimes. Special New Year Message.
2.0: Melbourne Central Post Office Chimes. Last half-hour of the first day's play in the Third Test, England v. Australia. Short Resume of the Day's Play.
2.45: National Anthem.
Close Down.

JANUARY 2nd

- P.M.
1.45: Melbourne Central Post Office Chimes. Last half-hour's play of the second day of the Third Test, England v. Australia. Short resume of the day's play.
2.25: Camp Fire Concert of the Boy Scout International Jamboree in Adelaide.
2.45: National Anthem.
Close Down.

Varley

NICORE COIL UNITS

Four NEW CIRCUITS. We have recently published four new circuits, which are giving excellent results with our new ganged units. No. 1 (BP 111) Mains Superhet for 110 kc. No. 2 (BP 112) Battery Superhet for 465 kc. No. 3 (BP 113) Three-valve mains receiver with band-pass tuners. No. 4 (BP 114) Screened Grid Battery Three with Pentode.

Blueprints now ready (BP 111, BP 112, BP 113), 6d. each. BP 114, 3d. post free.

OLIVER PELL CONTROL, LTD., BLOOMFIELD ROAD, WOOLWICH, S.E.18 **WOOLWICH 2345**

TECHNICAL JOTTINGS

(Continued from previous page.)

volume of the soil and help to maintain a good earth contact even in dry weather. If you are using any earth other than a good connection to a main waterpipe, it is well worth while to examine the earth and make sure that it is really effective. It is surprising how careless people are about this most important point and how many sets can be so greatly improved by attention to it.

Impedance and Resistance

Terms which are often used rather loosely, especially by newcomers, are the terms "resistance" and "impedance." You often find people speaking, for example, of *resistance* when, in fact, they ought to use the word *impedance*, and it may perhaps be useful to point out the correct use of these terms. Resistance anyone knows, and this is restricted to cases where the current is direct or continuous current; for example, the current from a battery or from D.C. mains. When it comes to alternating current, however, the resistance is of a different kind. For example, if alternating current passes through an inductive coil, it will, other things being equal, experience a greater difficulty in getting through than *direct* current, owing to the fact that the alternating current is continually changing its direction, and therefore meets with more inductive opposition. Again, in the case of a *condenser*, alternating current is able to pass through (to an extent which depends upon the frequency of the alternations) whilst direct current is not able to pass through at all.

You will see from all this that alternating current resistance is a matter which depends very much on the particular circumstances and needs to be differentiated from direct-current resistance.

A.C. Zero Frequency

Inasmuch as the impedance of a coil to alternating current is greater than the resistance to direct current (which we may regard as *alternating* current of zero frequency), it is obvious that the impedance will increase as the frequency increases.

With a condenser, regarding direct current as alternating current of zero frequency, again we see that the conductivity of the condenser—that is, the extent to which alternating current can pass through it—increases as the frequency of the alternating current increases.

Therefore the resistance or impedance in the case of a coil and that of a condenser vary in the opposite directions: as the frequency of the alternating current is increased the resistance of the coil *increases* and the resistance of the condenser *decreases*. It is obvious from the above that if a condenser is shunted across a coil, the impedance of the coil is thereby reduced, whilst if a condenser is connected in series with a coil the impedance is increased.

OUR FRENCH SERIES

Part 43 of "Learning French Through Your Radio" has been unavoidably held over from this week's issue. This series, however, will be continued as usual in next week's "P.W."

MISCELLANEOUS ADVERTISEMENTS

3d. per Word

6d. per word for first words in heavy type
6/- per line for displayed lines (12 pt. type)

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Advertisements for these columns are accepted up to first post WEDNESDAY MORNING for the following week's issue.

The Proprietors have the right to refuse or withdraw advertisements at their discretion.

Postal orders in payment for advertisements should be made payable to the Amalgamated Press, Ltd., and crossed.

All communications should be addressed to Advertisement Department, "Popular Wireless," John Carpenter House, John Carpenter Street, London, E.C.4.

RECEIVERS, COMPONENTS AND ACCESSORIES

Surplus, Clearance, Second-Hand, &c.

SOUTHERN RADIO'S Wireless Bargains; all goods guaranteed and sent post paid.

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COILS.—Telsen, iron core, W349, Midget size, 4/-; Type W478 (twin), 9/- pair; W477 (triple), 16/- set; Type W476 (triple superhet selector and oscillator) 16/- set, all ganged coils complete on base with switch; Telsen I.F. transformer coils, W482, 5/-; Telsen dual range aerial coils, with aerial series condenser incorporated, W76, 4/-; Telsen aerial series condensers with shorting switch, 2/-; Telsen L.F. transformers, Type R.G.4 (4 to 1), 3/-; all brand new, in sealed cartons.

MICROPHONES.—Ace (P.O.) microphones, complete with transformer, ready for use with any receiver, 4/6 each; Ace concert microphone, complete on chromium stand with volume control, ready for use with any receiver and amplifier, 11/-.

RESISTANCES.—Tru-ohm 1-watt, colour coded and marked, 36 assorted capacities on card; 6/- per card.

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

HEADPHONES.—Lightweight headphones, double pole type, 4,000 ohms, each ear piece; 3/- pair.

REPAIRS.—Any type of receivers, American, British, etc., repaired by expert staff.

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10/- Parcel, containing components to value of at least 45/-, comprising variable condensers, screened chokes, switches, resistances, screened coils, wire, circuits, etc., etc.; 10/- per parcel.

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(Continued)

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Made by John Waddington Ltd., makers of LEXICON.

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THE FULL-OF-THRILLS CARD GAME

"P.W." LIST OF EUROPEAN BROADCASTERS

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

WAVE-LENGTH.	STATION. MEDIUM WAVEBAND.	COUNTRY.	POWER KW.	WAVE-LENGTH.	STATION. MEDIUM WAVEBAND.	COUNTRY.	POWER KW.
203.5	Plymouth	Gt. Britain ..	0.3	349.2	Strasbourg	France	100
203.5	Bournemouth	"	1	356.7	Berlin	Germany	100
206	Eiffel Tower (Paris)	France	5	360.6	Moscow (No. 4)	U.S.S.R.	100
215.4	Radio-Lyons	"	25	364.5	Bucharest	Rumania	12
233.5	Aberdeen	Gt. Britain ..	1	368.6	Milan (No. 1)	Italy	50
236.8	Nürnberg	Germany	2	373.1	West Regional	Gt. Britain ..	70
238.5	Riga	Latvia	10	377.4	Lwów	Poland	50
240.2	Saarbrücken	Germany	17	382.2	Leipzig	Germany	120
241.9	Cork	Irish Free State	1	386.6	Toulouse (P T T)	France	120
243.7	Gleiwitz	Germany	5	391.1	Scottish Regional	Gt. Britain ..	70
245.5	Radio Marconi (Bologna)	Italy	50	395.8	Katowice	Poland	12
247.3	Lille (Radio P T T Nord)	France	60	400.5	Marseilles (P T T)	France	90
249.2	Prague (No. 2)	Czechoslovakia	5	405.4	Munich	Germany	100
251	Frankfurt	Germany	25	410.4	Tallinn	Estonia	20
253.2	Nice-Corse	France	60	415.4	Kiev	U.S.S.R.	35
255.1	Copenhagen	Denmark	10	420.8	Rome (No. 1)	Italy	50
257.1	Monte Ceneri	Switzerland ..	15	426.1	Stockholm	Sweden	55
259.1	Kosice	Czechoslovakia	10	431.7	Paris (P T T)	France	120
261.1	West National	Gt. Britain ..	20	443.1	Sottens	Switzerland ..	100
261.1	North National	"	20	449.1	North Regional	Gt. Britain ..	70
261.1	London National	"	20	455.9	Cologne	Germany	100
263.2	Trieste	Italy	10	463	Lyons (P T T)	France	100
265.3	Hörby	Sweden	10	463	Prague (No. 1)	Czechoslovakia	120
267.4	Newcastle	Gt. Britain ..	1	470.2	Lisbon	Portugal	15
269.5	Radio Normandie (Fécamp)	France	10	476.9	Trondelag	Norway	20
269.5	Moravska-Ostrava	Czechoslovakia	11.2	476.9	Brussels (No. 1)	Belgium	15
271.7	Kuldiga	Latvia	50	491.8	Florence	Italy	20
274	Vinnitsa	U.S.S.R.	10	499.2	Sundsvall	Sweden	10
278.6	Bordeaux-Lafayette	France	12	499.2	Rabat	Morocco	25
283.3	Bari (No. 1)	Italy	20	506.8	Vienna	Austria	100
285.7	Scottish National	Gt. Britain ..	50	522.6	Stuttgart	Germany	100
288.5	Rennes-Bretagne	France	120	531	Athlone	Irish Free State	60
291	Königsberg (No. 1)	Germany	100	539.6	Beromunster	Switzerland ..	100
296.2	Midland Regional	Gt. Britain ..	70	549.5	Budapest (No. 1)	Hungary	120
298.8	Bratislava	Czechoslovakia	13.5	559.7	Wilno	Poland	16
301.5	Hilversum (No. 2)	Holland	60	559.7	Bolzano	Italy	10
304.3	Torun	Poland	24	569.3	Viipuri	Finland	10
304.3	Genoa	Italy	10				
307.1	Northern Ireland Regional	Northern Ireland	100				
312.8	Poste Parisien	France	60	1107	Moscow (No. 2)	U.S.S.R.	100
315.8	Breslau	Germany	100	1153.8	Oslo	Norway	60
318.8	Goteborg	Sweden	10	1250	Kalundborg	Denmark	60
321.9	Brussels (No. 2)	Belgium	15	1293	Luxembourg	Luxembourg ..	150
325.4	Brno	Czechoslovakia	32	1339	Warsaw (No. 1)	Poland	120
328.6	Toulouse	France	60	1379	Novosibirsk	U.S.S.R.	100
331.9	Hamburg	Germany	100	1389	Motala	Sweden	150
335.2	Helsinki	Finland	10	1500	Droitwich	Gt. Britain ..	150
338.6	Linz	Austria	15	1571	Deutschlandsender	Germany	60
342.1	London Regional	Gt. Britain ..	70	1648	Radio-Paris	France	80
345.6	Poznan	Poland	16	1744	Moscow (No. 1)	U.S.S.R.	500
				1807	Lahti	Finland	150
				1875	Radio-Rumania	Rumania	150
				1875	Hilversum (No. 1)	Holland	100

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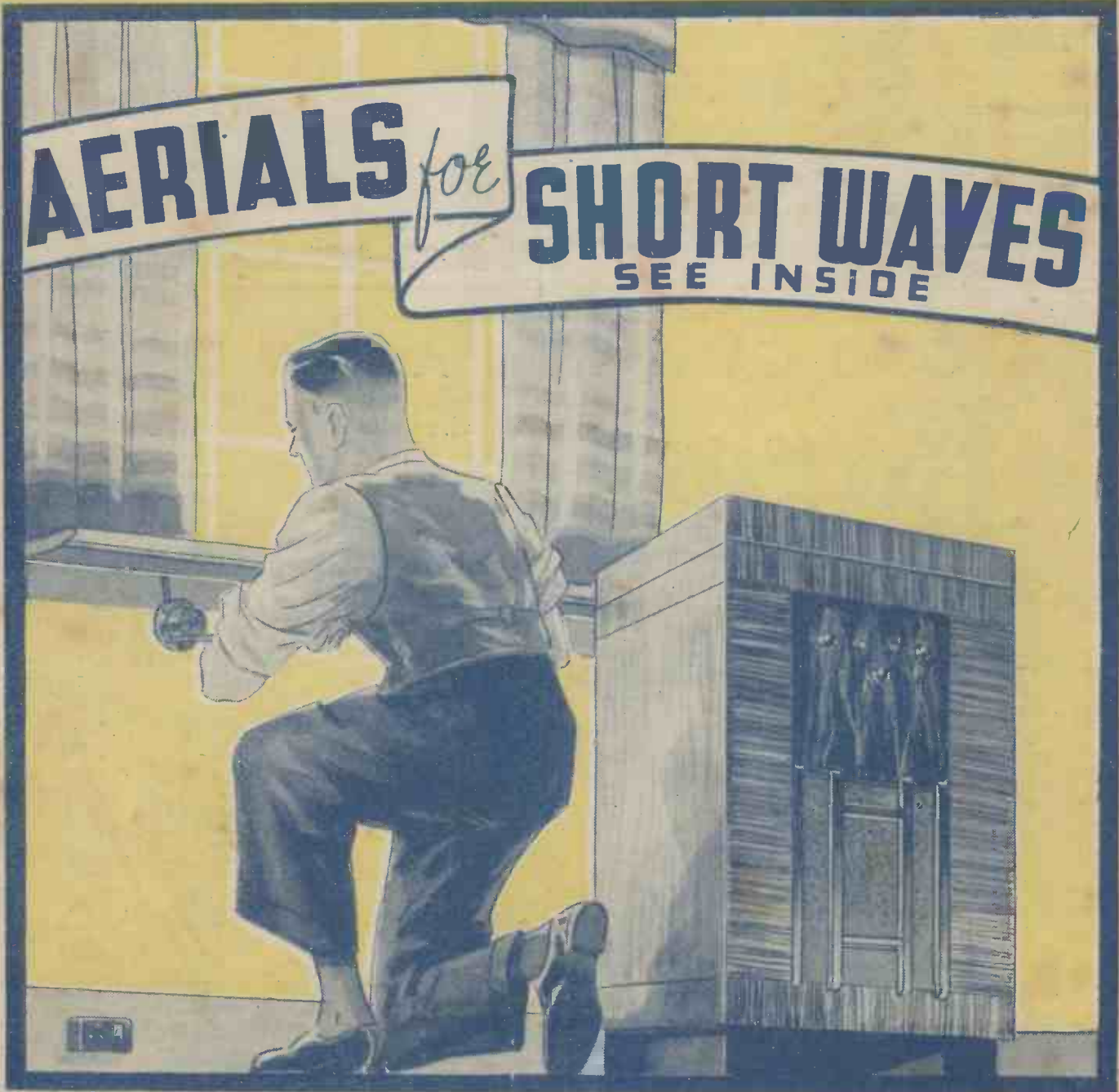
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★ ULTRA-SHORT, SHORT, MEDIUM ★
★ AND LONG WAVES WITH ★
★ SIMPLE SWITCHING ★

EVERY
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PRICE

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No. 762.
Vol. XXX.
Jan. 9th, 1937



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Editor: G. V. Dowding

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

OLD TIMER
RADIO LINK
GOING ABROAD

RADIO NOTES & NEWS

TIME, PLEASE
JUVENILE LEAD
MUSICAL METEOR

We Take the Count

AS I forecast some time ago, the honour of being Europe's Radio Country No. 1 has been wrested from Great Britain by Germany. And we must admit they put up a magnificent struggle for it.

If we examine the stricken field we shall find that on December 1st, Germany roped in 7,937,907 licences; while the British figures for November 30th, with only a midnight chime separating them from their competitor, totalled 7,897,518.

This is the first time since broadcasting began that we could not slap ourselves on the chest and congratulate ourselves on being uppermost bow-wow in Europe. Will Germany forge ahead from us, or shall we now do the ding-dong struggle stunt?

Old Timer

ONE of the curious benefits that only radio can bestow was that afforded by the recent broadcast from Kalundborg of the oldest organ in the world.

Believe it or not, that instrument was built in 1610. It was presented to the King of Denmark by the Duke of Brunswick, and has been housed in Fredriksborg Castle ever since, except for one occasion about eighty years ago when it was lent out to Copenhagen.

While it was on loan there, the castle where it normally lived was badly burnt. The organ has more than 1,000 square wooden pipes, many encased in ivory, and its keys are covered with plates of silver. For hundreds of years organists have been going from all over the world to hear the instrument, but now radio can give it the wider audience it deserves.

Linked by Radio

THE biggest telescope in the world, at Mount Wilson Observatory, California, is to be connected by a radio link with the new monster eye being built at Pasadena, California. The Mount Wilson is a 100-inch instrument, but the Pasadena monster will be a 200-incher. The scientists in charge of it have selected short-wave radio as the best means to link them with their colleagues, when discussing any ophthalmic troubles that may arise in the construction of the world's most gigantic eye.

Java Jumps in With Both Feet

PROUD possessors of the S.T.800 may like to know that at the time of writing Java is jumping on British aerials with all the sonority of a ton of

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coals rattling down an iron chute. For a couple of hours from 1 p.m. onwards it is

FOR BATTERY USERS



One of the latest models in the H.M.V. range—an all-wave battery superhet covering from 18 to 50 metres on the short waveband. The price is 13 guineas.

worth tuning to a fraction over 29 metres to see if the "Flying Dutchman" is paying a visit to your locality. If he is, mind your ear drum!

He calls himself Bandoeng, and his exact wavelength is 29.24 metres. Geographically he is in the Dutch East Indies, but the "800" often appears to find him at the bottom of the garden, or thereabouts!

"Resolute Yo'self, Bo"; Resolute Yo'self"

IF you made any Good Resolutions for 1937 (and I doubt it), if any of them are serious (and I doubt it), you will, no doubt, welcome another. Yet I put it forward, because I should hate to think of there being a lot of flowers at your house, and you not being able to smell 'em.

The resolution in question is to forswear all monkeying about with aerials when there is a high-voltage-carrying wire in the vicinity.

Not long ago an aerial fell on to a 33,000-volt grid transformer in Gt. College Street, Camden Town, and it caused a black-out in that district, Regent's Park, and King's Cross. Had you been holding on to the end of that aerial, my friend, your hold on life would have been short and precarious. You have been warned.

Davertry's Dive

AMONG the experiments now going at Daventry is one that has given the B.B.C. the distinction of operating the lowest pukka broadcasting wavelength in the world.

It seems that the Empire transmissions to South Africa on 13.97 metres have been falling by the wayside, or dithering about in the ionosphere, or just truckin' or something; anyhow there have been some spirited letters from South Africa, and some hearty scratching of heads in the Engineering Department of the B.B.C.

As a result, the midday transmission to South Africa is to be radiated on 11.49 metres. And if that gets over all right, the Afrikanders will point out that this is a practicable wavelength for television experiments. A few weeks ago I said we were going to see some fun in 1937—maybe this is the first chunk.

Going Aboard

BY rights you and I should be performing that complicated gymnastic manoeuvre known as giving ourselves a pat on the back, in recognition of the changes on the B.B.C.'s Board of Governors. I, for one, was mightily pleased by the definite announcement that our new governors were to be Sir Ian Fraser and Dr. J. J. Mallon.

(Continued overleaf.)

Next Week: FIRST DETAILS OF THE "SUPER-VOL" AMPLIFIER

FROM CAFÉ PIANIST TO COVENT GARDEN CONDUCTOR

Sir Ian, who lives next door to St. Dunstan's in Regent's Park, will probably be the first B.B.C. Governor who is an expert home constructor. Despite his blindness and his duties as M.P. he has always been an active radio fan, and no more popular appointment could have been made—though the House of Commons will miss him, for he has decided to resign his seat for North St. Pancras.

Dr. Mallon has seen life through the eyes of a warden of Toynbee Hall, and that's a good enough recommendation for most of us.

No Time for Explanations

LET fall a sympathetic tear for Hiram P. Dupont, radio dealer of Union City. After Hiram had told his story to the Associated Radio Dealers' Convention there was only one dry eye in the room, and that was a removable orb belonging to Glass-Eye Pete.



The dealers had been praising the help given to their servicemen by the broadcasting authorities, in putting

out a programme of man-made interference. This programme included carpet-sweeper rattle, refrigerator roar, faulty-switch fizzle, generator grunts, electric-iron salvos, and every known variety of hum.

After many dealers had testified to the educational value of such demonstrations by radio, Hiram spoke. He said he had heard this programme; he remembered it well. He had that day asked a wealthy client to come up to his shop and see the perfect radio set. The customer said: "Let's hear it," so Hiram switched on and got the interference programme with all the gusto of a good eighteen-valve set behind it.

When Hiram had recovered and switched off, the customer was two streets away, and gathering speed!

Juvenile Lead

LISTENERS with an S.T.800 or other set that opens the door wide to all-wave entertainment may have marvelled at the accomplished acting of the little broadcasters in "The Lady Next Door" series from America. Those children, despite their tender years, have poise and microphone presence.



Miss Tucker, who introduces them, says they rarely miss a cue, and she cites the case of one Ronald Liss, aged five. This young fellow, peeved at the word-fumbling of a character old enough to be his grandfather, once walked over to the control window, beckoned the production-man aside, and whispered: "Say, if old Bill's going to falter and stumble like that, don't you think I'd better improvise a few nifty gags?"

"Time, Gentlemen, Please"

DID you happen to hear the talk on Christmas Eve by the "Star-Gazer" on the subject of Harrison's chronometers? If so, you heard the one man of the two on earth whom I envy. For the "Star-Gazer"—who in private life is Lieut.-Commander R. T. Gould—told me how he got one of the biggest thrills of the century when he succeeded in reconditioning that wonderful first marine chronometer, and getting it to go perfectly again after its 186 years of neglect.

The whole story is a thrill, for scientists and navigators had for centuries despaired of getting a reliable sea-going timekeeper until John Harrison, a Yorkshire carpenter, showed them how. Every ship that now puts to sea takes with her some direct descendants of Harrison's genius. Thanks to Lieut.-Commander Gould the original timekeepers may now be seen in the Science Museum, South Kensington, and if they differ from your watch, it will be your watch that is wrong!

BROADCAST TOPICALITIES

"THE MAN OF DESTINY"

Regional, January 11th;
National, January 12th

Bernard Shaw wrote this play in 1895, and it was first performed two years later at Croydon by Murray Carson. It has been broadcast on two previous occasions. A light-hearted footnote to history, it provides an entertaining glimpse of that extraordinary person who was later to become Emperor of France. Listeners in general, apart from the large number who are undoubtedly convinced Shavian admirers already, will be well advised not to miss what happens to be, apart from its other excellencies, a play that might well have been written specially for the microphone. A distinguished cast is in process of collection for the production, which will be in the hands of Barbara Burnham.

PANTOMIME EXCERPTS

Midland, January 13th

An hour will be allotted on January 13th to a double bill reflecting two Midland pantomimes, one at Nottingham and one at Oxford. The former is "The Sleeping Beauty," presented by Tom Arnold (for Julian Wylie Productions Ltd.) at the Theatre Royal, Nottingham. The cast includes Helene Cooney as the Prince, Eleanor Fayre as Beauty, Ernest Lester and Hugh Rene as King and Queen respectively, and Frank Attree as the Witch.

The Oxford pantomime is "Cinderella," presented at the New Theatre, by arrangement with Bertram Montague, and produced by Lewis Marks. Heather Gayle takes the name part, Cecile Benson is the Prince Charming, Dan Leno the dame, and Joan Brett, Dandini.

Musical Meteor

NAPOLEON, Emperor of France and patron saint of all who play ha'penny nap, once declared that every soldier has in his knapsack the baton of the field-marshal. The baton of Covent Garden Opera House is, however, mighty hard to come by. This enhances the pleasure I feel in congratulating 32-years-old Stanford Robinson, in having received an invitation to conduct six performances at Covent Garden this year.

A few years ago he left a job of piano-playing in a café to take up a post with the B.B.C. We heard him as chorus-master, and we heard him conducting symphonies and the lighter orchestral stuff. Then the B.B.C. showed imagination and made him their opera director, which caused a flittery

flutter in choirs and places where they sing. Now the seal of Covent Garden has been set on his reputation. Well done, Stanford.

Should Commentators Look Over Fences?

THE Victoria Racing Club recently sought an injunction to restrain the Commonwealth Broadcasting Corporation from broadcasting commentaries from a point outside the Club's racecourse.

The wily announcers, officially cold-shouldered, had erected a high platform outside the grounds. Climbing to the top of this with a microphone they had been so captivated by the view that they described it with loving care, galloping horses and all.

The Club alleged that such over-the-garden-wall tactics caused people to stay at home and listen to the racing instead of clicking the turnstiles to see it.

The judge, however, dismissed the application with costs. Apparently race-horses are in the same legal position as blind mice—you can see how they run!



Good Samaritan Switching

Because many elderly and poor people have been unable to pay for radio licences there is a scheme afoot whereby Good Samaritans may switch on in homes that otherwise would lack wireless. Funds are to be collected, and it is hoped to start in one or two counties and then extend the scheme to all. Needy cases would be reported by doctors and district visitors; but until the scheme is further advanced, donations are not being asked for—though it is hoped they may be put aside in readiness!

Full particulars of the plan are available from Miss Gladys Lindsay, Burnt Oak, Kidlington, near Oxford.

Petticoat Crackle Again

SCEPTICS who did not believe my story about silk petticoats becoming electrified and so causing crackles on the radio will be peeved at an incident which occurred in an N.B.C. studio.

After much conjecture over what was causing the crackling sounds coming through the 'mike,' the engineer in charge had the bright idea that it might be one of the new taffeta petticoats that the girls are wearing this year.

There was a conclave about this behind the scenes, and then the producer—blushing, though married—queried the girls, one of whom 'fessed up, and admitted that she was wearing this type of underskirt.

According to the official N.B.C. News Service, "The petticoat was removed, rolled up, and (honestly) tucked into her pocket-book until the show was over."

ARIEL



THIS COMPONENT BUSINESS

ONCE again the matter of components blazes into importance. The reason is that there has been some delay in delivery of certain components for the S.T.800 and a considerable number of readers and members of the radio trade have written to me to express their disgust. Some blame me, others hope that I will arrange for preferential treatment for them, and a third class thinks the trouble could be avoided in several ways, while a fourth writes heatedly, but the warmth is happily not focused on myself.

"Many Views Open to Criticism"

With all these people I sympathise most earnestly, but there are in these letters so many views open to criticism that it is only fair to all concerned that I should be given an opportunity of explaining matters.

Believe me, I have no sympathy with the trade at all where there is clear unpreparedness. But, on the other hand, it is a very severe strain on any manufacturing organisation to call for ten thousand of any particular article for immediate delivery. The need for some waiting seems to apply to a large number of products. I have tried recently to buy an electric fire, but was told that I should have to wait three weeks for it, although it was a perfectly standard job which one would think the manufacturers could have made during the summer. Another kind of electric heater has been promised me in a fortnight but if I get it within three or four weeks I shall be lucky.

The position as regards components for a big set such as the S.T.800 is unique. The demand for such a set goes on for a whole year, but there is always a huge rush of orders—certainly 5,000—within the first week. This means that the factories have to take on extra staff, train them and get into production in an almost impossibly short time. The sudden expansion of the industry on the arrival of the annual S.T. set has never yet been carried out successfully. On some components there seems to be never any trouble, but these are usually mass-produced articles which can be made in very large quantities in a short space of time. Amongst these number resistors and small fixed condensers. The fact that a component is a standard type is, however, no guarantee that very rapid delivery is possible. It may be that there has been little sale for a particular standard product but when the S.T.800 is published a huge demand is experienced.

The obvious question to ask is, "Why doesn't the radio industry foresee the demand and prepare for it?" One might think that, as every one of my big sets from



By

JOHN SCOTT-TAGGART

S.T.300 to S.T.800 has been a great success, the manufacturers might take a risk. The fact of the matter is that they are not prepared to take that risk. They want to wait and see, and it is hardly your province or mine to complain of this cautious attitude. Most of the component manufacturers are quite small people and to risk perhaps £2,000 is a serious matter. As regards the complete kit firms, their risk is even greater. To provide for an immediate supply of ten thousand kits would involve a risk of about £18,000. Is it really reasonable to expect them to take it before the day of publication? It is not reasonable, as you must admit.

Telling the Trade

Telling the trade long beforehand about my set is suggested as a cure. Well, the S.T.800 was handed to POPULAR WIRELESS on October 2nd, about six weeks before the day of publication. It is almost impossible to deliver a set earlier than this for a variety of reasons. One is that if one makes the date earlier, one cannot take advantage of any new components produced for exhibition time, and the same applies to new types of valves. Although laboratory tests can be carried out during the summer, a real final testing under service conditions cannot well be carried out before September, because of summer storms and light evenings. There also used to be arguments against too early a disclosure of circuits and confidential information which might be useful to

rivals, although I should like to give tribute to the good spirit which nowadays prevails amongst radio journalists.

But even if sets were designed and privately made available to the trade, I do not think this would help the position, because manufacturers will not lay-in large stocks. They have been "bitten" so often in the past on other sets that they always tend to wait and see which way the cat jumps. The fact that my own particular cat has jumped the same way consistently for six years is not sufficient to alter an ingrained cautiousness.

Readers' Opinions Invited

One manufacturer to whom I complained retorted, "Would a constructor be willing to order one of your sets before ever he had seen it? If so, surely that is the solution. Let them order the parts in advance and we shall make them." And I held my peace—for about half a minute. He was quite right in a way. No doubt several hundred readers would, on receiving an outline of what my set would be like, place an order in advance. But the number that would do

this would be too small to be of any value. It might, however, be a good idea and I should like to have readers' opinions of this because I think it would be possible to announce details of components, the price of the set, and a few details a month before the article was actually published. This would certainly place on the shoulders of the public exactly the same kind of responsibility which they so heatedly put on the backs of the radio manufacturers.

This rather sounds as though I were taking the side of the manufacturers, but, believe me, no reader is ever half as annoyed as I am when I hear of delays. But I think we must accept as normal a certain delay between placing an order and receiving the goods. That this delay has in some years been greatly exceeded is well known to all of us, but it is also known that most of the manufacturers sooner or later hold up a set. A firm that is good one year may be slow the next and this necessarily upsets not only the constructor but the rest of the trade.

Other readers think that the remedy lies in providing alternative components or giving the same component, such as a coil unit, to several manufacturers to make. Now, if this could be done the whole problem would be solved at once. In the old days this was done on a much greater scale than at present, and it was possible because sets were very much simpler and there was far less to go wrong. But, even so, I carried out some actual practical tests

(Continued overleaf.)

THE QUESTION OF ALTERNATIVE MAKES

and proved that a set made up in accordance with one set of alternatives was four times as good as another set using a different set of alternative components and valves. That sort of thing does not appeal to me at all. I would rather a man had to wait six months, and finally get a set like my own, than that he should "make do" with apparatus which would give him inferior results earlier.

What a Dealer Says

On the question of alternative components the following extract from a letter from Mr. R. H. Cosky, of Wireless Supplies Unlimited, of Stratford, London, is a fair example of a common opinion held in the trade.

"I should like to kick also about the manner in which the items are specified. Coil unit, B.T.S. no other possible; but surely some of the old-timers at the coil-winding game, say Colvern, Wearite, Varley, etc., might have been furnished with a specification of this unit and so ensured bulk deliveries? H.F. Choke, B.T.S. no other possible; no other possible? Not even, say, Eddystone, Wearite, Varley, R.I., or other first-grade types? L.F. Transformer, Varley Niclet; not even a higher-priced Varley, a Ferranti, an R.I.? Really, Mr. Scott-Taggart, this is too bad. To the hardened constructor, of course, it is not serious, because he knows; but the man who is constructing his first set and wants to stick rigidly to the specified

parts is hung up; and some of them (not many to be truthful) are even terrified of using one-watt resistors instead of half-watt, although they need cost no more. Please believe that I write you on this subject with deep feeling, not because I have a stock of alternatives to unload, or because I have any difficulty in getting deliveries of any components which are in production; but because the manner in which specifications are being given these days makes it exceedingly difficult for the retailer to keep his customer supplied. Surely it would be reasonable to work a list in such a manner as to allow a little latitude like this; one .004 mica condenser, working voltage not less than 250 (T.C.C. Dubilier, Graham-Farish, Lissen).

"So long as the constants were adhered to and the physical dimensions reasonably the same, the performance should not suffer.

"Some day you should try opening a retail components store and see some of the difficulties for yourself; you would then hear what the boys have to say about this position—not in criticism of your excellent designs, of course, but about specifications, and so on, in general. In the hope that I have presented to you from a fresh angle a matter which might have escaped your attention, I await your comments with interest."

Well, here they are: Believe me, there is no angle on this matter which in twenty-

three years I do not know like the proverbial back of my hand. Let me deal with the various points as he mentions them: I can well understand his annoyance about deliveries especially having regard to the title of his firm, but an extremely complicated coil such as that used on the S.T.800 certainly cannot be manufactured by half a dozen makers. In the old days you simply specified the kind of wire to use and the number of turns, and almost anyone could make up the coil. But when you have four wavebands and complicated switching, efficient screening, and so forth, it is completely out of the question. Each coil manufacturer has his own method of switching, and if you chose one of these methods it is highly likely that no other manufacturer would be able, for patent or other reasons, to use this particular method. It is certainly quite impossible to give a general idea as to what kind of coil I want and then leave it to individual manufacturers to make up their own versions. Calibrations would be different on each coil, reaction would be good on one and hopeless on another, switching would be good on one and bad on another, stray capacities and degrees of stability would vary, and all kinds of discrepancies would arise between sets. If the price of a coil unit is to be at all reasonable, one has to consult with one particular manufacturer at a time and see how he could carry out your general ideas to get the best technical results at the lowest price. Manufacturers obviously cannot make every detail of a coil unit afresh. They want to be able to use some of the parts which they already can manufacture or obtain. As it is, on a coil such as the S.T.800, the manufacturers have had to go to a very considerable expense in obtaining the tools for making this unit. There is then the expense of special test apparatus, and in fact a whole host of preparations; actually, in the case of the S.T.800 coil, various models were made for me for a period of six months and a great deal of time spent both by myself and by them in perfecting what is really quite a new type of coil unit.

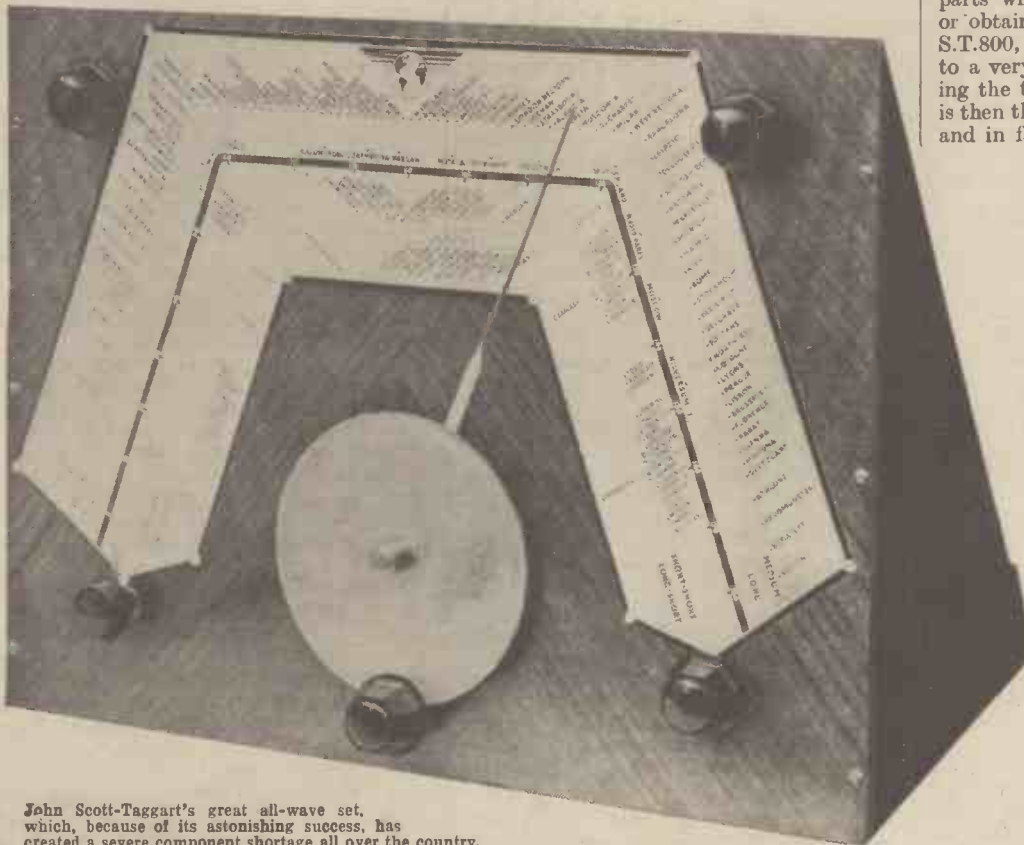
"Not Worth While"

It is not surprising that coil manufacturers say that it is not worth their while manufacturing a special coil if other manufacturers are also doing the same thing. Occasionally it has been possible for manufacturers of coils to supply very much the same article, but as a coil gets more complicated—as it must do if four wavebands are incorporated—the difficulties of duplication are such that manufacturers would not undertake them. In any case, even if a duplicate worked well it would probably not fit the station name dial.

Quality does not enter into this matter at all. It is suitability

(Continued on next page.)

S.T.800: THE RECORD-BREAKER



John Scott-Taggart's great all-wave set, which, because of its astonishing success, has created a severe component shortage all over the country.

WHY THE CHOICE OF VALVEHOLDERS IS IMPORTANT

that counts. A string of H.F. chokes is mentioned by my correspondent; each is good in its way but will it give just the result I want with the valves I used and the other components I have incorporated in the set? The B.T.S. choke gives excellent reaction from 13½ metres to 2,000 metres in conjunction with the rest of the components I have used.

I am always on rather delicate ground when I talk about why I have chosen a particular component. Sometimes there are very excellent reasons why some components are not used, but it would be unfair to state that the reason was that the results obtained were not as good because the particular choke rejected might work better in a different set or using different valves. Then the component rejected may be far too expensive for the purpose, or unnecessarily and undesirably bulky. There is a widespread fallacious idea that you can always substitute one component for another, provided the maker is of high repute. This is absolute rubbish.

Endless Combinations

My correspondent does not mention valveholders, but you would think at first blush that here the choice is quite unimportant and that almost any good valveholder would do. Well, in the case of most valveholders, my objection is that the fit is bad and that a poor contact will cause endless worry to a man who is not experienced in finding faults. A valveholder which will cleave to the valve legs like a brother appeals to me. When we come to dealing with short waves poor contacts become increasingly dangerous. On the whole, there is a wider choice as regards the low-frequency valves in a set when it comes to the valveholders. But when dealing with the H.F. or detector valves the valveholder becomes extremely important. There are certain losses in a valveholder and these may affect the high-frequency currents, altering reaction, stability, and so forth. The capacity of the grid connections of the valveholder is of great importance. It will affect reaction, selectivity, tuning range and other factors. Sometimes the connections to the grid are very close to a metal baseboard. Some valveholders are rejected because there is a risk of short-circuiting on to a metal baseboard when this is used. If there is a high capacity between the anode connections and a metal baseboard, reaction will be reduced. In any case, the size and position of the valveholder or its various parts may affect reaction, tuning range, calibration, stability, etc. By the use of a larger valveholder, the H.F. valve may be

shifted in position and its anode terminal brought near some "dangerous" point in the circuit where perhaps some stray coupling may arise and stability of the set cannot be obtained.

Only a designer of wide experience is fully alive to the changes made by components or alteration of position of parts or change of valves. A great deal of this experience is gained by a designer for the technical press, as he sees many sets which do not give proper results owing to the constructor having made the unauthorised alterations.

Long ago I refused point blank to give any opinion about changes in a set or alterations in components unless I actually tried the effect in a receiver. There may be twenty different components in a set and each one may be manufactured in some form or another by say five manufacturers. If you work out the huge number of sets I should have to build in order to try all the

the top notes and develop the low notes. With a suitable transformer this effect can be made to give very good quality, while a transformer with a straight line characteristic might give boomy results due to excess of bass.

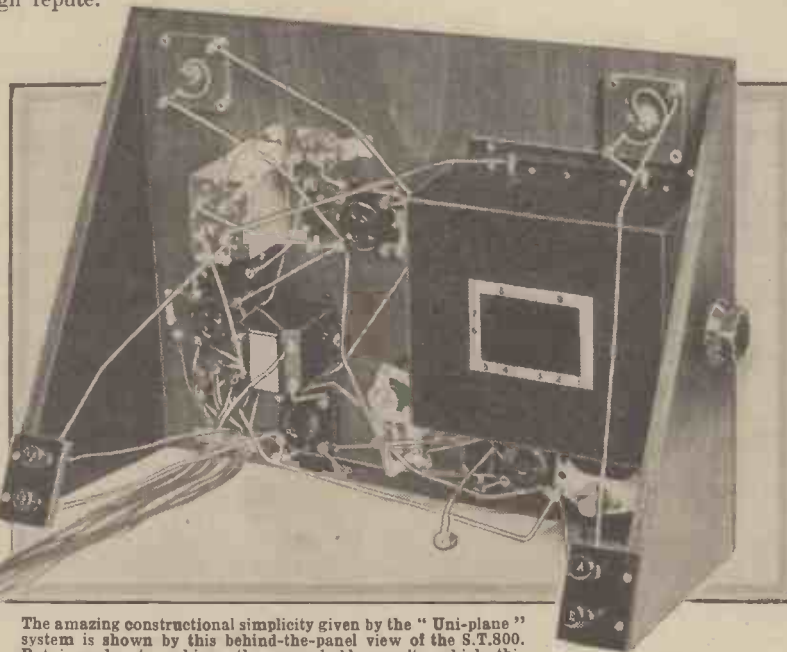
It is ridiculous to suggest that a collection of different makes of transformer will give the same results. There is not the remotest sign of standardisation in components for the home constructor and, until there is, it is impossible to give a variety of alternative specifications if a set is to be designed as a set and not as a higgledy-piggledy collection of oddments. A receiver is really a team of components and valves and their combined effect as regards quality, sensitivity, and selectivity is what counts, not the individual merit of each component. That is why I am quite prepared to say that a very good transformer may be very bad for the set. All my sets so far have been capable of being used on batteries or mains units. The complete cutting out of motor-boating or distortion due to low-frequency feed-back is essential and if a transformer otherwise excellent is used it may not only produce excessive bass in the particular set I have designed, but it will also produce uncontrollable motor-boating, or motor-boating which can only be controlled by adding greatly to the expense of the receiver.

"Thinks He Knows"

Mr. Cosky says, "To the hardened constructor, of course, it is not serious because he'd know." It is usually the hardened constructor who makes a mess of my sets just because he *thinks* he knows. Give me every time the timid beginner who adheres component by component and valve by valve to my design and who reads what I have to say. And a murrain on the constructor who has had years of experience and feels he knows what he can alter. The blunt, unpalatable fact is that nobody knows except myself, and I have spent months and months on the set trying out different arrangements. If I told you everything I rejected and the reason for every step in the design I should need every copy of this journal for twelve months in which to tell you. Also I should have a hundred libel actions against me.

It is a notorious fact that more absolute beginners get excellent results from my sets than in the case of any other designs, and that is not only because of the design itself, but because I do my best to terrify the builder into producing an exact duplicate of my set.

My correspondent gives as the supreme example of complete stupidity on the part (Please turn to page 490.)



The amazing constructional simplicity given by the "Uni-plane" system is shown by this behind-the-panel view of the S.T.800. But in order to achieve the remarkable results which this set is capable of giving it is essential to adhere strictly to the designer's specification.

possible combinations and permutations of components and valves, you will see how sane it is to recommend adherence to my design. Occasionally a different make of component might do, but it would call for redesigning the set.

L.F. Transformer Considerations

My correspondent next mentions L.F. transformers and wants to know why other makes cannot be used. Here the question is partly one of size, terminal positions (which would be quite likely to confuse a large number of constructors), and the question of motor-boating or L.F. instability of some sort. The Varley Niclet may not be the best transformer made, but it can quite readily be the best transformer for a particular job. The ordinary straight circuit uses reaction which tends to reduce

LEARNING FRENCH THROUGH YOUR RADIO

Part 43 of our special language series, contributed

By S. C. Gillard, M.A.

IN Part 40 I referred to -ISS and non-ISS verbs, and I dealt with the former rather thoroughly. It remains for me now to say something about non-ISS verbs. Like the -ISS verbs their INFINITIVES end in -IR, but their PRESENT PARTICIPLES HAVE NOT THAT EXTRA -ISS SYLLABLE which gives these -ISS verbs their peculiar name.

In case you have forgotten these -ISS verbs, let me quote a few once more.

FINIR (finissant, fini) to finish
PÉRIR (périssant, péri) to perish
ACCOMPLIR (accomplissant, accompli) to accomplish
RAVIR (ravissant, ravi) to ravish

Now note the difference between these -ISS verbs and a non-ISS one. SERVIR (to serve) is a good example of the latter. Its PRESENT PARTICIPLE is not "servissant," but "SERVANT" (i.e. without that -ISS syllable).

Again, English helps you here. It is more than likely that if SERVIR had been an -ISS verb we would now be calling our domestics "servissants." But we aren't and I think the reason for this is to be found in this French verb SERVIR, and particularly its PRESENT PARTICIPLE "servant."

So the PARTICIPLES of SERVIR are: SERVANT, SERVI; which give us the STEM "SERV" and not "SERVISS."

Now to conjugate the verb SERVIR.

Its PRESENT TENSE (T. No. 1) is noteworthy by reason of a peculiarity. There is no explanation for it. It has to be accepted

Je sers	sair	I serve, etc.
tu sers	sair	
il sert	sair	
n. servons	sair-vo(ng)	
v. servez	sair-vez	
ils servent	saira	

IMPERFECT (T. No. 2). I was serving, etc.
servais, servais, servait, servions, serviez, servaient
PAST DEFINITE (T. No. 3). I served, etc.
servis, servis, servit, servimes, servites, servirent

The FOUR COMPOUND TENSES are very easy:

J'ai servi, etc.	I have served, etc.
J'avais servi, etc.	I had served, etc.
J'aurai servi, etc.	I will have served, etc.
J'aurais servi, etc.	I would have served, etc.

FUTURE and CONDITIONAL (T. Nos. 8 and 9) are quite regular:

servirai, serviras, servira, servirons, servirez, serviront, servirais, servirais, servirait, servirions, serviriez, serviraient

Other important verbs of this kind are: SORTIR (sortant, sorti) to go out; PARTIR (partant, parti) to leave, set out; SENTIR (sentant, senti) to feel; DORMIR (dormant, dormi) to sleep.

(You see now where our word "dormant" comes from, don't you?)

It is only the PRESENT TENSES of these verbs that call for special notice.

Je sors	sor	I go out, etc.
tu sors	sor	
il sort	sor	
n. sortons	sor-to(ng)	
v. sortez	sor-tez	
ils sortent	sont	

Je pars	par	I leave, etc.
tu pars	par	
il part	par	
n. partons	par-to(ng)	
v. partez	par-tez	
ils partent	part	

Je sens	sah(n)	I feel, etc.
tu sens	sah(n)	
il sent	sah(n)	
n. sentons	sah(n)-to(ng)	
v. sentez	sah(n)-tez	
ils sentent	sah(n)	

Je dors	dor	I sleep, etc.
tu dors	dor	
il dort	dor	
n. dormons	dor-mo(ng)	
v. dormez	dor-mez	
ils dorment	dorm	

The remaining Tenses are quite easily formed if you remember (a) that the STEMS of these verbs are respectively: SORT, PART, SENT, DORM; (b) that the PAST PARTICIPLES are: SORTI, PARTI, SENTI, DORMI; (c) that the INFINITIVES are: SORTIR, PARTIR, SENTIR, DORMIR.

But it must be noted that SORTIR and PARTIR are conjugated with ÊTRE and not AVOIR. That is, their COMPOUND TENSES are:

Je suis sorti	I have gone out
J'étais sorti	I had gone out
Je serai sorti	I will have gone out
Je serais sorti	I would have gone out

I am anxious that you should begin to attempt something bigger than the ordinary simple sentence. I can't do better, I think, than start you off on a type of sentence that is common to all modern languages. This particular sort of sentence is well illustrated by the formula

IF A DOES..... B WILL.....
A few examples of this:

If my friend arrives in time we will start this evening.
If you are good I will give you a sweet.
If it rains we will not go to the theatre.
If you love me you will do all that I ask you.
If he leaves now he will arrive there at 6 o'clock.

If you look carefully at these sentences you will see that the same PAIR OF TENSES are used in all of them. In the first half there is a PRESENT TENSE (T. No. 1), in the second a FUTURE (T. No. 8).

It is precisely the same in French. Let me give you a translation of these five sentences:

Si mon ami ARRIVE à temps nous PARTIRONS ce soir.
Si tu ES gentil je te DONNERAI un bonbon.
S'il PLEUT nous n'IRONS pas au théâtre.
Si vous m'AIMEZ vous FERIEZ tout ce que je vous DEMANDE.
S'il PART maintenant il ARRIVERA à 6h.

Yes, I have used the same PAIR of TENSES, namely, ONE and EIGHT. I want this phrase (ONE and EIGHT) to stick in your memory. Or the formula "If A does... B will..."

With ONE and EIGHT I want you to associate a similar phrase, TWO and NINE. Or the formula:



This charming listener is just giving the final touches to a programme on that popular Cossor set, the A.C. mains "Super-Ferrodyne" which costs only 8 guineas.

IF A WERE TO..... B WOULD.....

Again, take these five English sentences, like those above but with a difference:

If my friend were to arrive in time we would start this evening.
If you were good I would give you a sweet.
If it were to rain we would not go to the theatre.
If you loved me you would do all I asked you.
If he were to leave now he would arrive there at 6 o'clock.

If you examine these sentences you will see again that the Englishman uses the same PAIR of TENSES in all of them. This time it is the IMPERFECT (T. No. 2) and the CONDITIONAL (T. No. 9).

The Frenchman constructs sentences according to the same formula as well. A translation of the above sentences will show this. Look!

Si mon ami ARRIVAIT à temps nous PARTIRIONS ce soir.
Si tu ÉTAIS gentil je te DONNERAIS un bonbon.
S'il PLEUVAIT nous n'IRIONS pas au théâtre.
Si vous m'AIMIEZ vous FERIEZ tout ce que je vous demandais.
S'il PARTAIT maintenant il y ARRIVERAIT à 6h.

Study the above sentences carefully. Make similar ones up for yourself and translate them into French.

Above all, remember ONE and EIGHT, TWO and NINE. I shall give you other PAIRS of TENSES next week.

Here is another VOCABULARY to set about. Besides knowing the Grammar of a language you must have a Vocabulary at your finger tips. This Vocabulary contains a number of useful words and phrases involving the word COUP.

Un coup de bâton	blow with a stick
Un coup de vent	puff, gust of wind
Un coup de chapeau	salute
Un coup d'eau	rush of water
Un coup de froid	cold snap
Un coup de cloche	stroke of the bell
Un coup de collier	effort, spurt
Un coup de sang	apoplectic fit, stroke
Un coup de dents	bite
Un coup de queue	stick of the tail
Un coup de couteau	stab
Un coup d'épaule	push, help
Un coup d'essai	first attempt
Un coup d'état	revolution
Un coup de gosier	gulp, swallow
Un coup de crayon	pencil stroke
Un coup de plume	stroke of a pen
Un coup de filet	draught (of fishes)
Un coup de feu	shot
Un coup de foudre	thunder-bolt

(Please turn to page 492.)

ON THE SHORT WAVES



"DO YOU WANT 'PROGRAMME VALUE'?"

THESE short waves of ours, like most of the other blessings conferred on man by radio, have their disadvantages. Not the least of these is the ability to stir up violent emotions within the minds of those who use them, with the result that a discussion between two short-wave enthusiasts often ends with a creditable imitation of a dog-fight.

I used to think that there were an infinite number of different types of short-wave fan. Possibly there were; but now they have gradually come together, at one end of the scale or the other, until we have two distinct types which are poles apart.

This page is set aside for the "programme-value" merchant, and the next for the "DX-hound"; and whenever these two meet, in print or in the flesh, there's bound to be a bit of a scrap.

Two Points of View

Acting in the role of peacemaker, I want to try to put forward the point of view of each class of listener in such a way that the other man will see it a little more clearly. Then, perhaps, we'll have some peace, in our homes and in our correspondence columns.

The man who is all out for "programme value" from short waves asks less of his receiver than the "DX-hound"; and yet he often uses a much bigger receiver. This apparent contradiction is easily explained. He wants to sit back in a comfortable chair and listen to Schenectady with the same peace of mind with which he would tune to "Music-Hall" on the local station at 9.20 p.m. one Saturday. He wants to hear a programme without having to touch the volume control or the tuning condenser—and why shouldn't he?

The average "hot-stuff" (so-called) short-wave set is just a pain in the neck to him. His ideal is probably a biggish superhet with A.V.C., H. & C., and every modern convenience, which will, as nearly as possible, tune in itself for him, and continue to work without being touched.

If he can get a couple of dozen short-wave stations sufficiently well to be really amusing to him, he cares nothing for the other 2,000 that he can't get. Give him Schenectady in armchair comfort, and he will not ask for the Fiji Islands.

Perhaps, on a Sunday morning, he will tune across 40 metres and hear a handful of amateurs. He will just listen to those who come in loudly and clearly enough to

interest him, but he won't bother to examine those little weak, scraping noises which may, possibly, be coming from some obscure corner of the world whence no signal has previously been heard.

No, he is quite content to leave the breaking of DX records to that queer fellow next door who fiddles about with a funny little set, and has such nice wavy hair because he wears the headphones all day.

He probably hears an amateur saying "Your sigs are RST 579 this morning, QSB to S5, and your modulation is about 60 per cent. I am using two '59 type tubes

extreme differences between them that have caused the differences between our two types of short-wave receiving enthusiast. The broadcaster doles out entertainment, and uses the highest possible power, within the necessary limitations, in order to do it effectively. The amateur plays about with the highest power than he can afford, or the highest that he is allowed to use; but even so he uses only a few "fly-power" compared with the broadcasting station.

And he doesn't distribute this for the entertainment of all and sundry; he tries hard—sometimes pathetically hard—to get it to some remote part of the world that he hasn't got before, and he generally does it in the long run. He has thousands of sympathisers who, even if they don't aspire to transmission themselves, love to hear him doing it; and they send him reports on his signals.

Those QSL Cards

If he is a novice, or if he uses very low power, or if the report comes from some remote part to which his signals don't often penetrate, then he is duly thrilled by the report and will send some tangible evidence of his appreciation—generally "just another QSL card." If, however, the report tells him nothing, then he won't bother.

And that's just why it's time this card-collecting craze was reorganised. Thousands of "programme-lovers" think it worth while to send reports to the broadcasting stations to which they listen. They forget, perhaps, that it isn't the slightest bit of news to the owners of those stations to know that someone has heard them. *Everyone* has heard them—that's what they're there for. Fan-mail is just an unmitigated nuisance, and is generally treated at such.

You can take it for granted, therefore, that unless you hear a station that you imagine no one has heard before, you are wasting your time and money by sending a report, and you may justifiably mumble in your whiskers about "this childish cigarette-card racket," for that is just what it is, unless the reports exchanged are of some value to somebody.

Stick to your programme value, if you're built that way; if you are a home-constructor, make a set that is big enough to give them to you, and don't bother unduly about these little weak stations that other people go all goofy about. Leave them to your opposite number on the next page.

HE PUTS ENTERTAINMENT FIRST



The man who is all out for "programme value" from short-waves wants to sit back in a comfortable chair and listen to Schenectady with the same peace of mind with which he could tune to "Music-Hall" on the local station.

here, with a Collins coupler and a W3EDP antenna—" He just says "What a lot of bosh these mad hats talk!" He may, if he is reasonable, assume that they know what they're talking about, even if he doesn't. On the other hand, he is just as likely to tell his neighbour in the train on Monday morning that all these "hams" were born mad and seem likely to remain so.

The queer thing is that if he finds an amateur sending out a nice "broadcast programme" of gramophone records, he will sit back with a sigh of content and listen to it *ad infinitum*, blissfully unconscious of the fact that the said amateur is contravening the terms of his licence by doing so, and is liable to have it taken away from him without ceremony.

You see, the amateur and the broadcaster are poles apart, also; and it is the

ON THE SHORT WAVES—continued.

ARE YOU A "DX-HOUND"?

THERE'S no need to answer the above question. It is merely rhetorical—just something brainy in the way of a heading, to catch your eye and make you read. There's no knowing whether you *are*, really—but you may think you are, and that's almost as good.

For the purposes of argument, I had better define a "DX-hound," at the outset, as a man who, having heard a station at great strength for two days running, is no longer interested in it, but proceeds to snoop around and look for something else.

Everyone who comes into short-wave work with a longing for the thrills of long-distance reception seems to get like this sooner or later. And I think, as a class, that the DX men scorn the "programme-values" even more than the p.v.'s dislike them.

I'm not trying to stage an armistice between the two opposite poles. I think it far better to let each class go its own way and to acknowledge that their requirements are diametrically opposed. Week by week, though, I have to cater for both of them, and so it is vital to know what each of them wants.

Simple Sets are Used

The DX listener who spends most of his time in the amateur bands finds a big receiver a bit of a nuisance. I should say that the vast majority of amateur transmitters (excepting those who possess a commercial "single-signal" superhet, which is in a class by itself) use a simple two- or three-valve receiver.

Several DX receiving contests of international fame have been won by the users of such simple gear, although the man with a big superhet *does* often pull off the phone contests.

For amateur C.W. reception, however, the one-valver works on equal terms with the best of big sets, simply because of its freedom from background noise.

Your DX-hound, of course, has learnt something that the ordinary listener doesn't know, and that is that *nothing* is too weak to listen to. How do you imagine that a man hears the first signal to reach this country from M'bonga-M'bonga, or wherever it is? Simply by finding, sandwiched in between two strongish signals, a weak little quavery affair that defies analysis. He just gets on to it, and hangs on like grim death until he *can* read it; and then it turns out to be something fresh.

I won't describe it as "something interesting." It is intensely interesting to *him*, but the programme-value man would just laugh at it and say that a little squeak like that, no matter where it came from, couldn't be of the slightest interest to anyone but a lunatic.

Our DX man, however, has now succeeded in doing something that no one has done before, and he is duly elated about it, and proceeds to repeat the performance with another of his incredibly weak signals.

And make no mistake about it, they *are*

weak. They have to be, or they wouldn't be feathers in his cap—a score of other people would have heard them before him if they were a little stronger!

Rather a strange occupation, this; but full of thrills, as I know only too well, having been one of the breed myself for many years. And this is where the QSL-card racket, however childish it may seem to some people, really does a bit of good.

Imagine yourself to be an amateur transmitter on some lonely island in the Pacific Ocean—perhaps the *first* to start up there. Power supplies are difficult, and you have to be content with an input of 5 watts from accumulators and batteries. You call and call, but never succeed in raising anyone farther than the next island (perhaps 600 or 700 miles away).

Then, one glorious morning, the mail

NOTHING IS TOO WEAK



The "DX-hound" has learnt something that the ordinary listener doesn't know, and that is that *nothing* is too weak to listen to.

arrives, and with it is a card from "X. Y. Z." in London Town, reporting your signals as R3, T9, or what have you, on the evening of October 25th last. You turn it up in your log, and you find that you *were* on the air at the time stated. There's nothing very childish about *that* piece of information; and you send a card to the receiving man, thanking him for his report.

That card of yours probably finds a special place on his wall. Is *that* a glorified cigarette-card? No. That exchange of cards has entailed real hard work at both ends, and each card means something. But all these cards buzzing about between listeners and broadcasting stations which are capable of wrenching moving-coils off their mountings at 5,000 miles are worse than useless.

Circulating Worthless Wallpaper

And I think many of the cards circulated between amateur transmitters are also just waste of time. Pleasant souvenirs of a contact, perhaps, but unnecessary in so many cases nowadays. And what gets my goat is that the tale is always the same—

it's the man who puts out a strong signal who gets all the cards, and his neighbour, on low power, who would really be wild with joy to receive a few, gets nothing at all.

In other words, most of the people who circulate this worthless wallpaper have rotten receivers and can only get just a handful of the most powerful stations. Small wonder that the owners of the powerful stations get fed-up and refuse to answer cards. When a man in Egypt has worked with 500 British stations, he's no longer interested to get a bunch of cards telling him that he's been heard there by enthusiastic owners of the "Super-Whatisit-Three." But the other man down the street, struggling along with 3 watts, and putting out a weak signal that necessitates a *real* receiver at the other end, would welcome them all right.

I have dealt with this QSL racket at some length, because I really do want to discourage readers from circulating so much worthless literature to the wrong people. If you call yourself a DX man, lay off these strong stations that everybody can hear, and listen to something else for a change.

And now I have a suggestion to make: Those readers who find short-wave listening palling on them would be well advised to change their mode of living, so to speak, for a little while.

The DX man who is tired of straining after weak signals ought to be able to find quite a lot of interest in listening to some of the broadcast stations for a change. Possibly the programme-value merchant would even get a thrill from a little dose of listening to something weak and (almost) unintelligible.

Try a Different Band

But they need not really change places like that, for each of them can make a change for himself. Try a different waveband. Keen followers of the amateur 20-metre band are apt to become terribly fed-up with it after a while. Try listening on 80 metres, for instance.

You will find that your receiver needs a bit of altering, perhaps, and you will have to get used to the different technique of the new band, but you will find it supremely interesting when you have done so. There will be different stations to listen to, and a different "feel" about the whole thing that almost takes you back to the good old days, when anything connected with radio was one long thrill.

A broadcast listener who has confined himself to the 19-metre and 31-metre bands will be well advised to look at 49 metres for a change; and possibly, if his receiver covers that interesting stretch between 60 and 200 metres, he will find something new up there.

The main point is that there's no *need* to get fed-up with radio and to decide that the business isn't worth while—there's far too much going on for that to be true.

Variety is the spice of life, and there's plenty of it for the short-wave listener, whatever his particular tastes may be. If he has a receiver that covers the whole range from 5 to 200 metres, he need never have a dull moment. W. L. S.

AERIALS FOR SHORT WAVES

What sort of an aerial do I want for good short-wave results? It's a question often asked these days, and is answered in a really practical and interesting way in this article

By A. S. CLARK

NOW that short-wave reception is becoming rapidly more popular, both with special short-wave receivers and also with commercial all-wave sets, the question of the best aerials to use in various circumstances is one of importance to most listeners. In this article I propose to deal with the subject in rather a non-technical manner, with special emphasis on some of the vital practical considerations, but not overlooking other aspects of special interest.

With the advent of the all-waver a number of special aerials of all-wave type have appeared on the market. In view of the appearance of these two advances almost simultaneously, many have wondered to what extent one is complementary to the other.

Losses Must Be Avoided

Right away let it be noted that these special aerials have many advantages, but it is possible to obtain good results with the ordinary single-wire antenna. We will consider the advantages of the special aerials later in this article.

First of all, what are the requirements of an efficient aerial of the single-wire type for use on short waves?

Generally speaking, if this type of aerial is made satisfactory on the short waves, it will also be very good on the medium and long waves—in other words, it will do a treat for an all-wave receiver.

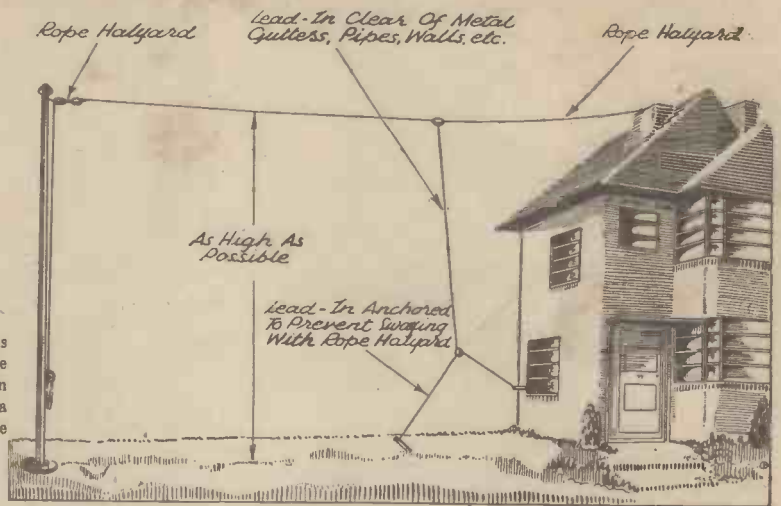
The chief thing to be borne in mind is that on the short waves, due to the higher frequencies in use, losses take place easier and consequently more care in erection is needed. The points at which this care should be concentrated are illustrated in Fig. 1.

Height is more important than length in the horizontal part of the wire, though the length of the latter should not be cut down too much if the set is an all-waver. Forty-five feet or thereabouts is a good length to use.

If possible, the wire should be in one piece right from the far insulator, through the lead-in, to the aerial terminal of the set. If you have any joints they must be soldered, and should also be covered with insulating tape or protective coating.

Broken strands in stranded wire, loosely twisted points in the wire, such as at an

★
Fig. 1.— This sketch gives the vital points in the erection of a good short-wave aerial.
★



insulator, or any point where two parts of the wire can rub together, are to be avoided, as they may cause clicks and other noises in reception. When insulators are used, two small ones "in series" will stand the "weather" longer without cleaning than one.

Steel halyards, while being acceptable because they are strong and do not stretch, are not desirable. They may introduce losses and can conduct interference of the "man-made static" type to the aerial.

For the same reasons both the aerial and the downlead should be kept a couple of feet or so away from metal gutters, pipes and so on. Also they should not run too

the side of the house as well as prevent it from moving in a strong wind.

This type of aerial is known as the inverted "L" type, and is the most suitable kind. A "T" aerial in which the downlead is taken from the middle is all right, providing the downlead really does come from the middle. The trouble is that it should be the electrical middle, which does not always exactly coincide with the physical middle.

The Dipole Arrangement

So much for ordinary aerials which may have to be used for normal broadcast bands as well as short waves. Of special aerials which are only intended for use on short waves there are very many. They are intended for use on one band of frequencies only, such as the 20-metre amateur band and frequencies round about that band.

The idea behind them is to arrange the lengths of the wires used so that the aerial itself tunes to something like the wavelength to be employed, although they may prove most efficient on wavelengths far removed from those for which they are designed.

The simplest type of all to erect is known as the half-wave dipole. Actually it consists of two quarter-wave wires in a line, two feeders being taken from the two inner ends of these wires. These wires terminate across a coil coupled to the set's first grid circuit.

These feeders should be an inch or two apart, and should "change places" every two feet, transposing blocks being used for this purpose. Each quarter-wave wire should be approximately one quarter of the length of the average wave to be received.

When Space is Limited

The two wires may be arranged vertically or horizontally in line. And when there is not room for this, they can take the form of a "V." Make the "V" as wide as possible and connect the feeders to the points where the two wires come close together.

This arrangement of aerial is suitable for wavelengths from about 15 to 50 metres. When we get down to the television wavelengths the dipole can be arranged more exactly, because there is then one fixed wavelength to which it can be set.

(Continued overleaf.)

A GOOD TELEVISION AERIAL

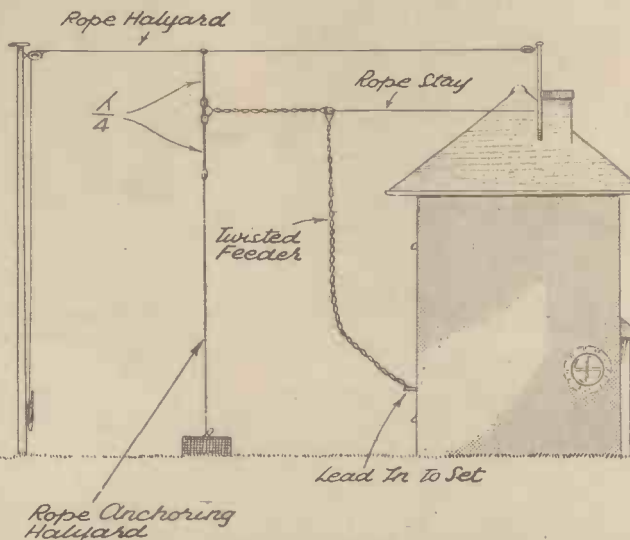


Fig. 2.—Showing the very best way of putting up a dipole aerial for the reception of the transmissions from the Alexandra Palace.

near to brick walls or slate roofs even. When these get wet they can become quite passable conductors.

Lastly there is the question of swaying in the wind. On short waves this can alter the tuning sufficiently to cause fading, or even to make the reception of weak stations impossible. An anchoring stay, such as that shown, can keep the downlead away from

AERIALS FOR SHORT WAVES

(Continued from previous page.)

For a television receiver it should be adjusted for the lower of the two wavelengths, while if you are only going to listen to the sound, then the lengths of the wires are governed by the higher wavelength. In the former case the two wires would be 5 ft. 6 in., while in the second they would be 6 ft.

In Fig. 2 I have shown the ideal way of erecting a dipole aerial for television reception. In most cases they are fixed direct to the mast on the roof, and this is nearly as effective.

Main Considerations

Height and isolation from surrounding objects are the main considerations in the erection of a television aerial. This is achieved in the sketch by means of a pole attached to the chimney-stack and a mast. The aerial is then suspended from a strong halyard running between the two. Not only does this provide a high aerial, but the aerial itself is kept clear of the house.

It is also farther from the road in front of the house than it would be if mounted on the roof. Interference from the ignition systems of cars, one of the biggest con-

placed at an angle away from the vertical in any direction. This is very helpful in further reducing interference from cars. The theory of the dipole aerial is explained in the article on "Television Aerials" on the opposite page.

If you look at Fig. 3 you will see that a dipole is at its least sensitive angle when waves are striking it from a direction exactly end on. With this in mind, you will see that it is only necessary to bring the anchoring point well up to the house

HOW TO POINT YOUR AERIAL

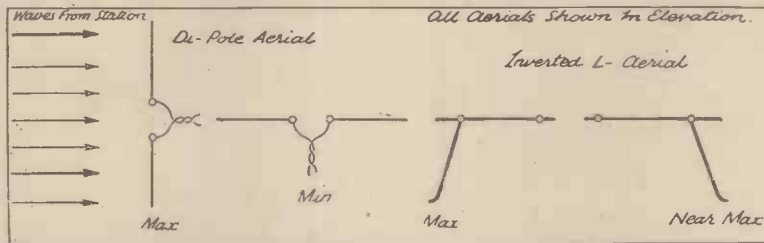


Fig. 3.—Illustrating the directions in which dipole and "L" type aerials tend to show directional pick-up properties.

to point the bottom end of the aerial almost directly at the road and so cut down its pick-up from the cars. If, with this arrangement, the Alexandra Palace lies in a direction approximately at right angles to the top rope halyard on which the aerial hangs, reception from Alexandra Palace will not be affected to a noticeable extent, if at all.

As Fig. 3 shows, even an inverted "L" type aerial can be somewhat directional. This can apply on short waves very often, although it will not show up on medium and long waves. The reason for this is that the horizontal part of the aerial approaches nearer to the actual wavelength than it does on medium and long. It thus tends to act as a tuned aerial.

Anti-Interference Properties

So called "man-made static" (although it is often caused by a woman at her housework!) is generally worse on short waves. When it is very bad one of the special all-wave aerial systems to which we have already referred are to be recommended.

Practically speaking, all of these have anti-interference properties, though the degree of effectiveness varies with the type of system—some, for instance, only use plain twisted feeders, while others have fully screened feeders.

In order that these aerials may work well on all broadcast bands, matching transformers have to be provided, sometimes these are used at both ends of the download, sometimes only at one. And

again, sometimes switching is employed on the transformer at the set end of the download, and sometimes it is not required.

A specially good example of anti-interference all-wave aerials is the Belling-Lee "Eliminoise." This has a completely screened download and no switching is required on its transformers when changing

from one band to another. A test report of it appeared in last week's POPULAR WIRELESS.

With suitable transformers it is possible to run a number of sets off one aerial. And since losses in feeder lines can be made negligible, it is possible to feed a whole block of flats from a single aerial.

An instance of the development achieved in this connection is provided by Carrington House, Mayfair, London. Every flat in this building is provided with an elaborate

Marconiphone system which, by making use of a form of the newly-developed co-axial cable, enables radio or television receivers to be plugged-in in any of the large number of flats.

Combined Outputs

Fig. 4 gives a general idea of the layout of the system employed. On the roof of the building are separate broadcast and television aerials. Short waves are efficiently covered by the broadcast aerial as well

as medium and long.

The leads from the two aerials are taken to amplifiers where sufficient boost is given to cover varying loads and line losses. After this the television and broadcast frequencies are fed in together to one co-axial cable which distributes them to each flat.

In each flat is a transformer, which takes the place of the one at the set end of an ordinary screened download aerial, and which separates out the frequencies to two wall plugs. One of these is for a television receiver and the other takes the plug for an ordinary all-wave broadcast set.

SCRAPBOOK FOR 1922

Regional, January 21st

CHARLES BREWER and Leslie Baily, in presenting the twelfth of their popular Scrapbook programmes, will choose the year 1922. The main feature of that year from the point of view of listeners is that it marked the beginning of the organised activities of the B.B.C. Personalities connected with the early days of broadcasting will come to the microphone and address their millions of listeners on the changes that have taken place during the past fourteen years.

London Music Successes

Outside the broadcasting sphere, the year 1922 was a great year for light musical entertainment: "Decameron Nights" at Drury Lane; Phyllis Dare as "The Lady of the Rose" at Daly's; "Cairo" at His Majesty's; and "The Cabaret Girl" at the Winter Garden, were some of the successes which are to be recalled. The year saw also the first London performance of a more serious musical play, Rutland Boughton's "Immortal Hour," which ran for 216 performances at the Regent Theatre, King's Cross. Another resounding theatrical success was "Tons of Money," the first of the famous Tom Walls-Ralph Lynn farces, which enjoyed a run of 737 performances.

Politics will, of course, be touched on, for example, the end of the War Coalition brought about by the famous Carlton Club Meeting, which resulted in the resignation of Lloyd George and a victory for Bonar Law and the Conservatives in the subsequent general election. Other home and foreign affairs with which "Scrapbook for 1922" will be concerned will include the rise to power in Italy of Mussolini, the formation of the Irish Free State, Princess Mary's wedding, and death of Lord Northcliffe.

COMMUNITY RECEPTION FROM ONE AERIAL

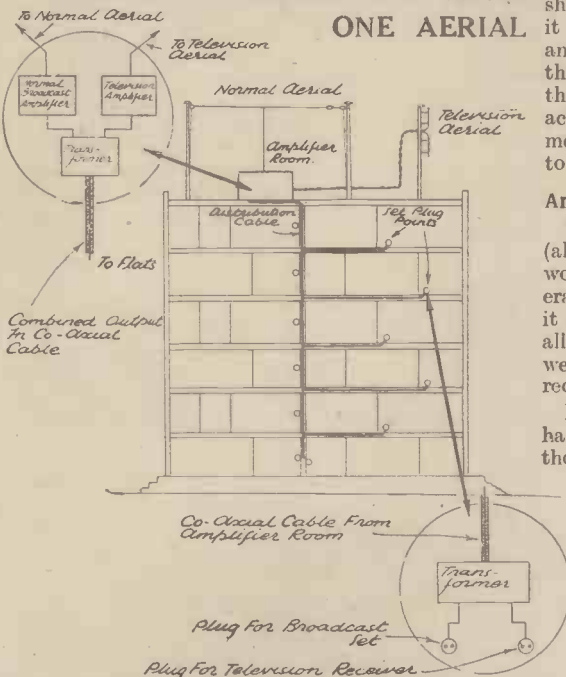


Fig. 4.—This diagram explains how energy picked up on one aerial can be distributed to each flat in a large block.

siderations with a television aerial, is thus reduced also.

The rope stay from the bottom of the mast on the roof is used to enable the feeder wires to run away at right angles for the first few feet. The rope anchoring halyard provides another advantage for this aerial, for it permits the aerial to be

TELEVISION AERIALS

By Carden Sheils

An explanation of the theory behind the dipole aerial which has come so much more into prominence since the television programmes commenced

As shown in Fig. 2 the aerial is broken in the middle, and the inner ends of the two halves are connected across the two leads of a piece of twisted lamp flex, which then serves as the down-lead to the set. The use of a two-wire down-lead instead of the usual single wire is a feature peculiar to short-wave working.

It must be taken for granted that to secure good results the impedance of the aerial must "match" the impedance of the down-lead, otherwise there will be a loss of signal energy in the process of transferring it from the aerial to the set.

Luckily the impedance of a 10½-ft. dipole of 12 S.W.G. wire happens to be roughly the same as the surge impedance of standard lamp flex, so that the problem of "matching" automatically disappears in this particular case for any required length of down-lead. Since, however, attenuation losses occur along the twisted wire, it is best not to make the down-lead too long.

It is clear from Fig. 1 that the two ends of the aerial build up signal voltages of opposite sign. We may regard these, for one particular instant of time, as the two terminals of a battery which is connected across the two wires of the down-lead, so as to drive a current down one wire into the receiver, and back again along the second wire, into the opposite end of the aerial. In other words, at any point along the length of the flex the instantaneous signal currents will be found flowing in opposite directions along the two wires.

Cutting Out "Static"

By contrast, any interfering waves due to local "static" will cut across the down-lead as though it were a single wire, so that the resulting current flows in the same direction through both wires, until it reaches the input transformer to the set. Here it branches so that one half flows from top to bottom of the transformer winding, whilst the other half simultaneously flows from bottom to top. Obviously both currents will cancel each other out, so that no static "noise" enters the set.

For exactly the same reason a two-wire down-lead of twisted flex does not increase the effective length of the dipole aerial, which, as already explained, will only build up the incoming signals to maximum strength, when its length is such that it "swings" naturally to their frequency. Any increase or decrease in this fixed length causes the aerial efficiency to fall off very noticeably.

The flex down-lead may, of course, intercept some of the signal energy, but if so, it is automatically balanced out across the input transformer to the set, and does not affect the proper working of the aerial.

a dipole or "doublet," and is distinguished from the common- or garden- aerial by the fact that it is not earthed.

It must be remembered that ultra-short wireless waves travel in a straight line, like rays of light, and are therefore limited to the so-called optical range. For this reason the receiving aerial should be erected as high as possible, both to bring it "within sight" of the transmitting aerial, and also to avoid the "screening" effect of neighbouring buildings. Finally, it is known that a dipole aerial will only function at its best when it is elevated at least half a wavelength above ground, where it is not affected by the capacity of the earth.

The way in which a dipole collects and builds up the incoming signal is shown in Fig. 1. Since there is no tuning coil to "lump up" the signal voltage, it is necessary to couple the aerial to the down-lead at a point where either the current or voltage naturally rises to a maximum, so that all the available signal energy is effectively transferred to the receiving set.

Centre-Point Coupling

Actually, the dipole builds up a "standing" wave with loops of voltage at the two free ends—which are in phase-opposition—and a loop of current at the centre, as shown by the dotted line curves. In practice the coupling to the down-lead is most conveniently made at the centre point of maximum current.

CURRENT AND VOLTAGE

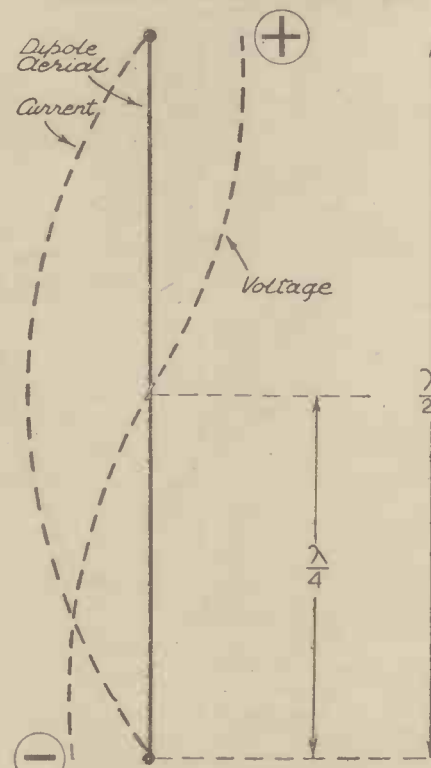


Fig. 1.—Showing how current is at maximum and voltage at minimum in the centre of a dipole aerial.

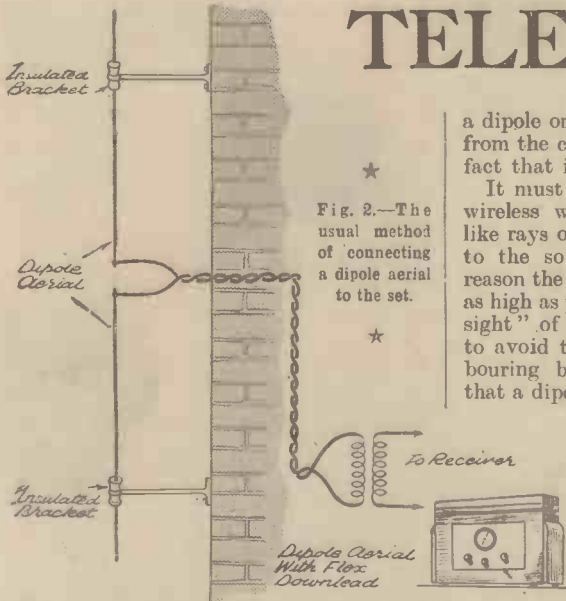


Fig. 2.—The usual method of connecting a dipole aerial to the set.

ALTHOUGH in theory one is handling exactly the same kind of wireless wave, whether receiving the B.B.C. National programme on 1,500 metres, or the new television service on 6.67 metres, one soon finds out there is a remarkable difference in behaviour between the "longs" and the "ultra-shorts." This is by no means confined to the valves and other specific components, such as coils and condensers—though they, of course, have to be specially adapted for short-wave working. It also occurs very noticeably in what may be called the "plain-wire" parts of the receiving circuit. The ordinary type of garden aerial, for instance, is not ideal for receiving television. And the same applies to the single wire down-lead.

The Best Arrangement

The ideal aerial for any kind of wireless reception is a plain "unloaded" wire cut to such a length that it will oscillate naturally—owing to its distributed inductance and capacity—at the signal wavelength. Now the shortest aerial that will oscillate freely in this way must have a length equal to at least a quarter of the incoming signal wave, which would mean something like a quarter of a mile of wire for the 1,500-metre National programme, and nearly a 100 yards for the Regional. Such sizes are, of course, out of the question for most listeners—apart from the fact that a plain-wire aerial cannot be tuned from one station to another.

Accordingly, for ordinary broadcasting, we compromise by using an aerial which is much shorter than a quarter-wavelength, but which is "loaded" with a variable tuning-coil, so that it will oscillate at all the various frequencies required, to bring in a wide selection of programmes.

In television the position is quite different. A quarter-wave aerial, which will oscillate naturally at about 7 metres, is only just over 5 feet long, and since television signals are transmitted on a fixed wavelength, the necessity for tuning does not arise. This being so, we can go one better than the minimum quarter-wave wire, and employ a half-wave aerial, usually in the form of a straight wire 10½ feet long. Or the same length of wire may be arranged as an inverted V.

A half-wave aerial of this kind is called

1936 BROADCASTING REVIEWED

An Official Summary

IN a brief review of outstanding events in British broadcasting during the year 1936 the B.B.C. states that the aggregate programme transmission time for all transmitters (excluding the Empire station) was 71,608 hours 21 minutes. The corresponding figure for last year was 68,795 hours 38 minutes. The breakdown percentage was 0.031, as compared with 0.026 per cent. last year. The aggregate programme transmission time for the Empire transmitters was 12,608 hours 33 minutes.

The high-power transmitter at Lisnagarvey in Northern Ireland was opened in March, replacing the low-power transmitter at Belfast. The construction of a similar transmitter at Burghhead in the north of Scotland was completed and the station put into service in October, using the same wavelength as the Scottish Regional transmitter at Westerglen. Construction of another high-power transmitter at Stagshaw, west of Newcastle, is proceeding.

A new medium-power transmitter at Beaumaris in Anglesey has been completed and will be put into service early in 1937, working on the same wavelength as the present West Regional transmitter.

Extensions at Daventry

Good progress has been made with large-scale extensions to the Empire Station at Daventry. Three transmitters of considerably higher power than those now in operation have been ordered, and it is hoped that all three will be in operation by the early summer of this year. Eight additional masts are being erected to support an improved aerial system, which is the outcome of experiments carried out at the Empire Station since it was first put into service in 1932. The existing Empire short-wave transmitters at Daventry have continued to provide reception in most parts of the Empire and other parts of the world. Correspondence with and reports from listeners and organisations overseas have been productive of useful information and helpful suggestions.

Empire Service

The Empire service has now completed its fourth year of regular working. The daily schedule covers more than seventeen hours of broadcasting, as the sixth period of transmission, designed primarily for listeners in Western Canada, was increased in April last to two hours daily (from 2 a.m. to 4 a.m., G.M.T.).

The year's work was marked by two main tendencies, viz., a substantial growth in the number and scope of incoming broadcasts from the Empire overseas, and steady progress towards a more systematic and varied schedule of programme material outgoing from Daventry, especially in the fields of music and talks.

Under the first head, the following occasions will be recalled, among others, by overseas listeners: The change-over of Viceroy in India (April); the meeting of the Governor-General of Canada and the President of the United States in Quebec (July); the Jubilee of the City of Vancouver (August); the opening of the Empire Exhibition in Johannesburg (September); and the centenary of the State of South Australia (December).

More than thirty broadcasts from the Empire overseas were arranged and carried out with the co-operation of Post Office technicians and broadcasting authorities in the Dominions and Colonies.

The News Bulletins

As regards outgoing programmes, the News has clearly held its place as the most important branch of the Empire service during a year of exceptional anxiety. With News may be bracketed a series of weekly reviews of world affairs.

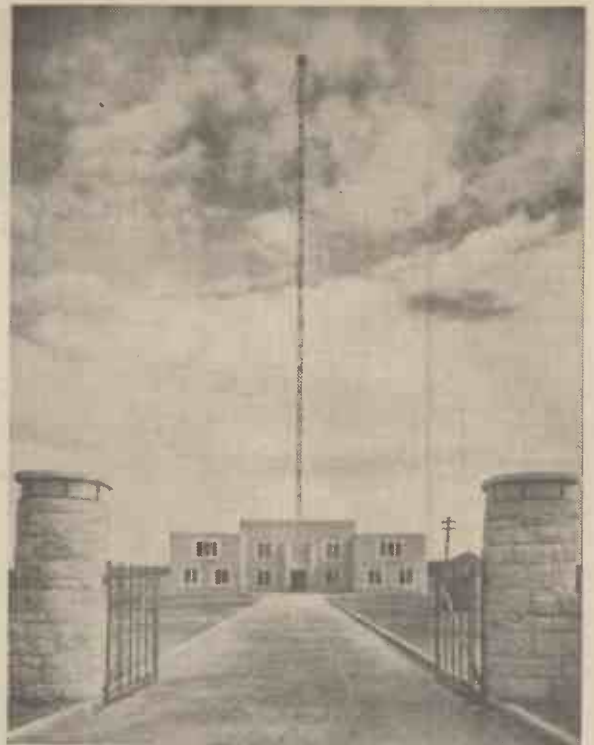
Other series of talks designed to interest overseas listeners are now a regular part of the programmes. Similarly, in music, drama and variety, an increased staff has made it possible to consider more closely the special needs of various parts of the Empire, especially in areas where, owing to time differences, the outstanding programmes broadcast in the home country cannot be heard.

It would be impossible to over-estimate the effect produced by the regular transmission from Daventry of the bulletins during the last illness of His late Majesty King George V. and of the funeral and other ceremonies. These undoubtedly promoted a feeling of unity throughout the Empire. Three broadcasts by Edward VIII—his message to the Empire early in March, his unveiling of the Canadian National War Memorial at Vimy in July, and his farewell speech following his abdication in December—were similarly made audible all over the world through the Empire Station.

Erection of New Studios

The new Glasgow studio premises, formerly Queen Margaret College, are undergoing the necessary reconstruction and will be put into service in 1937. A site has been acquired in Belfast for the erection of new studios and offices.

Buildings in Swansea and Aberdeen have been acquired for conversion into studio premises. Certain other provincial premises



The new Burghhead transmitter was put into operation in October. This view shows the entrance to the station, which is situated on the Moray Firth about nine miles from Elgin and ten miles from Forres. The aerial is of the "anti-fading" type and is 500 ft. high.

have been brought up to date and equipped with a new type of microphone.

Television Progress

During the month of May new members of the television programme staff began to join for duty at Alexandra Palace. They were occupied for about three months in studying B.B.C. policy and sound broadcasting technique and organisation. By the first week in August the whole television programme staff had started duty at the London Television Station. The planning of the service and of the necessary facilities for handling it had had the continuous attention of the skeleton staff for almost a year.

On August 26th special experimental transmissions were carried out to demonstrate television to the public at Radiolympia. Two transmissions took place daily, from 12 noon to 1.30 p.m. and from 4.30 to 6 p.m., until September 5th, the Baird and Marconi-E.M.I. systems being used on alternate days. Programmes consisted of a set variety programme for the ten days, a film newsreel changed every three days, a documentary film, and a specially prepared series of excerpts from outstanding entertainment films of 1936. Transmissions discontinued when Radiolympia closed to enable the B.B.C. engineering staff to "take over" from the Baird and Marconi-E.M.I. organisations, and the programme staff to acquire technique and prepare for the more elaborate experimental transmissions from October 1st to October 28th. These were broadcast by the Baird and Marconi-E.M.I. systems in alternate weeks. During that period film newsreels, short film subjects and direct programmes consisting of variety, ballet, excerpts from stage plays, and outside broadcasts in Alexandra

(Please turn to cover iii.)

THE "EVERY-BAND THREE"

THE FIRST SET FOR ULTRA, SHORT, MEDIUM AND LONG WAVES WITH SIMPLE SWITCHING

WITH the inception of the B.B.C. television programmes, the home-Constructor once again has the lead over the buyer of commercial sets. And we are proud to be able to claim that it is "Popular Wireless" which is right in the forefront with entirely new and original designs.

This would not have been possible were it not for the fact that this journal possesses its own well-equipped and expertly staffed Research Department having fourteen unbroken years of experience behind it.

Original Design

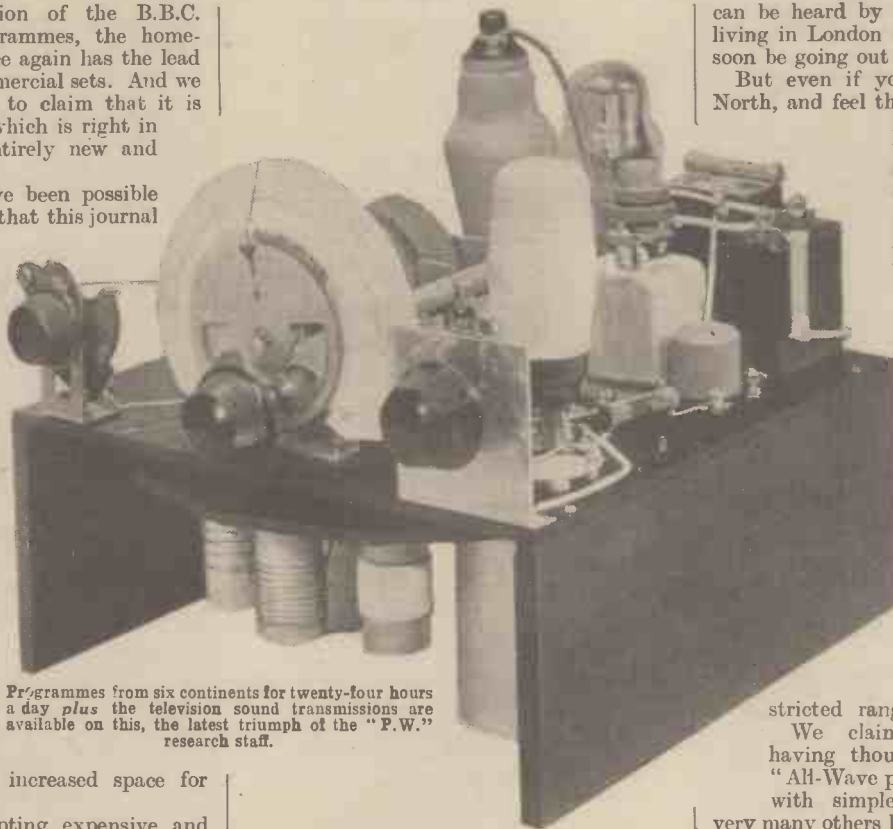
Some hundreds of "P.W." readers have been able to see this Department at work with technicians operating the synthetic broadcasting gear, measuring set qualities in the metal-lined cabinet, handling the 5-kilowatt universal power plant and so on. Recently, another room has been added in order to provide increased space for television research.

It is only by adopting expensive and elaborate measures such as these that original and practical designs can be developed. The only alternative is to take advantage of the pioneering work performed by others and to refer to published material which is available to all in order to build up specifications.

In connection with television, it is interesting to recall that the "Popular Wireless" Research Department has more than justified its existence. It produced the very first cathode-ray television receiver in the whole of this country, if not in the world, and also the first ultra-short-wave sets and adaptors. But that was some years ago and long before the high-definition service started. And from the Crystal Palace we conducted the first nation-wide ultra-short-wave transmission tests.

Within recent months we introduced the very first ultra-short-wave sets with simple switching to the medium and long waves. These again are developments which we were able to initiate only because we are adequately equipped to carry out lengthy experiments in fundamentals and design.

And now we have pleasure in recording that we have been able to advance the technique of radio reception one further



Programmes from six continents for twenty-four hours a day plus the television sound transmissions are available on this, the latest triumph of the "P.W." research staff.

can be heard by many others than those living in London and which, anyway, will soon be going out from provincial stations.

But even if you live right up in the North, and feel that it is likely you might have to wait for some time before you can with advantage use the ultra-short-wave facilities of the "Every-Band Three" you will know that you are equipped all ready for them when they come your way. A comforting feeling of superiority!

Inexpensive to Build

That might be offset to some extent if you had had to pay heavily for the privilege. But the amazing fact is that you won't have to do this, for the "Every-Band" actually costs less to construct than the majority of ordinary three-valve sets for the normally restricted ranges of wavelengths!

We claim nothing at all for having thought of the idea of an "All-Wave plus Ultra-Short" receiver with simple switching. No doubt very many others have toyed longingly with this idea. But there is an awful lot of difference between thinking of the desirability of a result, and its achievement.

We have already told you in previous articles something of the practical difficulties confronting the adding of ultra-short to only the ordinary waves. These difficulties are multiplied many times when the short waves have to be added to the equation.

Looking at the very simple set which is the outcome of our work, it is hard to visualise the experimenting which had to be done before the practical design was achieved. Here was no mere matter of taking a circuit and then expertly devising a layout to give it expression. There are no standard circuits applicable, and there are no conventional methods, for obviously a set of this kind has no precedent which can be turned to for guidance.

In fact, we had to start with an entirely blank sheet. Even all those ordinary methods of switching had to be jettisoned at the very beginning. Indeed, the rotary type of switch we ourselves had developed for ultra to medium and long-wave switching could not be applied to this new purpose.

(Continued overleaf.)

step forward. This is crystallised in the "Every-Band Three," a simple set having astonishing features.

Only One Switch Employed

By means of the one front-of-panel control you can switch it on or off or change over to any of the wavebands providing broadcast entertainment. It is, in fact, an all-wave set plus the ultra-short waves.

What a set!

You have the medium and long waves for B.B.C. and Continental listening. This is where the vast majority of sets possessed by listeners leave off! In addition there are two short-wave bands covering world-wide reception all the way from about fourteen to eighty metres.

Programmes from six continents for twenty-four hours per day—if you want them. Variety from New York, Tango from South America, Cricket from Australia, Film-star acts from Hollywood, Weird music from Japan, Dictators from Moscow and Rome; a truly cosmopolitan entertainment of unceasing variety—non-stop.

And, finally, there are the ultra-short waves for the television programmes which

"POPULAR WIRELESS" LEADS AGAIN

FROM OUR READERS

SO NEAR: AND YET SO FAR

The Editor, POPULAR WIRELESS.

Dear Sir,—The most interesting experience I have had occurred about four months ago, when I was then only mildly interested in wireless.

Having nothing better to do one evening I twiddled the knobs on the short-wave band of my set and eventually I tuned in to what I thought was the frequency of an American station. But I was surprised to hear two men speaking with a distinct Tyneside accent.

Greatly interested I continued to listen, and after a while I found (much to my astonishment) that it was, after all, an American station relaying a concert taking place in a hall in my own town and only a few yards from where I sat listening. In other words, although I could actually see the lights of the building through my window, I was hearing what was taking place inside, after it had travelled across the Atlantic to America and back again to my set!

And I realised that even though the sound had gone that great distance I would, no doubt, hear the words of those two Tynesiders a second or so before the audience at the back of the hall!

This made me realise what a wonderful thing wireless really is and since then I have been a 100 per cent radio "fan."

Yours faithfully,

C. L. TOWERS.

2, Edward St., Morpeth, Northumberland.

"BELIEVE IT OR NOT"

The Editor, "Popular Wireless."

Dear Sir,—Here is a true radio story. About five years ago there were eight of us, college students, staying at a hotel in Sheringham. One of the party had a portable battery set. Nearly every night we used to listen to the late dance music. On one particular night all of us retired early to bed, leaving a commercial student behind to hear the English programme through.

The following day we found that the accumulator had run down. We naturally asked the solitary listener if he had switched the set off on going to bed. To our amazement, he replied, "No, I thought the announcer switched off the set from the other end when he said 'Good-night.'"

Yours faithfully,

N. HUGHES.

15, St. Andrews Road, Enfield, Middlesex.

ARE "ALL-WAVE" SETS JUSTIFIED?

The Editor, POPULAR WIRELESS.

Dear Sir,—It is common knowledge that competition, and a natural wish to give the public what it wants, almost forces manufacturers to put something on the market against their own better judgment at times. Unless their goods comply with the "craze" of the moment, they are in danger of being dubbed out of date, and obsolete.

After testing out a number of different makes, one is inclined to think something of this kind applies to the popular all-wave set. The number of actual short-wave fans is very limited, and far the greater number who purchase all-wave sets do so with a view to being able to turn on entertainment such as they get from the other wavebands, and the claims made for the all-wave set undoubtedly lead them to suppose they will get it. But do they?

For the small number of listeners who can read Morse, or the genuine S.W. fan, who is thrilled to his marrow by logging a few blurred and distorted words, or call number from the Antipodes, no doubt an all-wave set is the goods. For the average listener it is more often a distinct disappointment. The difference in world times, which necessitates a listener in England sitting up till the early morning

How a reader realised what a wonderful thing radio is and became a keen radio enthusiast.

hours for a chance of logging really distant stations, the crowding of the ether, with all sorts of interference, and the phenomenon of "fading," are all so difficult to deal with that the owner of an all-wave set soon ceases to use the S.W. side of it at all, or at best only very rarely, since neither for himself nor his family can it provide entertainment as generally understood; and, recalling the slogans used to sell him the set—the "round the world from your armchair" sort of sales talk, he is left in rather a disgruntled state of mind, and an impression that he has not had quite a fair deal, and certainly not favourably inclined towards the particular make which he has purchased.

An "All In" all-wave set makes a strong appeal to popular imagination; but, technically, designers know how hard, or even impossible, it is to actually produce such a set with everything housed in the same cabinet.

On the other hand, set makers must comply with popular demand or watch their sales decline.

From a commercial point of view manufacturers must give the public what it wants, not what they know to be actually best. Inconsistent as ever, when the public finds out that what is demanded is not the best, then it turns round and blames the manufacturer, and may even have a bad effect on the future development of S.W. reception for "entertainment" purposes. "Once bitten, twice shy," thinks the potential buyer.

Might not this state of mind be overcome by makers being a little less enthusiastic about what their all-wave sets will do; by being much franker with the public in re to the difficulties of S.W. reception with an all-in set: by giving buyers an option between their long- and medium-wave sets and their all-wave sets, or a specially designed and self-contained S.W. set for such as are specially interested in that direction? In the end, "over-statement" never pays.

Research will undoubtedly vastly improve transmission and reception of short waves, and some day

it really will be possible to turn out an all-wave set in the same cabinet which functions equally well on all waves.

It would be interesting to know how many readers are fully satisfied with the S.W. side of their all-wave sets from a family entertainment point of view, and not continued into the "wee sma' hours," for most of us have to get a little sleep and can't work properly if we have been sitting up all night trying to get Australia.

Set makers might get some useful hints in considering the views of actual users of the all-wave set, and perhaps temper their eulogies a little, for the moment.

The lovely publicity matter they issue, showing an English gentleman sitting in a luxurious armchair, surrounded by his smiling family, with small, cloud-like drawings floating about the ceiling, depicting Spanish señoritas dancing, American baseball players about to swat it, and Australian natives hunting the wombat, or riding the emu, are all very interesting; but if the English gentleman after a whole night's twiddling has heard nothing but a few discordant howls and screeches, all he can do is to try to persuade his cynical family that they have been listening to the mating song of the platypus (or duck bill), or a corroboree of the Woola-Goolagoola tribe, and it is most unlikely that they will consent to endure any "repeat performance" on subsequent evenings.

Am I right? Or am I?

Yours truly,

K. T. HARDMAN.

110, Singleton Avenue, Birkenhead.

ANOTHER READER'S VIEW

The Editor, "Popular Wireless."

Dear Sir,—It's rather surprising the number of listeners who are not convinced that the S.W.'s offer real entertainment. There are nearly 8,000,000 licence holders in this country, and I think it can be safely said that there are about 12,000,000 sets in regular use. I don't mean to insinuate that there are a cool 4,000,000 radio pirates, but quite a lot of listeners have two sometimes three or more sets in regular use.

Out of these 12,000,000 sets it would be interesting to know what percentage are all-wave or S.W. sets; and

it would be still more interesting to know how many owners of all-wave sets use the S.W.'s for entertainment. It's surprising if you get talking to other listeners the way they'll expound the merits of their sets, but mention S.W. reception and they'll "shut up like clams," or else look at you in their "superiority complex" way as I to say, "You're crazy."

There's no doubt that Mr. John Scott-Taggart's article on S.W.'s convinced a great number of readers of "P.W." of the merits of S.W. reception, and those who built the S.T.800 and tried the S.W.'s for the first time will probably get the surprise of their lives; but, even so, unfortunately, there are still too many people who "turn up their noses" when you mention S.W. reception. I think this is due to the fact that a very great number of articles have appeared in the past on S.W. reception which gave one the impression that S.W. reception was extremely difficult and very unreliable; so unreliable that it was necessary to twiddle the knobs for hours, and then you had to be born under a lucky star to get any kind of result.

No doubt this was true to a certain extent—although grossly exaggerated—in the old days, but since the radio manufacturers in this country suddenly woke

OUR GUINEA AWARD

Each week we present a guinea to the sender of the letter which, in the opinion of the Editor, is the best. Send us your ideas or opinions or experiences. No radio subject is barred and everyone stands an equal chance. This week the guinea goes to Mr. C. L. Towers.

to the fact that there was—and, of course, still is—a growing demand for all-wave sets about ten months ago, a lot of the "bugbear" of S.W. reception has been eliminated. Then again, there's the fact that "dozens" of new stations have "sprung up" in the past year or two, and also that a lot of these stations seem to be having a "war" among themselves to see who can use the most power, which augurs well for "short-wave reception in the future."

Perhaps a few words on my personal experience of S.W. entertainment in the last three months wouldn't be out of place. I have listened during this period at all times of the day and most of the night, purely with a view to getting entertainment, and cutting out the thrills of getting stations from thousands of miles away. I think I can safely say that during this time I have never had a "blank period." By "blank period" I mean when it has not been possible to get at least half a dozen different stations.

A great number of people who are thinking of buying new sets, must at this very moment be asking themselves, is a S.W. band worth having? My answer to this would be a definite "Yes." To the listener who prides himself—or herself—on his impartiality regarding International Affairs, the S.W.'s are a real boon, as nearly all the S.W. stations of the world provide news bulletins in English, thus you are able to get your news "straight from the horse's mouth," so to speak, and hear all sides of the argument. Apart from getting everybody's point of view, you can also get your news while it is still "hot" and not hours after the events have happened. These news bulletins alone are worth a S.W. band on your new set.

Coming to real entertainment again, who can resist such household names as the following: Burns & Allen, Bing Crosby, Rudy Vallee, Fred Astaire, Eddie Cantor, Amos & Andy, Nino Martini, Nelson Eddy, Paul Whiteman, Jack Benny, Tom Mix, Ben Bernie, and Kate Smith, etc. These, and hosts of other stars are on the air regularly from the N. American stations which are heard nightly over here. Then, again, who can resist the appeal of the tango, bolero, or rumba, played as it should be, in all its native glory, or the weird, fascinating rhythm of the Orient.

All this, and much more, I have heard in the past three months. "Span the world on the S.W.'s and get REAL entertainment."

Yours faithfully,

HARRY LADNER.

10a, Mulgrave Street, The Hoe, Plymouth.

WHAT DO YOU SAY?

The Editor, POPULAR WIRELESS.

Dear Sir,—On page 412 of "Popular Wireless" for December 19th, 1936, W. L. S. asks what is wanted. May I ask for more of the same kind of this contribution please? I have no time to experiment, but this article on short waves has given me a greater insight of the "hows," "whens" and "wheres" than any other.

Yours truly,

A. WIGHTWICK.

Pembroke House, 1, Ashfield Road, Chelston, Torquay.

CUT OUT THAT RINGING

The simplest way of dealing with a microphone valve is illustrated here. By fixing a small weight to the bulb by means of "Plasticine" its frequency of vibration is altered sufficiently to stop the trouble.

SEEN ON THE AIR

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

L. MARSLAND GANDER

THE B.B.C.'s New Year gift to televiewers is a grey form. On it are a number of questions to which answers are invited, such as:

What is your make of television receiver?
Have you a special television aerial?

Please state (a) height of aerial above the ground; (b) height of aerial above sea-level.

Are you experiencing any difficulty in adjusting your receiver: (a) for vision; (b) for sound?

Do you find that reception is upset when motor-cars pass your house?

Are you experiencing interference from any other source?

Opinions on the Programmes

A letter accompanying this form will also invite opinions on the programme material. Viewers will be asked to say which among recent items they regarded as the most successful and which as the least successful. All the information will be regarded as confidential.

This decision to hold frank consultation with viewers is the most important service which Mr. Gerald Cock, the "D. Tel." (Director of Television), could have rendered television at this stage. It remains to be seen, however, whether the B.B.C. will act upon the advice

given in the matter of programmes. In the face of a noble gesture I do not like to "cock a snook," but I feel bound to mention that experience does not encourage the belief that the B.B.C. pay much attention to the counsels of its audience.

Moreover, though the advisability of treating individual replies as confidential is unquestioned, I think some general analysis of the referendum results should be made public. If we never know the consensus of opinion among viewers, we shall, similarly, never know how the B.B.C. responded.

On the technical side the data should be exceedingly valuable and will supplement the information regarding the service area which is being steadily collected by private firms and by B.B.C. engineers. The B.B.C. has, in fact, already prepared a map showing the contour lines of field strength, but for some reason will not disclose it. No doubt when the evidence more firmly establishes the facts this reluctance will be overcome.

Personally, I think that an authoritative map should be published without needless delay. It is a disservice to the public to withhold the information, for reasons which should be perfectly obvious. There are few really "blind spots" in the Metropolitan area, and if "Mr. Jones" residing in "Square A" could not, for geographical reasons, obtain satis-

factory reception it is grossly unfair that he should be misled into the belief that he can. It is *suppressio veri* by the B.B.C.

I have just received a copy of the questionnaire and accompanying letter myself. (I should have said that the B.B.C. made a microphone announcement asking for names and addresses.) "The successful development of the television service depends a good deal at this stage upon the voluntary help of viewers," it states. As regards programmes viewers are reminded that there are at present many practical limitations upon the arrangement, quality and planning.

"Other points are likely to come up from time to time," concludes the letter, "on which we should appreciate information from viewers. If you answer this present inquiry we should propose, unless you ask us not to do so, to let you know of them as they arise."

All this is, of course, only possible because the television audience is of a manageable size. Still we must give the B.B.C. full marks for evidence of good-will.

George Robey Makes a Hit

The Christmas programmes were a great success. On Christmas Eve came a big surprise—the first television appearance of George Robey, whose special technique, from eyebrows and bowler to stage mannerisms, might have been designed for the medium. At short notice he took the place of Bransby Williams, who was indisposed.

In recent broadcasts he has departed from the Robey tradition, but television brought back the old polysyllabic Robey who has convulsed more audiences than he cares to enumerate. Though no particular Robey fan myself I enjoyed his broadcast. He was on the screen for six minutes.

(Please turn to page 489.)

DISTANCE LENDS ENCHANTMENT

An ingenious W.B. remote control unit reviewed

I HAVE been having a fine time lately: working the latest piece of radio magic turned out by the Whiteley Electrical Radio Co. You are too familiar with their Stentorian ranges of loudspeakers for there to be any need to introduce W.B., but I must bring to your notice not only their latest speakers, but the new-born "Long Arm" remote control which they fit to some of them.

Worked by a switch which is integral with the volume control of the speaker, it can be obtained for fitting to or already fitted on the Stentorian speakers, type 37S and 37J. They are the senior and junior models.

I am not going to tell you exactly how the remote control works as regards its theory. It uses no current except a momentary impulse when it is switched on and off, which it takes from a small battery inside the unit. The effect is delightful. There is no more need to rush to and from the room in which the extension speaker is situated in order to turn the set on or off. You just sit back in your chair, reach out for the volume control, turn it to minimum and press a knob. Immediately the set either goes on or off. Delightful, isn't it?

Silent in Operation

And it works, too. I have had remote controls in the past which have pleased me for a time and then decided to play Old Harry with my nerves. Controls which would switch on the set and let me settle down to the enjoyment of a programme and then suddenly start crackling, or even switch the receiver off again without any orders from me.

Nothing like that in the "W.B." I have tested. It switches the set on and leaves it put. There is no extraneous noise, and as the volume control is at the minimum position when the remote control is operated, there is no sudden pop in the speaker as the set goes on or off. Everything is delightfully quiet.

The wiring up of the control is quite simple. The whole thing can be done in a few minutes. It costs 15s. 6d., and the only "extra" you need is the three-way cable which connects the remote control to the speaker.

The control is connected on one side to the loud-speaker terminals of the set, and through it also

goes the current from the L.T. battery or the mains power.

The unit is placed near the set, of course, and the three-way cable (obtainable at practically every dealer's) is run from the unit to the speaker terminals. It connects with the terminals marked W, R and B on the speaker chassis and with corresponding terminals on the remote control unit.

I should remark here that the standard cabinet speakers of the 37S and J types are fitted with the necessary volume control and remote control switch.

If you want to fit the remote control to the chassis models you can do so provided that the models are the same types. In that case, all you have to do is to get the necessary volume control with its press button and to wire it up to the speaker in accordance with the instructions from the makers. It's all very simple.

And now a few words about the speakers: They



The "Long Arm" control unit and one of the latest W.B. Stentorian speakers.

have exceptionally close matching ratios, so that exceedingly accurate matching can be obtained for output valves with impedances or optimum loads ranging between 3,250 and 70,000 ohms. In all there are nine different switch positions giving nine different matching ratios on the high-resistance setting. On the low resistance setting there are again nine ratios giving close matching with a low-resistance output between 1 and 22 ohms—enough for any type of set.

Harking back to the remote control, I should make it clear that it does not matter whether you are using high- or low-resistance coupling with your extension speaker; the remote control can be employed just the same.

Either straight or push-pull output can be used with the Stentorian speakers, the only difference being

that with the push-pull or Class B type of set the maximum anode current allowable through the speaker is 120 milliamps, whereas in straight outputs the maximum is very much lower.

The volume control is not fitted as standard on the chassis models, but provision is made for it. All you have to do is to remove the shorting strip between terminals D and E and to connect the volume control there.

As regards the quality of output I can honestly say that the Stentorian speakers I have tested have given the most realistic output I have ever heard from any extension speaker. That is saying something, I know, but it is true. The Stentorian seems to give a life-like quality to the reproduction that is all too often missing when extension speakers are used. The cabinet is commendably free from resonance, and the top notes are very well reproduced indeed.

With a small cabinet, one that is suitable for use in almost any position in the room, and does not take up much space, you cannot expect to get every low note with its maximum fullness. But with the Stentorian you do get a reasonable proportion of bass, and it is exceedingly well reproduced.

No Harsh Areas

The balance of the speaker is excellent. There are no harsh areas in the musical scale, and I could detect no peaks either in the bass or in the high notes. Speech is particularly well reproduced.

Altogether the Stentorian speakers and the Long Arm remote control units are to be highly commended. They will solve the problem of set control for a great many people, especially those who like to have their receiver in a room that is not normally used for listening. Those who like music by their bedside will welcome the unit, for it removes at once all the tedium of having to get up and switch off the set, and the fact that the remote control switch is incorporated in the volume control on the speaker is one that is most important. It does away with any untidy switch control which in past remote control units was always a bit of a bugbear. They had a knack of falling down on the floor, or being knocked about if they were fixed to the wall or skirting.

I congratulate "W.B." on a very fine piece of work, and one which I feel sure will reap its well-merited reward in very ready sales.

K. D. R.

TELEVISION TOPICS—Collected by A. S. Clark



Mr. A. S. Clark at the controls of a small cathode-ray tube used for oscillograph investigation and the testing of new ideas in television time-base circuits.

“TELEFRAMES”

Items of general interest

THE B.B.C. is going to make a special effort to find out just what lookers think of the television programmes. Lookers are to be invited to send their names and addresses so that they may be asked questions from time to time.

It is a good idea, but we hope that *ad lib.* remarks will be welcome as answering set questions will hardly meet the case.

Also the scheme aims at getting some idea of the present number of lookers.

The trouble is that so many people, if they are satisfied with the programmes, will take them for granted, while if they are not satisfied, they will just not be bothered about it. Further comment on the subject appears under “Seen on the Air” on the opposite page.

CINEMA TELEVISION

We understand that on January 4th, the Dominion Cinema, in Tottenham Court Road, commenced to include a ten-minute television item in its programmes.

The Baird big-screen system recently described in POPULAR WIRELESS is employed.

It is stated that many famous screen and stage stars will be appearing in these items.

“RECORD BREAKING”

Sir Malcolm Campbell is to feature in an interesting combination of film and direct television to-day, Wednesday, when in “Record Breaking” he will show televiewers how he captured and retained the world’s land speed record. Viewers will first see the actual record-breaking car “Blue Bird,” which is to be brought to Alexandra Palace for the occasion; Sir Malcolm will then be interviewed by Cecil Lewis, and will explain the car’s features. Finally, a series of films of the record run will be shown, Sir Malcolm supplying the commentary. The final sequences will show the Blue Bird’s last record-breaking run at Utah.

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

A DUSTLESS ROOM

In the television section of the G.E.C. research laboratories at Wembley, Middlesex, is what is claimed to be the most dust-proof room in the world.

Here a white-coated girl scientist spends her day conducting one of the most delicate operations in the manufacture of a television set—making the screen. Even the smallest particle of dust would be enough to distort the picture on it. So the room in which she works has to be free, not only from the kind of dust that can be seen, but dust so minute that only the most powerful scientific instruments can detect it.

The television screen consists of a special powder coated on to the flat surface inside the glass cathode-ray tube. When this powder is bombarded with electrons it lights up, giving the picture.

This layer of powder must be *absolutely even*, and that is why there must not be even a speck of dust in the room. The thickness of the coating is so slight that it has to be measured by weight in grammes after application.

The powder used by the G.E.C. is zinc sulphide with other chemicals, the nature of which is not divulged. These must be added with an accuracy of within a thousandth of one per cent.

This television “screen” of powder has to be able to withstand a terrific strain, as it is bombarded by electrons travelling at 70,000,000 miles an hour.

ELECTRON OPTICS

“ELECTRON OPTICS” is a term one soon comes across in studying television. It sounds a little terrifying at first, and no doubt puzzles many, because it seems to be something entirely fresh and unusual.

Actually it is an extremely interesting and fascinating subject, though what it does for television is so often taken for granted.

Ordinary “optics,” as you know, concerns light-rays and their focusing by means of lenses. Similarly, electron optics deals with focusing, but in this case it is a beam of electrons instead of light which is focused.

When a beam of electrons passes from an electric field of one strength to a field of different strength, the nature of the beam

is changed. By suitably arranging the field strengths in relation to one another, it is possible to focus the beam into a spot of any size desired.

Rather surprising, too, is the fact that it is possible more or less to forecast by calculation just what effect certain fields will have, just as one can work out what a given type of lens will do to a beam of light.

The electric fields may be produced in two ways. They can be static-voltage fields, or they can be provided by means of a coil giving rise to magnetic fields.

PHOENIX BAIRD



A reproduction of the illustration on the front of the 1936 Baird Xmas Card. Nothing could have been more appropriate or illustrated better their determination not to let misfortune hold up their progress. The bird shown is Phoenix, a fabulous bird, which after an existence for a long time in the wilderness, was burnt in a fire but afterwards sprang into new life and youth from the ashes.

The first type is to be found in cathode-ray tubes with two or three anodes to which different H.T. voltages are applied. By suitably varying these, and the negative voltage on the screen, the spot on the end of the tube is focused down to a fine point.

With magnetic focusing, as with magnetic deflection of the beam from side to side, a suitable coil (or coils) of wire is wound round the outside of the tube.

It is thus that you find the terms “magnetic focusing” and “static focusing” in connection with cathode-ray tube specifications.

TELEVISION TOPICS—Continued

BOX HILL CAN'T STOP TELEVISION

DRIPPING into the Betchworth Road House the other night, to enjoy the amenities of this hospitable establishment, I had a most interesting television experience. The manageress, Miss Sutton, had had a Cossor television receiver installed for test purposes. Luckily I had swung my car into the entrance a few minutes before nine o'clock.

First of all I must give you some details of the geography of the locality.

The Betchworth Road House is situated on the by-pass road running from Dorking to Reigate, and consequently is just to the south side of Box Hill. I should estimate it is a quarter to half a mile from the base of the hill.

On the Edge of the Area

More interesting are the facts that the distance to Alexandra Palace is over 25 miles (so that the locality is right on the edge of the "normal" service area), and that a straight line from the Road House to the Palace passes just about through the highest point of the hill. The hill is 590

feet above sea-level. You will see it is obvious the locality is anything but an ideal one. In fact, the engineers admitted they were dubious about their chances of picking up a strong enough signal.

But when we come to consider the facilities available for erecting the aerial, things get even worse.

To start with, the roof of the Road

back some 30 yards and joined up with the usual feeders.

Unfortunately, however, the ground behind the Road House sloped so steeply that even with the aid of a tree and a long mast, the aerial was not as high as the roof of the building.

And yet the pictures I saw were as good as many I have seen in London, and nearly as good as the best I have witnessed in London. That statement, in itself, is practically a complete test report of the Cossor receiver which was the 120 guinea model, incorporating an ordinary broadcast receiver and automatic record changer.

A Constant Time-base

An idea of the pick-up the vision had to work on can be gathered from the fact that the sound volume control, when turned to maximum, gave barely sufficient volume. Pictures remained properly synchronised, except for the occasional slight side shift of a few lines, during the whole hour's broadcast I witnessed. That speaks well for the constancy of the time-base circuits.

The amount of "snow" from cars passing was by no means excessive in spite of the high degree of sensitivity at which the set was working. I understand that the pick-up was slightly less during darkness as compared with daylight reception.

Pictures were black-and-white, with a very, very slight bluish tinge. A. S. C.

A FERRANTI TUBE



One of the standard Ferranti 14" diameter-screen cathode-ray tubes which are used in television receivers of this make.

House was out of the question because of the fairly busy main road running immediately outside. So the aerial had to be set

compared with daylight reception. Pictures were black-and-white, with a very, very slight bluish tinge. A. S. C.

TELEVISION FOR BEGINNERS

G. Stevens explains how the synchronising impulses are handled

THE signal which is delivered by the detector to the tube includes both the modulation and the synchronising impulse, the difference between them, as explained before, being that the synchronising pulse is below the level of an arbitrary datum line. The height of this datum line corresponds to the "black" signal, and when the modulation is applied to the tube the only effect of the synchronising pulse is to cut the beam off still more if possible, i.e. to carry the bias well beyond the cut-off value.

Now when we apply the synchronising pulse to the grids of the scanning circuit relays, we want the opposite effect to happen—the pulse must reduce the bias instead of increasing it.

How It is Done

To do this we must "reverse the phase" of the pulse. This means that with regard to the datum line the pulse must be in the positive direction above the line instead of the negative direction below it. The diagram of Fig. 1 will help to make this clear, and it really boils down to turning the whole curve upside down.

This can be done quite easily by passing the signal through another valve and connecting the lead from the anode circuit to the grids of the relays. A valve will always

reverse the phase of a wave passed through it, because a reduction in grid bias means an increase in the anode current and a corresponding increase in the voltage developed across the anode resistance.

If we imagine the synchronising pulse applied to the grid of a valve,

PHASE REVERSAL

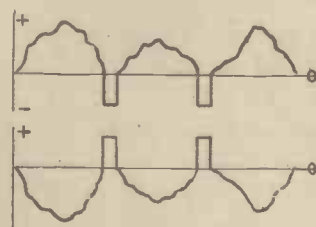


Fig. 1.—How a valve reverses the phase of a modulated circuit.

each dip down will increase the anode current and give a corresponding rise in voltage across the anode resistance.

This rise is in turn fed to the grid of the relay and produces a momentary drop in the bias to allow the condenser to discharge.

The voltage changes in the anode circuit of the "phase reverser" are composite, since the line and frame synchronising pulses are mixed up and are both delivered in the output. To apply

only the correct pulse to each valve, which is desirable in order to obtain strong "syncing," we shall have to use some form of filter which will prevent the line pulse affecting the frame scanning and vice versa.

We are helped a lot in separating out the pulses by the wide difference in their frequency, one being 6,000 or 10,000, and the other 25 or 50. The problem is really one which radio designers are continually finding, and it is possible to design a band-pass filter which will pass one or other of the two frequencies and exclude all others. A professional band-pass filter is fairly elaborate, however, and simpler circuits will work quite satisfactorily, helped by the fact that it is not necessary to filter the two frequencies perfectly.

Separating the Pulses

Fig. 2 shows a diagram of a simple filter for the two frequencies. On the left the anode voltage is developed across a choke and condenser in series. Since the impedance of the choke is very high to high frequencies there will be negligible voltage dropped across the condenser, and the high frequency output will be negligible across the terminals P and E. On the other hand the impedance of the condenser on the right hand side is very high at the low frequencies, and the majority of the voltage developed across R will be high frequency. This filter is quite sufficient to ensure that the correct frequency is applied to the grid of each relay.

Another point in the management of the synchronising impulse is to try to make the impulse of constant amplitude whatever is happening in the modulation or the strength of signal. This makes the scanning circuit run much more smoothly, as otherwise an occasional weak pulse may fail to trip the relay, or an extra strong one trip it too early.

Using a "Limiting Valve."

The strength of the impulses is controlled by passing them through a "limiting valve," which is just a screen-grid valve arranged so that the anode current cannot change more than a given amount. The strength of the input signal is adjusted to give an anode current change just up to the

SYNC. FILTERS

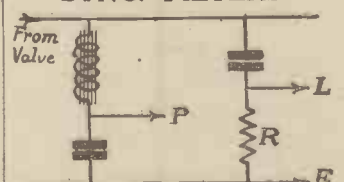


Fig. 2.—A circuit for separating line and frame synchronising pulses.

maximum value, and then any stronger impulse is cut off automatically and reduced to the level of the normal one. Of course, we shall take care that the setting of the valve is such that the weakest impulse just gives the maximum change in anode current, and then all others are trimmed to this height.

RANDOM RADIO REFLECTIONS

A Million Volts Let Loose—Television—Radio Drama on "the Other Side"

By VICTOR KING

HOME-MADE LIGHTNING

I HOPE you heard that short talk on high voltage the other Saturday evening. It was a fascinating glimpse into a different kind of H.T. from that which you encounter in a radio set. Which isn't high voltage at all in a strictly engineering sense.

Nowadays nothing under about ten thousand volts is considered to be a high voltage. And what's a miserable 90 or 120 volts against that? Nothing but a mere grid bias!

The very high-voltage stuff is most thrilling. I was privileged to inspect the first million-volt outfit assembled in this country. That was a few years ago now. The gear was installed in a great hall big enough to accommodate a picture palace. The transformer for stepping-up the volts from an ordinary mains supply was nearly as big as a house—or a cottage, anyway.

And when they cracked off their million volts between two big round balls about 8 feet apart there was a report nearly as loud as a thunderclap. Instead of the spark being a straight thread of flame, as you might have expected, there were darts and flashes zigzagging out from it into the surrounding air just as though it were real lightning and you were right up against it.

The rail surrounding the plant kept one some 20 feet back, but even so I don't mind admitting that I didn't feel particularly safe. Since then I have seen two million volts in action—although, after a fair amount of personal experience with the very high-voltage aspects of electrical engineering, I still find it thrilling. Mind you, it isn't just a stunt. The Grid system of electricity distribution uses voltages of over a quarter of a million and the apparatus employed has to be tested at a million volts. Or, at least, some of it does. Such pressures demand particularly drastic testing, as can be appreciated.

For example, insulators have to insulate when they are dealing with spectacularly high volts—and how. Think of two or three hundred thousand volts sneaking off the Grid and roaming loose around the countryside!

TELEVISION IDEA

MY remarks about a large-screen idea have called forth quite a few letters. Notably one from Mr. H. G. Newman, of Southwick, Sussex, who has read every "P.W." from No. 1 to the present.

(Pretty good going, H. G. That's about fourteen years, I think.)

Mr. Newman says that he had thought of applying an epidiascope principle to television before I disclosed my idea. But he has been thinking in terms of transmission and not so much of reception.

His scheme comprises the modulation

of a light beam by the light fluctuations of the picture. This beam to be broadcast and picked up by elevated periscopes instead of radio aerials.

There is certainly a thought here, but I can tell our friend that there are two points to note. (1) That light beams for ordinary wireless communication have had many millions of words and heaps of patent applications devoted to them. (2) Modulation of one light source by another will not

deny to oscillate between the "precious" and the "proletarian." No defined policy. Perhaps there ought to be two independent drama departments at the B.B.C. One which would go all out for the popular appeal (with stuff you and I would lap up), and the other to plug the high-brow dope. You can't expect the one bunch of lads to be able to handle both with success. It's like expecting to be able to provide Symphony Concerts and Chamber Music and Dance Music all with the one team of arrangers and players. The result is bound to be a flop—a falling between two schools.

But about the U.S.: Once upon a time, when you and I were very young (say seven or eight years ago), there was practically no drama on the air in America. It was all cross-talk comedians (à la Amos 'n Andy), crooning and dance tunes.

Then serial drama began to creep into the afternoon programmes. The heart-throb adventures given by instalments of a quarter of an hour a day, and going on and on and on.

Gradually these serial-plays increased in number until the U.S. after-lunch ether became absolutely packed with them. They have now begun to creep into the evening programmes. Then complete episodes somewhat longer in duration started up. Goodness knows how many of them are now running. I'm following a dozen or so—when I've got the time. It doesn't matter if you miss a number of instalments or episodes. You can easily pick up the threads. They are very artfully contrived so that each instalment is full of action, but the story moves very little farther forward.

Every Sunday I make a point of listening to the Colt detective stories from W2XAD on 19 metres and the Grand Hotel episodes which follow later. Then I listen to the thrilling adventures of Ma Perkins, of the Young Family, of Jack the Chinaman Dodger and goodness knows what else.

Low-brow? You've said it—and how! But I yam because I yam—

SPORTSWOMAN AND MUSICIAN



Miss DIANA DOVETON, who hails from Bath, is an International Badminton player as well as an accomplished pianist. She has already broadcast twice, the last occasion being only a week ago when she was solo artist in the Bristol Royal Orpheus Glee Society's programme from the West Regional.

give an amplified effect. One might just as well take the main beam and make that the picture beam direct, à la magic lantern. My idea was rather different. In any case, what about daylight transmission. Hard to get by the jolly old sun with an artificial light radiation!

However, there may be an "in-studio" germ of an idea here that Mr. Newman might find worth pursuing.

WHITHER U.S. BROADCASTING?

I AM amazed at the development of radio drama in the U.S. Over here it is something of a poor relation of broadcasting. Or so it would seem. Maybe, because of a ten-

THOSE A.P. PROGRAMMES

IT is with real pleasure that I record that the television programmes have recently shown signs of great improvement. But there is still lacking that "something" in presentation which makes all the difference between slickness and slackness.

However, with the better material and the obvious will to please "viewers" one can forgive the "televisionites" of the A.P. that failing so long as it doesn't last too long. Anyway, I've already found television a quite indispensable domestic amenity and should hate very much to be without it.

RADIOTORIAL QUESTIONS AND ANSWERS

By K. D. ROGERS

TOO MUCH BASS WITH A CRYSTAL PICK-UP

L. T. F. (Purley).—*I have a crystal pick-up which gives very fine reproduction, but I think that the bass is a little too pronounced. Can I cure this?*

Quite easily. It has been the subject of these columns before, but for the benefit of those who did not see it, I will give the circuit again. All you need to do to reduce the bass is to connect a resistance—preferably a variable resistance—across the pick-up. In other words, across the volume control you now use for the pick-up.

The recommended volume control for the piezoelectric or crystal pick-up is 500,000 ohms. This gives the full bass response of which the pick-up is capable, but in many cases it is found that the bass reproduction is too much.

I prefer to have a subsidiary volume control connected across the main control. Not for the purpose of altering the volume, but for decreasing the bass response on such records as seem to be too heavily recorded in comparison with the treble. I suggest a volume control with a switch incorporated, so that it can be switched out of circuit completely. You will have to adjust the value to suit your amplifier, but I use a 1-megohm control, which, when cut out of circuit, has, of course, no effect on the bass reproduction at all. When it is switched in—wired as an ordinary resistance and not as a potentiometer, it gradually decreases the total resistance across the pick-up and so reduces the bass. It can be reduced to a very low value, and the bass can be cut practically out, though, of course, you never want to reduce the resistance to that amount.

The connections are shown in the diagram, and it will not take you a moment to fix the thing up. When the additional resistance is first switched in, with its 1-megohm value, it results in a total resistance value (being in parallel with the 500,000-ohms) of .3 megohm, or 300,000 ohms approximately. That reduction should not have a very great effect on the bass. But on reducing still further the resistance by reducing the resistance of the additional control, you will soon reach a point at which a very pronounced aural loss of bass exists.

FITTING VISUAL TUNING

L. C. S. (Earls Court).—*I have a five-valve set, using two mains variable-mu pentodes, a power grid detector and a couple of L.F. valves. I want to fit visual tuning. Can this be done?*

Not really well without converting the set to some sort of A.V.C. You see, normally, as you have the set, with probably hand-controlled volume control on the variable-mu valves, the incoming signals have no effect on the anode currents of the valves. But the signals do have an effect on the anode current of the detector, and this will be reduced in proportion with the strength of the signal. You could, therefore, have a somewhat crude visual tuning device in the form of a milliammeter in series with the H.T. for the detector, but the sensitivity of the device would not be on a parallel with that of the true visual tuning in which a meter is placed in series with the H.T. of the H.F. valves and A.V.C. is used in the set.

NO REACTION

A. R. L. (Northfield).—*I have a short-wave set, but I find that I cannot get reaction, even though I turn the condenser all in. It is of the right size and the coils are as specified. What is wrong?*

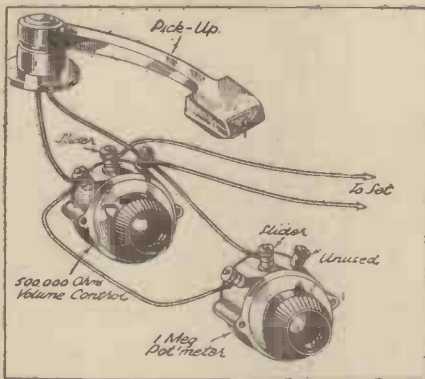
I am afraid I do not know. I cannot tell you right off, with only those small details. Make sure as a start that the coils are O.K. for continuity. Then see that the reaction winding is connected the right way round. You may have connected the coil wrongly.

Are the H.T. and L.T. all right? Try increasing the former, and also try another grid leak—say one of higher value. It is possible, though not likely, that you have a faulty one in circuit.

What about the aerial damping? Is the coil connected straight on to the aerial so that the grid winding is in connection direct with the aerial? If so, try a small condenser in series with the aerial—a .0005 should be O.K. Or, alternatively, tap the aerial on to the coil with a crocodile clip, moving the clip along the coil to get different tapping points.

Try the set with the earth disconnected. Make sure that the H.F. choke in the anode circuit of the detector valve is O.K. If this is faulty you will get no reaction. Those are the main points to consider. Check them over, and if you cannot cure the trouble drop me another line.

THE CONNECTIONS



How a variable resistance is joined across the pick-up volume control to reduce the bass response. See reply to L. T. F. (Purley.)

not pay any firm to undertake the repair of the valves. You can have big pieces of apparatus like cathode ray tubes mended—the makers of the tubes themselves undertake that service—but I am afraid that you cannot have new filaments or even heaters in mains valves put in. It just would not pay the firms to undertake the job. But before you buy new valves let me advise you to overhaul your set and make sure that the new valves will not blow from the same cause as that which brought about the decease of your other ones.

LOST EMISSION

B. G. G. (Birmingham).—*What makes a valve lose its emission?*

That is a big question, isn't it? It really needs a full-length article on the subject, but I will do my best to explain in a few words as clearly as I can.

Imagine you have a big spray, like that which is fitted to the ordinary garden hose. Imagine that the holes in it are very much smaller than as used by the hose, and that there are hundreds of them instead of about twenty or thirty. Also imagine that each hole is connected to a separate thin pipe and is fed by a separate supply of liquid. Also imagine that the spray is to feed steam instead of water, and that each pipe goes to a separate tiny kettle which is heated on a large fire. All the hundreds of kettles are being heated on the same fire, and they all contain water.

Now, there are two ways in which you can make water boil faster than it will normally. One is to increase the heat so that it is driven off in the form of steam at a very great rate. The other is to create a sort of vacuum, or reduced pressure at the outlet end so that the steam is sucked off from the kettle. The water will then turn into steam very quickly indeed. Now suppose you start up your peculiar spray boiling the tiny kettles and letting the steam come out of the nozzles. You are doing very much what happens in the filament of the valve. The electrons in the filament are "boiled" off by the heat of the filament. Now, with your kettles apply some suction. You are applying something that will cause the boiling to take place faster. You are applying a rough analogical equivalent to H.T. on the anode of the valve.

Your kettles will boil faster and the water will boil away in a shorter time. Now, if you also heat the kettles more you will further increase the boiling, and probably one kettle will dry up before the others, and one nozzle will stop emitting steam before the others.

That is what happens in the valve. The electrons boil off in unequal patches when the filament is

overheated or/and too much H.T. is applied. Remember that too little grid bias is equivalent to too much H.T.

Your valve will lose emission because the electrons are being boiled off too fast. There are other physical phenomena that we cannot go into here, but the analogy of the kettles is not very far out. It is inadequate, but as far as it goes it is pretty near the truth.

So "boil" your filament slowly, and with not too much H.T., or with plenty of grid bias, and your valve will last a long time. The electrons will not be boiled off too fast. They will not leave bare patches of filament where the electrons have all been torn off, and thus give patchy, unsatisfactory emission.

Just picture those electrons boiling off the coated filament or cathode, and remember the fact that the valve's "kettles" are not inexhaustible. They only hold so many electrons, and when these are all gone the valve is useless. As a matter of fact, it becomes useless before the electrons have all gone. When the stream of electron "steam" drops to a certain density the valve is of little good. It will not amplify properly, and distortion creeps in. Then the "steam" supply drops still further, and the valve has to be discarded.

BROADCASTING AND CINEMAS

Details of the Western Electric Arrangements with the Relay Services

THERE has lately been an increasing demand on the part of cinema exhibitors for facilities to relay broadcasts of events of national importance to their patrons over the cinema amplifiers and speakers, and many requests have been made to radio relay service operators for the connection of their services to cinema sound reproducing systems. Some exhibitors have attempted to connect up ordinary commercial radio receivers, but results have generally been unsatisfactory; in addition, very bad electrical interference is often encountered.

Negotiations have been proceeding for some time between the Relay Services Association of Great Britain and Western Electric Company Limited, and an agreement has now been reached under which Members of the Association are granted the right, subject to certain conditions, permanently to connect their services to Western Electric sound equipment when requested by the Exhibitor.

Relay Services engineers have, in conjunction with Western Electric, designed protective apparatus for insertion between the relay service cables and the sound equipment, which has successfully overcome the technical difficulties of bringing speech circuits of anything up to 50 volts into cinema operating boxes without the risk of pick-up or cross-talk in the sound equipment, and of feeding into the amplifiers in a satisfactory manner. The protective and control apparatus consists of two separate units, both of which are located in the operating box, but which are separated by a distance of two feet.

Inside the Two Units

The first unit contains a relay programme selector switch, an isolating step-down transformer electrostatically screened between windings, and attenuator pads which may be switched in and out of the circuit as required. A single earpiece monitoring headphone is provided, permitting the theatre operator to select the desired radio programme while the sound film equipment is still in use.

The second unit controls the input to the main amplifiers, and consists of a film-radio key and a volume control potentiometer.

Experiments have proved that extremely satisfactory sound reproduction can be obtained in theatres by this equipment, and exhibitors taking advantage of this new arrangement will be enabled to relay practically all broadcasts, with the exception of news items, running commentaries, and certain other items for which the B.B.C. do not give permission for public broadcasting.

SEEN ON THE AIR

(Continued from page 484.)

The next feature was notable for the first appearance of a television studio audience, and consisted of a Christmas Party of veteran variety artists. An audience is a definite asset to a show of this kind. The whole affair, with Bert Terrell as chairman, was an infectiously jolly party in which a good time was had by all—including viewers.

These artists, who entertained a past generation and who introduced several catch-phrases into the language, were at home with the newest entertainment of all. It was happy association of ideas at an appropriate season. Charlie Lee started off with a song he sang fifty years ago and (I think it was he) did a hand-spring across the floor. Lottie Lennox, "Darling of the 'Gods'," wondered (tunefully) about love in her old age and confirmed my impression that television deals best with brunettes. Then there was Harry Bedford who craved a little bit off the top; there were Ada Cerito and Tom Leamore.

Some Wood Green children were invited into the studio to receive presents off a Christmas tree—another happy thought.

The Peak Programme

The Christmas Day Picture Page transmission was the peak programme. Joan Miller, the telephone girl, did all her announcing at the beginning—a good idea for a variation I thought. Then Leslie Mitchell (off screen) chipped in from time to time with further announcements. However, it appeared that the real motive for the change was to allow Miss Miller to appear as one of the "turns" herself later, which she did very effectively in the guise of an American hotel telephonist.

The most charmingly un-self-conscious visitor to Picture Page was Princess Kouka, a Sudanese princess who is to play opposite Paul Robeson in a new film. I prophesy brilliant success for her. She told us in French of difficulties she had in persuading her father to let her go. I must say that I sympathised with the old man.

Then, seasonably, there were bell ringers and carol singers; a plumber and his mate, natural humorists, and Edward Shackleton, the explorer's son, told of a winter and a Christmas in the long night of Ellesmereland. Popeye the Sailor brought amusement, and Chelsea pensioners a proper measure of sentiment to the programme.

An expert chef showed us how to carve the Christmas turkey before Picture Page proper.



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

It is very often necessary in short-wave transmitting work, and in designing short-wave and broadcast receivers, to place a control some distance from the component which it operates. To do this, a length of rod, coupling the control and component, is needed. But there is always the difficulty of alignment to consider, and for this purpose some kind of flexible coupling is desirable.

A. F. Bulgin & Co. have recently introduced suitable flexible couplings into their range. They are designed for 1/4-in. diameter

shafts, and provide several angular degrees of flexibility.

Two types are made, having either 1-inch or 2 1/2-inch porcelain insulators. This characteristic makes them suitable for high-voltage and television uses.

The 1-inch type is listed at 1s. 9d., and the 2 1/2-inch coupling costs 2s. 3d.

In addition there is also a simpler coupling known as the short-shaft type, in which no insulation is employed. This is listed at 9d., or alternatively one can obtain a similar flexible coupling in which the disc is of insulating material for 1s. Numerous uses for these couplings will suggest themselves.

BELLING & LEE SUPPRESSOR

Among the new Belling & Lee lines is a three-core flex lead suppressor costing 7s. 6d. Weighing only 4 1/2 ozs., it is designed for insertion between apparatus known to

be causing interference and the mains. Those who are troubled with electrical interference would be well advised to get into touch with this firm, who are specialists on interference elimination.

Also from the same firm comes a high-frequency low-impedance feeder for use with dipole aerials of the half-wave type, in which the feed is taken from the centre of the aerial.

The feeder has been designed for reception purposes with particular reference to the television frequencies.

The makers claim that in practice it has been found to subscribe towards the production of a particularly clean picture, remarkably free from interference even when it has been found necessary to lead down via a lift shaft.

Sold in reels of 65 feet, the price is 6s. 9d.

REALISM—NOT JUST 'TONE'



Above is the 1937 Stentorian Senior Chassis, at 42/-. Incorporating an entirely new exponential moulded cone (manufactured from an exclusive material at Mansfield) it gives a width of response and freedom from resonances that must be heard to be believed. The enormous flux strength, original speech-coil construction, and re-designed matching system make possible a new sensitivity and brilliant "attack." It will make all the difference to your set. Other models from 23/6. Ask your dealer.

Taken from a user's letter, the words above have an important meaning for you.

During 1937, will you be satisfied with "just tone" or will you let this new marvel of speaker efficiency bring you that vivid "life" which makes all the difference to radio listening?

To thousands, the new features of the 1937 Stentorian will bring a fresh radio enjoyment during the New Year. How about you?



1937 STENTORIAN

THE *NEW* SPEAKER WITH THE *NEW* REALISM

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

A Radio mechanic named Hyde

For a "fault-finder's" job once applied.

"I'll be all right," he mused; "Where no FLUXITE'S been used

I could always find fault if I tried."



See that FLUXITE is always by you—in the house—garage—workshop—wherever speedy soldering is needed. Used for 30 years in government works and by leading engineers and manufacturers. Of Ironmongers—in tins, 4d., 8d., 1/4 and 2/8.

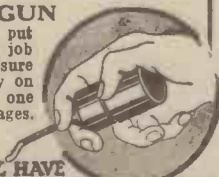
Ask to see the FLUXITE SMALL-SPACE SOLDERING SET—compact but substantial—complete with full instructions, 7/6.

Write for Free Book on the art of "soft" soldering and ask for Leaflet on CASE-HARDENING STEEL and TEMPERING TOOLS with FLUXITE.

TO CYCLISTS! Your wheels will NOT keep round and true unless the spokes are tied with fine wire at the crossings AND SOLDERED. This makes a much stronger wheel. It's simple—with FLUXITE—but IMPORTANT.

The FLUXITE GUN

is always ready to put Fluxite on the soldering job instantly. A little pressure places the right quantity on the right spot, and one charging lasts for ages. Price 1/6



ALL MECHANICS WILL HAVE

FLUXITE

IT SIMPLIFIES ALL SOLDERING

FLUXITE, LTD., DEPT. 324, DRAGON WORKS, BERMONDSEY STREET, S.E.1.

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Masons Hill, Bromley, Kent.

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THIS COMPONENT BUSINESS

(Continued from page 473.)

of a constructor his refusal to replace a half-watt resistor by one of one watt. While it is true that makes of resistors are almost always interchangeable, the fact remains that some types are noisier than others, and that I may choose for a coupling resistance a type which I have found quiet. As a matter of fact, a change of a resistor from one-half watt to one watt may cause a serious change in conditions if the resistor is on the high-frequency side of the set. A grid leak, for example, if of much larger size might alter the stray capacities and incidental coupling effects, resulting perhaps in instability. These resistors usually have quite large metal caps on the end, and these may form one side of a "condenser," the other plate of the condenser being a dangerous point on the anode circuit. Frequently there would be no room for a one-watt resistor, and the constructor in trying to find accommodation will push the resistor into a position which is dangerous from a design point of view. He may even alter the position of other components to make room for it. So be very careful, all of you, before sneering at a man who prefers to build a set as I have done, even to the resistors.

Effect of a Different Type

I remember a particular case of a grid leak which completely altered the operation of the set when one of a different type was employed. The substituted type was such that its metal end came to within one-sixty-fourth of an inch of the metallising on the baseboard. This completely altered reaction and tuning.

Occasionally there is latitude, but where it occurs you will find in my list of components that alternatives are permitted. But here again sometimes the list is not as complete as some people might expect. I remember cutting out one firm on one occasion because I found that although their 00005-mfd. fixed condensers were utterly unreliable as regards capacity. In another case I omitted the 1-mfd. condensers of a highly reputable firm because on test I found that all six of a batch I received were leaky.

When Delays Never Occur

The fact is that no two components are exactly alike. I refuse to specify alternatives unless I am certain, as a result of actual test, that they will work in the actual design without affecting efficiency.

I hope I will be forgiven if I remind you that component delays never occur when sets are failures. People will be thinking in a year's time of ordering parts for the S.T.800. You need not feel that you have slipped behind. All you have missed is the delight and entertainment to be obtained from this whole-world all-wave set.

J. S.-T.

JOHN SCOTT-TAGGART'S

Next Exclusive Article For
"POPULAR WIRELESS"

will be entitled:

"SIR JOHN REITH"

TECHNICAL JOTTINGS

Items of interest to all

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

High-Frequency Instability

High-frequency instability is often due to the electrostatic capacity between grid leads or leads to the tuning condenser, this capacity effect creating a coupling between the grid and anode circuits of one or more of the valves. The same effect may also be caused by coupling between the coils if the screening is insufficient, whilst, again, it may be due to a lack of H.F. decoupling.

As to the various methods by which instability can be reduced or removed, these are numerous, and it would take a long time to deal with them all. The simplest method probably is to introduce bypass condensers in all necessary positions and decoupling resistances in the anode and screening high-tension leads. The bypass condensers may be of a capacity of 0.1 microfarad, although there is as a rule nothing very critical about the actual capacity value, whilst for the decoupling resistance you can start by trying a value of 1,000 ohms, using higher and lower values to see which gives you the best result. I should not forget to mention that the condensers for bypass purposes should be non-inductive.

Variable-Mu Valves

With variable-mu valves in the high-frequency stages, of the battery type, it is important to remember that the grid-bias feed should be decoupled, especially where there are two high-frequency stages. A simple way to accomplish this is to introduce a resistance between the terminal of the grid coil and the slider of the volume-control potentiometer. For the value of this resistance 50,000 ohms is usually suitable. The condenser which is connected between earth and the grid coil terminal will function as the decoupling condenser.

A Sheet Anchor

The above are just a few very simple dodges which can be tried where there is a tendency to instability, but the sheet anchor against these effects is, of course, an adequate amount of screening by means of suitable metal screens, and I need hardly say that until proper screens have been introduced it is superfluous to go in for the various devices mentioned above. In some cases the proper use of screens will be all that is necessary, and it is only in cases where the use of such screens has been fully explored and they have proved to be not entirely effective that you need go in for the other dodges which I have described.

The Importance of the Earth Connection

I have more than once emphasised the importance of the earth connection, not only in reference to the efficiency of the set as a whole, but also in particular in relation to its importance in keeping the set stable. The aerial and earth are complementary to one another, and, properly speaking, I suppose we should regard them as merely names for two different parts of the same thing.

(Continued on next page.)

TECHNICAL JOTTINGS

(Continued from previous page.)

For some curious reason, however, many people fall into the habit of regarding the aerial as the bringer of the radio signals and the earth as a kind of tail to the set, which is sometimes useful but not very necessary.

This is quite a wrong way to look at it, and I think one might almost go so far as to say that, of the two, the earth is often more important than the aerial. By this I mean that there are more cases in which a set can be worked quite satisfactorily with a poor aerial, but with a good earth, than there are cases where a set can be properly operated with a poor earth, or without an earth at all, even though it has a good aerial. The proper thing is to have a good aerial and a good earth.

Tuning Calibration

The practice of marking the names of various broadcasting stations on the tuning-dial of the set instead of, or in addition to, wavelengths or other calibration is becoming very popular. Quite a number of manufacturers now use this

departure or wandering from the specified wavelength is quite sufficient to cause complications between that wavelength and an adjacent wavelength of some other station.

All these factors contribute to "unsimplifying" the problem of tuning-dial calibration.

Tuning by Ear

In some mass-produced sets the slight variations in the characteristics of components and in the adjustment of the components are sometimes an important factor, and many owners of such sets have found that the station markings on the dial, although good enough as a guide, are not by any means strictly accurate.

With the more expensive sets—individually tuned and calibrated and everything finally adjusted before sending out—this particular source of difference does not arise to any extent, and with such a set the only difficulty is when the transmitting stations themselves do not keep to their proper wavelengths. Variations or disturbances in the interior of the receiver itself are a far more frequent cause of inaccuracy in the tuning calibration than "wandering" in the transmitted wavelengths.

Simplifying Dial Marking

You will appreciate that once the set is calibrated, no matter what form the calibration may take, this can only remain correct so long as nothing inside the set is changed, whether deliberately or by accident. Also you see that strictly accurate and permanent calibration is not at all easy to achieve; manufacturers are on the look-out for any simplification in this direction, anything which will render the calibration more easy to obtain, and which will make it more permanent and reliable.

Permeability Tuning

In this connection the principle of permeability tuning has been mooted a good deal; some people think that in time this system of tuning will render dial calibration much more accurate. At any rate, simplified station selection is greatly to be desired, as by far the great majority of listeners nowadays are concerned only with the programmes and not with the operation of the set. Anything which contributes to this end would be a valuable help to manufacturers and to the listening public alike.

A Useful Present

I wonder how many of you gave electric clocks as Christmas presents last year? It is always hard to choose presents, especially for people who have "got everything," and I have found the electric clock quite a godsend; I sent four of them this Christmas to various friends, and was terribly pleased that I had been clever enough to think of them—the clocks, I mean. The electric synchronous clock makes a very useful present at any time, and those of you who have never used this instrument do not know what a great convenience you are missing. Many of the electric supply authorities in different parts of the country have now synchronised their alternating-current electric-light mains and in all such districts the synchronous electric clock can be used; it cannot, of course, be used on

(Continued overleaf.)

PETO-SCOTT

S.T. 800 BATTERY VERSION

Complete Kit of Components exactly as FIRST specified and used by Mr. John Scott-Taggart, with Konectakit (Gratis with Complete Kit) but less wander plugs, accumulator connectors, valves, Extractor Kit, Cabinet and Speaker. Cash or C.O.D. Carriage Paid £37/6.

KIT "A" YOURS 7/- Balance in 11 monthly payments of 6/3.

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S.T. 800 (BATTERY MODEL) FINISHED INSTRUMENT

CONSOLETTA MODEL Exact to specification. Complete with FIRST SPECIFIED valves. Peto-Scott Type 101 matched speaker and walnut consolette cabinet with Australian Walnut veneered front and wings, dimensions 20 in. wide, 24 in. high, 12 in. deep (filibuster on left), less batteries. Cash or C.O.D. Carriage Paid £28/19/6.

CABINET ONLY, with speaker baffleboard, battery shelf, and extension spindle, 35/-. Cash or C.O.D. Carriage Paid £26 extra.

PETO-SCOTT 1937 SUPER SENSITIVE S.G.3 KIT

A NEW VERSION OF AN OLD SUCCESS

Without a doubt the very last word in sensitive and selective Kits, capable of providing real entertainment from numerous British and Foreign stations. Screened grid, detector, Harrios Pentode Output valves.

KIT "A" 4/6 Cash or C.O.D. Carriage Paid. Complete kit of parts including ready-dressed enamelled steel chassis, less valves, cabinet and speaker.

4/- DOWN And 11 monthly payments of 4/6.

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FREE TO P.W. READERS. Send for our beautiful Art Brochure "All-Wave Radio for the Millions," and also for our 40-page 2-colour catalogue which fully describes 36 Peto-Scott All-Wave Broadcast, Battery and Mains Receivers. Every Peto-Scott Radio Set is amazingly reliable, extremely efficient, and is outstanding value for money. Models from £4/19/6. Cash or C.O.D., or from 5/- down. Peto-Scott have specialised in Radio since 1919, and that is why we give you the best Radio at prices that defy competition.

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- Improves Selectivity.
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- Two Transformers.

READY FOR ERECTION.

The first really economical solution for overcoming the noise of man-made static. The **PETO-SCOTT AERIAL OUTFIT** comprises Duplex enamelled stranded aerials, insulators, waterproof "lead-in" wire, Aerial and Set Transformers, assembled and ready with instructions and drawing illustrating method of erection.

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PETO-SCOTT Co., Ltd., 71 (P.W.12), City Road, London, E.C.1. Telephone: Giltspur 3675.

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The Editor cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped, addressed envelope must be sent with every article. All Editorial communications should be addressed to the Editor, "Popular Wireless," Tallis House, Tallis Street, London, E.C.4. All inquiries concerning advertising rates, etc., to be addressed to the Advertisement Offices, John Carpenter House, John Carpenter Street, London, E.C.4. The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the subjects of Letters Patent, and the amateur and the Trader would be well advised to obtain permission of the patentees to use the patents before doing so.

method, and so far as it goes it is a very great help to the ordinary listener who is only concerned with the reception of broadcast programmes and not interested in the technicalities of the set at all. If there were no cases of variation in the relationship between the actual tuning and the markings on the dial, all would be well.

Adjustment of Components

Unfortunately, this is not the case. As you know, when the dial is set to any particular point the wavelength to which the set is then tuned depends upon the adjustment of various components and on quite a number of things. For example, the trimming of the ganged condensers can cause an appreciable difference to the wavelength setting. Variations in other components in the same way can quite easily upset things, so that if any change is made within the set, strictly speaking the calibration of the tuning dial should be gone over again.

Wavelength Variations

In addition to all this, what is perhaps not so generally known is that various broadcasting stations, not perhaps the B.B.C. stations but more particularly some foreigners, do not keep strictly to their allotted wavelengths. In some cases the

TECHNICAL JOTTINGS

(Continued from previous page.)

supply mains which are not synchronised. (As to whether the mains are "time controlled" or not, you can find this out by simply writing to the local electric supply people.)

The "Last Word"

The electric clock is the complete solution not only to time-keeping but also to the problem of winding, regulating and any other attention given to ordinary clocks. Once you have installed the clock and connected it to the mains you have only to set it right by the time signal from the radio and (provided the current does not go off) you should have absolutely Greenwich time thenceforward without any adjusting or attention of any sort or kind.

The familiar and anxious query "Does anybody know how much fast this clock is?" is heard no more. Everybody knows that the clock is right.

The synchronous electric clock is the absolute "last word" in time-keeping, and if you haven't got one, the sooner you look into the matter the better for all concerned.

NEXT WEEK

The "Every-Band Three"

More about this new-design receiver.

AND

The "Super-Vol" Amplifier

A powerful amplifier with many uses.

LEARNING FRENCH THROUGH YOUR RADIO

(Continued from page 474.)

Un coup de grâce	finishing stroke
Un coup de main	rush
Un coup d'œil	glance
Un coup de pied	kick
Un coup de poing	punch
Un coup d'approche	approach shot (golf)
Un coup d'envoi	kick-off (football)
Un coup de bonheur	stroke of luck
Un coup d'audace	bold stroke
Un coup d'éclat	glorious deed
Un coup de tonnerre	peal of thunder
Un coup de tête	rash deed
Un coup de théâtre	striking and unforeseen event
Un coup de sifflet	blast of a whistle
Un coup de sirène	blast of a buzzer
Un coup de sonnette	ring (of a bell)
Un coup de téléphone	telephone call

Learn also the following phrases:

Fout d'un coup	at one fell swoop
D'un seul coup	at one fell swoop
Du premier coup	at the first attempt
Sur le coup	on the spot
Pour le coup	for the moment
Après coup	now, at last
Tout à coup	all of a sudden
Coup sur coup	in rapid succession

Finally a little PROGRESSIVE FRENCH:

Il est parti	He has gone
Il n'est pas parti	He has not gone
Est-il parti?	Has he gone?
Pourquoi est-il parti?	Why has he gone?
Why has he gone?	
Pourquoi n'est-il pas parti?	Why has he not gone?
Why has he not gone?	
Je ne sais pas pourquoi il n'est pas parti	I don't know why he hasn't gone

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COILS.—Telsen, iron core, W349, Midget size, 4/-; Type W478 (twin), 9/- pair; W477 (triple), 16/- set; Type W476 (triple superhet selector and oscillator), 16/- set, all ganged coils complete on base with switch; Telsen I.F. transformer coils, W482, 5/-; Telsen dual range aerial coils, with aerial series condenser incorporated, W76, 4/-; Telsen aerial series condensers with shorting switch, 2/-; Telsen L.F. transformers, Type R.G.4 (4 to 1), 3/-; all brand new, in sealed cartons.

MICROPHONES.—Ace (P.O.) microphones, complete with transformer, ready for use with any receiver, 4/6 each; Ace concert microphone, complete on chromium stand with volume control, ready for use with any receiver and amplifier, 11/-.

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S.T.700, 63; S.T.600, 52 5 0; S.T.500, 51 15 0;
S.T.400, 51 10 0; S.T.300, 51 2 6. Lissen Bandspread, S.W.3, 51 19 6; Vidor S.W. Converter, 51 12 6; Kelsey S.W. Adaptor, 51 12 6; B.T.S. S.W. Superhet Converter, 51 12 6; all with valves. Prompt delivery. Send for full bargain list.—R. Wigfield, Edlington, Doncaster.

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The ARGOSY

MAGAZINE

Monthly, at all Newsagents 1/-

1936 BROADCASTING REVIEWED

(Continued from page 480.)

Park of items of instructional, sporting and topical interest were included.

The London Television Station was officially opened on November 2nd by the Postmaster-General. The programme was transmitted first by the Baird, then repeated on the Marconi-E.M.I. system. A film news-reel and a short variety entertainment followed the opening speeches in each case. A short film, made by the television programme staff, suggesting the activities of television up to the opening of the service, had been completed in time for transmission in the first service programme on the evening of November 2nd.

Following the opening ceremony, programmes lasting one hour, from 3 p.m. to 4 p.m. and from 9 p.m. to 10 p.m., were televised regularly on week-days, the system alternating weekly as before.

Sound Recording

Among the manifold general broadcasting activities, greater use has been made of facilities for sound recording. The equipments installed at the Maida Vale premises have been supplemented by two mobile recording units using disc methods.

Much attention has been devoted to the design and acoustic treatment of studios. As a result the arrangement of many studios has been modified, whilst greater accuracy is now possible in the design of projected studios.

Further study of the problems involved in synchronising two or more high-power transmitters on a common wavelength has been reflected in the improved performance of the London, North and West National transmitters, and in the synchronising of the new transmitter at Burghead with the Scottish Regional transmitter. Work along these lines is being continued in the hope that the Corporation may be able to provide an improved service in certain districts. Improvements have been made in methods of recording programmes, and a test period with a new system employing film has been begun.

The Corporation's checking station at Tatsfield has continued to co-operate with the checking station of the International Broadcasting Union at Brussels in making regular measurements of the wavelengths of European stations. Its activities have been extended to cover measurements of stations in the short wavebands used for long-distance broadcasting. Programmes radiated in America and elsewhere were picked up for re-radiation to home and Empire listeners.

The Committee, upon which the B.B.C. is represented, set up by the Institution of Electrical Engineers to investigate electrical interference with broadcasting, presented its report in July. In this report it was recommended that the Electricity Commissioners should be given powers to issue regulations for the suppression of such interference.

A preliminary examination of interference with television reception has been made.

Outside Broadcasts

Notable Outside Broadcasts of 1936 were connected with the death of King George V.

The funeral service was broadcast from St. George's Chapel, Windsor, and in addition B.B.C. observers gave a description of the funeral processions from positions at Westminster Hall, St. James's Palace, and Windsor Castle. The Accession and Coronation Proclamations were also broadcast from St. James's Palace.

The "Queen Mary's" maiden voyage and the Olympic Games in Berlin were other outstanding features of the Department's activities, which were widened to include visits to places and events of minor importance but outside the reach of the majority of listeners, e.g. pigeon racing, gliding, fencing, village cricket, clay pigeon shooting, darts, racquets, fly-fishing and women's billiards. Visits were made to a haunted house, a diver under Waterloo Bridge, a lambing pen on the South Downs, Beachy Head Lighthouse, the Mint, an observatory, Cruft's Dog Show, the West India Docks, a lifeboat launch, a London sewer, and a gipsy encampment.

An attempt to improve technique has been centred round the finding of new commentators by means of special tests and recordings. The search has proved more successful in showing the extreme difficulty of the commentator's task than in finding any outstanding talent. Efforts have also been directed to give variety to the more regular commitments by putting in extra commentators at special points. The length of outside broadcasts has been cut down to more effective limits.

Feature Programmes and Drama

The year has been marked by a considerable increase in the work of the Drama Department, notably the creation of a Feature Programme Section under Laurence Gilliam, and the further appointment, as second in charge of the whole Department of Moray McLaren. Both "actuality" features (e.g. "Trinity House," "Mincing Lane," and, on a larger scale, "Scotland Yard" and "Underground") and "studio" or "literary" features (e.g. the "Lives from Letters" series, "American Humour," "London Calling—1600") have had more space allotted to them in programme-time.

In both feature and dramatic work, closer liaison and greater co-operation with regional staffs and regional resources have been successfully encouraged, and it is possibly not an exaggeration to give credit for the highest dramatic achievement of the year to the combined efforts of North and Scottish Regions for the production of "The March of the '45." This play perhaps deserves special notice also as being the first original drama in verse ever written for the radio.

Radio-dramatic activities have been fairly evenly divided between adapted stage plays and original radio dramas. In the latter class, Horton Giddy's work (exemplified in "Off Finisterre" and "The Queen at Lochleven") probably holds pride of place, but Philip Wade's "Jenny Meade" and Francis Dillon's "Snow Queen" both deserve honourable mention.

Two interesting experiments in adapting film material for the radio were made in "Episode" and "The Thin Man."

The series of "Famous Trials" found representation in those of Titus Oates; the Emperor Maximilian of Mexico; and Jessie McLauchlan. In the production of the latter, Scotland renewed the success previously achieved with the trial of Madeleine Smith.

Among adapted stage plays, perhaps the two outstanding successes were "Murder in the Cathedral" (another example of the suitability of verse drama for presentation on the air) and "The Silver Cord," with its all-round excellence of acting and Edna Best's outstanding performance. "Cavalcade," "London Wall," "The High Road," "The Calendar," "The Voyage Inheritance," "Youth

at the Helm" were other examples of theatrical successes which surmounted the difficulties of adaptation to the microphone.

A number of distinguished stage personalities took part in broadcast plays, including Edna Best, Diana Wynyard, Jean Forbes-Robertson, Ann Todd, Cathleen Nesbitt, Kay Hammond, Marie Ney, Angela Baddeley, Carol Goodner, Cedric Hardwicke, Ronald Squire, Ernest Milton, Robert Speaight, Cyril Maude, Ion Swinley, Leon Quartermaine, Sebastian Shaw, Ronald Simpson, Robert Farquharson, Stephen Haggard, Stewart Rome, and Miles Malleson.

Gramophone Records

Varied programmes of gramophone records have been broadcast during the current year, ranging from dance music to symphonic concerts of modern music. An outstanding series of programmes was "Kings of Jazz," which brought out the best recordings of jazz music and represented most of the principal American and British dance band leaders and instrumentalists. Benny Carter, the well-known saxophones player and arranger, was engaged to compère one programme of this series. Programmes entitled "Music by—" have also been undertaken. These were arranged to show the virtuosity of one composer and included examples of piano music, choral compositions, violin sonatas and symphony works. Among the composers represented were Fauré, Liszt, Stravinsky, Handel, and Purcell. Another series entitled "From the Films" was devoted to the recordings of contemporary artists.

During the year some forty evening feature programmes were broadcast, ranging from recitals by Francis Toye, P. G. Hurst's old operatic records, German Romantic Opera, Alistair Cooke's very successful "Bum and Hobo Songs" to "The Old Times," "Curiosities," "Orientale" and "Tzigane."

Dance Music

Several new feature programmes have been presented during the year, in particular "Music from the Movies," performed by Louis Levy and his Symphony, playing a programme of the latest hits from the films, a feature which ran fortnightly from January to September.

In October Van Phillips and his Two Orchestras made their first appearance in the programmes, playing attractive dance tunes in a contrasted manner, the smaller combination of strings featuring the "sweet" tune, followed by an exhilarating performance of the "snappy" number by the major orchestra.

Another addition to the autumn schedule was "The Music Shop" featuring Geraldo and his Romance in Rhythm Orchestra playing a selection of the current hit tunes in a carefully considered order of popularity.

In an endeavour to discover new talent many new bands have been auditioned, a number of which were eventually broadcast, and whereas twenty bands were responsible for supplying the dance music in 1935, the number was increased to approximately sixty in 1936.

Schools

In 1935 the B.B.C. decided to grant the Central Council for School Broadcasting a greater measure of independence, the B.B.C. to retain its overriding power in respect of Corporation policy, finance and programme production. The necessary reorganisation has been carried out during the year 1936, giving effect to this policy.

Evidence of increasing interest on the part of local education authorities in the work of school broadcasting is furnished by the growth in the number of effective listening schools.

(To be continued next week.)

"P.W." SHORT-WAVE STATION LIST

Wavelengths and other details of many of the stations you can hear on your short-wave receiver

Wave-length.	Station.	Call-Sign.	Power.	Wave-length.	Station.	Call-Sign.	Power.
13.93	Pittsburgh	W8XK	40	31.07	Lisbon	CT1AA	2.5
13.93	Daventry	GSJ	10	31.13	Rome	2RO	25
13.94	Wayne, New Jersey	W2XE	1	31.27	Radio Nations	HBL	20
13.97	Daventry	GSH	10	31.28	Philadelphia, Pa.	W3XAU	10
15.93	Bandoeng, Java	PLE	60	31.28	Sydney	VK2ME	20
16.86	Daventry	GSG	10	31.28	Eindhoven	PCJ	20
16.87	Bound Brook	W3XAL	35	31.32	Daventry	GSC	15
16.88	Huizen	PHI	23	31.32	Lyndhurst, Australia	VK3LR	1
16.89	Zeesen	DJE	5	31.35	Millis, Mass.	W1XK	10
16.89	Wayne, New Jersey	W2XE	1	31.36	Bombay	VUB	4.5
19.52	Budapest	HAS3	20	31.38	Zeesen	DJA	5
19.57	Schenectady	W2XAD	18	31.45	Suva, Fiji Islands	VPD2	—
19.60	Daventry	GSP	10	31.45	Zeesen	DJN	5
19.62	Buenos Aires	LRU	5	31.48	Jeloy	LKJ1	1
19.63	Zeesen	DJQ	5	31.48	Tokio	JZI	20
19.65	Wayne, New Jersey	W2XE	1	31.48	Schenectady, New York	W2XAF	30
19.66	Daventry	GSI	10	31.55	Melbourne, Australia	VK3ME	1.5
19.68	Radio Colonial, Paris	TPA2	12	31.55	Daventry	GSB	15
19.71	Eindhoven	PCJ	20	31.58	Rio de Janeiro	PRF5	5
19.72	Pittsburgh	W8XK	40	32.88	Budapest	HAT4	5
19.74	Zeesen	DJB	5	38.48	Radio Nations	HBP	20
19.76	Daventry	GSO	10	46.52	Barranquilla	HJ1ABB	1
19.8	Tokio	JZK	20	48.78	Winnipeg	CJRO	2
19.82	Daventry	GSF	10	48.86	Pittsburgh	W8XK	40
19.84	Vatican City	HVJ	10	49.02	Wayne, New Jersey	W2XE	1
19.85	Zeesen	DJL	5	49.10	Daventry	GSL	15
22.00	Warsaw	SPW	10	49.18	Chicago, Ill.	W9XF	10
24.52	Reykjavik	TFJ	7.5	49.18	Bound Brook	W3XAL	35
25.00	Moscow	RNE	20	49.20	Johannesburg	ZTJ	5
25.23	Radio Colonial, Paris	TPA3	12	49.26	Hong Kong	ZBW2	2
25.27	Pittsburgh	W8XK	40	49.50	Philadelphia, Pa.	W3XAU	10
25.29	Daventry	GSE	15	49.50	Cincinnati	W8XAL	10
25.36	Wayne, New Jersey	W2XE	1	49.59	Daventry	GSA	15
25.36	Lisbon	CT1AA	2	49.67	Miami	W4XB	2.5
25.38	Daventry	GSN	15	49.67	Boston, Mass.	W1XAL	10
25.40	Rome	2RO	25	49.83	Zeesen	DJC	5
25.45	Boston, Mass.	W1XAL	10	49.85	Bogota, Colombia	HJ3ABH	1.6
25.49	Zeesen	DJD	5	49.92	Podebrady, Prague	OLR	30
25.51	Podebrady, Prague	OLR	30	49.96	Montreal, Canada	CFCX	6
25.53	Daventry	GSD	15	50.00	México City	XEBT	1
25.60	Winnipeg	CJRX	2	50.00	Moscow	RW59	20
25.60	Radio Colonial, Paris	TPA4	12	50.26	Vatican City	HVJ	10
29.04	Ruyssede, Belgium	ORK	9	51.28	Maracaibo, Venezuela	YV5RMO	—
29.24	Bandoeng, Java	PMN	3	51.72	Caracas, Venezuela	YV2RC	1
30.43	Madrid	EAQ	20	70.20	Kharbarovsk	RV15	20

AMAZING TELEVISION SYSTEM (SEE PAGE 495)

Popular Wireless & TELEVISION TIMES

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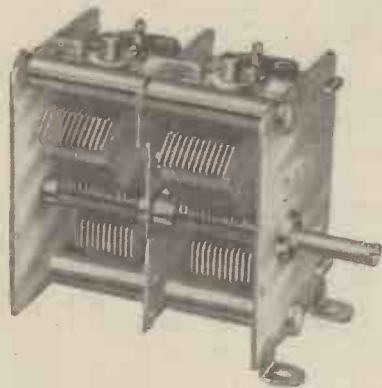
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Editor: G. V. Dowding

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

BIG EVENTS
AIR SAFETY
ITALIAN RADIO

RADIO NOTES & NEWS

GOOD KNIGHT
TOO FUNNY!
SILENT PAPER

Radio Retrospect

BEFORE we let old 1936 slip through memory's fingers into forgetfulness, let us recall two or three outstanding radio events that made the year notable. It was the year when Germany finally beat us to it in the race for European licence supremacy; but at sea the "Queen Mary" beat all radio records by handling 132,000 words on one trip, as well as 149 telephone calls and forty broadcast programmes.

The number of ships fitted with radio has grown tremendously; and whereas, before the War, the loss of life among crews was one man in every 582, the losses are now only one in 2,360.

Another remarkable development of 1936 was the reduction of the cost of telephone calls to New York and Montreal from £6 to £4 4s., and a reduction from 11d. per word to 8d. in the standard charge to ships.

The G.P.O.'s new ultra-short-wave commercial telephone service with Guernsey is the highest-powered on five metres in the world. And in 1936 the number of radio-equipped ships rose to 15,000, over 5,000 of them being fitted for direction finding.

No End to Radio Development?

NOW that the Americans have sifted out the results of the recent 3-metre demonstration of facsimile radio transmission between Philadelphia and New York they are more impressed than ever with the possibilities of this method of communication.

You will probably remember that they rigged up a 90-mile circuit via two intermediate relays, and the six waves used were "scrambled" to ensure secrecy. The intermediate stations were controlled automatically by a tone signal from either terminal station, and the circuit worked like a charm.

Since the radio facsimile method of transmission is photographic, and easily handles

pictures, printing, writing, and so forth, the newspaper proprietors are getting the breeze up and even the Postmaster-General is said to be complaining of a possible draught.

New York Likes Him

WHEN John Barbirolli went to New York a few months ago there were people left in this country who thought that the B.B.C. had not made half

York Philharmonic Symphony Orchestra. So, without unnecessary flourish or wave-of-the-hand, John has appended his signature to a buxom contract.

Aid to Air Safety

THOSE new ultra-short-wave beacons which have been fitted at the Croydon aerodrome—of which "P.W." was telling you recently—are not the full extent of the radio improvements there.

In addition, the medium-wave radio beacon, which is situated in the north-west corner of the aerodrome, has been further hotted up. As a result of the various technical improvements that have been effected it is hoped that aircraft that are not fitted with ultra-short-wave receiving apparatus will now be aided in the approach to Croydon.

It is hoped that all these radio aids will soon be in operation regularly for the benefit of fliers, when the technical tests have been completed. But there is no intention of stone-blind landings, the idea being to afford guidance to within 100 feet or less, from which point the landing field will be visible to the pilot.

FREQUENCY CHECKING AT DOLLIS HILL



A glimpse of the standard frequency control apparatus at the G.P.O. experimental station at Dollis Hill. A great deal of wavelength checking is carried out here with the object of seeing that the wireless "roads" are kept clear for traffic and that no jamming occurs. Soon this work will be conducted at Baldock, where the necessary apparatus is to be installed.

Increased Italian Interest

IT used to be said of the citizens of Rome that "all were for the (convivial) party, and none for the State (radio)," but such unkind paraphrasing of Macaulay's poem is not now justified; Rome is taking to radio with gusto, and, in addition to the several stations now serving the city, it is to be provided with another powerful short-waver this year.

Sicily, which already has a station at Palermo, is to have another at Catania. And the wireless service over the Adriatic coast, at present largely in the hands of Bari, is to be strengthened by another

(Continued overleaf.)

the fuss of him that he deserves. He is one of those who believe that it is possible to conduct an orchestra without strenuous gymnastic athleticism or gesticulatory pantomime. The stray fly, attending a concert conducted by John Barbirolli, is comparatively safe.

In New York, John was given the formidable task of following the great Toscanini. And New York, to its own surprise, took to the Englishman, and has made him conductor and musical director of the New

NEXT WEEK: "P.A." FOR THE HOME CONSTRUCTOR

THE KNIGHTS OF BROADCASTING HOUSE

station at Ancona. The wavelengths are still in the air; the masts soon will be.

Cannon Street Comedy

WHY is it that very big, fat men carry such little accumulators? They generally do, you know, but the other day I saw a big and pompous man carrying a big accumulator.



He had valves in the pockets of his overcoat, and a large loudspeaker cone in a parcel—and he glared at the crowd with a don't-you-come-near-you'll-bust-it look that made

him the most unpopular man on the platform.

Suddenly, one of the electric trains slithered in unexpectedly. I saw him step back on to the accumulator, fall over (POP!) on one of the valves, and put his hand right through the loudspeaker.

As he sat there, with all his dreams shattered, somebody accidentally kicked his bowler under the train. And while his eye registered that catastrophe, he heard a sympathetic voice say, "How ya goin' to explain that cracked loudspeaker to the missus, chum?"

It was the only aspect of the tragedy that had hitherto escaped the victim's attention!

Good Knight

IF business or pleasure calls you to Broadcasting House, watch your step, or you may put your foot into it. Very Ritzy there, nowadays.



In addition to certain brittle intellectuals who know better than you do what you like to hear, there are the musical highbrows, the fellows in the Art-meant Department, the intelligentsia, the literati, the

dilettanti, the hidalgos, and (fortunately) a goodly company of Stout Fellows.

There is some talk of buying a round table, in the King Arthurian style, because there are now no fewer than five knights in the building—Sir John Reith, Sir Charles Cappendale, Sir Noel Ashbridge, Sir Stephen Tallents, and the new Director of Talks, Sir Richard Maconachie. And we mustn't forget Sir Ian Fraser, who was recently appointed to the Board of Governors.

So the announcer's signature tune is really more in the nature of a prophecy than a farewell—he really means "Good Knight Everybody"!

Italian Liner Scores a Point

WHEN the Italian shipping lines combined to produce the two record-breaking liners "Rex" and "Conte di Savoia" there began a friendly rivalry

between the two vessels. First the "Rex" would do this, and then the "Conte" (as they call her) would do that, and then the "Rex" would cap that one, and so on.

But when the "Conte" proudly claimed that she had the first large-liner stabiliser in the form of a 750-tons gyroscope, that would not let the ship roll more than a few degrees in any weather, the "Rex" had to think hard. What more could the nervous passenger want than that?

Came the answer—wireless cardiograph! And now the "Rex" has installed the

Broadcasting Brevities

BERTRAM MILLS' CIRCUS: Regional, January 26th.

All children would like to visit Bertram Mills' Circus at Olympia, London. This is fundamentally impossible, owing to distance, capacity, expense and a thousand and one reasons. The Outside Broadcast Department, fully alive to the children's tastes, have arranged with Mr. Mills to take a wandering microphone behind this circus, where, in the hands of Mr. Woodrooffe, it will visit the Fun Fair and other features of this remarkable circus.

Children may rest assured that the clowns will follow round with the microphone, and eventually this faithful instrument will find its way into the circus ring, and through the eyes of Mr. Woodrooffe will tell the children exactly what is happening.

VARIETY IN MINIATURE: Midland, January 19th.

The half-hour's programme on January 19th, entitled "Variety in Miniature," compiled by Martyn C. Webster, will have Jane Carr's character studies as its star turn. It will include a swing quartet formed by Eric Jeffcote, of Leicester, who has broadcast as a syncopated artist; a new Hawaiian quartet—Martini and his Music; one or two Yorkshire stories told by Jane Ayre, of Retford, Nottinghamshire; and two sketches, "More Things to Come," by A. Morley Barnes, and "Excuses," by Francis Durbridge, of Birmingham. The artists appearing in the sketches are John Bentley, and Maurice Westhead (of Leicester), both of whom have broadcast frequently; Bryan Jones, of Shrewsbury, a young singer; and Hilary Williams, of Oxford Repertory Company, who will broadcast for the first time.

OPENING TELEPHONE HOUSE, BIRMINGHAM: Midland, January 21st.

Introduced by the Postmaster-General (Major Tryon), the Rt. Hon. Neville Chamberlain, Chancellor of the Exchequer, will open Telephone House, Birmingham. Recordings of the ceremony will be given in the evening programme on January 21st. Telephone House is the headquarters of Post Office Telephones in the Birmingham district, which extends over a populous area and covers ninety-three exchanges.

apparatus, which enables the ship's doctor to call up a specialist in New York or Rome from mid-ocean, and let the shore medico listen for himself to the heart or lungs of a difficult case.

Meat for Bloodhounds

AMATEUR detectives, sleuths, problem-solvers, genuine investigators and Nosey Parkers in general, all seem to have been stirred up by those code and cypher problems which "P.W." has been publishing from the pen of Louis C. S. Mansfield. And as we have received a number of enquiries as to what books are obtainable on this fascinating subject I asked Mr. Mansfield the other day whether any of his own works were easily obtainable at a low figure.

He told me that his "Solution of Codes and Ciphers" and also "100 Problems in Cipher" are obtainable through W. H. Smith and Sons or from the publisher,

MacLehose of Bloomsbury Street, London, W.C., price 2s. 6d. each.

Have You a Funny Story?

WHEN the Editor put in our December 19th issue a page entitled, "Have You An Amusing Story?", he thought he was doing you a good turn by giving you the chance to earn an honest guinea.

Alas! for human nature. Instead of accepting the journalistic challenge, and augmenting your incomes with the good boodle thus temptingly dangled, some of you incorrigible bad-lads sat down and penned long letters to me—letters that were assuredly amusing, but totally unfit for eye of printer. (And that's saying something!)

Shame on you! Shame on you, for all this frivolity and rowdiness. Why don't you remember your New Year resolutions, and go after that guinea with earnest endeavour?

(All the same, boys, I love you for it! *Thousand pities we can't print 'em!*)

Snaps and Snippets

MOST astonished man I've seen this year—Norman Long, when my 3 a.m. taxi missed him by '001-inch at corner of Queensthorpe Road, Sydenham. (Norman can jump; you'd be surprised!)

Favourite Good Cause—Old Original Rooters, Star Hotel, Hyde, Cheshire. They specialise in pushing old spare cash in the directions where it is needed most.

In Perfect Silence

AN eminent Austrian inventor, Herr Whadyacallim, has bent his brows and intellect to this ever-recurring problem of the radio speaker, whose talk is spoilt by the crackling of the paper as the speaker turns over his notes before the microphone.

How can that irritating crackle be prevented? After much cogitation the inventor suddenly sat up in his bath and cried aloud, "Skeeto-pot" (which is Austrian for "Eureka"), for he had hit upon the right idea. Shorn of all technicalities, the idea was to print the notes on rubbery, slithery paper, which remains dead silent however you crumple it.

After weeks of work a satisfactory formula was evolved, and for safety it was written on one of the new silent notes. But now the secret must be re-discovered, for a chow found the formula and "chowed" it up—in perfect silence!



ARIEL

Transmitting Television By Insulators

An amazing new method of conveying the high frequencies of television programmes by means of insulator rods

By J. C. Jevons

THE picture signals produced in a television studio have, of course, to be fed to the transmitter before they can be radiated into the ether. Similarly the incoming signals picked up by a receiving aerial must be fed through a down-lead into the set before they can be reproduced. In both cases a very wide band of frequencies must be fed over a wired circuit, and this is not such a simple matter as may appear at first sight, because very high frequencies are not easily confined to a wire. They prefer to leak away through any stray capacity they can find or, failing that, to escape into the ether as radiation.

In practice we get over the difficulty by

THE CURRENT IN THE FEEDERS

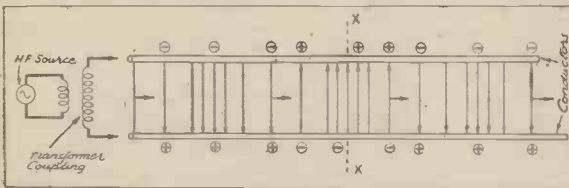


Fig. 1.—Showing the distribution of current of opposite voltages in a normal twin feeder.

using special forms of transmission lines, such as a pair of parallel wires spaced fairly close together, or one centre wire which runs inside an outer tube. The so-called "snake cable" which will be used for linking up one station with another—when we have reached the stage of having a network of television centres distributed throughout the country—is one interesting example of the coaxial type of transmission line.

Interesting Transmission Line

Mr. G. C. Southwood of the Bell Telephone Laboratories has recently developed a still more interesting transmission "line," over which high-frequency currents can be transmitted from one point to another in quite an unusual way. It is suitable only for carrying very short wavelengths—but for this very reason is likely to play an important part in the future of television.

In principle the new transmission "line" consists of a rod made solely of insulating material. Although there need be no metal, it is found that, for a given diameter of insulator, a definite band of high-frequency waves will travel through it, without any tendency to leak away, either to earth or into the surrounding air, and with practically no loss of power. In fact the losses due to attenuation become less as the frequency increases.

On the face of it, this discloses rather an extraordinary state of affairs. In spite of there being no conductor, in the ordinary

sense of the word, high-frequency waves are made to travel in a clear-cut fashion, keeping strictly to the dielectric material without any tendency to leak away into the surrounding air. The insulating material which forms the guide is, of course, different in substance from the outer air, and it is the dividing boundary between the two media that plays the important part. In effect, it acts as a reflecting surface which keeps the guided wave intact.

In a more practical form of "line" the insulating substance is enclosed inside a hollow metal tube. Here, it may be thought, the metal tube puts a different complexion on the matter, because it may serve to carry the currents by ordinary conduction. But we know that is not the case, because there is no "return wire" such as is essential in any ordinary "go and return" circuit. In a sense the high-frequency currents travel through the insulator in much the same way as they travel through the ether—which is, of course, an insulator, too.

Lower-speed Travel

But there are two points of difference. First the wave does not spread out in all directions, and, secondly, it travels at a lower speed than a true ether wave. Under certain circumstances the guided wave can be made to travel at the speed of light, but in general its rate of progress is slower. Actually the metal tube only acts as a convenient container for the insulator, the waves being guided and confined, as before, by the boundary surface between the internal insulator and the outside air.

By way of contrast it may be interesting to examine the way in which electric currents are transmitted along an ordinary wired circuit.

The simplest case is that of a direct current passing through a single wire connecting, say, the two poles of a battery. As soon as contact is made the current passes at practically the speed of light from one end of the wire to the other. At least, that is the observed effect. But it must be remembered that the electrons that pass from the battery into one end of the wire are not those that return into the battery from the distant end of the wire.

Imagine the wire to be a hollow tube, with free electrons packed closely together along its length, like billiard balls. Then obviously

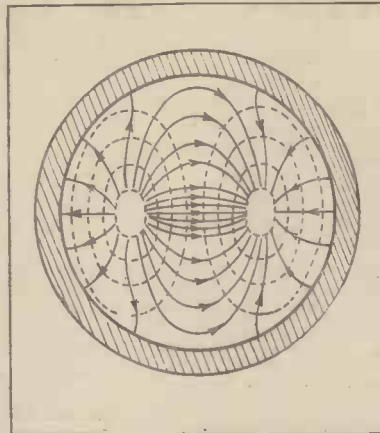


Fig. 2.—A cross section of the field in the new type of "cable."

the introduction of an extra ball at one end is going to push a surplus ball out at the other end. And if the balls are packed really close together, the action will be practically instantaneous—like the speed of light. But if we follow the individual motion of any particular billiard ball—or electron—along the chain, it will be found to move quite slowly.

A.C. Considerations

Next consider an alternating current—of comparatively low frequency—again passing along a single wire. Here the actual process of conduction is very similar to that just described, in the sense that it is mainly a terminal movement of electrons giving rise to intermediate "effects." But there is one noticeable difference. An alternating current will pass through a series condenser, whilst a direct current will not.

At least the alternating current appears to pass through. What actually happens is that, as it reaches one plate of the condenser, the current creates a charge on that plate, and so either attracts or repels the electrons inside the dielectric of the condenser, so that they swing to and fro, as a body, between the two plates. But none of the electrons inside the condenser leaves it. They merely pass on the "push or pull" of the alternating current from one plate to the other, so that the energy appears to pass clean through.

Now take a single wire conductor and gradually increase the frequency of the applied current. The higher the frequency the more the current appears to shift to the

HOW THE FIELD IS DISPOSED

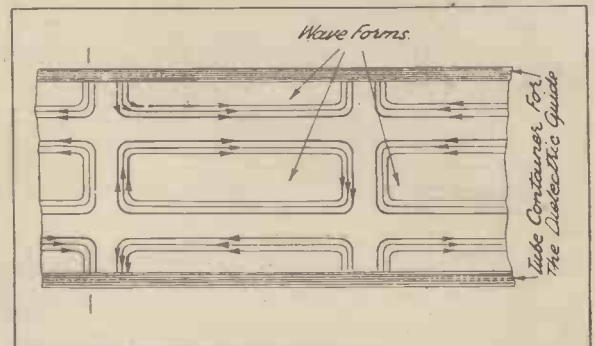


Fig. 3.—A longitudinal section of "cable" showing how the field is distributed.

outside "skin" of the wire, as though it were trying to escape from it. If there are any shunt capacities about, it will start to jump across them. Finally, at very high frequencies the current is no longer "bound" to the wire but escapes away into space as a radiated wave. That is what happens when H.F. currents feed a transmitting aerial.

(Please turn to page 513.)

FROM OUR READERS

WHEN THE LIGHT WENT OUT

The Editor, POPULAR WIRELESS.

Dear Sir,—Towards the end of 1917 the R.E. Wireless Section was rather short of operators, and the deficiency was partly solved by the "importation" of infantry signallers, who were given intensive training in the operation of trench sets, etc. One day on "Schemes" (Field practice) an outstation had failed to get into communication with H.Q., so an officer and I set out to ascertain the cause of the delinquency.

As we approached we could see two men making frantic efforts to trace the fault, e.g. tightening up terminals, adjusting the reeds of the Brown's phones, etc., etc., all to no purpose apparently.

Suddenly, however, one of them perceived that the filaments of the valves were not in their usual state of healthy incandescence, and, turning to his colleague exclaimed: "No wonder we ain't gettin' no signals, Bill; the ruddy light's gorn aht!"

Your faithfully,
H. E. CHAPLIN.

11, Oxford Road, Ipswich.

FOR TESTING.

The Editor, "Popular Wireless."

Dear Sir,—Many experimenters desire a small device for testing rather than to carry a battery around.

To construct this tester first shape a piece of copper about 1/8 in. in thickness, and bend as shown in one diagram. Then drill a hole to take a small terminal in the bent portion Duplicate this in an equally-sized strip of zinc. Next obtain a 2-in. length of dry wick and place in between the copper and zinc evenly. Then wind tightly round with string, as shown.

ONE PLATE

When ready for use connect a telephone receiver to it and moisten the wick with salt water or plain water. Distinct sounds can be heard when testing components for continuity.

Finally, I would like to pass comment upon "Popular Wireless," having been a reader for a considerable while. I think its deserved popularity is due chiefly (apart from its technical value) to the friendly manner in which your contributors write, giving we readers the impression of them being personal friends to whom we look forward to meeting each week. Wishing "good sales" to "Popular Wireless."

I remain,
Yours truly

D. SLATER.

31, Upper Moor Road, Allenton, Derby.

THAT "HAIR-COMBING" INTERFERENCE

The Editor, POPULAR WIRELESS.

Dear Sir,—Your correspondent, Mr. R. Dunn, describes an incident which he thinks is rather strange, but if the explanation I am

An Amusing Story of the R.E. Wireless Section During the War

about to give is correct perhaps he will understand a little better. So here's hoping that I am correct.

The incident Mr. Dunn so interestingly describes took place about eighteen months ago, which would be during the summer of 1935. As is generally known, in such weather the human hair is usually very dry, and, in such a condition well suited to produce static electricity when combed briskly with an ebonite comb, and further, on some summer nights the air itself is full of "static," which would tend to emphasise the effects described by your correspondent.

Now, Mr. Dunn states that the leads from his speaker were more than usually long and that they passed behind a mirror on the mantelpiece from the set to the speaker.

The length of these leads would naturally cause them to possess a fairly large capacity and would therefore be in a condition to act as an inductance and would therefore be affected by "static," as Mr. Dunn considers. But to my mind it was the mirror that assisted most in picking up the "static," and thus causing the loud cracklings.

The L.S. leads ran very close to the back of this mirror and at a slope. Now, the surface of the mirror is composed of a mercury compound and is capable of holding a charge of electricity, as, of course, this thin layer of mercury is conductive. There would be then a condenser effect between the L.S. leads and the mirror which would serve as an excellent pick-up of any static discharge. Mr. Dunn states that when his sister stepped away from the mirror the cracklings decreased in intensity, which would appear to prove the above explanation. I hope this brief explanation will enlighten Mr. Dunn and prove of interest.

Yours respectfully,
RONALD HARDING.

24, Grindlow Street, Manchester, 13.

SUPERS versus STRAIGHTS

The Editor, "Popular Wireless."

Dear Sir,—In reply to Mr. M. Wild's letter in "P.W.," Dec. 12th, I strongly agree with his remarks re straight sets.

Although I have been using a 1936 model "all-wave" superhet. for the last month or so, I feel that it is only fair to say that, on the grounds of quality, the straight set comes through with flying colours every time. But as regards range, I think the superhet. is definitely superior—on the medium waves, at any rate. On the shorts, I am not keen on the superhet. as it has too much background noise.

The set I should like to see described in "Popular Wireless" would consist of two H.F. stages, D.D.T. detector (although I believe there are slight losses as regards quality in the latter), followed by push-pull output, an A.C. mains job with possibly a socket at the back for plugging in a short-wave adaptor. I

shall definitely change to this type of set sooner or later.

Down here in Cornwall we are fortunate enough (or unfortunate) not to be bothered very much by selectivity problems, we are too far off the map to get any one station strong enough to cut out any other. Television is not expected until we are all old men with beards, but when that time comes I hope we shall be still able to hobble down to the bookseller to get our "P.W." as this is the one bright spark on Wednesday.

Wishing your valuable paper its continued success.

Yours faithfully,
J. RUNDLE.

60, Edgcombe Avenue, Newquay, Cornwall.

THAT BOW BELLS RECORD

The Editor, POPULAR WIRELESS.

Dear Sir—With reference to Mr. W. Harvey's, also to Mr. B. Aldous's, letters in the issue of December 12th, 1936, I should recommend Mr. Harvey to get in touch with the Columbia people, as the record may now be withdrawn. The number is as given by Mr. Aldous—Columbia 4082. And now, re Mr. Aldous. The bells in question at the moment of writing this particular sentence are being broadcast, and it is still the old original that has been in use the past four years or so—that is, Columbia 4082.

By a strange coincidence, on Wednesday last, I was in charge of the "graino." at a small chapel concert. I was given a batch of records and told I would see from the text when they were wanted. I saw the word "bells" on sorting out. I found this new "Bow Bells" record which I had yet to hear, that is Columbia D.B.1637.

Now, this latter was made some time about last March—the interval signal has been with us for over four years. I set the speed of my spring motor, having my record running whilst it was broadcast when I made the S.T.400—and on this new one the recording is of a peal of twelve bells, and that which is broadcast is a peal of ten. They can be easily counted if one cares to. It is true the chimes are the Whittington chimes, but the chime (or change) has the same "basis," whether rung on six, eight, ten, or twelve bells.

Yours faithfully,
A. H. BARTRAM.

Somerby, near Melton Mowbray.

RADIO BEACONS

The Editor, "Popular Wireless."

Dear Sir,—In your Xmas number of "Popular Wireless," dated Dec. 5th, 1936, you have an article on "Radio Beacons," and in your diagram you give the Bishop Rock Lighthouse as having a radio beacon.

As a keeper at the Bishop Rock Lighthouse, may I give you the true facts? At the Scilly Isles there are two fully manned Trinity House lighthouses: Round Island and Bishop Rock. It is the Round Island Lighthouse that has the wireless beacon—not the Bishop Rock.

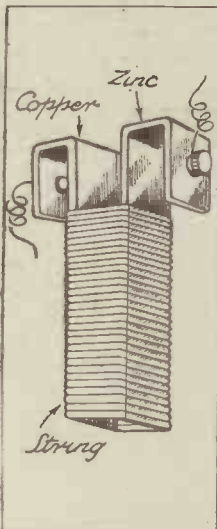
Your error is not such a bad one as the commentator who, during the maiden voyage of the "Queen Mary," said: "The Bishop Rock off Plymouth." Surely things are moving.

Trusting that this information may be helpful to you,

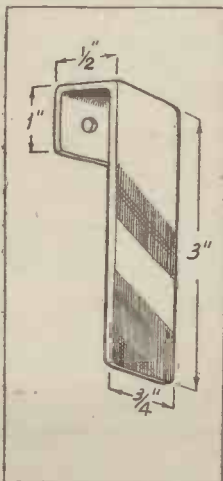
Yours truly,
C. E. J. GANDY.

Bishop Rock Lighthouse, c/o Mrs. J. Lethbridge, Trekene, St. Mary's, Isles of Scilly.

THE CELL



How the unit looks in its complete form.



Dimensions for the plates of Mr. Slater's test cell.

WANT A GUINEA?

Have we heard from you? We get letters from hundreds of readers and many are of interest to others—hence this weekly page written entirely by readers for readers. Has a letter from you appeared on it? A guinea is awarded each week for the letter which, in the Editor's opinion, is the best one. This week the guinea goes to Mr. Chaplin.

BUILDING:

THE "EVERY-BAND THREE"

This week we commence the constructional description of "P.W.'s" latest development in receiver design which was introduced in our last issue. Further how-to-build details will appear next week

THIS week we deal with the preparation of the components and materials used in the construction of the "Every-band Three." Next week the actual constructional details will be given, together with operating and installation hints.

First of all it must be stated very definitely that the components specified must be used, and no others substituted. This is, of course, good advice when building any receiver. In this particular design it is even more important than usual to observe this point.

Layout Importance

The layout is just as important—perhaps even more important—and you should not deviate from the original in the smallest detail. When dealing with the normal broadcast bands, certain liberties may sometimes be taken with the layout without adversely affecting results. When we get down on the short-wave bands—particularly at such low wavelengths as 7 metres—a very slight alteration in layout, which probably affects length of wiring, will in all probability cause results to be ruined. As you know, it has taken many weeks of experimenting to evolve this design, so it is very improbable that you will get better results by modifying it!

It may be thought that the warning regarding substitution of components and alteration in layout has been "rubbed in" sufficiently. We hope it has. Anyway we will now proceed with a description of the general shape of the receiver.

It consists of two essential parts, namely the baseboard carrying the components other than coils, and a coil-base which carries the coils. The baseboard is of $\frac{3}{8}$ in. ebonite, 10 in. by 10 in. On the underside of this baseboard are mounted the wavechange switch contact strips, the on-off switch contact strip, the stop strip, and the aerial, earth, and L.S. terminals. On top of the baseboard are mounted all the components except the coils. These are mounted on an ebonite base $\frac{3}{8}$ in. thick. This is cut from a 9-in. square as shown in one diagram of coil base. Mounted on the coil base also are two .0001 mfd. pre-set condensers. These are trimmers for the broadcast coils. The contact screws are $\frac{3}{8}$ in. by 6 B.A. brass cheese-heads, and are mounted with nuts and soldering tags.

The coil-base is fitted to the baseboard by means of a 2 B.A. pivot rod and nuts. The appropriate set of contact screws on coil-base registers with the contact strips on the underside of the baseboard when coil-base is rotated to required waveband.

By A. SMITH



Mr. Johnson-Randall discusses the "Every-band Three" with members of the "P.W." research staff.

That concludes a brief description of the form of the receiver.

The first thing to do is to mark out the ebonite baseboard. The positions of the holes for mounting the contact strips are shown in the diagram of the underside of the baseboard. These holes should be drilled very accurately, with a $\frac{1}{8}$ -in. drill. The hole marked "X" carries the 6 B.A. screw which fixes the on-off switch contact strip and the stop strip. This same screw is also one of the fixing screws for a valve-holder on top of panel. The next hole to drill is the pivot hole, and a $\frac{7}{16}$ -in. drill is used for this. When these holes have been drilled, the baseboard should be put aside, and the coil-base should be cut out from the 9-in. square of ebonite in the following manner.

Marking-out the Coil-Base

With a pair of dividers scribe a circle with a radius of $4\frac{1}{2}$ in. (The centre of the square is the point where the diagonals cross.) The circumference of the circle will, of course, touch the four sides of the square. This is shown in one of the diagrams of the coil-base.

The circumference is now divided up into twelve. This is done in the following manner. Scribe two lines through the centre of the circle, one being parallel with one pair of opposite sides and the other with the other pair. From the point where one of these lines meets the side of the square, place one point of the dividers set to radius of circle. Mark off circumference by this means into six parts. Starting at the same point of an adjacent side, mark off the remaining six points. Now scribe a line between each adjacent pair of points. The circle is now turned into a twelve-sided figure. This is now cut out.

Now drill the centre pivot hole. This is $\frac{3}{8}$ in. diameter. The holes for the contact screws are now drilled using the baseboard as a template. Scribe a line through pivot hole and hole "Y" on underside of baseboard. Place the baseboard on the coil-base, so that the bottom of the baseboard is in contact with the bottom of coil-base, and the pivot-holes in each register. Insert 2 B.A. rod through pivot-holes, and lock together with a nut on either side, with one point of the twelve-sided coil-base registering with the line through the pivot-hole and the hole Y on coil-base. Place on bench with base-board uppermost, and part of the coil-base which overlaps towards you.

(Continued overleaf.)

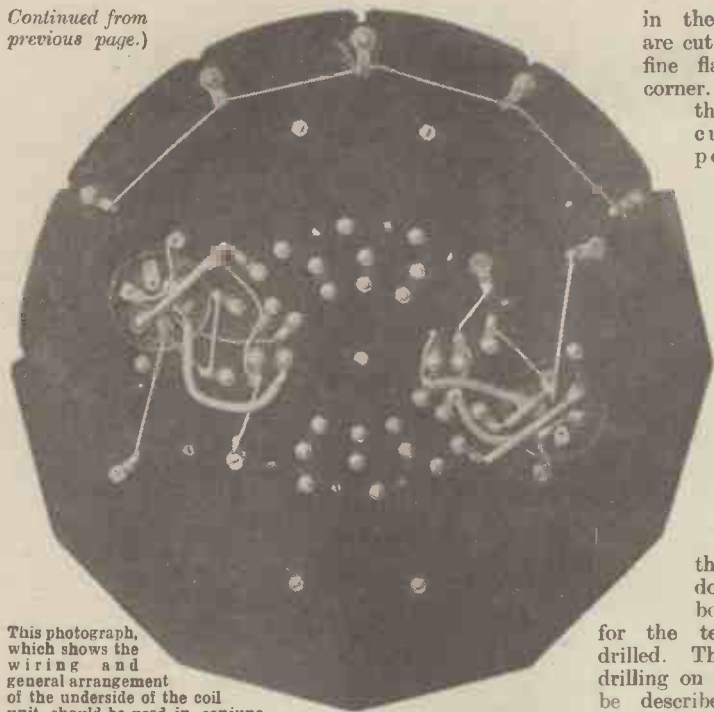
.....
THE FIRST SET FOR ULTRA-SHORT, SHORT, MEDIUM AND LONG WAVES WITH SIMPLE SWITCHING

The position is located by means of the stop strip (on underside of baseboard), which drops into the stop "V's" on the periphery of the coil-base.



THE COIL UNIT.—The two screened coils are for the ordinary medium and long-wave broadcast bands, while the two groups of three coils cover the short and ultra-short wavebands. These latter coils are home-wound.

Continued from previous page.)



This photograph, which shows the wiring and general arrangement of the underside of the coil unit, should be used in conjunction with the fully dimensioned diagram below.

Now, using the holes already drilled in the baseboard as a template, drill through the coil-base these holes: the top two in line with the centre, and that to the left of these two. Then drill through the hole marked Y. Turn coil-base clockwise so that the next point comes opposite the line through centre and hole Y. Repeat drilling as before. Turn to next point, and repeat the process. Turn to next point, but this time drill through all four W/C contact strip holes, and through Y. Turn to next point, and drill as in first three cases with the exception of hole Y which is not drilled. Then miss a point and turn to the next one, and drill through three W/C switch contact holes as before. Repeat this on next two points.

VALVES AND BATTERIES

V.1 Cossor 210 V.P.T. (4 pin)	V.2 Mazda L.2.	V.3 Hivac Y.220
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L.T. 2 volts—Exide.
H.T. 120 volts—Drydex.
G.B. 4½ volts—Drydex.
Loudspeaker—W.B. Stentorian.

On the fourth point drill all four W/C contact strip holes. On the fifth one drill only three. Turn to next point and drill through hole Y only.

Next remove coil-base from baseboard, and drill remaining holes. The positions of these holes are given in the coil-base diagrams. All holes are 1/8 in. diameter, except that for the pivot which is 3/16 in., and those for the coils BC 1 (C 6) and BC 2 (C 8), which are 1 1/4 in. diameter.

The next job is to remove the points of the coil-base between the two end stop-V's. This is easily done by means of a rasp. This portion of the coil-base must be fashioned into a circular form, as shown in diagram. The position and shape of the stop V's and end stop V's are clearly shown

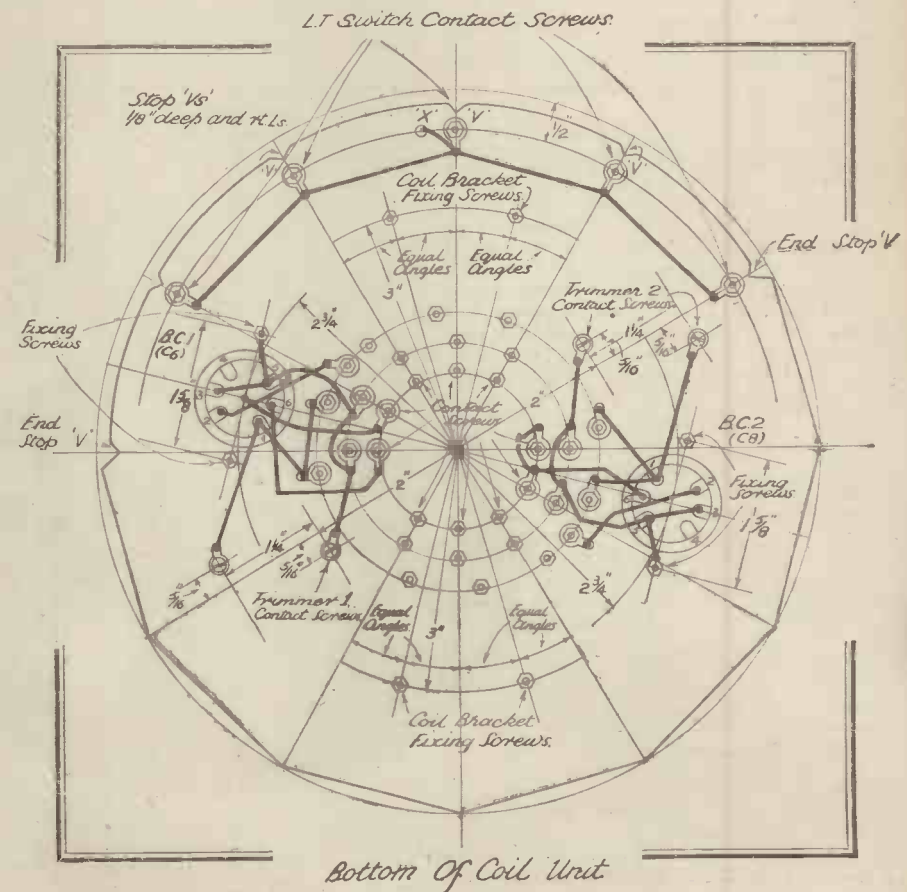
in the diagram. They are cut with an ordinary fine flat file, using the corner. It is essential that they should be cut in the exact position, as they have to locate the switch contacts. The coil-base is now complete, and ready to take the coils. The construction and mounting of these will be described next week, together with the remainder of the constructional details. There is just one more thing that may be done to the baseboard. The holes for the terminals may be drilled. The remainder of the drilling on the baseboard will be described in the actual construction.

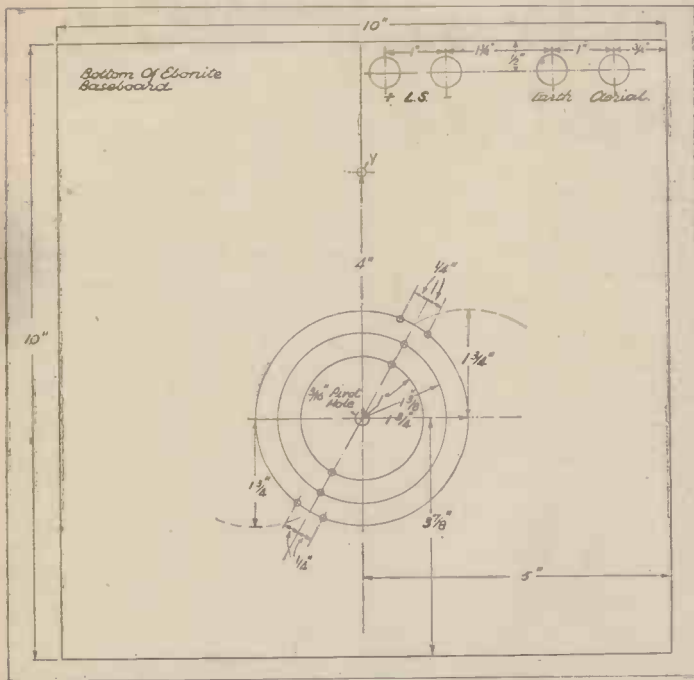
The side-pieces or runners which support the baseboard are made of 3/8 in. plywood, and are 10 in. long by 4 1/2 in. deep. Make sure that the top and bottom edges are square; otherwise the complete assembly will not be square.

There are some alterations and additions to be made to the two-gang tuning condenser. In the first place the trimmers are removed. This is done by screwing

- YOUR SHOPPING LIST**
- 1 Polar 2-gang tuning condenser, each section .0005 mfd., Bar type.
 - 1 Polar semi-circular drive, marked in degrees.
 - 1 Bulgin coil, type C.6.
 - 1 Bulgin coil, type C.8.
 - 1 Eddystone S.W. H.F. choke, type 1066.
 - 1 B.T.S. screened all-wave H.F. choke.
 - 1 Wearite screened H.F. choke, type H.F.J.
 - 1 Varley "Nicore II" L.F. transformer.
 - 2 Bulgin 4-pin short-wave baseboard mounting valveholders.
 - 1 W.B. 5-pin baseboard A.C. type valveholder.
 - 1 J.B. .00005-mfd. baseboard trimmer condenser.
 - 2 J.B. .0001-mfd. baseboard trimmer condensers.
 - 1 Polar .0005-mfd. "Compax" condenser.
 - 1 B.T.S. .0005-mfd. solid dielectric variable condenser, with insulated bush and spindle.
 - 1 T.C.C. 2-mfd. fixed condenser, type 50.
 - 1 T.C.C. 1-mfd. tubular fixed condenser, type 250.
 - 1 Dubilier .0001-mfd. fixed condenser, type 665.
 - 1 Erie 2-meg. 1-watt. resistance.
 - 1 Erie .25-meg. 1-watt. resistance.
 - 1 Erie 10,000-ohm 1-watt resistance.
 - 1 Erie 5,000-ohm 1-watt resistance.
 - 1 Belling & Lee indicating terminals, type R.
 - 1 Ebonite baseboard, 10 x 10 x 3/8 ins.
 - 1 Piece of ebonite, 9 x 9 x 3/8 ins. to make coil base (Peto-Scott).
 - 2 Pieces 1/2-in. plywood, 10 x 4 1/2 ins. for runners (Peto-Scott).
 - 6 B.A. nuts and screws.
 - 20 ft. 18 S.W.G. tinned copper wire for U.S. and S.S. coils and wiring (Peto-Scott).
 - 1 oz. 22 S.W.G. D.C.C. wire for L.S. coils (Peto-Scott).
 - 3 Lengths of insulating sleeving (Peto-Scott).
 - 1 2 1/2-in. mounting bracket with long slot (Peto-Scott).
 - Aluminium for brackets (Peto-Scott).
 - Screws, flex, soldering tags, etc.
 - 6 "Paxolin" coil formers 2 in. x 1 in. diameter.
 - Brass for contact strips.
 - 2 B.A. rod, nuts and washers.

off the trimmer heads, and cutting off the trimmer vanes close to the anchoring screws. Do not remove these screws as they fix also the tags to which the fixed vane connections are made. Next fit a 1/2 in. x 6 B.A. screw and nut to the hole, in the front end-plate, nearest





The underside of the baseboard is marked out as shown here, holes being drilled to take the coil unit and switching contacts in the exact positions given.

trimmer, the head of the screw being inside. Fit a similar screw and nut to the back end-plate in the hole in the corner near foot.

SEEN ON THE AIR
News and views on the Television Programmes by our special radio-screen correspondent
L. Marsland Gander

It is reported that the Television Advisory Committee has under consideration a proposal that the B.B.C. should shortly "rest" for six months one of the two systems now being used at Alexandra Palace.

If this is so, it is, indeed, a surprise. After only two months of working with apparatus which has cost thousands of pounds to instal it would seem premature to reach any such decision. On the other hand it is an open secret that the B.B.C. have not found it simple to work the Siamese twin experiment.

Lack of staff can be overcome but it is not so easy to remedy the lack of accommodation and of facilities for rehearsal. In any decision which the Television Advisory Committee may reach the implications are necessarily serious. I hope, therefore, that the true interests of television will be kept uppermost in the minds of the Television Advisory Committee, and that they will not "rush their fences."

Departure of Cecil Lewis

Most viewers will regret the departure for Hollywood of Mr. Cecil Lewis, Hollywood's first recruit from television and from the B.B.C. Mr. Lewis is to write the scenario of a great flying epic for Paramount. It will be remembered that he recently embodied his war-time flying experiences in the graphic book "Sagittarius Rising."

He is to earn £150 a week, and even after paying three kinds of income tax the money should be worth having. Mr. Lewis is not only a pioneer of television, but was also one

of radio. He joined the B.B.C. back in 1922, when 2LO had started to broadcast from Marconi House. Soon he was chairman of the Programme Board. Then he left the B.B.C. and went into film work, his most noteworthy effort being the directing of Mr. Bernard Shaw's "Arms and the Man." He is a personal friend of Mr. Shaw, who often spends holidays at Mr. Lewis's "hide-out" on Lake Maggiore.

Mr. Lewis was the only man whom Shaw would entrust with the screen version of "Arms and the Man," and it must be confessed that some of the critics were not too pleased with the finished product. However, the most interesting point about the new appointment to me is that Hollywood does not merely want Mr. Lewis to write the script of this new film but also has him in view for a leading part. Anybody who has seen him on the television

screen will agree that here is a potential film star. Mr. Lewis, who is 38 and looks 28, is tall and fair and makes a fine picture.

During the few months of service at Alexandra Palace his chief success was, in my view, as a television commentator. He had an easy natural manner and a ready charm which I feel certain will not readily be replaced. Incidentally, he has a two-years' contract which he can break at his own option after six months or a year. The B.B.C. have on this occasion behaved very handsomely by releasing Mr. Lewis at once and inviting him to return to the television service when it suits him.

Complete Talks Schedule

Mr. Lewis has arranged a complete talks schedule for television for the next three months. Mrs. Mary Adams, of the Adult Education Talks section is to transfer to Alexandra Palace to take over part of Mr. Lewis's relinquished duties.

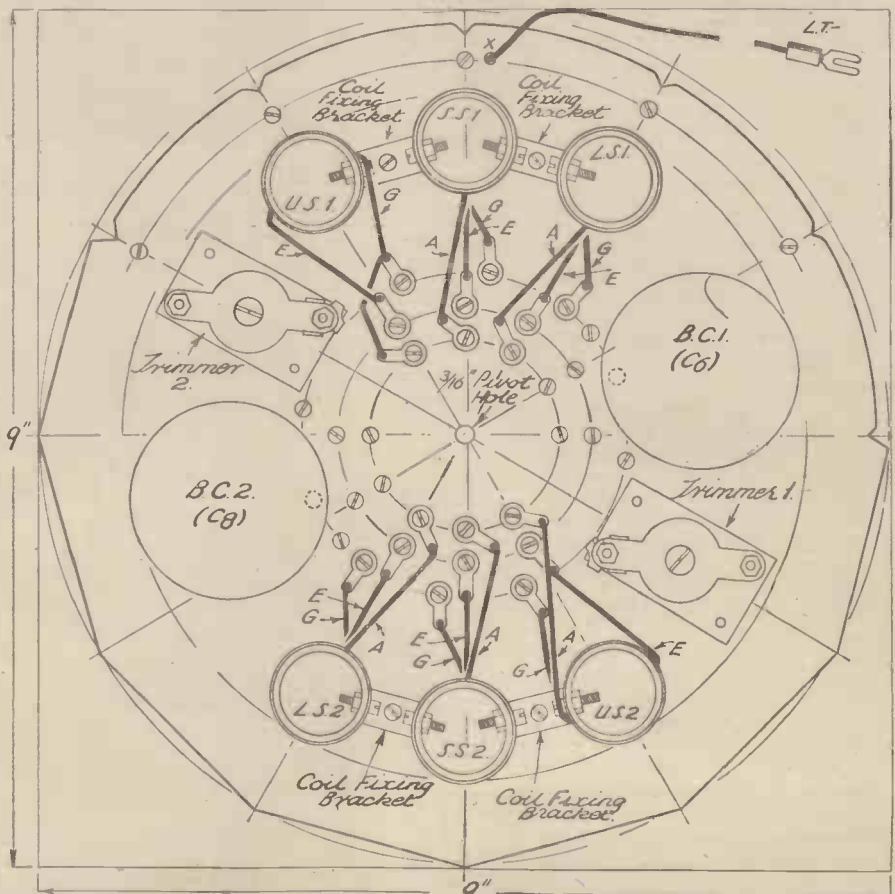
Mrs. Adams was formerly a lecturer in biology at Cambridge. Besides planning talks series she has shown herself to be an eloquent and persuasive broadcaster. Her husband is the National Unionist M.P. for West Leeds.

Yet another personal note. Mr. Howard Marshall, the genial giant who has carved a special place for himself in three different spheres—sport, Fleet Street, and broadcasting—has been offered the position of television Sports Editor at Alexandra Palace.

I believe that sport will be the making of television. I am glad to know that the B.B.C. are tackling it in a big way. In their Sports Editor they have chosen obviously and chosen well.

(Please turn to page 514.)

HOW THE EIGHT COILS ARE ARRANGED



How the coils are arranged. The lettered leads correspond with the lettering on the coil constructional sketch which will appear next week. Note the L.T.—flexible connection which passes through the hole marked "X" and is joined to the L.T. contact screws on the underside.

LEARNING FRENCH THROUGH YOUR RADIO

I HOPE you have been thinking about those two PAIRS of TENSES that I gave you last week. You remember them, don't you?

ONE & EIGHT TWO & NINE

And the formulae:

IF A DOES . . . B WILL
IF A WERE TO . . . B WOULD

The other day I came across a lovely example of a TWO and a NINE in a French short story I was reading. Here it is:

Si vous n'aviez pas de boutons sur la figure je vous embrasserais. (If you hadn't [were not to have] pimples on your face I would kiss you.) Sounds like an advert. for a skin ointment, doesn't it?

This week I am going to give you another PAIR of TENSES. We find the same pair in English, namely, TENSES ONE and TWO, exemplified in the well-known nursery rhyme, "As I was going to St. Ives I met a man with seven wives." Here we have a case of interrupted action. A certain incident happens to interrupt the one already in progress. That is, as I was engaged in the process of transporting myself on foot to St. Ives I suddenly and unexpectedly ran into a man whose fame was that he was married to seven wives. Look at these English sentences.

As I was walking down the street I met the postman.

As I was listening to a broadcast on Christmas Eve an unexpected visitor arrived.

As I was getting off the bus this morning I fell.

While shepherds watched their flocks by night . . . an angel of the Lord came down.

Do you notice the peculiar sort of TENSE used in the first part of each of these sentences? As I was —ing; While shepherds were watching. This is important, so keep it in your mind.

Now look at the same sentences in French.

Comme je descendais la rue je rencontrai le facteur. Pendant que j'écoutais une radio-diffusion la veille de Noël il arriva un visiteur inattendu.

Comme je descendais ce matin de l'autobus je tombai. Pendant que les bergers gardaient leurs troupeaux pendant les veilles de la nuit . . . un ange du Seigneur se présenta à eux.

I want you to notice how in each of these sentences there is an IMPERFECT (T. No. 2) and a PRESENT (T. No. 1). Also, notice the type of word that introduces the first part of each sentence.

Pendant que (While), Comme (As), Quand (When), Lorsque (When).

Here are a few more sentences of the same kind.

Comme il allait frapper on l'arrêta. As he was going to strike he was arrested.

Comme il traversait la rue une auto le heurta. As he was crossing the road a car ran into him.

Comme le père et la mère apportaient le petit enfant Jésus, il (Siméon) le prit entre ses bras et bénit Dieu et dit "Seigneur, tu laisses maintenant aller ton serviteur en paix, selon ta parole." And as the parents were bringing in the child Jesus, he

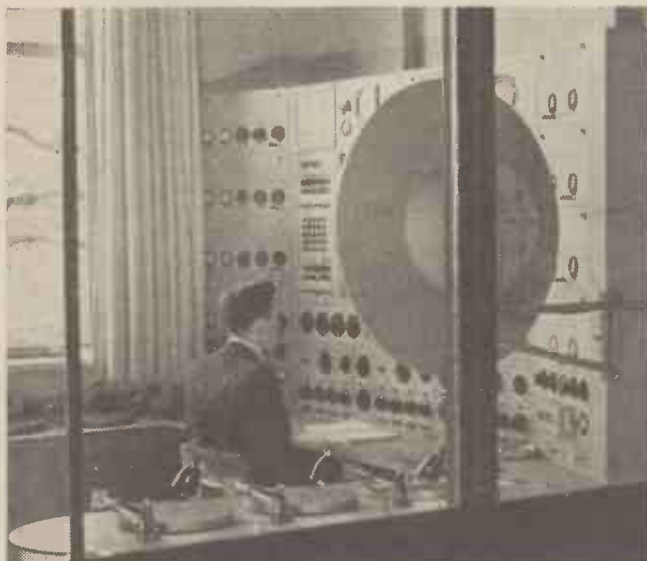
Part 44 of the special language series

By S. C. Gillard, M.A.

(Siméon) received Him into his arms, and blessed God and said, "Lord, now lettest thou thy servant depart in peace according to Thy word."

Now, the same sentences may be, so to speak, the other way round, thus:

NEW AVRO CONTROL ROOM



A corner of one of the two control-rooms at the new AVRO "Broadcasting House" at Hilversum. The letters AVRO stand for the name of the broadcasting association which runs this particular radio service, and it is interesting to note that it is supported entirely by the voluntary subscriptions of listeners, of which there are over 200,000. Further details appear on another page of this issue.

I was contemplating the scene when a cry went up. Je contemplais la scène quand un cri se fit entendre. I was filling my glass when suddenly there was a knock at the door. Je remplissais mon verre quand soudain on frappa à la porte.

She was speaking to the crowd when to her surprise a policeman arrived. Elle haranguait la foule quand à son étonnement un agent de police arriva.

No matter which way round the sentence is, whenever there is interrupted action the verb whose action suffers the interruption will be in the IMPERFECT, while the verb that causes the interruption will go into the PAST DEFINITE. But, surely, the examples which I have given you must make all this clear.

There is an altogether different use of TENSES No. 1 and 2 that I wish to talk about now. This may be a little more difficult to grasp as we do not employ the same construction in English. This particular construction concerns that popular English question the like of which you are constantly asking. Such questions are these:

How long have you been waiting?
How long have you been learning French?
How long have you been here?
How long have you been living in London?
How long have you had a five-valve portable wireless set?

How long has Norman Long been broadcasting?
How long have you had a car?
How long has there been a Cinema here?

Now the Frenchman, unlike the Englishman, in asking these and similar questions, recognises from the start that you are doing the thing in question right up to the moment of his asking the question. Nay, more, even while he is asking it. So he avoids the TENSE we Englishmen use, that is, the PAST INDEFINITE (T. No. 4), and uses the PRESENT (T. No. 1). Take the first of these questions, for instance:

How long have you been waiting?

If you analyse it, dwelling especially on the TENSE employed, you are bound to confess that "have you been" suggests something now finished and done with. Whereas, in actual fact, you are still boiling with indignation over your two-hour wait (in the rain perhaps) for a friend who was two hours late in turning up. Now the Frenchman, because he seems to appreciate the fact that you have been waiting and are still waiting, puts his verb into the PRESENT. This change of TENSE necessitates a totally different type of sentence. Instead of beginning his question with the words HOW LONG . . . he prefers the two words SINCE WHEN . . . So for HOW LONG HAVE YOU BEEN WAITING? he asks.

SINCE WHEN WAIT YOU?

DEPUIS QUAND ATTENDEZ-VOUS? Similarly:

DEPUIS QUAND APPRENEZ-VOUS LE FRANÇAIS?

Since when do you learn French?

DEPUIS QUAND ÊTES-VOUS ICI?

Since when are you here?

DEPUIS QUAND DEMEUREZ-VOUS À LONDRES?

Since when live you in London?

DEPUIS QUAND AVEZ-VOUS UN POSTE PORTATIF À CINQ LAMPES?

Since when have you a five-valve portable wireless set?

DEPUIS QUAND NORMAN LONG EST-IL UN ARTISTE DE RADIO?

Since when is Norman Long a radio artiste?

DEPUIS QUAND AVEZ-VOUS UNE AUTO?

Since when have you a car?

DEPUIS QUAND Y A-T-IL UN CINÉMA ICI?

Since when is there a Cinema here?

Naturally in your reply you will use the same TENSE and the word DEPUIS.

J'ATTENDS DEPUIS DEUX HEURES

I wait since two hours

J'APPRENS LE FRANÇAIS DEPUIS UN AN

I learn French since a year

JE SUIS ICI DEPUIS TROIS MOIS

I am here since three months.

Then again, there is the same question only in a different TENSE.

How long HAD you been waiting?

How long HAD you been learning French?

How long HAD you been living in France?

How long HAD you had a wireless set?

In translating these into French you use the same construction, beginning with DEPUIS QUAND, but the verb is moved ONE TENSE ON. That is to say, the verb is put into the IMPERFECT, and the Frenchman asks:

(Please turn to page 513.)

ON THE SHORT WAVES



PRE-SELECTION
Some Suggestions for
a useful H.F. unit
By W. L. S.

EVERYONE that listens on the short waves nowadays realises that good conditions are a mixed blessing. Five or six years back, when many of the short-wave bands were dead for weeks at a time, we used to pine for the "good old days," when sunspots were sunspots, and stations came in like nobody's business at all times of the day.

I predicted then (and this isn't the old fable of "I told you so!") that when conditions *did* become good again, we should find ourselves up against it, in more ways than one. Stations throughout the world have been improving their efficiency, increasing their power, and putting aerial systems of special design into action.

Selectivity Vitally Necessary

In other words, we once wanted a receiver that was just *sensitive* enough to pick up all the weak little things that were floating through the ether; and now our receivers, if they are of any good at all, pick up far too much!

It was inevitable that what happened on the broadcast bands should happen all over again on the short waves. Luckily for us, it hasn't happened all at once. Now, in 1937, we have to use something really selective for broadcast reception, even if we only want to receive the more powerful stations.

Short waves, of course, are going the same way. More and more is it becoming necessary to use something really selective. Luckily for those of us who like simplicity, the small sets aren't done yet—not by a long way—and I doubt if they will be scrapped for many years to come. But look at the commercial tendency—the marketing of low-priced superhets, which really do their job, on short waves or broadcast.

During the last two or three weeks nearly all my spare time has been spent on the construction of a two-stage H.F. amplifier, a handy, self-contained little unit, which could be calibrated and used in front of any existing receiver.

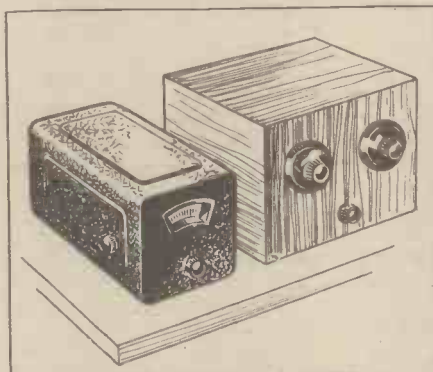
Under Varying Conditions

I have had it going in front of my own O-V-1; in front of a straight converter which works into a broadcast receiver; and in front of a commercial short-wave superhet which has no pre-selection. In each case it has more than justified its existence. Strangely enough, its benefit is felt more with the commercial superhet than with either of the other sets.

I don't propose to go into technicalities now, because I am still playing with the unit. I hope to describe it fully a little later on. Meanwhile, however, those

readers who feel the need for such a unit can easily build one up for themselves, just using the necessary parts plus a little common sense.

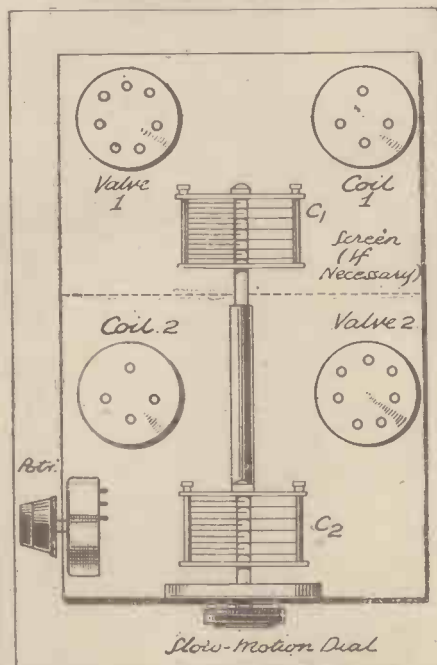
VERY WORKMANLIKE



The H.F. unit (left) can be built into a neat case and used alongside an existing set.

The lower figure on this page shows the layout. I have used an aluminium box nearly twice as deep as it is wide, and my original idea was to divide it into two

GANGED TUNING



The suggested layout for the two-stage H.F. amplifier referred to by W. L. S. The two circuits are ganged.

complete sections, placing one H.F. stage in each. As things have turned out, however, the central screen is unnecessary on account of the layout used.

The first stage, with its coil, condenser and valve, is at the rear of the box; the second stage occupies the same space, but has a "reversed layout" in the front portion.

Short Leads to Condensers

In other words, the two coils are kept well away from each other, although each of them is right up against the condenser that tunes it. A pair of H.F. pentodes is used, and the screen voltage on the two is controlled by a potentiometer mounted at the side of the box near the front. This forms a very useful gain control; without which the handling of the unit would be rather tricky.

I managed to persuade the two tuned circuits to gang quite nicely without trimmers, and it has been possible to calibrate the thing for each pair of coils.

The anode of the second H.F. valve is coupled to the aerial terminal of the existing receiver through a small pre-set condenser, which is carefully set at such a value that there is no "pulling" whatever between the controls. In other words, it is possible to tune in a signal on the ordinary receiver, and then to bring the pre-selector into tune without having to touch the actual set again.

It serves just as a volume control, but has a wonderful effect on selectivity.

I have used indirectly-heated valves, and a separate transformer supplies their heater current. The H.T. is taken from the H.T. supply to the set that follows the unit, whichever one that may be.

One H.T. Positive Terminal

Incidentally, there is only one H.T. positive terminal on the pre-selector, all voltages being adjusted inside by means of resistances. Thus it is by no means a fiddling business to couple it up to whichever set may be on the operating table at the time.

Readers know what the 31-metre band can be like on a good night at about 10.30 or 11.0 p.m.? How many of them can pick out *all* the "Yanks" without interference? My own superhet won't always do it; but with this two-H.F. unit all my three combinations will do it with the greatest of ease.

All the welter of Latin-American stations between 50 and 42 metres can also be examined closely, and I have identified many of them that I would never have bothered to listen to before.

ON THE SHORT WAVES—Page 2.



W. L. S. Replies to Correspondents

D. W. H. B. (Leatherhead) wants to know where to write for particulars about transmitting licences. The P.M.G., G.P.O., London, E.C.1, is the man who handles the matter. Before you think much further about this, D. W. H. B., it would be a good plan if you joined a radio society and got in touch with a few transmitting men.

S. O. G. (Gloucester) tells me that I started him on the short-wave trail when he was out in Singapore—and the effects of the "bug" remain. He started off with the one-and-only single-valver, but it has now grown in both directions, and has an H.F. stage in front and two L.F.'s behind. He sends some beautiful snaps from "out East," which I hope will be good enough for reproduction. He now wants me to describe a really "hot" three-valver for jungle-dwellers and all those pukka wallahs in the Outposts of Empire. Duly noted, S. C. G.

A Wanted Address

D. C. C. (Balham) responds to a previous query. The address of Z M B J, the "New Zealand Luxury Liner," is S.S. *Avatea*, Union Steamship Co., of New Zealand, Ltd., Wellington, N.Z. Reports addressed to the chief operator will probably be acknowledged with a QSL of some kind.

J. A. R. (Taunton) seems to be bothered by the two diagrams that are enclosed with some makes of commercial short-wave coils. One series of connections is shown as "in oscillator circuit," and another is described "grid winding, with aperiodic primary or reaction." The latter connections are the ones that should be used in an ordinary detector circuit.

L. E. S. (Camberwell), in the course of an

interesting letter, describes a useful little unit that he has made up. It takes the form of two L.F. stages, with a five-pin plug as input. Sets with one L.F. stage can be converted into real loudspeaker jobs simply by removing the last valve, inserting the plug, and putting the valve back into the "L.F. Adaptor," for that is what it really is.

J. H. (Weymouth) wants me to give details of an "all-wave" doublet aerial. Strictly speaking, there isn't such a thing; but I intend to deal with receiving aerials very shortly, and I hope he will find the necessary information then.

What About the Pigtail?

N. H. (Scarborough) has double-spaced a .0005 variable condenser in the hope of turning out a nice low-loss condenser for reaction control. With it, however, the set refuses to oscillate, although it behaves perfectly with an ordinary .0001 reaction condenser. The capacity of the "special" should be about .00012; so it's hard to say what's wrong, unless it's something obvious, like a disconnection between the pig-tail and the end-plate.

There can be no reason why the set should work with one and not the other if they are both functioning correctly.

E. C. W. (Cosham) wants me to give a lay-out for a modern S.G. detector followed by a pentode, or two L.F. stages, for loudspeaker work. I will try to do that on the lines of the "standard-baseboard" lay-outs very soon. I don't think we have had our fair share of loudspeaker receivers on those humble baseboards, and will try and remedy that deficiency.

E. de C. (Prittlewell) mentions that he has heard VO 11 on 20 metres calling "CQ Ten." Other readers have reported similar things. I think the solution of this is that the stations concerned are on 20 metres all right, but they have had reception reports on their 10-metre harmonic, and occasionally call a "CQ Ten" and listen down there just to see if their harmonic is strong enough to raise any DX. I've done the same myself, so I know!

H. A. (Preston) sings a song of praise for the "B.C.L." Two, which, in his case,

is still going strong, although he has had a little trouble with microphonic detectors. Funny how some of these screened-grid battery valves vary in that way.

Although the set wasn't designed for 10-metre work, he gets the band all right, and also can hear harmonics of the 19-metre broadcast stations just below 10 metres. He wants to know whether it would be policy to alter the detector valve and its coupling. Candidly, I think it preferable to leave things as they are.

J. G. G. (Ashford) has a short-waver that doesn't! With the coil removed he hears London Regional all round the dial, with it in place he just hears faint Morse. Obviously he has made a bad bloomer in the wiring, because when the coil is removed the plate circuit should be broken and he naturally shouldn't hear a thing. Look to those coil connections again.

P. E. T. (Barnet) wants to know how reaction is supposed to be controlled with circuits of the electron-coupled type. The only thing to do, of course, is to use a variable resistance, suitably by-passed, in the H.T. lead. Some people believe in varying the screen volts, but I very much prefer the other method.

When an indirectly-heated valve is used, there is no need for a cathode-bias resistance.

For Prospective Transmitters

H. H. (Leeds) asks: "Will you please tell me how I should begin acquiring the knowledge necessary for the working of an Amateur Transmitting Station?" Sensibly put, H. H.; I have had letters asking how one chooses a call-sign when one has decided to transmit! The best thing is to try to find a local society and to join it. Failing that, find the address of the nearest "ham" and look him up. If no one can tell you, the local sorting office will know him all right, unless he's not active!

The "Guide to Amateur Radio" (6d. from the R.S.G.B. at 53, Victoria Street, S.W.1) is, so far as I know, the only book published in this country which covers absolutely everything concerning amateur transmission from the point of view of the would-be "ham."

THE "P.W." DX
CERTIFICATE

READERS who have heard (and verified) two stations in each of the six continents are entitled to a special certificate presented by "P.W." A small reproduction of this certificate appears on this page.

To receive your own certificate you must forward your twelve verifications (two from each continent) and enclose a stamped, addressed envelope for their safe return. The certificate will be sent under separate cover.

No Complicated Rules

There are no complicated rules governing these awards. The only point to remember is that North and South America are separate continents, the West Indies and countries north of Panama counting as North America.

Java and Sumatra count as Asia, not Australasia.

The following are a few recent claimants to whom the certificate has been forwarded:

WORTH WINNING



This is a small reproduction of the "P.W." DX certificate which readers can win by sending in twelve verifications consisting of two from each of the six continents.

R. W. S. Halsey, 7, North Approach, Kingswood, Watford.

- E. A. G. Shaw, "Sonnyden," 25, Christchurch Gardens, Kenton, Harrow.
- D. L. Pelham, "Annan," 18, Selvage Lane, Mill Hill, N.W.7.
- J. G. Treece, 95, High Road, Beeston, Nottingham.
- S. A. Donaldson, The Garden House, Mer-ville, Booterstown, Dublin, E.F.S.
- D. Rushman, 19, Hampden Square, Osidge Lane, Southgate, N.14.
- H. M. Bull, 276, Holmesdale Road, South Norwood, S.E. 25.
- G. W. Smith, 76, Church Street, Gainsborough, Lincs.
- R. L. Tyrrell, 97, Canterbury Road, Margate, Kent.
- F. W. Parkhurst, 63, Hendford, Yeovil, Somerset.
- D. W. Morgan, 15, Grange Road, Kenton, Middx.
- H. F. Hamilton, "Glenara," Shelveys Way, Tadworth, Surrey.
- J. Francombe, 2, Park Way, Ruislip, Middx.
- R. Duncan, 56, Cambridge Road, Seaforth, Liverpool.
- J. Dalton, 33, Kempton Road, Anlaby Road, Hull.

RANDOM RADIO REFLECTIONS

By Victor King

"NOW, MR. FENDER!"—AMERICAN L.F. DEVELOPMENT—SERVICE MEN IN THE U.S.A.—"TOASTING-FORK" REFLECTORS

PROGRAMME TIMING

IS it my imagination, or are the B.B.C. programmes becoming more than usually slack and badly timed in their presentation? Maybe one notices lapses because of the slick U.S. programmes which come over.

Not that I, for one, mind if the B.B.C. fails to work its schedules to split seconds. But when an announcer says:

"Now, Mr. Fender, what have you got to say about Hammond's performance?" and you wait and wait and wait for nearly half a minute before Mr. Fender gets going, then that is what I call indifferently slack presentation.

Yeah! I know! Mr. Fender might have got caught up with his script. Well, and what's wrong with the announcer nipping in to cover up the break? But I forget; our announcers mustn't be extempore. Only dance-band leaders are allowed to speak without a book. Or are they?

NEW USE FOR OLD FEED-BACK

SEVERAL of the new American sets are employing low-frequency feed-back. Shades of the "motor-boat" and L.F. howl! But this is feed-back with a difference—phase difference.

The idea is this: Your output circuit amplifies the good stuff and adds a bit of bad stuff of its own, so you feed back the bad stuff in reverse and it wallops into its brother distortion and wipes it out.

Similarly, all the sins of valve-speaker mis-matching are washed away, and a good time is had by all.

The only snag is that a bit of the good stuff is diverted back and neutralises a slice of the jolly old pure and noble. You can't help that; but it's easy to push up the amplification again to make up for it.

THIS SERVICING

SERVICING is very much a full-time and honourable profession in the U.S.

When I was over there, a year or two ago, I met a man who runs a whole team of servicing engineers. This man began as a set constructor. Later, he carried out some servicing for friends' sets; then the sets of strangers.

Now he owns a posh car and a pent-house, and employs a manager to manage his team. I suppose he merely manages the manager!

There are numerous schools for service men in New York, and the amount of gear produced especially for the craft must occupy the full time of many large factories.

Among the things you can buy are shielded testing rooms. But not, I think, on the C.O.D. principle!

THE LONE EXPERIMENTER

TALKING about France (I know we weren't, but it's a good subject), I hear that some very secret television tests have been carried out at the Eiffel Tower. A new system of radiation is involved, and it is hoped that by its means the range of ultra-short waves will be enormously increased.

Which reminds me. In a deserted corner of the Cotswold Hills there is a lone experimenter who spends many hours a day fiddling with a kind of oversized toasting-fork mounted on a large, square box.

The "L. E." has a theory. He believes he can re-radiate or refract ultra-short waves. He has a vision of the whole country studded with these over-sized toasting-forks, and bending on their way the "picturised" beams of one central transmitter.

He became quite annoyed with me when I suggested that he might give us at least one alternative programme!

But, joking apart, I think this "L. E." (Lone Experimenter) has got hold of some-

thing. He won't divulge any details, although he claims to possess patents.

Certainly the demonstration I witnessed seemed conclusive, although, being sworn to secrecy, I can't tell you much about it except that he can get a jolly good Alexandra Palace signal at a distance of over 200 miles with the aid of only two intervening "toasting-forks," one at Aylesbury and one somewhere between Oxford and Cheltenham.

No valves or anything like that are used, but I gather that the box part of each "toasting-fork" holds tuned circuits. If it isn't a mare's nest, you should hear something about this "L. E." before the end of the year.



Mr. Motycka, the Czecho-Slovakian experimenter, to whom our European correspondent, A. A. G., refers below.

A CZECH AMATEUR

An enthusiast whose call will be familiar to many "P.W." readers.

IN a number of Continental countries it took much longer for the postal authorities to issue amateur transmitting licences than it did in Britain. But in spite of restrictions which, for instance, make Yugo-Slav amateurs work their transmitters to-day still even with the ever-present fear of detection, as officially they are non-existent, the amateur movement gained ground. In Czecho-Slovakia it was not until 1930 that amateurs were granted licences and thus recognised.

On a recent visit to Prague I made the acquaintance of OK1AB, Mr. Motycka, now an engineer in the Prague Philips factory. Mr. Motycka's call-sign was CSOK in pre-licence days, and he is perhaps better known in Britain under that sign. Amateur work in Czecho-Slovakia goes back to 1919 and 1920 when Mr. Bisek, now OK1BK, organised Boy Scout transmissions with a spark transmitter on 200 metres. Mr. Motycka was the first to contact Holland, England and France in

1924. In 1925 he made his first transatlantic contact, and a year or so later other amateurs began working clandestinely.

With the issuing of licences in 1930 the situation was regularised, and there are now over 300 amateurs in Czecho-Slovakia, about half the number of those in Germany, although Germany has about five times the population. Czech amateurs have to pass an initial examination, and have to pay for this and for the issuing of the licence, but after that the only fee they are required to pay is the ordinary broadcast licence one. They are allowed to operate on telephony as well as telegraphy. Telephony is restricted to 50 watts input. There are also certain restrictions regarding hours, so as not to interfere with broadcast reception, but otherwise Czech amateurs enjoy complete freedom.

Mr. Motycka has his own "wireless cabin," built of wooden planks on the outskirts of Prague. Here he passes many a night with his phones glued to his ears. He told me that he always enjoyed the early morning air when he left the cabin for home. Nowadays he is deep in practical research for commercial uses, but has not forgotten the thrills of his purely amateur days.

A. A. G.

MILLION POUNDS DISSIPATED AT PORTLAND PLACE?

Will the vast expenditure necessitated in doubling the size of Broadcasting House be money well spent?

Asks **BARRY KENT**

FAR exceeding all other B.B.C. capital expenditure during the coming year will be the sum of £1,000,000 spent on doubling the size of Broadcasting House. No other single item in the B.B.C.'s accounts can possibly compare with this. Even the new short-wave Empire Station, at Daventry, which is to be ready in time for the Coronation, will not cost a tenth of this sum.

As a listener whose ten shillings contribute towards this huge outlay, I am tempted to ask: "Is it worth it?"

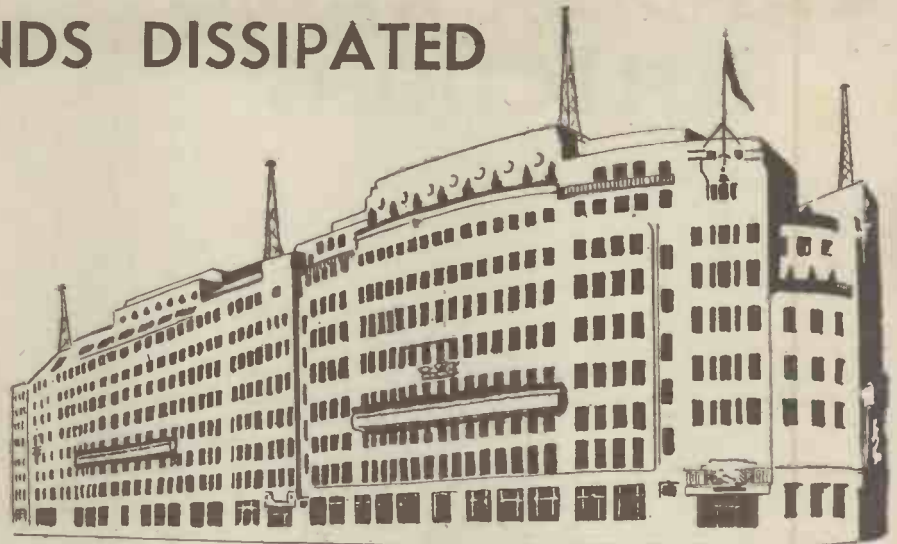
We all know that the B.B.C. built Broadcasting House on its present site despite the exceedingly high cost of land, because of some queer notion that the place for Britain's broadcasting headquarters was in one of the most expensive parts of the West End of London. Cheaper and possibly far better sites were available in the neighbourhood of Savoy Hill. Moreover, even before the building was finished, it was admittedly too small, and still more money had to be spent on acquiring the freehold of neighbouring houses in Portland Place with a view to extending the building.

Now the time has come when Sir John Reith and his colleagues are about to take the plunge and complete what has become known as "the other half" of Broadcasting House. Will it be money well spent or will it be a million pounds poured down the drains of Portland Place?

Unforeseen Television Development

The big query to my mind is television. No one (I should say, least of all at Broadcasting House) can possibly foresee along which lines this new service will develop. Even Alexandra Palace, designed and built after months of investigation and inquiry by Government committees combined with all the foresight of the Post Office, B.B.C. and television engineers, has already proved itself inadequate to cope with the present experimental transmissions. If this has become obvious within four months, goodness knows what could happen during the eighteen months or two years which it will take to carry out the proposed million-pound constructional effort.

So far, the B.B.C. has revealed only two details of what it has in mind for the new building. One is that the top floor is to be a fine restaurant and the other is that any studios will be below ground level. I doubt if it will be possible to stick to these meagre plans, for no one can say definitely that television will ever entirely oust ordinary sound broadcasting, although it does seem probable that within five years



An artist's impression of the enlarged Broadcasting House as seen from Portland Place.

certainly ten, the B.B.C.'s main programme efforts will be directed towards vision. Obviously, therefore, any big extension must make provision for this.

It seems likely that, for the sake of convenience and centralisation, the B.B.C. will want to abandon the studios at Alexandra Palace as soon as technical conditions permit. Under the best conditions it now takes me thirty minutes to get to Alexandra Palace from Central London. One foggy day it took me two hours—and I am a regular visitor, knowing the route with all its short cuts fairly well. Heaven only knows what would happen to artists who had but a few minutes to spare! True, the B.B.C. runs a 'bus service to and from Broadcasting House and Alexandra Palace, but what is the good of this?—you first have to get to Portland Place in time to catch the 'bus and then, when you come to return from Alexandra Palace, you probably find that the next 'bus is not for another half an hour. Clearly such inconvenience will not be tolerated indefinitely.

There is a co-axial cable between Portland Place and Alexandra Palace, which enables the B.B.C. to televise direct from any of the studios at headquarters. So far as I know no use has yet been made of this cable, but it is there and another is shortly to follow. This can mean only one thing, that the B.B.C. expects to carry out a good many television programmes from Broadcasting House, St. George's Hall, etc. How much more convenient such an arrangement will be for all concerned! But, alas! there is no hope of any really big television developments in Broadcasting House until "the other half" is finished, for already the B.B.C. is as crowded as any slum area.

What About the Inside?

Architects and the B.B.C.'s own surveyor are working on the plans for extending the building even now. The outer design, as it is to be seen from Portland Place, is simple—as my artist has shown in the accompanying illustration. But the interior is a different matter. Already a hundred-and-one different ideas and instructions have come from Sir John Reith and his controllers.

Meanwhile television at Alexandra Palace

forges ahead, and each month Mr. Gerald Cock sends back reports and recommendations which, if adopted, will radically influence the new building. In short, there seems no immediate prospect of getting a really perfect set of plans for the builders to work on. What will happen apparently is that the builders will be told to go ahead with the external shell, as it were, and leave the innards to be filled in afterwards, as the occasion arises. This would seem a wise precaution in view of the never-ending progress, but is it a practical proposition? A structural engineer with whom I discussed it said he thought it was, but only if the place was built like a Meccano set.

Now Meccano is a wonderful invention for which I have the greatest admiration, but with all due respect I hate the idea of a million pounds' worth of public money being spent to put a Meccano structure inside a Portland Stone shell—which is what will happen unless listeners rise in protest.

AN UP-TO-DATE FIRE STATION

New G.E.C. Equipment at Heston

A STRIKING example of the practical application of modern electric amplifying equipment is provided by the loudspeaker-announcing system manufactured by the G.E.C., which is being fitted to the Heston and Isleworth Fire Station. Specially designed loudspeakers are being installed to cover the engine house, the recreation room and the parade ground, so that an immediate message can be sent to all members of the Brigade for an urgent call.

The main microphone is in the control room, but a subsidiary microphone can be used on the parade ground for instructional purposes. A "priority-call" device is included, however, so that even if the parade-ground microphone is being used it will be immediately cut out of circuit by the main microphone if a sudden summons has to be broadcast. In the same way, while a switching control normally enables a choice of any of the loudspeaker channels to be made, the "priority call" automatically switches all loudspeakers into circuit.

Since the authorities required an equipment which would always be ready for use at a second's notice, the amplifier is operated direct from an accumulator bank which is auto-charged from the D.C. supply.

THE "SUPER-VOL" AMPLIFIER

DURING the past few years tremendous progress has been made in what is known as "public address" work. An ugly but quite expressive term! It means the using of valve amplifiers for the magnification of the human voice so that it can be heard clearly by large gatherings in the open or in halls.

It is really the modern version of the megaphone. An extension of the principle is to use a gramophone turntable as well as a microphone so that music can be employed to fill the intervals between speeches.

Public address outfits are to be seen and heard all over the place. Cinemas are equipped with them, so that variety turns, including crooners and cross-talk comedians, can get over with the same volume as the talkies. In this instance, however all the stage microphones are connected to the permanent amplifier and loud-speaker equipment which figures in the film reproduction system.

Special public address outfits are nearly always to be found at large political meetings. Sports meetings also use them, and many football grounds, skating rinks and other similar places have them installed.

And they have become necessities at such functions as air displays and Olympic Games. The police use them, and no doubt some of you have at one time or another been bellowed at by a police car fitted with loudspeaking apparatus.

Even aeroplanes have been equipped with "Public Address," and it is said that great moral advantage follows when, for instance, native tribes can be "public addressed" by a giant voice from the sky. A humane alternative to the use of bombs!

Simpler Than the Average Set

Now most of these are purely professional adaptations of the idea, as it were. But there must be many of our readers who could find important amateur uses for it. That is why we have produced the "Super-Vol" amplifier. It is relatively inexpensive and definitely easy to build. In fact, it is much simpler to assemble than the average set, for "public address" is concerned only with low-frequency currents.

But, as its name suggests, it is capable of providing a considerable output. Quite sufficient to fill a hall seating five hundred persons. And either a microphone or a gramophone pick-up and turntable can be used with it. Let us enumerate some of the jobs it could do:—

1. For making announcements and providing music at a sports meeting, garden party, football or cricket match.
2. For providing the music at a social or dance in lieu of a band.

There are many occasions on which an amateur can make use of a powerful amplifier for private dances, amateur dramatics, local meetings, etc. The ten-watt amplifier introduced to readers here is ideal for the purpose, and is compact and easily built.

not only with music, but by means of special "effects" records.

It will be appreciated by any constructor that a fair amount of margin in volume is required for tasks such as these. It is easy to fill even a large hall with an output such as is given by almost any modern mains set—when that hall is empty. But the presence of an audience will at once change the conditions. Their bodies will introduce absorption, and there will be a persistent background of rustlings, coughings and other noises however strongly their attention is held.

A powerful output is called for in order that all can be enabled clearly to hear.

And, of course, with dancing, there will be the shuffling of feet, and conversation, making an even higher level of interference. Your stock as a "public address" expert would fall very considerably if the dancers farthest from your loudspeakers could not hear the music.

We have had quite a deal of experience in these matters as can no doubt be imagined. Not only in giving advice on the subject, but also practical experience in fitting up gear. Some of you may remember those "Popular Wireless" meetings at the London Memorial Hall and the Central Hall. That was many years ago, and it is possible that the loudspeakers we fitted up on those occasions constituted pioneer "public address."

More recently our engineers have built and installed amplifiers for use at the Guildhall School of Music and other places in connection with the activities of the "Fleetway Players" and similar amateur and social occasions.

Result of Practical Experience

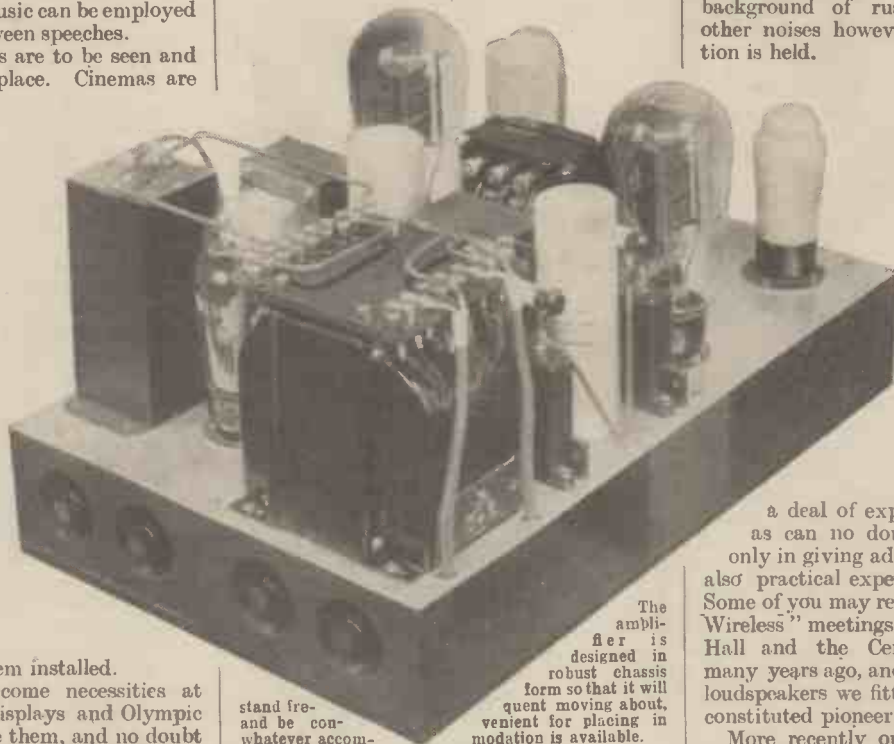
So it is with the advantage of really practical experience in this somewhat specialised aspect of the use of the thermionic valve, that we can present the "Super-Vol" and give you advice as to its use with the confident knowledge that the results will prove adequate.

The output of the "Super-Vol" is ten watts, and this is the minimum which we should advise for anything but the most modest requirements. But your "Super-Vol's" ten watts allow quite sufficient margin for small dance halls and outdoor meetings of fair dimensions.

Now here is an important point: for many of the purposes we have indicated one loudspeaker is not sufficient. At least two are to be advised. And next week we shall tell you how to place the speakers, in order to obtain the best effect.

We shall also give you detailed advice concerning the arrangement of microphones, pre-amplifiers for microphones, running of wiring, choice of gramophone records, etc.

But to revert to the essential item, the
(Continued overleaf.)



stand free and be convenient whatever accom-

The amplifier is designed in robust chassis form so that it will permit moving about, convenient for placing in modulation is available.

3. For meetings in church or school halls.
4. For amateur dramatics. In this case useful "effects" can also be produced

COMPONENTS FOR THE "SUPER-VOL" AMPLIFIER

- 1 Erie 500,000-ohm. potentiometer volume control.
- 1 Erie 50,000-ohm potentiometer.
- 1 Polar N.S.F. 200,000-ohm resistance, 1 watt.
- 1 Polar N.S.F. 250,000-ohm resistance, 1 watt.
- 2 Polar N.S.F. 50,000-ohm resistances, 1 watt.
- 2 Erie 10,000-ohm resistances, 1 watt.
- 2 Erie 5,000-ohm resistances, 1 watt.
- 1 Polar N.S.F. 500-ohm resistance, 2 watt.
- 2 Erie 500-ohm. resistances, 2 watt.
- 2 Polar N.S.F. 100-ohm resistances, 1 watt.
- 2 Bulgin smoothing chokes, type L.F. 21S.
- 1 Ferranti output transformer, type OPM1(c).
- 2 Clix five-pin chassis-mounting valve holders, type V1 without terminals.
- 3 Clix four-pin ditto.
- 1 Premier mains transformer, type SP501T
- 2 Dubilier 8-mfd. electrolytic condensers, type 0281.
- 2 T.C.C. 8-mfd. electrolytic condensers, type 902.
- 2 T.C.C. 50-mfd. electrolytic condensers, type 521.
- 1 Dubilier 20-mfd. electrolytic, type 401.
- 1 T.C.C. 4-mfd. fixed condenser, type 95.
- 2 T.C.C. 1-mfd. tubular fixed condensers, type 250.
- 7 Belling-Lee terminals, type B.
- 1 16 gauge aluminium panel, 16 in. x 10 in.
- 1 Wood baseplate, 16 in. x 10 in. x 1/8 in.
- 2 Wooden runners, 10 in. x 2 1/2 in. x 1/2 in.
- 2 Wooden runners, 2 1/2 in. x 2 1/2 in. x 1/2 in.
- 2 Ebonite terminal strips, 3 1/2 in. x 1 1/2 in. x 1/8 in.
- 1 Ebonite terminal strip, 7 1/2 in. x 1 1/2 in. x 1/8 in.
- Bolts, nuts, woodscrews, wire, insulating sleeving, flux, etc.

SELF-CONTAINED ON ONE CHASSIS



The power-supply components are all carried on the same chassis as the L.F. parts of the amplifier, thus making it absolutely complete in the one unit.

"Super-Vol" amplifier: it is, of course, an all-mains job. It works entirely on A.C. Where there is no A.C. available it is necessary to employ a D.C. to A.C. transformer.

The most widely used type takes the form of a "rotary converter," and it can be obtained for working off all D.C. voltages, even including an accumulator as well might be essential should it be required to install the apparatus in some place remote from mains supplies.

As you will see from the accompanying theoretical circuit, a push-pull arrangement is adopted, the output transformer being conveniently disposed for feeding two loudspeakers. But only one loudspeaker need be used or, on the other hand, a greater number can be fed if desired.

The Question of Copyright

The amplifier makes up very compactly and, fitted with a metal covering, it can be stowed away quite safely out of sight. A wide-range volume control is included so that you can obtain an output varying from the proverbial "whisper" to a shout.

There is another use for the amplifier which we have not yet mentioned at all. Quite easily you can connect it to the output of any radio set and obtain a greatly enhanced volume. But in this connection we must issue a word of warning:—

You must not take a B.B.C. programme and broadcast it to an assembly unless special permission has been extended. The news bulletins are copyright and if you disseminate them you infringe that copyright.

Much the same applies to music. For the public "re-broadcasting" of music a special licence is needed. We have arranged for our legal expert to tell you all about this and other such matters in our next issue.

In the meantime, those of you who intend to build the "Super-Vol" will be able to start getting your components together. It is specially important that you should obtain exactly those parts we have specified because, remember, this is not an ordinary amplifier such as you assemble for normal radio work. It is a "power amplifier," and

many of its components will have to deal with somewhat heavier loads than do those employed in a radio set.

And the values of these components assume a considerable importance, too, in view of the nature of the circuit employed.

VALVES REQUIRED:

- V1 and V2: Hivac AC/HL.
- V3 and V4: Marconi or Osram PX 25.
- Rectifier: Marconi or Osram Mu14.

RADIO IN SPAIN

AMATEUR radio has been wiped right out in Spain, for all the transmitters have been collared either by the government or the insurgent authorities. Over fifty stations send out propaganda talks every day, although many of these are of too low a power for them to come over here under normal conditions.

The insurgents operate a network of twelve short-wave stations to maintain communication between their various armies in Spain and Spanish Morocco. Most of the gear is of American manufacture.

But the government forces are not using radio for communication purposes.

Phone Calls from Listeners

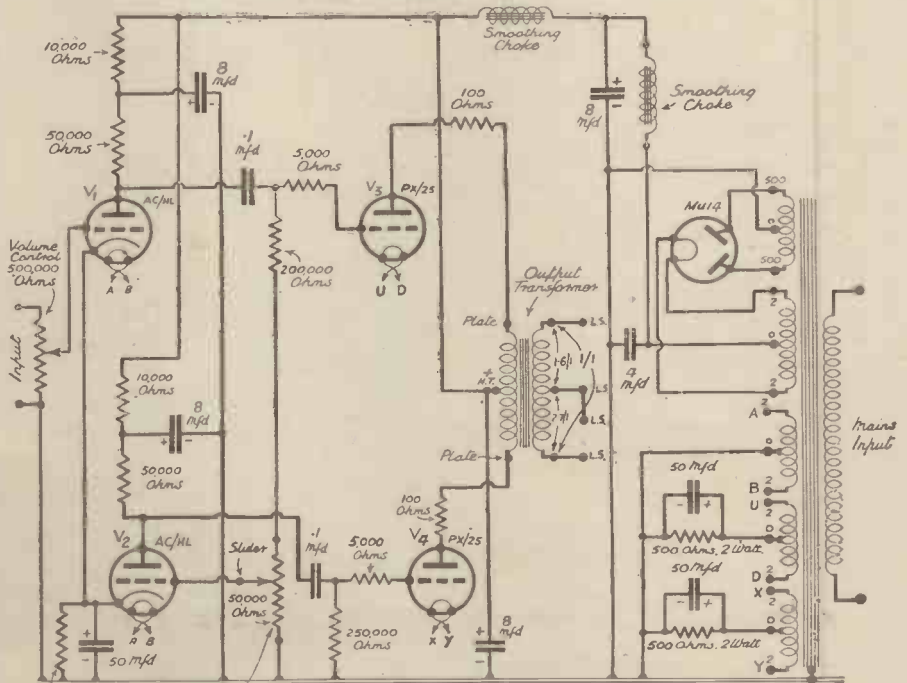
A curious sidelight on this Spanish business came to my notice while having lunch with one of my government department friends. He told me that the Admiralty and the Foreign Office frequently receive phone calls and letters from listeners telling them about things they have heard broadcast from stations in Spain.

On one occasion, my informant said, the insurgents broadcast something about their intentions to bombard Bilbao from the sea. Whereupon dozens of well-intentioned listeners rang up various Government departments in order to pass on this information. But the Admiralty had already heard all about it from their own wireless watchers, which is just another proof that the jolly old British Navy isn't such a back-number as some would seem to think.

This same friend also told me that he has a sister living in Spain. In her last letter she didn't say much about the civil war—apparently she hears rather less about it than we do!

V. K.

PARAPHASE PUSH-PULL IS EMPLOYED



Two PX 25's are used for the output, and are resistance-capacity coupled to the previous stage. V2 is simply a phase inverting valve.

OF TECHNICAL IMPORTANCE

NEGATIVE FEED-BACK

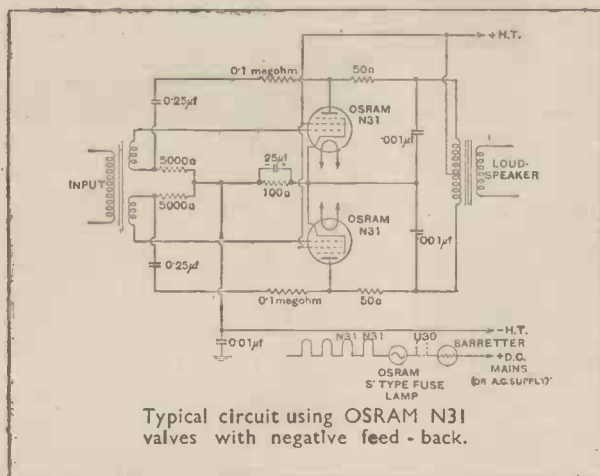
AMPLIFICATION

FOR D.C.-A.C.

CIRCUITS

Osram Valves

MADE IN ENGLAND



TYPE N31 HIGH SENSITIVITY OUTPUT PENTODE

"The development of the negative feedback principle has made it economically possible to build a D.C. Mains Amplifier which is strictly comparable from the point of view of quality with the best A.C. apparatus"

"The chief advantage of the arrangement is to give a pentode performance which approaches that of a triode as regards quality of amplification."

The ideal valve for negative feedback circuits is the OSRAM N31.

CHARACTERISTIC OF TYPE N31.

Heater Current	0.3 amp. or 0.6 amp.
Heater Volts	26.0 or 13.0
Anode Volts	200 max.
Screen Volts	180 max.
Mutual Conductance	10.0 mA/volt
Anode Current average	40 mA
Screen Current average	10.6 mA
Anode Dissipation	8 watts
Normal Grid Bias	-4.4 volts
Automatic Bias Resistance: each valve	87 ohms
Optimum Load (single valve)	5,500 ohms
Optimum Load (anode to anode, Low Loading Push-Pull)	7,000 ohms

Price each: 13/6

OTHER OSRAM 0.3 AMP. SERIES — RUN VALVES TO OPERATE WITH THE N31 ARE —

TYPE W31	Vari- μ Screen Pentode	12/6
TYPE X31	Triode-Hexode Frequency changer	15/-
TYPE H30	High ' μ ' Triode	9/6
TYPE D41	Double diode	5/6
TYPE DH30	Double-diode-Triode	12/6
TYPE U30	Rectifier	15/-

Technical data on application.

OSRAM VALVES—DESIGNED TO ASSIST THE DESIGNER

LISTENERS' PARADISE

In contrast to that of Great Britain, the Dutch broadcasting service is made up of four organisations, each supported by the voluntary contributions of its listeners. Here is an interesting description of this unique scheme

VOLUNTARY subscriptions obviously are the ideal system of broadcasting finance. If the Postmaster-General were to rule that in future each listener was at liberty to send his annual contribution to the cost of the programmes and their transmission to his favourite station, I wonder what the reaction would be! Would the B.B.C.'s budget suddenly dwindle away, and that of continental stations swell from contributions from England. Or would Scottish Regional suddenly find money pouring in from grateful listeners, whilst London was unable to find sufficient fees to pay for the announcer?

Voluntary Programme Contributions

All this sounds rather Utopic, but the voluntary system of contributions to programmes actually exists here in Europe, and has proved its worth over ten years. In fact, it has been so successful that one of the stations concerned has just opened a posh Broadcasting House which is so efficient and so modern that it even impressed American specialists to the extent of their inviting one of the architects over to help them build new studios.

I refer to the Kingdom of the Netherlands. Four large broadcasting associations live comfortably side by side there, each supported by its members' voluntary contributions. Three of the organisations are in some manner connected with political

parties, the fourth is entirely neutral, and, incidentally, has the largest number of adherents—over 200,000! The name of this association, which is also the proud owner of the new Broadcasting House referred to above, is Algemeene Vereeniging Radio Omroep, or AVRO for short. It was formed by listeners to provide programmes. It, together with the other three organisations, rents one of the two Dutch broadcasting transmitters for half a week. It would like to do so for the whole week, but the wavelength position only permits of two different simultaneous programmes in Holland, so the four have to share the available programme time.

Voluntary licence fees, or rather contributions, do not mean inferior programmes. Symphony concerts, radio drama, relays from abroad, talks and all the items of stations supported by compulsory licence systems, feature in the Dutch programmes. It is perhaps only natural that the organisation affiliated to the Roman Catholic or to the Protestant Party should broadcast more religious material than the Socialist or the neutral organisation. But even here the reaction of listeners can be felt in the sensitive pulse of the contributions and excessive one-sidedness is prevented. Quite apart from the fact that, taken as a whole, the Dutch programmes are provided by four different associations with four entirely different outlooks on life, they are varied and cater for every taste.

Each organisation has to keep an index of its supporters. The AVRO has a large card index. By this means it is easy to remind listeners at the proper time that their subscription is due. "Good" listeners, i.e., those persons who pay without a reminder are rewarded by some little token. Then regular visits to the new Broadcasting House keep interest alive, in the case of the AVRO. This same organisation arranges public

When listeners send in their contributions to the AVRO programmes without having to be reminded, a small token of gratitude is sent to them. Here you see an AVRO pageboy packing one of the gifts for dispatch.



The card index room in the AVRO office building at Amsterdam. Over 200,000 names and addresses are neatly filed for reference.

bridge drives in various Dutch cities, or the dance band Kovacs Lajos, the AVRO's own, goes on tour, and members are admitted at a rebate. But the best publicity for the AVRO, apart from its programmes, is its radio paper, which has a circulation far above that of the number of its members.

Government's Nominal Revenue

As a neutral organisation, AVRO had to build up its regional organisation, whereas the other three associations had the help of the existing party regional offices. The KRO, NCRV, and VARA, as the other three are called, all have their studio centres in Hilversum, like the AVRO. All four, and the one or two miniature broadcasters who are allowed an occasional half-hour, live happily on voluntary contributions. No publicity broadcasts, no sponsored programmes, and no obligatory licence fee!

The government is the only one that possibly can be considered to suffer from the Dutch system. Its only revenue from broadcasting is a nominal fee of three guilders per hour of transmission time, which it receives as a kind of recognition fee for the granting of the broadcasting concession. Lucky Holland! If you don't like the programmes you don't pay or you pay the man across the street! Listeners' paradise? I think so.

A. A. G.

THEY SEND THEM A PRESENT



NEXT WEEK

"SIR JOHN REITH"

BY

JOHN SCOTT-TAGGART

TELEVISION TOPICS—Collected by A. S. Clark

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

“TELEFRAMES”

Items of general interest

THIS year will see the opening of the ultra short-wave television transmitter in Moscow. Scenes will not only be transmitted from the studio, but will also come from streets and squares in the capital. It is intended in November to transmit the procession in the Red Square which takes place on the twentieth anniversary of the Revolution.

The Kaganovich Works in Leningrad is to produce two hundred television sets. These will use from thirty-three to forty valves and have screens about six inches in diameter, which seems very small when compared with the size of tube to which we are used in this country.

“HIGH-VOLTAGE” DUST

Most readers will be familiar with the way a fountain-pen or rod of ebonite when rubbed on the sleeve will attract small pieces of paper, due to a static voltage on it. An interesting effect due to the same fundamental cause can often be seen on the controls of cathode-ray tube apparatus.

The knobs controlling the tube's anode voltages become quite dusty in comparison with the others. This is due to the high voltages on the spindles to which they are attached. This attraction effect makes it necessary for high-voltage test apparatus in laboratories to be frequently dusted in spite of special precautions to avoid dust in the rooms.

WHY NOT A DELAY?

It is somewhat surprising to find that on some commercial television receivers it is necessary to see that the brightness control is turned well away from maximum before switching on. This is because the spot appears stationary in the middle of the screen for a short period while the valves in the scanning circuits are warming up, and is to avoid burning of the fluorescent coating.

It would seem that an automatic delay switch, to switch the H.T. for the tube on after the scanning circuits were operating, could easily be provided. Such a “technical” adjustment seems out of place on instruments costing so much.

TELEVISION FOR THEATRE

The Prince of Wales' Theatre, London, which is to be rebuilt this year, will include a complete television-projection installation in its new equipment.

THE SOUND OF TELEVISION

How would you describe the sound made by the vision transmission from Alexandra

Palace? It has been described in various ways, including that of “an aeroplane-like noise.” Surely it is much more like—in fact, very much like—the noise made by a motor-boat with one of those small out-board engines which fit on the back and are started up with a cord!

GOOD RECEPTION

It is interesting to note that good reception of actual pictures—not just the sound of television—has been proved consistently possible in Tunbridge Wells, Kent. The distance from Alexandra Palace is just on forty miles.

COSSOR RECEIVERS

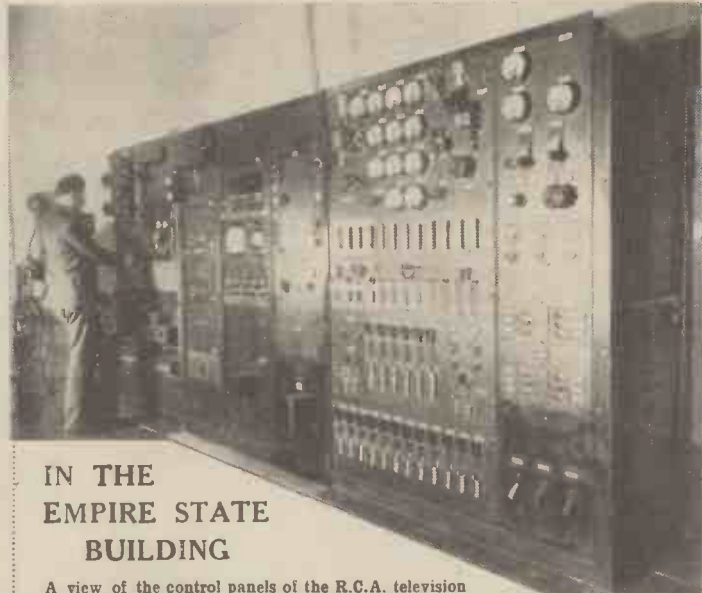
The fact that the Cossor television department was established way back in 1928 explains how they obtained a flying start in the production of television receivers. The first one was actually sold and delivered during the first week of Radiolympia last year. Due to the big demand for television receivers, new plant has been laid down at the Kelvin Works of Cossor's, and additional bays have been fitted up for assembly.

It is interesting to note that the Cossor television receivers are among the simplest to operate on the market.

CABARET CARTOONS

On January 18th the third and fourth “edition” of Cabaret Cartoons will give televiewers an opportunity of seeing a number of cabaret acts as they appear before the television camera and also as Harry Rutherford, the well-known artist, sees them. In this popular television feature, which is produced and devised by Cecil Madden, each cabaret artist appears in turn upon the television screen and, simultaneously, Harry Rutherford is seen sketching him or her in the studio. In both transmissions on January 18th Marion and Irma, the slow contortionists, will be making their last appearance before their departure for America; the Topsy Turvy Two, will also be seen; and the Bavera Trio will give a skating act.

In the afternoon programme only, Louis, Ouida and Milroy will dance before the television camera and Cal McCord will spin ropes and yarns simultaneously. In the evening transmission, televiewers will also see and hear Zoe Wyn singing songs, and will see, but not hear, Sherkot, the French silent comedian, give an impression of a Continental goalkeeper. Moray and Moyia, adagio dancers, complete the evening production of “Cabaret Cartoons.”



IN THE EMPIRE STATE BUILDING

A view of the control panels of the R.C.A. television transmitter in the Empire State Building, New York. Two methods of linking up to the studios are used: A co-axial cable terminating at the centre panel, on which can be seen the cathode-ray tubes; and a radio link, the panel for which is to the right of that carrying the cathode-ray tube.

ASSISTANT STAGE MANAGER

Like many other members of the television staff at Alexandra Palace, the new assistant stage manager, Mr. Reginald Smith, has had some experience in connection with film work. He has also been associated with broadcasting.

Mr. Smith received his education at Clifton College and Merton College, Oxford. When, in 1923, he left the university he joined the Oxford Repertory Theatre, and has been in the theatrical profession ever since.

CECIL LEWIS FOR AMERICA

Cecil Lewis, one of the B.B.C. television producers, has been released from his contract with the B.B.C., we learn, so that he may go to Hollywood to make a film. This film is connected with his war-time experiences. Further details will be found in our “Seen on the Air” feature.

IN AMERICAN EYES

“England is going definitely television-minded on the same great scale that America went air-minded when Lindbergh made his famous solo hop to Paris” is how an American technical radio publication describes the present era of television in this country.

All due credit appears to be given by the Americans to England for its present lead in television. They are now agitating for something to be done in their own country, and asking why someone does not get a move on and start an American system.

“LOOK-UP,” PLEASE

The operators in charge of the Berlin-Leipzig television-telephone are able to watch both “subscribers” all the time. Should one of them move so as to be out of focus, they can immediately advise him by means of loudspeakers in which direction to move.

TELEVISION TOPICS—Continued

PICTURES IN COLOUR

NOW that monochrome television is a definitely accomplished fact, scientific interest seeks to go a step further and perfect colour television. So far no satisfactory form of electronic colour-television has been devised, a mechanical system appearing necessary.

There is thus great scope for those of an inventive mind. But no one studies the subject for long without coming up against what are termed primary colours, and it will not be long before apparently conflicting statements are met.

Red, Green and Blue

For instance, the three primary colours are usually stated to be red, green and blue, and one is given to understand that by suitably mixing light of these colours any other colour, such as yellow, mauve, etc., can be produced. At the same time one learns that red, blue and yellow are the colours used in three-colour printing which seems to give an infinite variety of shades, and most of us have had experience with our paint boxes in making all sorts of colours from these.

Right away it must be appreciated that

the mixing of paints and inks is a different matter from mixing light rays. In one case you have the thickness of pigments and possible chemical effects to take into

AMERICAN ANNOUNCER



Miss Betty Goodwin, of the N.B.C. Press Department, who acts as announcer for the American television test transmissions from the Empire State Building.

account; in the other merely vibrations in the ether.

So we return to our red, blue and green, and we said that these are usually called the three primary colours. Actually, completely scientifically, the three primary colours are red, green and violet.

A primary colour is one which cannot be produced by mixing other colours (now don't get muddled up with your blue and yellow paints making green). Also, suitable combinations of the three primary colours will produce any other colour.

The Three Colour Nerves

The eye appreciates colour through three nerves tuned to a particular kind of red, green and blue light. A colour is seen because of its effect in certain proportions on these three colour nerves.

They are not quite identical with the primary colours, but we may assume that violet light, though not composed of a compound of light frequencies, can affect more than one of our colour nerves, otherwise we could not see it. Anyway, violet soon becomes ultra-violet, which we cannot see.

To get colour effects with mechanical television, as with colour films, all we need to do is to reproduce each scene three times instead of once. One time each as it would appear seen through red, blue and green light filters. The effect on the eye would then be of natural colouring.

(Please turn to page 515.)

TELEVISION FOR BEGINNERS

G. Stevens tells you how equal synchronising pulses are obtained

ONE of the principal snags in the practical reception of high definition television is the necessity for careful adjustment.

The time intervals in the various picture and line signals are so short and so carefully dovetailed together that it is easy to spoil the picture by losing a few lines or getting part of the synchronising signal in the wrong place. It is quite possible to receive a picture nowadays with the minimum of expensive apparatus, but it is another thing to take care of all the details which go to make up a perfect picture as it is radiated.

Manufacturing Tolerance

For example, we know that there is a manufacturing tolerance on component values—there has to be, if the components are to be a reasonable price. This means that of dozens of circuits all built to a specification, each one will differ slightly in the constants of the resistances and condensers used. And yet to produce an ideal line screen the values should be exactly as calculated.

This being next to impossible, the next best thing is to make an allowance for variations in the components by supplying sufficient energy in the television signal to make the scanning circuit run at the correct speed. This is

what is done in the transmissions now being radiated, the amplitude of the synchronising pulse being calculated to lock a scanning circuit into step under normal conditions of variation. But we have now to make allowance for the fact that the pulse itself may vary in amplitude according to variations in the receiver and in local conditions, and a signal which may be just right one day may overdo it on another day with another programme, or even with changes in the same programme.

The amplitude of the carrier wave is continually altering, and with it the average value of the anode current in the output stage. With a black picture the carrier is low and the synchronising pulse is reduced in amplitude, while with a succession of white lines the pulse rises in amplitude.

Voltage Variations

Suppose that the scanning circuit is adjusted to as near the correct running speed as possible, and is held in step by the synchronising pulse of a certain value. If this value is reduced the scanning may go on at the correct speed, but it is more likely to miss a few lines due to occasional variations in the mains voltage. This would mean a continual adjustment of the impulse applied to the scanning circuit, the first

signs of wavering in the picture being followed by a leap for the control knob!

And having adjusted the knob and sat back to look at the picture again, along would come a bright patch, up would go the strength of synchronising signal, and a nasty black line would appear at the edge of the screen! This would be caused by the encroaching of the impulse on part of the picture signal or by actual upsetting of the thyatron timing.

The moral of all this is that it is not sufficient to provide a strong synchronising pulse—it must be controlled in amplitude to make it constant so far as possible, in fact A.V.C.'d! It is not necessary to use an elaborate circuit

such as an A.V.C. valve to do this, as all that is necessary is to amplify the very lowest pulse amplitude received to a reasonable value and then limit the amplitude of any pulses above this.

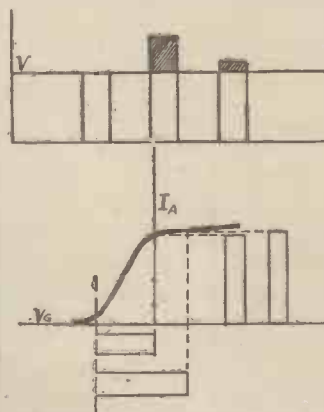
This limiting effect is seen from the top diagram. If we settle that we require an arbitrary value of V volts for the pulse to maintain the scanning circuit at a steady rate, the amplifier is adjusted so that the smallest pulse just gives V volts at the grid of the thyatron. Then any pulse which is greater in value is cut off abruptly as in the second and third waves of the figure.

The Method Used

This cutting off is done quite simply by applying the pulse to the grid of a valve having an anode current curve similar to the lower sketch. This could be done in a screen-grid valve, for example, by dropping the anode volts. You will see that after the anode current has risen to a given value it "saturates" and ceases to rise any more.

Now if our signal is applied to the grid, the normal strength will just bring the anode current variation up to the flat portion, while a stronger signal will not produce any increase beyond this point. The valve is thus automatically limiting the change in anode current produced by various swings on the grid, and if the output of the valve is applied to the thyatron grids, the amplitude will be constant whatever the value of signal applied to the "limiting" valve.

LIMITING EFFECT



Illustrating how "saturation" of the valve characteristic restricts amplification.

"OVER THERE"

A feature devoted to various aspects of American radio, giving interesting sidelights on broadcasting and microphone methods of that country

UP—THE RADIO FANS!

AMERICAN radio artists a decade ago received 550,013 fan letters, good, bad, or indifferent. In 1929 the million mark was reached and, by the way things were going in 1936, it looks as though an all-time record will have been set by a total of between 7,000,000 and 8,000,000. That means that the Canadian and U.S. governments sold approximately £140,000 worth of stamps to radio fans.

GALLI-CURCI'S NEW VOICE

RADIO listeners had their chance of hearing Amelita Galli-Curci's new voice when she sang with the Detroit Symphony Orchestra recently. The vocal equipment which was altered by an operation on the coloratura throat had already been discussed by Chicago music critics who heard her with the Chicago opera some time ago. The effects that night, however, were blamed on extreme nervousness, and later she made some records which are said to have reversed the verdicts of those same critics.

WEATHER FORECASTS VIA RADIO ROBOTS

AMERICAN scientists, as a step towards improved weather forecasting, have made a robot balloon, which constantly calls down to earth radio reports of temperature, pressure and humidity from altitudes as lofty as 40,000 feet.

The flying radio station weighs only two pounds and the balloon is five feet in diameter. The radio emits a 1.7 metre wave, which is one of the shortest wavelengths used for a practical purpose. The apparatus has already made one flight to 30,000 feet.

A WAR HERO

JEANNE D'ARC, a horse believed to be the only survivor of 20 steeds returned to the United States from France after the World War, was the central figure in "War Horse," the Lights Out drama heard over the N. B. C.-Red Network recently.

The gallant mare, winner of six gold stars and a wound stripe during the war, is now owned by Lieut.-Col. John D. von Holtendorff, director of high school R.O.T.C. work in the Chicago area, and lives in honourable retirement at the 122nd Field Artillery Armory in Chicago.

CRIMINALS BEWARE!

TESTS of a new two-way police radio system in Boston have led the engineers of the General Electric Company, who installed the equipment, to announce, "Boston is now the major city in which it is most difficult for criminals to operate."

Two-way conversations were carried on with the different stations while the cars were moving through traffic, at a standstill, moving at slow and high speeds, and at no time were they interrupted.

Kate Smith does everything in a big way. Her football team will be selected by 600 football coaches.

HE USED THEM ALL

DURING a recent broadcast Peter Van Steeden used 30 different batons. He had them all laid in front of him, and for every music cue from Fred Allen up went his right arm with a different stick.

His curious musicians gathered around him after the show and inquired about the different batons for every musical move. He explained to them that the batons were all gifts from fellow maestri on the occasion of his tenth anniversary on the air.

Every maestro sending him a gift-baton had included a request that he should honour the sender by using the stick in the anniversary programme!

A LISTENERS' SOCIETY

EVERY now and then there will come an organisation of listeners bent upon the reform of radio broadcasting. The latest group made a recent announcement from Hollywood under the organisation title of "Broadcast Listeners of America." Membership in the new group is said to cover 22 States, and the group backers hope to have a membership of 13,000,000.

MAKING-UP FOR TELEVISION IN U.S.A.



Grace and Eddie Albert preparing for a television broadcast from the N.B.C. transmitter in the Empire State Building in New York. It is interesting to note that their make-up is not done for them by a special make-up expert as at Alexandra Palace.

AEROPLANE INTERFERES

QUITE recently a Sunday afternoon programme was shut off from W E A F by one of the oddest accidents in radio. An unidentified aeroplane flew low over Denver, trailing behind it a 400-ft. line of some sort, possibly a radio antenna. The line dragged across the transcontinental telephone trunk lines, cutting one and throwing the several ends across the others to cause a complete short circuit.

QUITE ANDY

ABOVE the applause which greeted Oscar Shaw as he emerged from the wings of the C. B. S. Playhouse one recent night before going "on the air" sounded the hand-clapping of two grinning gentlemen in the first row. The two gentlemen then came in for their own share of applause when they were revealed as

Amos 'n' Andy. They were spending a posman's you-know touring Columbia's studios.

COSTLY BARS

RUBINOFF paid £10 for permission to play in a recent C. B. S. broadcast just two bars of George Gershwin's "Rhapsody Blue" as part of his special arrangement "Sing, Baby, Sing" in the styles of Gershwin, Rachmaninoff, Kreisler and Paderewski. He could have got the whole "Rhapsody" for the same price, but needed just the two bars for the Gershwin motif.

SOMETHING NEW

DANCE music and classical music on the same programme as presented by the distinct orchestras has been started as a regular feature by the John H. Woodbury Company presenting a new programme to succeed Pa Whiteman's Musical Varieties.

SNIPPY-SNIPS

DAINTY Deanna Durbin, youthful radio protégée of Eddie Cantor, is one of the rarities of the musical world. Still in her early 'teens, she has a voice almost fully developed. It has amazed experts. They predict that her voice will not change with the years, except to gain range and depth.

Radio's "idea factory," far from being one central plant that churns out enchanting programmes on a production basis is a scattered collection of individuals and groups distributed among some 600 stations, a half-dozen or so network, several hundred advertising agencies and countless sponsors who foot the bills.

Harry McNaughton (Bottle) was telling Phil Baker about golf game. "You should have seen my first drive," he said. "I went so far the caddy and I had to be introduced all over again by the time he'd found it."

WAS THAT FUNNY?

EVERYTHING seems to be well under control in the production of programmes excepting the musicians who play between the puns of the comedians.

Impresarios have found ways of making the audience applaud whenever desired, even though the script isn't so funny. By means of gestures familiar to every stage comic it is possible to build up ripples of laughter support jokes that fall flat. Even the announcer can be depended on to haw-haw at the right moment. But the bull fiddler and the first violinist are beyond the pale. They and make them laugh.

When next you go to your favourite show forget the comedian for a few seconds and watch the faces of the musicians.

ANCIENT AND MODERN

Two ancient Syrian musical instruments, the oud and the kanoun, have recently been introduced in broadcasts.

IS PARAPHASE PUSH-PULL WORTH WHILE?

A reader has written to ask if the paraphase type of push-pull amplifier is really worth the extra valve.

Apparently he considers that perhaps a transformer-coupled input valve and two push-pull output valves will give him just as good results as the paraphase arrangement in which a phase-reversing valve is used, in addition to the input valve and the two push-pull coupled output valves.

I can assure him that the paraphase arrangement is really that much better than the straight transformer-coupled scheme that the extra valve is worth it. Incidentally, the components needed for the paraphase circuit are cheaper than those required for the straight push-pull stage, except perhaps the mains transformer which has to give separate L.T. supply to the two output valves, and there is, of course, no input transformer for the push-pull valve grids.

As regards the quality of reproduction, that is much better, in my opinion, though perhaps some will contradict me, but provided the speaker in which the test is made is a good one, the brightness and clarity of the paraphase arrangement will be distinctly better from an aural point of view than is provided by the straight push-pull circuit.

It is all a matter of transients, and the contents of the paraphase are very much better for the reproduction of transients and high notes generally than are the iron-laden circuits of the straight push-pull circuit. As a matter of fact, a paraphase circuit with resistance-coupled output would probably give a great improvement over the one with the transformer-coupled output, but one must draw the line somewhere or things get quite impracticable. The problem of supplying sufficient H.T. voltage for such an output is too great to allow of the circuit to be used as an everyday affair.

NOT AVAILABLE

P. W. R. (West Hampstead).—*I want to get a television set that will allow me to show the pictures on the screen so that a large group can see them. I want a set that will give pictures of about the same size as my home cinema. What type of set should I get?*

Sorry, in the words of a great literary character, there ain't no such animal. The large television screen is a technical possibility, but so far there is no set on the market that will allow you to have such a screen—and to fill it with a picture—in your own home.

The cost and size of such a set would be prohibitive as matters stand at present, but it will come. Just a few years' patience and I expect we shall all be able to have television sets that will fill one side of the room with moving pictures of our announcers, the fat stock prices (stock and all) and not only the foundations of music but the walls as well. But so far, I am sorry to say, we must put up with the screen measured in inches instead of feet.

A CHRISTMAS GIFT?

H. L. W. (Edinburgh).—*Some friend of mine has sent me a transformer as a present. It is one of the R.I. non-shielded types which I believe you used many years ago for some of your sets. What shall I do with it?*

Without being rude to R.I., who would not wish any modern receiver to be judged by such an old standard, I would suggest you passed it on to some other friend whose friendship you did not wish to keep. Honestly, such a transformer, while excellent in its day, has long been surpassed and there are plenty of types of the same make and of other makes available which will knock it into the proverbial cocked hat. I should write to your "friend" and ask him if he would like a nice hertzite crystal.

METALLISED VALVES

P. L. D. (Bournemouth).—*I have to put a new S.G. pentode in my three-valve set. Can I use a non-metallised valve of the same type, which I have on hand, or should I get a metallised one which was specified with the original set?*

Without knowing exactly what set you have, it is not safe for me to advise definitely. But as you say it is a three-valve I should think that it would be perfectly safe for you to use the non-metallised valve. After all, the metallising is only a screen which keeps away stray couplings between the electrodes of the valve and other circuits. In a three-valve set, unless very badly designed, with non-screened coils and bad layout, you are not likely to get any sort of coupling that will affect the electrodes of the valve, or vice versa.

The real need for screened valves, or metallised valves is in sets such as the superhet where you have, perhaps, a row of valves all of high amplification and all dealing with H.F. impulses. Then, unless you have screening between the valves or in other words, metallising, you will get coupling between them and consequent instability.

In your case I should consider, from the brief details you have given me, that it is quite safe for you to use the "clear" valve. But as you have it on hand there is no harm in trying it. If it works all right and is really of the same type as the metallised one, but merely without the metal coating, then you can proceed and use it all the time. It cannot possibly do any harm.

CAN YOU HELP?

I have several letters from readers asking for blue-prints, diagrams, etc. Perhaps some of you will lend me a hand by writing to them and offering copies on loan. I am afraid we have none in stock now. Here are the names and the requirements.

H. J. Brisco, 3, Whistler Street, Drayton Park, London, N.5, is asking for a blue-print of the S.T.300. Then T. Hewitt, of 13, Aske Street, Shoreditch, London, N.1, wants an S.T.400 blue-print for purposes of checking the set which has just come into his possession. (Many thanks, T. H., for your good wishes, which are heartily reciprocated.)

One more. T. H. (unusual coincidence of initials) who does not give his name or full address, but lives in Bridlington, wants a copy of "P.W." describing the S.T.500. Please drop me a line, T. H., Bridlington, and let me have your name and address and "P.W."-ites can do something for you.

OSCILLATION TROUBLE

Well I'm blown. The very next letter I opened gave me the same initials again. True, cross my heart and all that. It is from T. H. (Warrington). He has a four-valve superhet and finds that when he touches the top cap of the second valve which often goes into continuous oscillation the trouble stops, and on removing the finger the cure remains sometimes for hours before the set goes into oscillation again. What is the trouble?

Obviously the valve in question is unstable, or rather the circuits containing the valve are unstable. The touching of the cap stops the oscillations, but from the letter I am not sure what function the valve is performing. I should think from the description of the set that it is the mixer valve and would suggest trying another of the same type in its place. Something may have happened to the constants of the circuit, or there may be a fault developing in the valve itself. Anyhow, without knowing the innards of the set I should certainly recommend a change of valve as a beginning to curing the trouble permanently. If this does not cure it the best thing would be to take the receiver—a commercial American one—to a service man. Sorry I can do no more than that, but a superhet which starts to oscillate after it has been in use for some time must surely indicate a faulty valve or a faulty component. Perhaps one or other of the decoupling arrangements has gone wrong, causing feed-back and consequent oscillation.

I AM TOLD OFF

L. O. L. (Oldham) writes to differ with me on the subject of American valves. I publish his letter, as he asks readers of "P.W." what they think. Let me off lightly, please. I don't want the Editor to give me the sack, you know. Here goes:

"In your issue dated 19/12/36 you state that American valves are not as efficient as those of British manufacture. I have found in most cases over a fairly wide experience that they are more efficient, if anything, than English types. Admittedly it would be a very difficult job to convert an English set to use American valves, but my own personal view is that a set correctly designed round them is more efficient than a corresponding circuit using British valves.

"And now in contrast, a word of gratitude for your splendid journal (I don't quite like that word 'contrast') and what do the other readers think about this American valve business?"

Well, readers what do you think about it? Let me know the worst.

TECHNICALITIES EXPLAINED—No. 36

The Volt-amp.

This is another name for the watt, but is often used especially where big power machinery is concerned and where A.C. is being used.

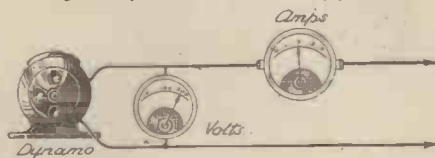
It is merely the product of voltage and current. If you have a current of one amp. flowing at a pressure of one volt, you have a power consumption of one volt-amp. or one watt.

It is the basis of the usual household unit of electricity, which is the watt multiplied by the time in hours. Thus we combine three units together, volts, amps, and hours forming the kilowatt hour, or thousand volts-amp.-hour.

In this case you can use one volt of electricity with a current of one amp. for one hour for your watt-hour unit. If your voltage is 200 and your current is

ten amps., you are thus using 2,000 watts. This can be used for half an hour for one unit. A current of five amps. at 200 volts would give one hour's use per unit.

In the sketch I have shown 200 volts and 2 amps.—giving 400 watts or volt-amps. On the unit basis this would enable you to run your current for 2.5 hours, of course, before you use a full unit of electricity.



★

LEARNING FRENCH THROUGH YOUR RADIO

(Continued from page 500.)

SINCE WHEN WERE YOU waiting?
SINCE WHEN WERE YOU learning French?
SINCE WHEN WERE YOU living in France?
SINCE WHEN WERE YOU having a wireless set?

DEPUIS QUAND ATTENDEZ-VOUS?
DEPUIS QUAND APPRENEZ-VOUS LE FRANÇAIS?
DEPUIS QUAND DEMEURIEZ-VOUS EN FRANCE?
DEPUIS QUAND AVIEZ-VOUS UN POSTE PORTATIF?

In translating these English questions the thing to avoid is a literal translation beginning with **COMBIEN DE TEMPS**. If you will remember to start with **DEPUIS QUAND** the right choice of **TENSE** for the following verb will naturally follow.

Lastly, another **VOCABULARY** for you. This time a Christmas one.

La Fête de Noël—The Christmas Festival
A la Fête de Noël—At Christmas
Le Jour de Noël—Christmas Day
La Veillée de Noël—Christmas Eve
L'Arbre de Noël—The Christmas Tree
Faire Noël à la Campagne—To spend Christmas in the country.

Le Sabot de Noël—The Christmas shoe (equi. stocking)

Un Noël—A Christmas Carol
Chanter un Noël—To sing a Christmas Carol
La Bûche de Noël—The Yule-log
Des Noël sont chantés devant la flamme de la Bûche de Noël—Carols are sung before the blaze of the Yule-log

Le Bonhomme Noël—Father Christmas, Santa Claus
Le petit Noël—Father Christmas, Santa Claus
Voilà un petit Noël—Here's a Christmas-box
Les étrennes—Christmas or New Year's Gift
Les étrennes du facteur, des boueux, des boueurs, et des petits télégraphistes—Christmas boxes for the postman, street sweepers, dustmen, and telegraph boys.

Un Livre d'étrennes—A Christmas Gift Book
Les Camelots—Cheap-jacks
Le Jour de l'An—New Year's Day
Souhaiter ia bonne Année à quelqu'un—To wish somebody a Happy New Year
Se mettre en prières—To kneel down and pray
Le Vin chaud et épice—Mulled Wine
La Crèche—The Manger
Joyeux Noël—Happy Christmas!
Bonne Année!—Happy New Year!
Tous mes Vœux!—All Good Wishes!
Meilleurs Vœux!—Best Wishes!
Le Réveillon—Seeing the New Year in
Célébrer la Messe—To celebrate Mass.

TRANSMITTING TELEVISION BY INSULATORS

(Continued from page 495.)

For this reason we are forced to use a two-wire transmission line if we want to transmit very high-frequency currents from one point to another without losing most of the energy through radiation. In this type of conductor it is perhaps simplest to regard the current as a field of energy built up of individual lines of force, which pass along the two wires, positive on one side and negative on the other, as shown in Fig. 1. If we cut the circuit through any particular section, such as XX, we shall find the current flowing in one direction along the top wire, and an equal current flowing in the opposite direction along the bottom wire.

In other words, it is definitely a "go" and "return" circuit. And the same applies to the coaxial type of transmission line.

By contrast, in the newly discovered dielectric "line" the current travels forward as a true wave, without any return path. The form of the wave is shown in Fig. 2 in cross-section, and is Fig. 3 along its length. The distribution is clearly different from that found in any ordinary form of metal conductor.

PETO-SCOTT EVERYTHING RADIO

—CASH, C.O.D. or EASY TERMS

DO YOU KNOW?

that you can obtain all your radio requirements from us either for CASH, C.O.D., or under our famous Easyway system? No matter whether you require complete Kits, or loudspeakers, eliminators, pick-ups, or a selection of special components for a set you intend to build, we will be pleased to quote you our EASY TERMS without obligation. We are the oldest Radio by Mail House in the country, and have been Established since 1919, and you can order with confidence.

S.T.800 KIT "A" 67'6 YOURS 7'6 FOR 7'6

Complete Kit of Components exactly as FIRST specified and used by Mr. John Scott-Taggart, with Konecakit (Gratis with Complete Kit) but less wander plugs, accumulator connectors, valves, Extractor Kit, cabinet and speaker. Cash or C.O.D. Carriage Paid £37/6, or 7/- down and 11 monthly payments of 6/3.

KIT "B" YOURS 8/6

As for Kit "A," but including set of 4 FIRST specified valves only, less cabinet and speaker, etc. Cash or C.O.D. Carriage Paid £3/4/0.

KIT "CT." As for Kit "A," but with valves and Peto-Scott S.T.800 Table Cabinet only, less speaker, etc. Cash or C.O.D. Carriage Paid £5/11/6, or 10/3 down and 11 monthly payments of 10/3.

* If the above Kits are required complete with 8 wander plugs and 2 accumulator connectors as specified, ADD 1/9 to Cash or C.O.D. prices or 1/9 to the Deposit.
* If Extractor Kit is required with any of the above Kits, add £1/4/0 to Cash or C.O.D. prices, or 2/3 to deposit and to each monthly payment.

A.C. S.T.800. KIT "A." Complete kit of components, including Peto-Scott ready-drilled and polished walnut plywood panel, ready-drilled terminal strips, aluminium brackets, mains lead, nuts and bolts, less valves, cabinet, speaker, and Extractor Kit. Cash or C.O.D. Carriage Paid £9/18/6. Or 12 monthly payments of 18/4.

W.B. SPEAKERS



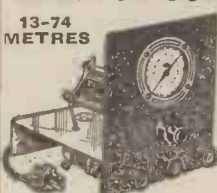
MODEL 37J. Matches any receiver as principal or extra speaker. Cash or C.O.D. Carriage Paid £1/12/6, or 2/6 down and 11 monthly payments of 3/-.

MODEL 37B. Baby Speaker with an adaptation of "Microlode" matching device. Cash or C.O.D. Carriage Paid £1/3/6. Or 2/6 down and 10 monthly payments of 2/6.

MODEL 37S. Amazing reproduction provided by new magnet and exponential moulded cone. Microlode matching device. Cash or C.O.D. Carr. Paid £2/2/0, or 2/6 down and 11 monthly payments of 4/-.



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



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

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

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



Peto-Scott SHORT WAVE 4 KIT COVERS 7 TO 77 METRES

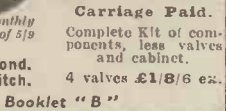


Entirely new design in Battery Short and Ultra S.W. Kits. Just what the keen DX fan has been waiting for. Provides for the reception of all Short-Wave Stations, and also covers the Television sound channel. Stove enamelled steel chassis and screens, with eight 6-pin coils.

- 4 Valves. Pentode Output.
- Dual Ratio S.M. Airplane Dial.
- Low payments of 5/9
- Loss Components.
- Slow Motion Reaction Cond.
- Combined V.G. and Switch.

KITA Cash or C.O.D. 63/- Carriage Paid. Complete Kit of components, less valves and cabinet. 4 valves £18/6 ex.

Described in Booklet "B"



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

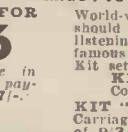


4 Wavebands: 16-29; 27-57; 200-550; 900-2,100 metres.

World-wide programmes on all wavelengths. Every constructor should build this all-wave set and enjoy the thrill of All-World Listening. Peto-Scott offer you a Kit which is, in the words of a famous designer, "An amazingly efficient yet simple to build Kit set."

KIT "A." Cash or C.O.D. Carriage Paid £3/17/6. Complete Kit of components, less valves and cabinet.

KIT "B." As for Kit "A," but with valves. Cash or C.O.D. Carriage Paid £5/0/3, or 9/- down and 11 monthly payments of 9/3.



The GRAMADAPTOR



CONVERTS your PRESENT SET to a MAGNIFICENT Radiogram!

Stand your Mains or Battery Set on this remarkable unit... give it all the qualities of a costly Radiogram. Connected in an instant... plays with front open or closed. Sensitive Pick-up. Volume Control. Needle cups. Walnut polishing Cabinet.

A.C. MAINS MODEL. Incorporates Improved Model Electric Turntable. 12in. turntable... constant speed... safe, silent, strong. A.C. Mains only 100/150 or 200/250 volts, 50 cycles. Cash or C.O.D. Carriage Paid £3/19/6.

BATTERY MODEL, with Garrard Double Spring Motor, same price and same terms.

Fully described in Booklet "B."



Peto-Scott BANDSPREAD SHORT-WAVE SUPER 3

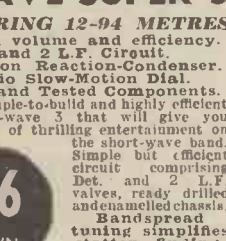


COVERING 12-94 METRES

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

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

KIT "A." Cash or C.O.D. Carriage Paid £2/5/0. Complete kit of parts including 3 coils, 12-94 metres, building instructions and wiring diagram, less valves, speaker and cabinet.



PETO-SCOTT CO. LTD. E.C.1 Head Office: 77 (P.W.13), City Road, London, Telephone: Clissold 9875/6.
West End Showrooms: 62 (P.W.13), High Holborn, London, W.C.1.

SEEN ON THE AIR

(Continued from page 499.)

When the new van is ready, a revolution in outside television broadcasting will follow. Broadcasts from Twickenham and Lord's will become possible. Wimbledon, for reasons of location, presents more difficulties, but one day these will be overcome. Mr. Marshall intends to bring sporting personalities to the studio and to take the microphone outside to them. He hopes to have the televan waiting when the Test team returns (victorious?) next Spring.

Television Cable Round London

And, by the way, just to extend the scope of this van, the Post Office is planning a television cable round Central London which can be "tapped" at strategic points. The main and immediate purpose of this cable is the Coronation, but it will follow a route making it possible to relay many events as and when occasion arises—such as Trooping the Colour, the Cenotaph ceremony, weddings at St. Margaret's.

I hear that the televan will not only use a land-line link but will also have a micro-wave transmitter with a range of about six miles on board.

There are other television developments of

TECHNICAL JOTTINGS

Items of Interest to All

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

Decoupling With Parallel Valves

I said something a short time ago about decoupling, and I should like to mention another case where decoupling is very important, and that is when using a pair of power valves in parallel for the output stage. A few years ago the paralleling of power valves for the output was fairly popular, but this has been superseded now by push-pull and various other output arrangements. However, a number of people still like to use a pair of power valves in parallel, and when doing so I think the following hints will be useful.

The first thing is, you must be sure that the high-tension and low-tension supply which you are using will be able to cope with the considerably heavier demands upon them which will now be made. The current which is going to be used under this system will be much heavier, and unless that current is forthcoming you will not get the full advantage you are looking for.

The push-pull arrangement of the two valves in the output stage, as I mentioned, is more popular than the parallel arrangement, and it has a number of advantages over the latter. For one thing, the high-tension voltage necessary for operating the push-pull arrangement does not need to be so high as with the other scheme. Perhaps a better way to put this is to say that, whatever the high-tension voltage available may be, within the ordinary limits, the push-pull system makes more efficient use of it.

Output Transformers

With this arrangement you will require an input and an output transformer. The input transformer has its output winding centre-tapped, and the output transformer has its input winding centre-tapped.

first importance impending. Negotiations are in progress for an arrangement to televise some of the most successful film cartoons, and also other humorous short films from Hollywood and British studios.

I hope I shall not be accused of malice when I say that I feel sure such professional efforts will meet with more approval than home-made documentaries.

The other day I met Mr. Gerald Cock. I must say that I do not share his enthusiasm for cooking lessons while the hours of transmission are so short. He told me that M. Boulestin is to give five broadcasts, taking

one course at a time, for the delectation of listeners.

Mr. Cock mentioned that he realised acutely he was still catering for a viewing-room audience. The ideal programme in the circumstances was a series of short snippets, but the gradual transfer from the viewing-room to the home audience was going to be one of his most awkward problems during the next twelve months.

Good Reception in Brighton

Television does not get as much encouragement as it might; Mr. Cock told me of one of the most heartening things that happened to him recently. It was a message after Christmas from an anonymous telephone caller, who said that he took his set down to Brighton and to his surprise had excellent reception, even at that distance.

By the way, a certain influential music-hall management is being awkward. It has inserted a clause in all the contracts of its artistes absolutely forbidding appearances in television programmes.

I thought one of the best features of the programmes during the week I have under review was the Crazy News Reel for 1936 of Gaumont-British. Apparently I am not alone in that opinion, for a number of viewers rang up the B.B.C., and they repeated it as the last item on Saturday night.

AN IMPROVISED NEEDLE HOLDER

MANY radiogram owners have from time to time desired to experiment with fibre needles in consequence of the well-known non-record-wearing qualities of the latter, but have been unable to do so owing to the fact that the needle chuck or socket of the pick-up was not shaped to take the relatively thick fibre needles.



For experimental purposes, at any rate, a good way of getting over this difficulty is to make a small fibre-needle holder from a length of stiff wire. An ordinary wire paper-clip will suffice for this purpose. It should be cut in half and one half of the former paper-clip should be twisted tightly round the fibre needle, leaving a short vertical piece of wire to be pushed up into the pick-up.

Provided that both the wire and the fibre needle itself are kept short, good reproduction will be obtained by means of this improvised arrangement and, if satisfactory, the wire-clip fibre-needle holder may at a later date be replaced by a fibre-needle pick-up adaptor of the orthodox type. J. F. S.

The two terminals of the secondary of the first transformer are connected to the grids of the two output valves, a stopping-resistance of about 100,000 ohms being included in each grid circuit. The centre tap of the first transformer is connected to grid-bias negative, whilst the centre tap of the primary of the second transformer is connected to high-tension positive. The secondary terminals of the output transformer are connected to the terminals of the loudspeaker.

Stabilising the Output Stage

The purpose of the two stopping or "decoupling" resistances, as we may call them, in the two grid circuits is to stabilise the output stage.

With this circuit arrangement the positive half-cycle goes to the grid of one valve and the negative half-cycle to the grid of the other, it is because one pushes whilst the other pulls that the arrangement gets its name.

With the push-pull arrangement it is very desirable, as with the parallel arrangement, that the two output valves used should be as nearly as possible identical in all their characteristics.

Checking Anode Current

It is sometimes necessary to check up the value of the current in the anode or high-tension circuit of the set, and you are generally advised to do this by inserting a milliammeter in series with the circuit. This works quite well in a good many cases but sometimes, with a sensitive set, the resistance introduced into the feed by inserting the milliammeter will set up instability. If this happens, what you have to do is to shunt a fixed condenser of reasonable capacity, say 1 or 2 microfarads, across the terminals of the milliammeter. Assuming that the condenser is a good one and that there is no direct-current leak through it, this will make no difference to the D.C. reading on the milliammeter, and it will effectively quench any tendency to instability. Incidentally, this method of shunting a fairly-large-capacity condenser across any component having an appreciable resistance in the high-tension circuit is one which you can always adopt, or at any rate try, when there is a tendency to instability.

Unwanted Coupling

Any unwanted resistance in the high-tension circuit causes voltages to be generated at its terminals and in this way constitutes a kind of coupling and this is what causes the instability. By connecting the condenser across the terminals of any such resistance the "coupling" is dissipated. An ordinary high-tension dry battery which is getting on in years is very apt to give trouble of this kind, but provided the battery is not too far gone, you can get over this particular part of the trouble by using the parallel condenser as mentioned. Of course, this will not increase the voltage of a decrepit battery or improve the efficiency, except in so far as it cuts down the tendency to instability.

Turning Down the Volume

It is curious how people often think that by turning down the volume, by means of a volume control, they are economising in the current consumption of the power valve.

(Continued on next page.)

TECHNICAL JOTTINGS

(Continued from previous page.)

I must say that this is a fairly natural feeling on the part of anybody not familiar with the technicalities of the radio, because they know that, when turning down the gas on a gas-stove or a gas-fire, or when turning down most things they reduce the consumption of something or other. In the case of the volume from the loudspeaker, however, anything that is done by the volume control can only economise to the extent of a milliamp or so on the H.F. stage anode current, assuming the control to be on the usual variable-mu principle. I must emphasise that I am referring to a set with a circuit of the ordinary type, not to one employing quiescent-push-pull or Class B amplification.

How Much Juice ?

Many people seem to have only a very hazy idea as to how much current their set actually consumes. As a rough guide, a small set using high-tension batteries and with a power-valve output should not take more than about 10 milliamps. If it does take more than this, you will find that the popular size H.T. batteries will not last you very long and it will be necessary to go in for heavy-duty batteries, or for a mains unit, so long as the latter will give sufficient current output.

High-tension current consumption depends a good deal on whether you use a stage of low-frequency amplification following the detector and before the output stage. In such a case the output stage is going to receive a fairly decent input, that is, a fairly large grid swing, whilst if the output stage follows the detector immediately, the output valve need not be capable of handling anything like so large a grid swing.

Grid Swing

A fair average would be perhaps 10 volts grid swing for the input to the output stage, if this is preceded by an intermediate stage of low-frequency amplification, and perhaps 5 volts grid swing to the output stage, if this immediately follows the detector.

The way to economise in high-tension current for the low-frequency side of the set is to use one of the various forms of pentode output which are now so popular, the pentode acting as a combined single low-frequency and output stage immediately following the detector. Because the pentode type of output stage gives such a remarkable performance, many people who are not actually using such a stage have the mistaken idea that it must be very heavy on current. Perhaps this belief persists from the early days of pentodes when, in fact, they did consume rather a lot of current, but they have been greatly improved since then, and a modern small pentode is really extraordinarily economical, particularly having regard to its remarkable performance.

All-Wave Receivers

I believe that in the United States there are something like ten million homes equipped with "all-wave" receivers. Personally, I believe that all-wave reception will become pretty well universal in this country. Short-wave radio has shown

that it can offer to radio listeners something that they cannot get in any other way.

Radio reception has been described in America as "fireside adventure," but I think this title applies in particular to short-wave reception, a field which is only beginning to be properly explored in this country.

Choosing a Set

I often wonder how many people there must be who go in for expensive radio sets, capable of getting all kinds of foreign stations, as well as the B.B.C. stations when, in point of fact, all they ever listen to is the National and Regional. I know one man in particular who has a most elaborate radiogram, a marvellous piece of furniture and, so far as I know, with wonderful insides. I say "so far as I know" because I have never heard anything on it yet except the National and Regional! I think a lot of people make the same mistake. They hear their friends talk about receiving all kinds of foreign stations and when they go to buy a radio set they feel they must have one which will get everything under the sun. This not only makes for a much more expensive set but, having got the set, it is not nearly so simple or satisfactory to operate.

Possible v. Probable

You notice exactly the same thing with motor-cars. Some friend of yours has a car with terrific acceleration and a top speed of 80, and is so enthusiastic about it that you become infected with his enthusiasm and feel that your poor old grid that only has a top speed of 60 is quite out of date. In point of fact, how often do you have a chance of doing 60, let alone your friend doing 80? In short, it is no good paying through the nose for all kinds of possibilities; what you want to consider are the practical probabilities.

To come back to the question of the radio set, the probabilities are (and this you can easily prove by just thinking over the programmes you have heard in the homes of your various friends) that you will never want much more than the local station, one or two other B.B.C. stations and one or two of the Continental Stations.

PICTURES IN COLOUR

(Continued from page 510.)

Actually, a good effect can be obtained with two filters, a greenish-blue and a yellowy-red. We shall have to scan at double the speed in this case, alternate scans being in alternate colours. This is easily achieved with a projected mechanical television system by means of revolving coloured filters in front of the light source.

To do it with a cathode-ray tube is not so easy. Here's one idea of which I will make a present to anyone who cares to work on it.

Arrange two cathode-ray tubes end to end with a single thin screen in the middle. Coat this thinly with fluorescent material on either side so that the light from one side shines through the coating on the other.

If one coating glows greenish-blue and the other yellowy-red you have a colour television system provided you can afford two complete channels in the ether to control the two cathode-ray beams. A.S.C.

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1936 BROADCASTING REVIEWED

The second article of the special short series summarising the B.B.C.'s work during the last year.

Programme Correspondence

DURING 1936 approximately 160,000 letters from listeners on programme matters were dealt with by the B.B.C., as compared with about 150,000 in 1935. Of letters expressing comment on the programmes, roughly 80 per cent. were appreciative. More letters of appreciation were received for Talks than for any other type of programme, Religion, Variety and Children's Hour broadcasts coming next in order of preference.

A large number of inquiries are dealt with annually, reflecting in their diversity the tremendous range of interests which the broadcast programmes comprise. In addition, the B.B.C. tends to be treated as a general information bureau; for instance, among other things it has been asked during the year to give hints on how to keep bulldogs, and to say what kind of work Shakespeare would be writing if he were alive to-day.

It is perhaps worth emphasising once again that the B.B.C. is always anxious to have listeners' comments on its work, and that constructive criticism, which takes into account the great variety of tastes which has to be met, is specially welcomed.

B.B.C. Symphony Orchestra's Tour

The B.B.C. Symphony Orchestra, under the direction of Adrian Boult, made a Continental tour in April, visiting Paris, Zurich, Vienna, and Budapest. An important British work was given in each of these towns. In Paris the work selected was Constant Lambert's "Rio Grande" (with Clifford Curzon as solo pianist); in Zurich, William Walton's Viola Concerto (soloist, Lionel Tertis); in Vienna, Dr. Vaughan Williams' Symphony in F Minor; and in Budapest, Arnold Bax's "Tintagel" and Elgar's "Introduction and Allegro for Strings." The B.B.C. Symphony Orchestra also gave concerts in Leicester (March), Glasgow (April), and Hanley (October). There were eight concerts in the Contemporary Music series, and the works performed included Frank Bridge's "Cello Concerto, Malipiero's opera "Filomela e l'Infatuato," Vladimir Vogel's "Wagadu," Alban Berg's Violin Concerto, Kodály's "Te Deum," Lennox Berkeley's Oratorio "Jonah," and Hindemith's opera, "Cardillac." All these were first performances in England.

On March 4th Sir Hamilton Harty conducted a Berlioz concert in the Queen's Hall with the B.B.C. Symphony Orchestra and Chorus. The works performed were the "Symphonie Funèbre" and the "Grande Messe des Morts." On this occasion the orchestra was augmented to 200 players and there was a chorus of 250.

In the Symphony Concert series, Willem Mengelberg was guest conductor on November 4th, and on November 18th Pau Casals gave a memorable performance of Elgar's Violoncello Concerto, playing the work for the first time in his career.

The Promenade Concerts (42nd year) again had a most successful season in the Queen's Hall during the period August 8th to October 3rd, under the direction of Sir Henry J. Wood. There were various operatic relays from Covent Garden and Sadler's Wells; and in the autumn the Dresden Opera Company's performance of Strauss' "Ariadne auf Naxos" and the Coates-Rosing production of Albert Coates' "Pickwick" and Roger Quilter's "Julia" were broadcast from Covent Garden.

In the "Foundations of Music" a series of Liszt performances was given under the direction of the late Bernard van Dieren, and among the subjects dealt with in special recitals were: Mendelssohn's Organ Works, Restoration Dramatic Music, Vocal and Instrumental music by William Byrd, Matthew Locke, Morley, and Richard Dering; Bach's "Clavierübung"; and the famous anonymous old English Mass, "O Quam Suavis," which was broadcast from St. John's College, Cambridge under the direction of Dr. Cyril Rootham. A feature of exceptional interest was the series of broadcasts of French Choral Music given by Mlle. Nadia Boulanger and her singers in November, when programmes included examples of French Choral Music from the twelfth century to the present day.

NEXT WEEK

"SIR JOHN REITH"

An exclusive contribution from the pen of

JOHN SCOTT-TAGGART

also

"P.A." FOR THE HOME CONSTRUCTOR

A special practical article on installing and getting the best results from power amplifying public address systems.

The Children's Hour

No startling changes were made during 1936 in the conduct of the Children's Hour. The weekly plays continued to be extremely popular, particularly L. du Garde Peach's series called "The Castles of England," in which Richard Gooden took the leading part; Sybil Clarke's "Tales of 'Weston's Hope,'" and Franklyn Kelsey's breathless serial, "The Prowlers of the Deep." For Christmas Day, Philip Wade made an adaptation of Dickens' "Christmas Carol," and himself appeared in the role of Scrooge.

The Zoo Man (David Seth-Smith) and Commander Stephen King-Hall continued their weekly talks, the one on animals, the other on World Affairs, and Lt. Commander R. T. Gould appeared every three weeks under the title of "The Star Gazer." Distinguished additions to the list of Children's Hour speakers were John Morgan, who contributed a monthly talk on Farming, and the Rt. Hon. Leslie Hore-Belisha, who on July 29th gave some hints for children on the Safety First problem.

A series of Outside Broadcasts entitled "Listening to London" ran at intervals through the year, the microphone travelling to such interesting places as the Royal Mint, Cruft's Dog Show, Lord's Cricket Ground, the Zoological Gardens, the Pool of London, and lastly, only a fortnight before its destruction, to the Crystal Palace for the Poultry Show.

Among the serial stories broadcast were Anna Sewall's famous story "Black Beauty," Hugh de Selincourt's "Young 'Un," Arthur Ransome's "Swallows and Amazons," and Defoe's "Robinson Crusoe."

Two Request Week Ballots were held during the year, in each of which nearly 50,000 votes were cast and counted. As usual, Toytown stories topped the list, closely followed by the Zoo Man, Commander Stephen King-Hall, and dramatic productions.

The four Appeals made during twelve months raised well over £2,000, and the causes which listeners showed the greatest inclination to support were for providing country holidays and Christmas relief for poorer children.

For the first time since 1926 the Children's Hour appeared for a week at Radiolympia, where a studio performance of a Toytown story was presented, and such well-known entertainers as Mabel Constanduros, John Rorke, Ronald Gourley and Leonard Henry appeared.

Another innovation, which is to be continued in 1937, was the production in the Children's Hour of adapted versions of certain evening programmes. Thus a shortened version of Peter Creswell's "Scott in the Antarctic" was broadcast on January 25th, and later in the year, Herbert Farjeon re-wrote for children his programme "London Calling—1600."

Talks by Distinguished Authorities

Two National Lectures were delivered, "Law and the Citizen," by Lord Macmillan and "Modern Poetry," by Mr. W. B. Yeats.

In "Conquest of the Air" various speakers, including Major R. H. Thornton, Mr. Frederick Montague, M.P., Air-Commodore J. A. Chamier, M. Henri Bouché, Mr. C. W. A. Scott, and others, discussed the progress and organisation of aviation.

In the three series on the "Sea," speakers such as Sir Richard Holt, Lord Essendon, Sir Alan Anderson for the Merchant Service, Mr. Wynn Thomas, Dr. W. C. Hodgson, Captain D. K. Wolfe-Murray for the Fishing Industry, and Admiral Sir Herbert Richmond, Sir Arthur Salter, Paymaster-Rear-Admiral Sir Eldon Manisty and Sir Samuel Hoare for the Navy, explained what the sea meant to the nation and how the situation has been affected by recent events.

In "Scientists at Work," Professor D. M. S. Watson, Dr. Rose Scott Moncrieff, Professor P. M. S. Blackett, Professor A. V. Hill, and others, explained some aspect of the research work in which they were engaged.

Talks on "International Co-operation" were given by Sir Albert Zimmern, Sir Henry Bunbury, Dr. Ludwik Rajchman, and Mr. Philip Noel Baker, M.P., who outlined activities in which the nations had combined for their mutual benefit. The series was completed by Major R. H. Thornton, who drew attention to what might be done in Civil Aviation.

Mr. Max Beerbohm gave two talks during the year, the first on "Speed" and the second on "Victorian Politicians."

Recorded Programmes

1936 shows a very considerable increase in material specially recorded for programmes. Three mobile recording units made possible programmes covering public services, including the General Post Office, Scotland Yard, and the Underground Railways; while recorded programmes of general interest have included "Twelve Months Back," a review of the year; "Conquest of the Air," a story of aviation; "Television" Programme, and a programme called "North of 70," about the Hull Fishing Industry. Events of public interest, such as the Joseph Chamberlain Centenary Celebrations and the Election of London's Lord Mayor were recorded and subsequently edited and broadcast in the evening programmes.

The library of recorded material now numbers some 4,000 records, and is being developed so as to include examples of every phase of contemporary activity.

(To be continued.)

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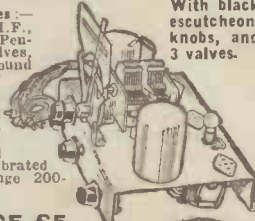
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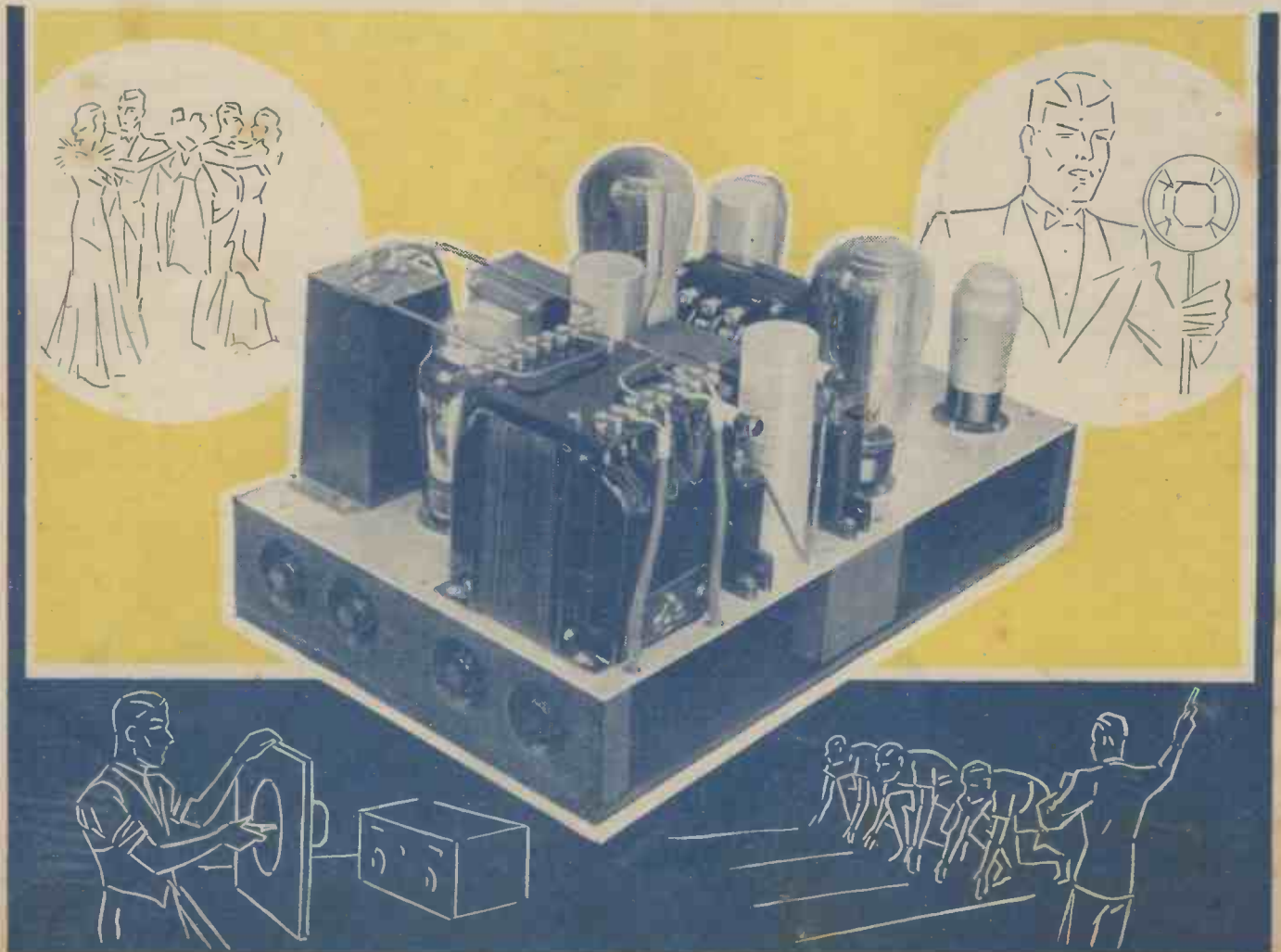
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Experience



Editor: G. V. Dowding

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

**"BLACK OUT"
STOP IT BILL
PROPHECY**

RADIO NOTES & NEWS

**ANONYMITY
QUICK STEP
OFFICE HOURS**

Floral Tribute

IF scent of primrose and of violet assail your nostrils, do not jump to the premature conclusion that Spring is here. For what you can smell is the beautiful bouquet which I now present to the B.B.C.'s engineers.

I present it, not to make them blush beneath their oily smears, nor to make them self-conscious in their overalls; but because they well and truly deserve it. For the 1936 figures disclose that out of the 71,608 hours, 20 minutes home-station broadcasting last year, the percentage of breakdown was only 0.031.

In other words, out of 10,000 possible bulls, only three strayed over the ditch to the Technical Hitch. Not perfect, I grant you, but surely worthy of some of those "Luvly vi'lets" that we have heard about in "In Town To-night"!

City of Dreadful Night

WILL London and other big centres follow the lead which Paris has now given in the adoption of "electrical applause"?

The listener to Poste Parisien and Co. has been asked to switch on an extra light in his house for a minute or so whenever he has specially enjoyed a radio programme item. The consequent increase in the use of electricity will be registered at the power station, and the man in charge there will pass on the information to the broadcasting authorities.

Conversely, if you find yourself listening to a loathsome item, you are at liberty to switch out one—or more—lights, to show your disapproval. So if the B.B.C. don't take care how they plan their chamber music, we may have everywhere in darkness one of these nights!

Audio Sieve Lets Crooners Live

THAT indefatigable inventor, John Hays Hammond, jun., of Gloucester, Mass., has more than once formed

the subject of one of these Notes, and now I learn that his inventive genius has excelled itself.

He has discovered how the voices of radio singers (or of talkie stars) may be "filtered," to remove any rasping or other offensive quality. He claims that by means of his new "editor of voice recording" he can completely remove all objectionable features, leaving only a voice that is pleasing to the most critical ears.

This is grand news for some of our crooners. Many of us had supposed that the only thing to do with them would

and other sleeping beauties, have been cogitating and considering it for so long that only an elephantine memory ("the elephant never forgets") can recall our high hopes when the subject was first officially investigated.

But now all is well. The interference has been distinctly heard by the powers that be, and, in their considered opinion, it does not improve the programmes. Any year now they may swoop down on it, so look out for the Radio Interference (Stop-It) Bill, and hope for a clean-up of the ether.

B.B.C. ORCHESTRA LEADER



PAUL BEARD, leader of the B.B.C. Symphony Orchestra, with his wife and his two children, David and Pauline. Prior to his B.B.C. appointment, Mr. Beard was with the London Philharmonic Orchestra.

be to cut their throats. Indeed, I have even known enthusiastic partisans who would willingly have volunteered to carry out that operation for them.

Stop It Bill

IDON'T want to alarm you fellows, but prepare yourselves for a shock Ready?

After three years or so of deliberation, the Radio Interference Bill is likely to arrive at any time now. Rip Van Winkle,

Oldest Wireless Prophecy

SEVERAL readers have been sufficiently intrigued by my recent reference to the oldest wireless prophecy to mention the matter in correspondence, and one reader—J. B. C., of Perth—claims that there is a much older radio prophecy than the one I gave. He refers me to the Bible, Job xxxviii, 35, where it says: "Canst thou send lightnings, that they may go, and say unto thee Here we are?"

J. B. C.'s quotation is particularly interesting, because he himself was sending wireless messages (officially) as early as 1901. But I confess that the other quotation (which I gave on page 422) seems to me more remarkable, because it was not a rhetorical question, but a definite forecast, in 1766, of future times when it might be possible to confer "at the distance of the Indies by sympathetic contrivances."

Incidentally, Shakespeare's "girdle round the earth in forty minutes" is outclassed by both the aforementioned.

Intermediate Interference

OWNERS of superhets will rejoice and make exceeding whoopee if a proposal now being considered in the U.S.A. ever materialises. It is suggested that all countries should agree to using a certain given channel for the intermediate amplification stages of superhets, and—this is (Continued overleaf.)

THE B.B.C.'s SECRET WAR PLANS

**EXCLUSIVE REVELATIONS
NEXT WEEK**

THE ANNOUNCER WHO LAUGHED AND LAUGHED AND LAUGHED

where the whoopee comes in!—no transmitter in all the world should be allowed to butt in on that wavelength.

On the face of it, there seems to be a lot to be said for such a scheme. It would tend to make superhets cheaper, and some of the startling epithets now in the radio service-man's daily vocabulary would become comparatively useless, and would give way to more anæmic expressions.

Anonymous Announcers

NOW that the B.B.C. has relaxed its rule about the names of announcers—and has not only disclosed who's who, but also has reproduced their portraits—it is time that they let us know which was the announcer who simply could not announce.

There was one in the Empire programme, and I believe it was all the fault of those Western Brothers.

There they were in the dead of night, doing such a funny song and trouncing the cads so heartily that the poor announcer got himself helplessly doubled up with laughter. At the end of their turn all he had to say was, "You have been listening to the Western Brothers, and the next part of the programme will follow immediately."

Instead of that he said, "You have been—ha—hee—ho—ho— You have yah ha he ho—"

And while he held his sides Kenneth and George made speech impossible by grimacing, rolling their eyes, and so forth. The listening Empire thought it was all part of the turn!

Nature's Quik-Step

IF you have any sympathetic tears to shed, shed them for the student of wireless theory. He has just recovered from the first effects of a body blow, and is sitting up and asking "Where am I?" Nobody can tell him the answer.

As you know, one of the few things really certain about the behaviour of radio waves is that they travel with the speed of light—186,000 miles a second. But a couple of suspicious-minded scientists in America had the temerity to erect some ingenious apparatus which was capable of testing the speed of travel of radio ground-waves, and they found that the velocity of the waves is only about a half—or at most two-thirds—of the published figures. Nature's quick-step is not as quick as had been supposed!

It matters nothing to you and to me. But to the poor chaps who have based millions of calculations on the greater figure it is a combination of bombshell, earthquake and biff on the boko. Peace hath her knock-outs no less than war.



To the Aid of the Party

THIS is the time when all good radio men should come to the aid of the Party. And when I say Party I do not mean politics or other-vice, but the good old—all-singin', all-dancin', all-bright, sit-up-all-night—that's the kind of party, my hearty.

As I staggered into the turquoise dawn the other morning from such a party (Oh, Such a Party!), there fluttered in me the hope that many of you are this year applying your radio knowledge in the same way—we'd had amplifiers working from room to room, uproarious sound competitions and sound effects, and comic turns that had the ordinary charade "knocked into a cocked."

Moreover, the baby next door had a microphone hanging near his cot to enable his parents to come along; a fair arrangement. I must say, for they would never have slept a wink near a party like that one!

"MIKE" SLIPS AND QUIPS

Commentator:
Both boys are shaking in the middle now.

Australian announcer giving cricket résumé:
The wicket is wearing well—no sign of wear at all.

Announcer during sponsored programme:
I always enjoy you who have not tasted—jelly crystals; you don't know what you are missing.

Cricket commentator:
But when I lifted my eye which I had on the ball, it was in his hands.

During Children's Hour:
We are always ready for our holidays when they come around, don't they?

Announcer:
—drinking glass after glass after glass after milk—oh, er—of milk, I should say.

Commentator speaking of the Tower of London:
To-day thousands of men and women go every year to see if they cannot catch from those walls some faint echo of the existing past.

During a play:
Next time I offer you my photo, you will have to go down on your knees and beg for it.

A Romance of Industry

ONE hundred years ago, in the month of January, a man opened a small shop in Minories, London, for selling insulated conductors. He began with two men and a boy, but the business grew to what is now a vast undertaking—W. T. Henley's Telegraph Works Company, Ltd.

William T. Henley left Midhurst for London at the age of sixteen. He had put in five years at his father's business of fellmonger and glover, and he wanted a change. So in 1830 he took a chance, and among the jobs he tackled were light porter and labourer at St. Katherine's Dock (2s. 6d. a day was St. Katherine's pay).

Somehow, he found time to study, and got specially interested in electricity. He came to the notice of Professor Daniell (who invented the Daniell cell) and of the telegraphic inventor, Professor Wheatstone, with whom he worked on various signalling problems. Then Henley started to manufacture cables, and got the contract

for the Persian Gulf cable from the Indian Government.

In 1859 he opened large works beside the Thames at North Woolwich; his experimenting had carried him to the top of the tree.

Up the Garden Path

YOU know how realistically the scrunch, scrunch, scrunch of the here's foot-steps can be heard on the garden path as he hastens to keep his tryst before the microphone? Well, they do that scrunching by the aid of a big box of gravel, in which an effects man marks time for the requisite number of steps. And this gave one incorrigible wag an idea.



When nobody was looking he shook a pound of grass seed into the gravel box and pushed it back under a bench. A week or so later, when the effects man got the "footsteps box" out at rehearsal, he was astounded to find that his "garden path" needed some thorough weeding before it could be walked on!

Snaps and Snippets

Best greeting card received this year—from Lawrence Lindsay, Shipley, Yorks, who paints like Michaelangelo did in his more inspired moments.

Flying brickbat—to the bloke who runs his loudspeaker on the Bybia system. (You know B-y-b-i-a = Bother You Bill, I'm All-right.)

Big bouquet—to Professor John Hilton for his talk on "Why I bet" in a recent B.B.C. Sunday programme.

During Office Hours

THE noble army of city workers will like to know of the recent radio troubles at Durban. By some unknown means the radio programmes there leaked through into the city telephone service, and the effect of this was to introduce an astonishing break in the business routine in many instances.

One peppery old boss had left the office for the day, but when he got home he decided to put a phone call through to the office just to let 'em know who was who and to make sure nobody had gone home early.

He got the office all right—and he nearly got apoplexy as well when, through the telephone, there were wafted the strains of dance music and a ditty about a girl in a Tyrolean hat! It took the tactful telephonist a solid five minutes to convince the old martinet that nobody was playing a gramophone record in his absence!



SIR JOHN REITH

A MAN WHO KNOWS HIS JOB AND HAS TRIED TO PERFECT A NATIONAL SERVICE

By
JOHN SCOTT-TAGGART

"I ALWAYS felt," recently declared bewhiskered Mr. Lansbury, "that Sir John Reith would have made a very excellent Hitler for this country."

Here is not only the opinion of a kind and wise old gentleman but of probably most people who have any personal knowledge of the son of the manse who controls the broadcasting ether of this country. For myself, let me say at once that if we have to have a dictator there is none I should be more pleased to obey.

The tragic weakness of every criticism of the Director-General of the B.B.C. is that his generalship has resulted in the creation of an organisation far superior to that in any part of the world. He has done his job so exceptionally well that no one even bothers to find out whether the B.B.C. service really is the best in the world.

The Programme Question

As a fact, the B.B.C. service is very good. It could be very much better, but only, perhaps, if it spent more money. The ultimate reputation of Sir John Reith depends upon the programmes and the ease with which they may be received. You know and I know—and let us hope—Sir John Reith knows the programmes are at times appalling. But if one considers the amount of money he has to spend, they are not only remarkable but uniformly remarkable.

Very little has ever been written about the technical history of the B.B.C. Although the Director-General is a trained and qualified engineer no one ever dreams of asking whether the B.B.C. and its head have made any technical errors. The reason perhaps is that every year things have been technically improving, and radio is so wonderful to begin with that we never stop to ask whether it was wonderful enough early enough. The policy of the engineering department of the B.B.C. has always been one of "Suck it and see." The result is that we have sucked and seen practically every known type of wireless aerial, microphone, and circuit that exist.

The Regional stations have, nearly all, different kinds of antenna. Occasionally there have been special reasons for a choice. We have also tried powers from 1½ kilowatts to 70 kilowatts. If we need this power now, why did we not need it thirteen years ago? The signal strength of adjacent stations has only been a small factor. Through shortage of wavelengths and the partial failure of that huge experiment Droitwich we have the appalling system of synchronised Nationals, with their second-rate or third-rate service.

But in all these matters it must be

that he will be Wellington and not Napoleon.

The astonishing thing about criticisms of Sir John Reith is that they are so feeble compared to what one might expect. He is so admirably a target for the shafts of a score of disgruntled types. Even his gaunt dominating figure is a challenge in itself. He stands six foot four inches in height and looks down upon most of his fellows. Combined with his height he possesses keen penetrating eyes and a face strengthened and actually made handsome by a scar which reminds one of his war service. A second cause for offence is his strong personality. People who get things done make enemies. A strong personality arouses antipathy in men of lesser breed, even though they may never themselves be victims of it. They resent it on principle.

A Strong Personality

But one cannot have a great organisation built up with vision and controlled with administrative genius without a strong personality behind it. Certain it is that the mould in which the B.B.C. is cast could never have been fashioned by any pleasant easy-going official. Having established a tradition, however, it is equally true that the B.B.C. could now be run by a far less forceful personality than Sir John Reith. But whether it could have been so created is an entirely

different pair of shoes.

The Director-General has had a great business organisation to create. It is to-day easily the greatest entertainment organisation in the country, and the greatest force for culture and the moulding of public taste and, perhaps, opinion. From a business point of view the B.B.C. has been a great success. Every year it has gone from strength to strength as regards the numbers of its patrons. So efficiently has it been run that the Government have collected a great slice of its profits. The rise in licence figures is Sir John Reith's greatest monument. Let us sing praises to

(Continued overleaf.)

FAR FROM THE MADDING CROWD



A homely snap of Sir John and Lady Reith with their two children while on holiday in Suffolk last summer.

remembered that radio is and always will be an empirical art. If our technical product is no better than that of other countries in the first class, it is because our able engineers can really go no farther. Except for general increase of power (which I myself would greatly welcome as the solution of local noise interference) little more can really be done. In the case of television, however, the B.B.C. engineers are really on their mettle, and here there is no limit to the advances they may make. Sir John Reith has received neither credit nor criticism for the engineering development of broadcasting. In television, however, he will meet his Waterloo. Let us hope

SIR JOHN REITH—Continued

him while the figure rises, for we shall fling stones if and when the figure falls.

The B.B.C. is a monopoly and as such Sir John Reith has had enormous advantages, but it is folly to imagine that monopoly alone brings success. You have only to try to strike a French match to find this out. His great power has resulted in there being arrayed against him at different times every interest in the country. He has been opposed by the whole entertainment industry. He has been faced by a suspicious and apprehensive press. Sometimes he has ridden rough-shod over his opponents. But more often he has compromised, even though sometimes only temporarily, while he dug his trenches. Parliament sometimes sees in him a great danger, but always and inevitably its members are silenced by a recognition that here is a man who knows his job and has tried to perfect a national service.

The miracle is not that Sir John Reith has enemies and critics but that he has so few. Failing to find in his works any material fault, his critics have fallen back on every petty detail of his administrative work. There is not a managing director in this country who would not cut a sorry figure compared to Sir John if the same searching limelight were focused on him. An ordinary business is conventionally judged by its products and its balance-sheet. The B.B.C. and its administrative heads are frequently judged by details of administration which are magnified out of all proportion to their importance. And even when the B.B.C. has a bit of dirty linen to wash, it is scoured with glee by malicious washerwomen in Fleet Street and hung out to dry in headlines in the morning newspapers.

A Great Acquisition

Sir Stephen Tallents is a shrewd humorist and a great acquisition to the B.B.C. I know of no one who is more competent to defend this great organisation. He counter-attacks with a vigour which pours a douche of cold common-sense on critics. He asks newspaper correspondents: "Have you ever thought what would happen if the B.B.C. turned its microphones even for five minutes one evening on to the private lives of Fleet Street? I have. With that amount of limelight playing on any newspaper office from Ludgate Circus to the Temple, shouldn't we get some pretty sensational bills fluttering on the streets? Rain or shine, frost or heat-wave, we generally seem to manage to excite somebody."

A casual reader of the news knows how true this is. Recently those who have cried out against the system of manuscript inspection by B.B.C. officials yelped to

know whether the Archbishop of Canterbury's and even the Duke of Windsor's address was thus censored.

Now and again the Director-General or one of his staff may overshoot. In their enthusiasm for a principle they may carry things too far, and only see things in perspective when the incident appears chronicled in the daily press. An example of highly-organised administration was a memorandum which was sent to all married women on the staff four years ago. It read: "Dear Mrs. X.—If you are contemplating motherhood in the near future, please communicate with the Internal Director."

But it May be Justified

This looks like a hilarious example of humourless and petty officiousness. Actually, the organisation that produced this famous memorandum may be both justified and efficient.

Six months ago in Parliament, Mr. Attlee,

IN "THE SPORT OF KINGS"



The theory that Sir John is preoccupied with his own dignity is blown sky-high by his performance as a butler in the comedy "The Sport of Kings" produced by the B.B.C. Amateur Dramatic Society. He called members of his staff "Sir," was cheeked by a page boy and caused roars of laughter with his "I have no desire to dictate to the staff or interfere with your private lives—now scram." In this scene Sir John, as Bates the butler, is overhearing his master, Amos Purdie, J.P., placing a bet by telephone.

representing the Labour Party, said that he was quite sure at present that "the B.B.C. staff was not a happy one because they did not feel free to develop their personality and were held down by a very strong personality."

Poor liddle dears. I have never yet seen a criticism of the Director-General about staff discontent which did not give one the impression that the B.B.C. staff were a lot of snivelling kids. The malcontents must

be a very small minority, and press criticisms of discontent are a very unjust reflection on the methods of the B.B.C. A certain amount of discontent is inevitable in any concern. In my recollection, we thrived on it during the war. There is not a man-jack of us to-day who does not think that the politicians who govern us are not incompetent. Fifty per cent. of every staff grumble good-naturedly, but they would be no better under anyone else. It is the same with the B.B.C., only there are so many interests only too glad to fan or even imagine discontent in the B.B.C.

The alleged discontent is usually directed against the alleged quarter-deck discipline of the Corporation. It must rejoice any sober, sensible person to hear that the motley gang of artistic and literary people at Broadcasting House are kept—if only for their own safety—under some sort of discipline, even if it takes the big guns of the Navy to do it.

There must be a large number of over-educated under-experienced intellectual young men at the B.B.C. There must also be large quantities of highly-artistic temperamental people who think that ability in the arts is a justification for slackness in a business organisation. Good luck to any dictator who makes them behave like ordinary normal human beings who have to fit into some sort of pattern if a great organisation like the B.B.C. is to carry on efficiently. It is the very people who complain of the iron rod at the B.B.C. who most need its ruthless application to their tender susceptibilities.

Fantastically Exaggerated

Actually, all these tales of discontent are fantastically exaggerated. The B.B.C. could not possibly carry on without some organisation of even its more intellectual and artistic staff. If Lionel's ego is not cossetted by Admiral Carpendale with the same cotton-wool solicitude of his mother—well, it is just too bad.

In some respects the B.B.C. have deserved criticism. The selection of staff is one example. It is sometimes said that appointments have been the result of favouritism. Examples have been given of relatives of officials who have found jobs at the B.B.C. There have, however, never been any suggestions that such relatives were incompetent. Nevertheless, Sir John Reith might be well advised to discourage what can only lead to undesirable criticism. The failure to advertise all appointments seems an odd error of judgment which has persisted for many years—in fact, until the Broadcasting Committee of 1935 advised as follows:

"We have had no evidence of undue influence, but it is clear that the existing practice leaves to its administrators the responsibility for avoiding patronage and prejudice. We think that the time has come when recruitment should be systematised,

and we accordingly recommend that the positions to be filled should be advertised and that appointments except those of minor staff should be made on the recommendation of a Selection Board comprising officials of the B.B.C. together with one of the Civil Service Commissioners or their representative and possibly an independent additional member."

Sir John is such an independent personality, fearing and favouring no one, that one would have imagined that such a system would have commended itself to him from the start. But the recent suggestion that the B.B.C. is only paying lip-service to this recommendation and that the old system is really still in force is absurd.

Happens in Commercial Life

It has been suggested that the advertisements are inserted merely as a matter of form, after the man for the job has been chosen. Some support for this theory arose when Mr. Hopkin Morris was appointed Welsh Regional director. He frankly admitted that he had not seen the advertisement and would not have applied even had he seen it. Actually, this kind of thing frequently happens in commercial life. The position is advertised, and no applicant being found suitable the advertiser communicates with one or more persons to whom the position is then offered, even though those persons did not answer the advertisement.

The more important the position, the less likely is it that application would be made by all suitable applicants. In the present case, Mr. Hopkin Morris was magistrate at Clerkenwell—not the sort of person who would be scanning the "Situations Vacant" column of the newspapers. If the B.B.C. think he would make an admirable Welsh regional director, what more natural or proper than that they should approach him directly? After all, most of the highest positions in business are filled not from the ranks of those unemployed but from those who already have situations, and who consequently would not be likely to make applications. Personally, I can sympathise with the B.B.C. because I have never deliberately looked at a "Situations Vacant" column in my life, as I flatter myself I am sufficiently well known by now for people to come to me if they want my services.

Little of the "Old School Tie"

Another fallacy about employment in the B.B.C. has been that family and social position has weighed heavily with Sir John Reith, who is alleged to dearly love a lord. Preference is also alleged to be given to university graduates, especially of Oxford and Cambridge. Both suggestions are very wide of the mark. There is very little of the "old school tie" about the chief officials of the B.B.C. As regards the lesser employees, only half of the 400 non-engineering staff paid monthly are university graduates. There seems, however, a definite preference for Oxford, for 76 members of the staff have come from that university while only 40 are from Cambridge. From other universities come 75 employees. But, in any case, would there be anything seriously wrong if nearly all the employees were university graduates? After all, the business of the B.B.C. is highly intellectual (too intellectual, some people think), and though the universities

have no monopoly of intellect they are obviously of the greatest value as recruiting centres. The marked ascendancy of Oxford needs a little explanation, but it may be, after all, that the B.B.C. lacks employment - appeal to Cambridge.

Perhaps the greatest credit which should go to Sir John is that he did not make the mistakes which most organisers of broadcasting might easily have made. In the first place, there must have been a terrific temptation to lavish money, especially in the face of programme criticism. The mad expenditure of the film industry on production and stars provided an example broadcasting might weakly have followed to its ruin and bankruptcy. The complaints now are not that the B.B.C. is extravagant with your money, but that it is too careful of the bawbees. B.B.C. salaries are niggardly, but there is dignity and (if you behave yourself) permanence as regards most of the jobs offered. How gleefully would critics have talked of squandermania and the waste of public money! Whatever you may sometimes think of programmes, the fact remains with extraordinary persistence that every pennyworth of value is obtained for money spent.

The second triumph of Sir John Reith is that he resolved from the start not to give the public what they wanted. Ninety per cent. of the public wanted, and perhaps still want, variety and jazz. Instead, we have a real service catering for all classes and tending all the time to improve our taste. Instead of becoming on a par with a Saturday night's fair-ground, the B.B.C. programmes have obtained the general respect of the people of this country. Sir John realised, quite apart from any idealistic motives, that children who cry out for sweets and cream buns all the time must be treated as children. We should have been sick of broadcasting years ago had we been given the programmes for which we clamoured.

So rightly contemptuous of public taste has the Director-General been that to some extent he has cut himself off from the benefit of public criticism. If you get into the habit of despising the public's taste, you may become so intolerant of criticism that you lose all flexibility and receptiveness. However stupid we, the British public, may be, we are not stupid the whole time, and some of our petulant pipings are worth attention.

The appallingly dull programmes on a Sunday are a case in point. Here Sir John has carried his otherwise correct contempt



Another scene from "The Sport of Kings," showing the butler, disguised as a bookmaker, stealing out of the house with his master, also in racy attire.

for public taste too far. Perhaps it has been because of his desire to save money. Moreover, his own personal Calvinistic upbringing has discouraged anything savouring of a desecration of the Sabbath. Consistently he has paid respect to the very large body of religious opinion in this country which is only slowly becoming more broad-minded. The religious bodies and their following are still extremely powerful. Even if Sir John Reith had no personal views, he would have been far-seeing and exceedingly wise in "going slow" where brighter Sunday programmes were concerned. The report of the Broadcasting Committee 1935 gave an official indication of the change in public opinion: It said, "We have little doubt that something has been lost in the past by a lack of attractiveness in the programmes broadcast on Sundays. We think it an advantage that one of the alternative programmes should be of a lighter and more popular character than the other."

Brighter Sundays

Instead of having half the country against him, Sir John is now in the impregnable position of being forced to give us a brighter Sunday. And it is certainly high time when most listeners boycott the B.B.C. on that day and endure the cheerful whistle-accompanied effusions from publicity-sandwiching foreign stations.

A few people like to think of our Director-General as a humourless prig. Actually nothing could be farther from the truth. Of wine, women and song he certainly has only encouraged the last. But it is surely better that an organisation such as the B.B.C.—far more in the public eye and ear than any branch of the Civil Service—should be like Caesar's rather than Potiphar's wife.

Mr. George Lansbury, who all admit is a man of high ideals, recently declared in

(Please turn to page 539.)

ON THE SHORT WAVES



W. L. S. Replies to Correspondents

SOME time ago L. E. C. (Yelling) told readers that Havana, C O C D (48-92 metres) sent out an interesting "veri." Now W. B. (Warrington) sarcastically remarks that L. E. C. was right. He sent C O C D a report, and received his "veri" back from C O C O (49-92 metres). So he says there's something interesting about it all right!

H. S. B. (Willesden) has an all-wave set and a job that allows him to sit up long after "ordinary people" have gone to bed. H. S. B. is mystified by frequent reception of a television sound channel on 22 metres, and also by reception of the London Regional programme between Prague and Brussels (about 475 metres!). This looks like a super-superhet to me!

W. G. (Melbourn, Cambs.) wants to add an amplifier to his short-waver, which already has one L.F. stage. He asks whether he can leave his power-valve where it is, or whether he ought to substitute an ordinary L.F. type and put the power-valve in the new amplifier. I think the latter would certainly be the better course.

The Best Coupling

He asks what I consider the best type of coupling. Well, from the detector to the first stage I should use resistance-capacity, every time; after that, R/C or transformer, according to your own preference.

Thirdly, he says that he has two chokes—one ultra-short, and one ordinary short-wave type. How can he use them as an efficient choke for 4-80 metres? Simply connect them in series, and off you go.

Lastly, W. G. finds that he receives some wavelengths best with an earth connection on the set, and others best without it. Why? Well, it's simply the length of the earth-lead coming into the picture. Sometimes it's exactly a quarter-wave, and then you will be definitely better off without it. Take it on and off to suit your taste, and don't worry about the whys and wherefores.

W. S. (Brighton), formerly one of our leading single-valve exponents, tells me that he now has a superhet. After struggling with it for some time, he has now got it going really well, and finds it ideal for phone reception. He still prefers the O-V-O, however, for C.W. work. That, I think, is the tale told by everyone except the owners of commercial crystal-gate superhets. They seem to be the only receivers which can beat a straight "single" for C.W. work.

J. H. (Paignton) encloses a diagram and asks me how to connect a pair of phones in circuit. He says "I connected them

from the plate of the output valve to H.T. positive and, of course, burnt them out." I don't get that "of course." Phones always used to thrive on the plate currents of last stages, and there's no reason why they shouldn't still do so.

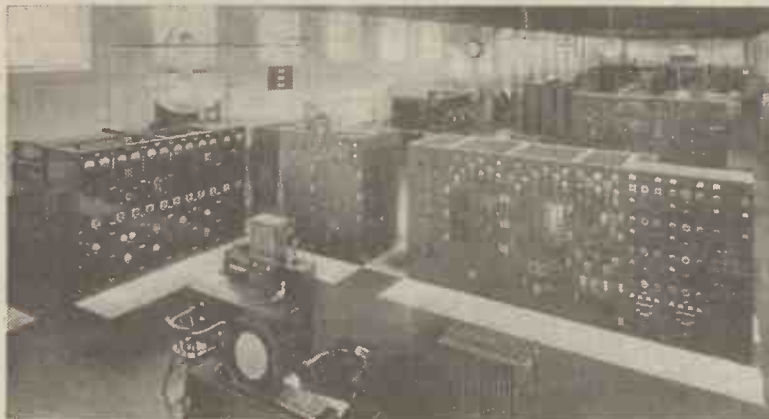
It must have been an unfortunate accident. If you don't want the D.C. through your phones, simply connect an output choke where the phones were, i.e. from last plate to H.T. positive, and take your phones, in series with a condenser of 2 mfd., from the last anode to earth. Alternatively, use a 1:1 transformer.

Five-Metre Activity

E. de C. (Prittlewell) reports that he recently heard an American station, W4 X E, testing on 9.5 metres. Incidentally, E. de C. seems to be on the right lines of receiver design, since he gets down to 9.5 metres with a four-turn coil, instead of the measly two-turn affair that most people seem to have to resort to.

He tells me that the 5-metre activity in the neighbourhood of Southend is now really tremendous. In other words, people who make 5-metre receivers have got something to listen to, which is far from

SHORT-WAVE GEAR AT RUGBY



A general view of the main hall of the short-wave building at Rugby. The transmitter in the foreground has a power of 60 kw. At the extreme left are the rectifier panels.

being the case in many parts of the country.

South London is another extremely active area, with well over a dozen good 5-metre transmitters on the air. Contacts over 50 miles and more are becoming almost commonplace these days, thanks to the extensive use of aerials which really are aerials, instead of random bits of wire obscuring the sky.

One transmitting friend of mine has a receiver equipped with a beam aerial, and it is so sensitive that he can pick up the ignition noises from several nearby towns, merely by rotating his aerial into the right position. He checks them off on a map! Almost as exciting as logging DX on a globe!

.....

NEXT WEEK
IN
"Popular Wireless"
HOW TO BUILD THE
"DEE-CEE" II

.....

Short-Wave News

THE latest Australian transmission schedules are as follows: Sydney (V K 2 M E), on 31.28 metres, transmits on Sundays from 06.00-08.00, 10.00-14.00, and 14.00-16.00. All times are in G.M.T.

Melbourne (V K 3 M E) will transmit every day except Sundays from 09.00-12.00 G.M.T., on a wavelength of 31.5 metres.

The address to which all inquiries concerning these stations should be forwarded is Amalgamated Wireless (Australasia), Ltd., 47, York Street, Sydney, N.S.W.

During the four week-ends of February, as usual, the R.S.G.B. runs its annual B.E.R.U. (British Empire Radio Union) Contest. Stations situated all over the Empire will be on the air in unprecedented numbers, using chiefly the 10-, 20-, and 40-metre amateur bands.

The Senior Contest, with powers of up to 250 watts permitted, is held during the first two week-ends; and the Junior Contest, with powers of 25 watts and less, during the last two.

A Good Chance

Entry for the contests is only open to members of R.S.G.B., who have been given fuller particulars in their official organ, the "Bulletin." I merely mention the contest here because it is a really fine opportunity for the keen DX listener to log a real book-full of stations.

The recently formed Mid-Cornwall Short-Wave and Television Society, with headquarters at St. Austell,

appears to be going strong. I hear from the secretary that the membership is steadily increasing. A new feature of the meetings is a "beginners' hour," which seems to be much appreciated.

A series of Morse classes is also being run for the benefit both of code enthusiasts and for that of members who hope to have their own call-signs some day.

Conditions on all bands remain surprisingly good. I say "surprisingly," because we aren't yet used to the sensation of being able to log everything for a continuous period of several months. I have been waiting for a downfall, but it hasn't arrived. Good old sunspots!

The 10-metre band seems to have nothing more to offer us. Instead of being the exclusive property of European and North American amateurs, as it seemed to be for a time last year, it is populated with signals from every corner of the world, and seems a better all-round "DX" band than 20 metres ever was.

Incidentally, it is becoming so cram full of powerful U.S.A. phone stations that one needs a real receiver down there nowadays.

W. L. S.

BUILDING

THE "EVERY-BAND THREE"

THIS week we come to the final constructional details and operating instructions for the "Every-Band Three."

The first job to do is making the various brackets. There are four brackets for mounting the short-wave coils. Comment on the making of these brackets is entirely unnecessary as full details are given in the diagram. They are made from 18 gauge sheet aluminium. There are two more brackets to be made, one for mounting the tuning condenser, and one for mounting the reaction condenser. Here, again, all the necessary details are given in the diagrams, making further instructions superfluous. These brackets are also made from 18 gauge sheet aluminium.

This brings us to the switch-contact strips. These are made from thin, hard ("springy") brass. The contact strips from old flash-lamp batteries are very good for the purpose, provided that they are not too stiff. These strips should be cut to the size shown in the diagram and drilled. They are not bent to shape until they are mounted on the baseboard. There are nine of these strips in all, eight being for the two sets of four wavechange contacts, and one for the on/off switch contact. The stop strip, which locates the wavechange position by engaging with the stop "Vs" in the coil base, is also made from hard brass. This may with advantage be made of slightly thicker metal than the contact strips.

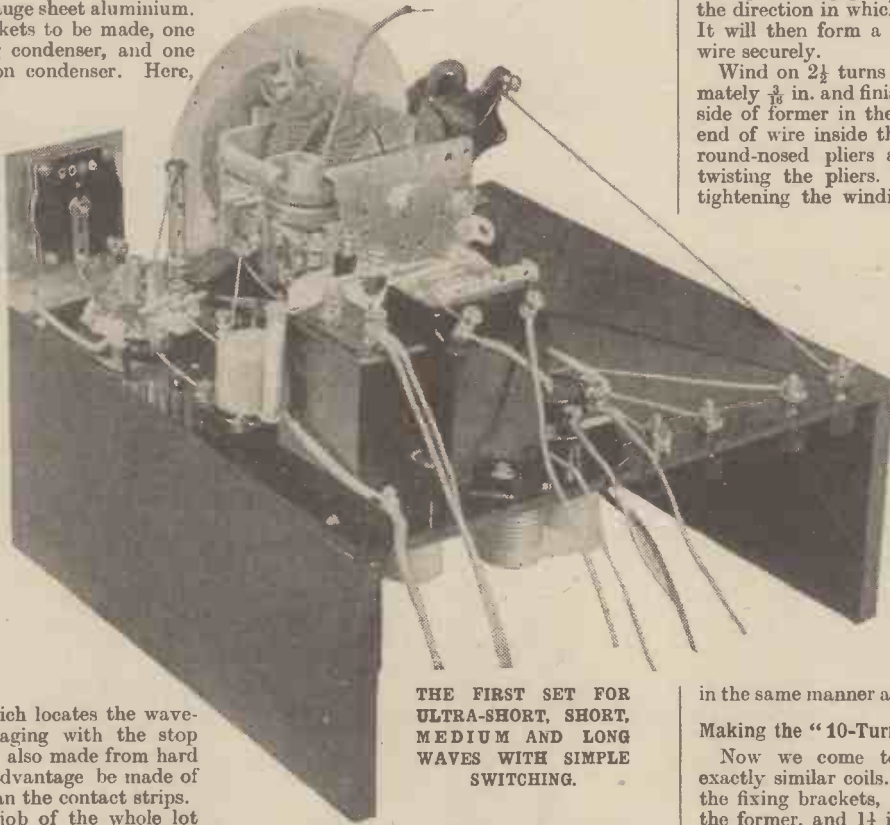
The most important job of the whole lot now remains to be done. This job is making the short-wave coils. It will be seen that these coils are referred to as U.S.1, S.S.1, L.S.1, U.S.2, S.S.2, and L.S.2. U.S.1 is the aerial coil for the ultra-short or television band. This coil has a plain winding of 2½ turns. The tuned grid coil, U.S.2, for this waveband has 5 turns, and is tapped half-way, one half being in the grid circuit, whilst the other half is the reaction winding.

The "Short-Short" Coils

S.S.1 and S.S.2 consist of 10 turns each and are exactly similar. In the case of S.S.1 there are 5 turns in the grid circuit of the H.F. valve, and the remaining 5 turns form the aerial coupling. In the case of S.S.2 there are 5 turns in the grid circuit of the detector valve, and the remaining 5 turns are used for reaction. These coils cover what one might call the short-short waveband of 14 to 35 metres. The remaining pair of coils, L.S.1 and L.S.2, cover the long-short waveband from about 28 to 80 metres. L.S.1 and L.S.2 are again similar. They consist of a total of 21 turns each, and are tapped at 12 turns. There are 12 turns in each grid circuit, and, in the case of L.S.1, 9 turns for aerial coupling. In the case of L.S.2 the 9 turns are used for reaction coupling.

The U.S. and S.S. coils are spaced as shown in the diagram, and it is essential that the spacing should be exactly as stated, otherwise the wave-range will be affected. The 18 gauge

This week A. Smith completes the constructional description of the "P.W." Research Dept.'s latest set development



THE FIRST SET FOR ULTRA-SHORT, SHORT, MEDIUM AND LONG WAVES WITH SIMPLE SWITCHING.

tinned copper wire with which these coils are wound should be stretched to remove any kinks before winding it on the formers.

We will deal first with the U.S.1 coil. First drill a ¼-in. hole ⅜ in. from the bottom edge of

the end of the winding, which consists of 2½ turns, is also ¼ in. and is drilled on the opposite side of the former, and 1 ⅜ in. from the bottom. Insert one end of a length (about a foot) of stretched 18 gauge tinned copper wire in the first ¼-in. hole, so that about a quarter of an inch shows inside the former. This projecting piece should be bent over in the direction in which the coil is to be wound. It will then form a hook, which anchors the wire securely.

Wind on 2½ turns tightly, spacing approximately ⅜ in. and finish off winding on opposite side of former in the other ¼-in. hole. Grip end of wire inside the former with a pair of round-nosed pliers and bend wire back by twisting the pliers. This has the effect of tightening the winding. Cut off superfluous wire. Leave about a quarter of an inch, which should be bent down flat on the inside of the former. Adjust spacing of turns to be exactly ⅜ in. That completes coil U.S.1. U.S.2 has 5 turns, so that the finishing hole will be on the same side of the former as the starting hole.

Therefore, the holes in the former for the bracket-fixing hole and the starting hole are the same as for U.S.1, but the finishing hole is ⅜ above the starting hole, and on the same side of the former. The winding is carried out in the same manner as that described for U.S.1.

Making the "10-Turners"

Now we come to S.S.1 and S.S.2—two exactly similar coils. Drill two ¼-in. holes for the fixing brackets, ⅜ in. from the bottom of the former, and 1¼ in. apart. Between these two holes, but ⅝ in. from bottom of former, drill a ¼-in. hole. This is for the beginning of the winding. Immediately above this hole and ⅜ in. from it, drill another ¼-in. hole. This is for the end of the winding. Now wind

THE "EVERY-BAND" SHOPPING LIST

- 1 Polar 2-gang tuning condenser, each section .0005 mfd., Bar type.
- 1 Polar semi-circular drive, marked in degrees.
- 1 Bulgin coil, type C.6.
- 1 Bulgin coil, type C.8.
- 1 Eddystone S.W. H.F. choke, type 1066.
- 1 B.T.S. screened all-wave H.F. choke.
- 1 Wearite screened H.F. choke, type H.F.J.
- 1 Varley "Nicore II" L.F. transformer.
- 2 Bulgin 4-pin short-wave baseboard mounting valveholders.
- 1 W.B. 5-pin baseboard A.C. type valveholder.
- 1 J.B. .0005-mfd. baseboard trimmer condenser.
- 2 J.B. .0001-mfd. baseboard trimmer condensers.
- 1 Polar .0005-mfd. "Compax" condenser.
- 1 B.T.S. .0005-mfd. solid dielectric variable condenser, with insulated bush and spindle.
- 1 T.C.C. 2-mfd. fixed condenser, type 50.
- 1 T.C.C. 1-mfd. tubular fixed condenser, type 250.
- 1 Dubilier .0001-mfd. fixed condenser, type 665.
- 1 Erie 2-meg. 1-watt. resistance.
- 1 Erie .25-meg. 1-watt. resistance.
- 1 Erie 10,000-ohm 1-watt resistance.
- 1 Erie 5,000-ohm 1-watt resistance.
- 4 Belling & Lee indicating terminals, type R.
- 1 Ebonite baseboard, 10 x 10 x ⅜ ins.
- 1 Piece of ebonite, 9 x 9 x ⅜ ins. to make coil base (Peto-Scott).
- 2 Pieces ¾-in. plywood, 10 x 4½ ins. for runners (Peto-Scott).
- 6 B.A. nuts and screws.
- 20 ft. 18 S.W.G. tinned copper wire for U.S. and S.S. coils and wiring (Peto-Scott).
- 1 oz. 22 S.W.G. D.C.C. wire for L.S. coils (Peto-Scott).
- 3 Lengths of insulating sleeving (Peto-Scott).
- 1 2½-in. mounting bracket with long slot (Peto-Scott).
- Aluminium for brackets (Peto-Scott).
- Screws, flex, soldering tags, etc.
- 6 "Paxolin" coil formers 2 in. x 1 in. diameter.
- Brass for contact strips.
- 2 B.A. rod, nuts and washers.

one of the 2 in. x 1 in. "Paxolin" formers. This is the hole for the fixing bracket. Immediately above this hole, and ⅜ in. from the bottom of the former, drill a ¼-in. hole. This hole is for the beginning of the winding. The hole for

on 10 complete turns, spacing approximately ⅜ in. The winding is done in precisely the same manner as described for the other coils. The spacing should be accurately adjusted, (Continued overleaf.)

Peto-Scott 1937 ALL-WAVE BATTERYS.G.3



4 Wavebands, 14-31, 28-62, 200-550, & 800-2,100 metres. Variable-Mu. H.F. Pentode. High Efficiency Detector. Harmonic High Efficiency Distortionless Output Pentode Valves. Double Ratio slow-motion self-indicating colour code Airplane Dial 8In. Tone Corrected M.O. Speaker. Latest type low-capacity switch with silver-plated self-cleaning contacts, 3-gang Ball-bearing Shielded Condenser. Combined Volume Control, On-Off

Model 7032

Switch, H.T. Consumption 10 m/A. H.T., L.T. and G.B. Batteries. Walnut veneered cabinet (illustrated). Aerial equipment. **READY TO PLAY.** Cash or C.O.D. Carr. Paid, £7/15. Or 5/- down and 18 monthly payments of 9/9.

5/- DOWN

FREE TO "P.W." READERS

Send for our beautiful Art Brochure, "All-Wave Radio for the Millions," and also for our 40-page 2-colour catalogue which fully describes 36 Peto-Scott All-Wave Broadcast, Battery and Mains Receivers. Every Peto-Scott Radio Set is amazingly reliable, extremely efficient, and is outstanding value for money. Models from £4/19/6. Cash or C.O.D., or from 5/- down.

CONNECT THIS Peto-Scott SHORTWAVE A.C./D.C. PRE-SELECTOR



TO YOUR EXISTING SET and tune-in to America and the whole World on Short Waves. Only a few simple connections necessary and **NO ALTERATIONS** to your receiver. Incorporates special coil unit covering 15 to 74 metres, and is equipped with an arrangement whereby just a turn of the switch by-passes the Pre-Selector so that your set is then available for reception on normal broadcast wavelengths. **SUITABLE FOR ALL RECEIVERS, A.C. D.C. OR BATTERY.** and 11 monthly payments of 9/- available.

9/- DOWN

- **ABSOLUTELY READY FOR USE.**
- **DUAL RATIO SLOW-MOTION DIAL (8-1,100-1)**
- **WAVELENGTH—CALIBRATED SCALE.**
- **B.V.A. VALVES.**

COMPLETE For A.C. or D.C. only with valves and cabinet illustrated £4:17:6 Cash or C.O.D. Carriage Paid

Peto-Scott NOISE SUPPRESSING ALL-WAVE AERIAL

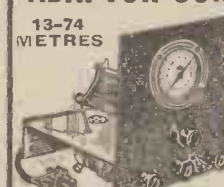


- Eliminates Man-made Static.
- Increases Signal Strength on all Bands.
- Improves Selectivity.
- Waterproof and Weatherproof
- Two Transformers.

Obtain utmost entertainment by using this Aerial outfit, the first really economical solution for overcoming the noise of man-made static. **AERIAL OUTFIT COMPRIZES** Duplex enamelled aerials, insulators, waterproof "lead-in" wire, Aerial and Set Transformers, assembled and ready with instructions and drawing illustrating the method of erection. **CASH OR C.O.D. CARRIAGE PAID 17/6** Or 8 monthly payments of 2/6.

2/6 DOWN

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



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

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

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

2/6 DOWN

PETO-SCOTT EVERYTHING RADIO—CASH C.O.D. or EASY TERMS

ANOTHER S.T.800 CUSTOMER WRITES! (9/1/37) "I may say the set is a revelation of sensitivity, and selectivity, and amazing range, it is far the best set I have built and I have been building since 1926. It was as you said, well worth waiting for." R.M.

S.T.800 KIT "A" Cash or C.O.D. Carriage Paid **67/6** or yours for **7/-** down and 11 monthly payments of **6/3**
Complete Kit of Components exactly as FIRST specified and used by Mr. J. Scott-Taggart, with Konectakit (Gratis with Complete Kit) but less wander plugs, accumulator connectors, valves, Extractor Kit, Cabinet and Speaker.

KIT "B" Cash or C.O.D. Carriage Paid **£4:14:0**
Or yours for 8/6 down and 11 monthly payments of 8/6.
As for Kit "A," but including set of 4 FIRST SPECIFIED valves only, less cabinet and speaker, etc.

KIT "CT" Cash or C.O.D. Carriage Paid **£5:11:6**
Or yours for 10/3 down and 11 monthly payments of 10/3.
As for Kit "A," but including FIRST SPECIFIED valves and Peto-Scott S.T.800 table cabinet only, less speaker etc.

KIT "CC" Cash or C.O.D. Carriage Paid **£6:9:0**
Or yours for 11/9 down and 11 monthly payments of 11/9.
As for Kit "A," but including FIRST SPECIFIED valves and Peto-Scott S.T.800 Console table cabinet only, with speaker baffle, and battery shelf, but less speaker, etc.

KIT "CLL" Cash or C.O.D. Carriage Paid **£6:11:6**
Or yours for 12/- down and 11 monthly payments of 12/-.
As for Kit "A," but including FIRST SPECIFIED valves and Peto-Scott Console cabinet, Type "LL" only, with speaker baffle, but less speaker, etc.

★ If Extractor Kit is required with any of the above Kits, add £1/4/0 to Cash or C.O.D. Prices, or 2/3 to deposit and to each monthly payment.
★ If the above Kits are required complete with 8 wander plugs and 2 accumulator connectors, as specified, ADD 1/9 to Cash or C.O.D. prices or 1/9 to the deposit.

A.C. S.T.800 KIT "A" Comprises complete kit of components as FIRST SPECIFIED and used by Mr. J. Scott-Taggart, including Peto-Scott ready-drilled and polished walnut plywood panel, ready-drilled terminal strips, aluminium brackets, mains lead, nuts and bolts, less valves, cabinet, speaker and Extractor Kit. Cash or C.O.D. Carriage Paid £9/16/6, or 18/- down and 11 monthly payments of 18/-.

S.T.800 FINISHED INSTRUMENTS

TABLE MODEL (BATTERY VERSION)



EXACT TO Mr. JOHN SCOTT-TAGGART'S SPECIFICATION
Built exactly to Mr. J. Scott-Taggart's specification by Peto-Scott's expert technicians. Complete with **FOUR FIRST SPECIFIED valves** and Peto-Scott Walnut table cabinet (illustrated on left), less batteries. **OVERALL DIMENSIONS:** Width 18"; Height 14"; Depth 12". **Cash or C.O.D. Carriage Paid 13/-** deposit and 11 monthly payments of 13/-.

CONSOLETTA (BATTERY VERSION)



EXACT TO Mr. JOHN SCOTT-TAGGART'S SPECIFICATION
Exact to specification. Complete with **FIRST SPECIFIED valves**. Peto-Scott Type 101 matched speaker and walnut console cabinet with Australian walnut-veneered front and wings. **Dimensions:** 20in. wide, 24in. high, 12in. deep (illustrated on left), less batteries. **Cash or C.O.D. Carr. Paid £8/19/6** or yours for **16/6** deposit and 11 monthly payments of 16/6. **CABINET ONLY** (as illustrated), complete with speaker baffleboard, battery shelf, and extension spindle, 35/- (Carriage and packing 2/6 extra.)

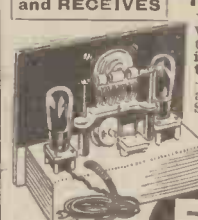
W.B. 1937 SPEAKERS



Model 37S. Amazing reproduction provided by new magnet and exponential moulded cone. Microdome matching device. **Cash or C.O.D. Carr. Paid £2 2/0.** Or 2/6 down and 11 monthly payments of 4/-. Model 37J. Matches any receiver as principal or extra speaker. **Cash or C.O.D. Carr. Paid £1/12/6.** Or 2/6 down and 11 monthly payments of 3/-. 37SC Cabinet Model. Highly efficient for use with any set. **Cash or C.O.D. Carr. Paid £3/3/0,** or 5/- down and 11 monthly payments of 5/9.

2/6 DOWN

TALK to your FRIENDS by RADIO Peto-Scott PORTABLE 5-metre TRANSMITS and RECEIVES TRANSCEIVER KIT



What a thrill! What a hobby! What a pastime! Imagine the delight in establishing radio communication with your friends — there's tremendous fun and entertainment in it. Start building your Transceiver NOW. Full Building and Operating Instructions with every kit. **KIT "A" £2:12:6**
Cash or C.O.D. Carriage Paid. Or 5/- down and 11 monthly payments of 4/10. Comprising drilled steel chassis and black panel, all necessary parts, including microphone, less valves, cabinet and batteries.

5/- DOWN

- SENSITIVE MICROPHONE in spring mounting.
- TRANSMITS AND RECEIVES TELEPHONY.
- SPECIALLY DESIGNED TRANSFORMERS for 5-metre band.
- ENTIRELY SELF-CONTAINED (except aerial). Fully described in Booklet "B."

B.T.S. 5-Valve SHORT-WAVE SUPER-NET KIT



An ideal Kit for constructors desiring a simple-to-build short-wave receiver possessing a high degree of selectivity. Incorporating special triple-range coil unit to eliminate coil changing, the B.T.S. 5-v. Superhet Short-Wave will provide a reliable reception of broadcasts from the farthest corners of the world.

COMPLETE KIT "A" 7/6 DOWN £3:19:6

or 7/6 and 11 monthly payments of 7/6. Complete set of parts with drilled chassis and panel, less valves.

Described in "SHORT-WAVE CONSTRUCTOR No. 2." Post free, 3d.

PETO-SCOTT CO. LTD. E.C.1 Head Office: 77 (P.W.14), City Road, London, Telephone: Clissold 9875/6. West End Showrooms: 62 (P.W.14), High Holborn, London, W.C.1. Holborn 3248.

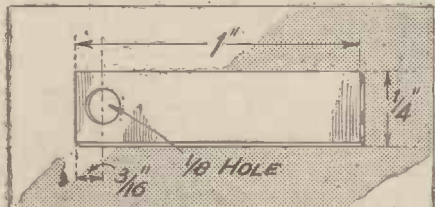
THE "EVERY-BAND THREE"

(Continued from page 524.)

the coil base. Soldering tags are fitted on the underside, or bottom, of the coil base.

Next fit the C.6 (B.C.1) and C.8 (B.C.2) Bulgin coils. Make sure that these are in the correct holes relative to the stop "Vs." Now mount the short-wave coils by means of their brackets. The coil-base assembly is now ready for wiring. This is, as you will see from the diagrams, a very simple matter. The connections to the short-wave coils should be made by referring to both, the wiring diagrams

SWITCH CONTACT STRIP



Nine contact strips cut and drilled to these dimensions are needed.

of the coil base and also to the diagrams of the coils themselves, the letters A, G and E on the wiring diagram corresponding to the same letters on the coil diagrams. All wiring is of 18 gauge tinned copper wire, sleeving being used where insulation is necessary. The coil base completed, it may be put aside for the time being.

We now revert to the baseboard. First fit the wavechange contact strips by means of 3/8 in. 6 B.A. cheese-headed screws and 6 B.A. nuts. They are mounted on the under-

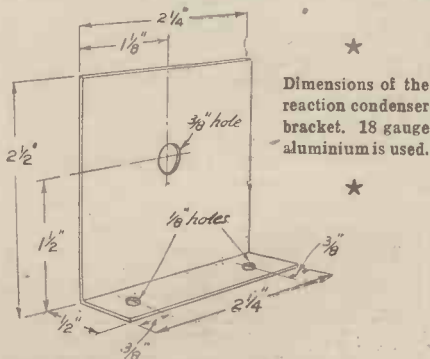
VALVES AND BATTERIES

V.1 Cossor 210 V.P.T. (4 pin)	V.2 Mazda L.2.	V.3 Hivac Y.220
--	----------------------	-----------------------

L.T. 2 volts—Exide.
H.T. 120 volts—Drydex.
G.B. 4½ volts—Drydex.
Loudspeaker—W.B. Stentorian.

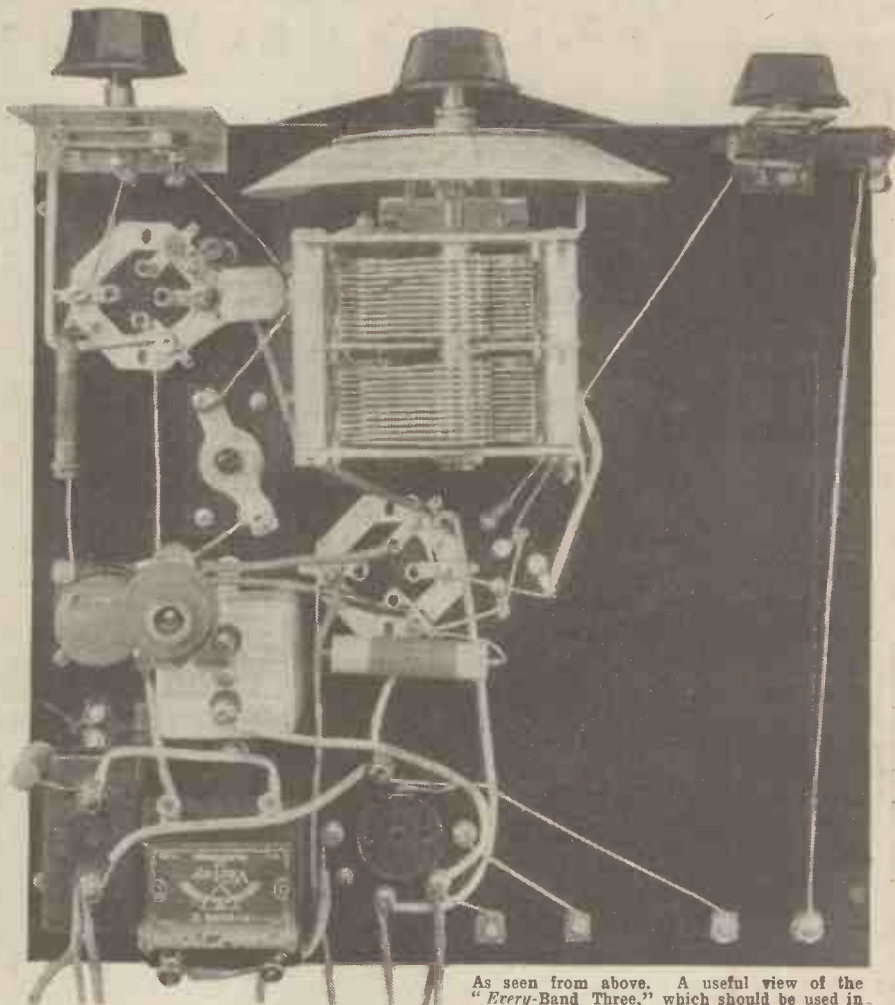
side of the baseboard with the heads of the screws on that side. Now bend them to shape shown in diagram. Next mount the on/off contact strip and stop strip to hole "Y," at the same time fitting the valvholder V3, which is also fixed in one instance by the same fixing screw. This same fixing screw carries the L.T. to the valve filaments. Bend on-off contact strip to shape.

Now fit 1½ in. length of 2 B.A. screwed rod to pivot hole in the baseboard. This is held



Dimensions of the reaction condenser bracket. 18 gauge aluminium is used.

in position by means of a 2 B.A. nut on either side of the baseboard. The rod projects on the underside, to take the coil base assembly.



As seen from above. A useful view of the "Every-Band Three," which should be used in conjunction with the main wiring diagram.

Place the components on top of the baseboard and mark out the positions of the fixing holes. Drill these holes, and mount all the components except the two-gang tuning condenser. Before mounting this it will be necessary to solder the wires to the switch-contact soldering tags which are obscured by the condenser. A sketch of these connections, together with reference letters, is given on the wiring diagram.

The bracket for mounting the tuning condenser is fitted by means of the same screws that fix the drive. Now mount the condenser.

The baseboard is now ready for wiring, which may be carried out with 18 gauge tinned copper wire and insulating sleeving, and no special comment is necessary regarding this. When the wiring is complete, the coil-base assembly is fitted to the baseboard by

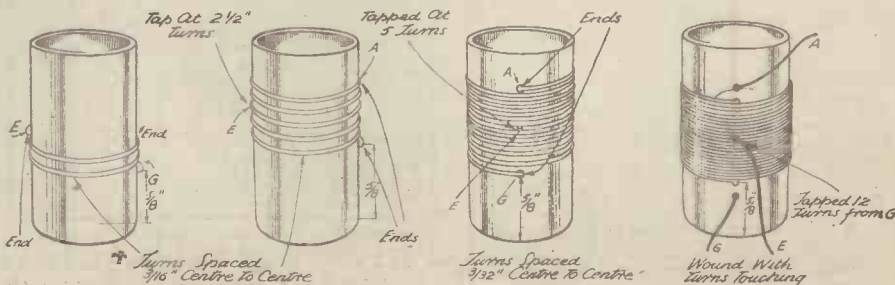
mounting it on the 2 B.A. pivot rod already fitted to baseboard. Brass washers should be used to space correctly so that contact strips on baseboard are compressed about 1/8 in. by the contact screws on coil base. The stop strip on baseboard must be bent, if necessary, so that it springs into the "V" stops on coil base and holds it in position.

The set is now ready to be tested out and trimmed on the medium waves. With the coil base projection pushed fully right the set is switched off. Connect L.T. in the normal way. Connect H.T. + 1 to about 60 volts, H.T. + 2 to about 90 volts, and H.T. + 3 to 120 volts. Connect G.B. + to + of G.B. battery, and G.B. - to 3 volts negative. Connect aerial and earth and loudspeaker to appropriate terminals.

(Please turn to cover iii.)

HOW THE SHORT-WAVE COILS ARE MADE

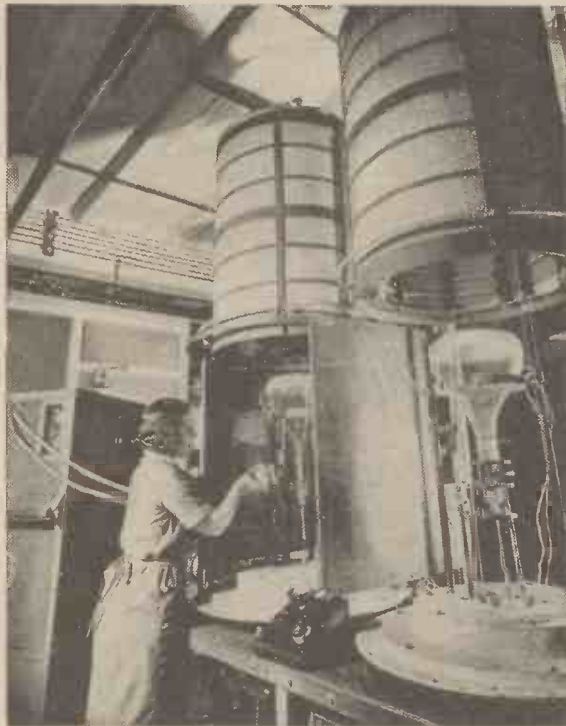
- 2½ Turns 18 SWG T.C. Wire U.S.1
- 5 Turns 18 SWG T.C. Wire U.S.2
- 10 Turns 18 SWG T.C. Wire S.S.1 S.S.2
- 21 Turns 22 SWG D.C.C. Wire L.S.1 L.S.2



All Formers 2" Long by 1" diameter (external)

Here is all the information you require for making the short-wave coils.

TELEVISION TOPICS—Collected by A. S. Clark



Cathode-ray tubes in the exhausting department of the G.E.C. works. The covers seen above the tubes are lowered over them for protection purposes during the pumping.

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

photographer, who was giving a party. The occasion was Philip Harben's annual exhibition of photographs, and in addition to these there was the added attraction of television for the Press and the folk who turned up.

AN EXPERT EXHAUSTER

Mr. William Hutt was one of the three members of the Ediswan staff who were recently presented by Sir Felix Pole, Chairman of the controlling company, with awards in recognition of long service. Mr. Hutt has now completed 54 years' service and is 67 years old. He received a gold watch.

It is interesting to note that Mr. Hutt, whose job is the exhausting of large rectifier valves for television, actually exhausted the first vacuum flask ever made. These were then known as Dewar Flasks, after the inventor, and were made at the Ediswan Works, which were then at Benwell, Newcastle, under the direction of Sir Joseph Swan, the famous electric lamp pioneer.

TELEVISION WITHOUT A SET

We are all familiar with the stories that crop up from time to time of people who are

able to hear broadcasting without the aid of a receiver of any sort. Now someone is apparently under the impression that he is receiving television without a receiver of any kind, for we have received a letter which reads as follows:

"Recently I had a funny experience after being in my bedroom for a short time. I suddenly saw pictures being formed on the wall of my bedroom. This went on for some weeks. Could you tell me if an amateur transmitter was at work?"

We can certainly assure him that no television transmitter was at work since he could not possibly see any television without a proper receiver. Either his imagination was at work or else what he saw was some pin-hole camera effect caused by a tiny hole in a blind or curtain over the window.

ANOTHER RECRUIT

A decision has been made by the government of Czechoslovakia to build a television station. It is hoped that it will be ready to commence broadcasting in the autumn of this year.

TELEVISION FOR HOSPITAL

Brentwood District Hospital is likely to be the first hospital to have television apparatus installed for the benefit of patients. A fund has been started under the organisation of Mr. P. C. Harrop, and collections are being made from audiences at demonstrations of television under his direction.

"TELEFRAMES"

Items of General Interest

A SPEEDY installation of a G.E.C. television receiver, including the dipole aerial, was recently carried out in twenty-four hours by their engineers.

The installation was at the Kingsway studio of Philip Harben, the commercial

TELEVISION FOR BEGINNERS

The significance of the "D.C." component in modern television is explained by G. STEVENS, in this contribution

EARLIER in these articles we saw that in order to reproduce a television picture more realistically the lighting of the scene should be varied on the cathode-ray tube screen to agree with the lighting of the subject being televised. This is done by making the amplitude of the carrier wave in the transmission alter proportionally to the amount of light present in the subject, and you will find it referred to sometimes as "D.C. working."

This is a little difficult to understand as it is something new in radio transmission, so we can spend a little time in seeing exactly where the difference lies.

In ordinary radio broadcast transmission the amplitude of the carrier wave when no signal is being sent out is a constant value and the sound modulates

this carrier between certain limits in height (amplitude). The process of rectifying the radio frequency wave removes the carrier, leaving the audio frequency to be amplified by the valve stages before being applied to the speaker. Now, in the case of television, the amplitude of the carrier is not fixed but varies according to the amount of light flooding the whole scene, and on top of this is the modulation corresponding to individual changes in the scene itself.

Bright and Dim Scenes

For example, a scene in bright sunlight will cause the carrier wave to be near its maximum amplitude limit, and the brightest part of the scene will give the maximum possible amplitude corresponding to 100 per cent. of the height. In a dim scene

the amplitude of the carrier, even when the brightest part of the scene is being transmitted, may not exceed 50 per cent. of its possible maximum. So far as the rectified wave is concerned, this means that the average current flowing in the output stages of the receiver will vary according to the strength of the carrier.

The Steady Boost

Looking at it another way, it is as though the picture modulation were given a "boost" above the normal zero line by an amount proportional to the brightness of the subject. It is this steady boost which gives the name "D.C. working" to the system, because it is as though a D.C. potential were applied to the amplifier output on which the modulation were superimposed.

As a matter of fact, this D.C. component is not absolutely necessary to reproduce the picture—it may be that in a lot of amateur constructed receivers it will be omitted by arrangement of the circuit. The effect of not providing for it would simply

be that the picture would be of a uniform tone with no contrast between bright exteriors and dull interiors—rather like flat prints from badly exposed negatives. The modulation is, of course, producing the picture all the time, and the only effect of this "boost" is to modify the background on which the gradations are drawn.

With an ordinary valve circuit it is extremely difficult to arrange for the D.C. component to be handed on to the tube, as it will be cut off by a condenser and the ordinary R.C. coupled stage has a condenser included in the output connection.

Varying the Anode Current

If we want to apply modulation plus D.C. to the tube, we shall have to arrange some form of circuit in which the anode current is altered in value according to the amplitude of the received carrier and, secondly, we shall have to apply this current to the grid circuit of the tube to alter the bias while the tube is working. How this can be done will be shown next week.

TELEVISION TOPICS—Continued

C.-R. TUBE TRANSMISSION

THOUGH several of the rather promising arrangements suggested during the last few years for scanning by means of electron rays have now been developed to full practicability at the transmitting end, the scheme first described by Manfred von Ardenne as far back as April, 1931, has in connection with recent tests been found to be fully on a par with its rivals. The principle of this scheme may be thus described:

An electron-ray tube of high beam intensity, comprising a standard fluorescent screen, is used for scanning. A "raster," produced on the screen by deflecting the ray (by means of a line and image sweeping system), is reproduced sharply by means of an optical system on the film to be televised, behind which there is arranged a photo-electric cell. The intensity of light impinging on the photo-cell depends on the degree of transparency at the place where the fluorescent spot of the transmitting raster happens to be reproduced by the optical system.

The main difficulty met with in connection with early experiments was due to the inertia of fluorescent screens. This drawback having been disposed of by developing fluorescent materials of practically instantaneous response and a very high luminous output. Von Ardenne, in connection with the C. Lorenz Company, thought it advisable to resume his early experiments.

Constant Operating Conditions

A high-vacuum tube is used at the transmitting end, thus securing operating conditions as well defined and as constant as possible. The anode potential has been raised to 25,000 volts, with a view thus to obtaining a fluorescent spot of the luminous intensity required for a satisfactory reproduction of images with a frequency band of two million cycles (allowing for a certain reserve). A special feature of the transmitting tube is that there are no accelerating fields of critical intensity acting immediately in front of the cathode, the main rise in potential occurring at a point far removed from the cathode. Outside features of the high-vacuum transmitting tube are the leads of the deflecting plates, which comprise lengthy lateral glass fittings. The fluorescent screen is practically free from any halo.

In order, in spite of the high anode

potential, to distribute the fluorescent spot on the raster surface, there had to be developed sweeping arrangements securing high sweeping potentials.

The potential supplied to the photo-cell is amplified, firstly, by a five-stage battery input amplifier and, after passing through the anti-distortion (equalising) coupling member, by a standard mains-operated oscillograph amplifier. Immediately after this amplifier designed for yielding high potentials there is another anti-distortion

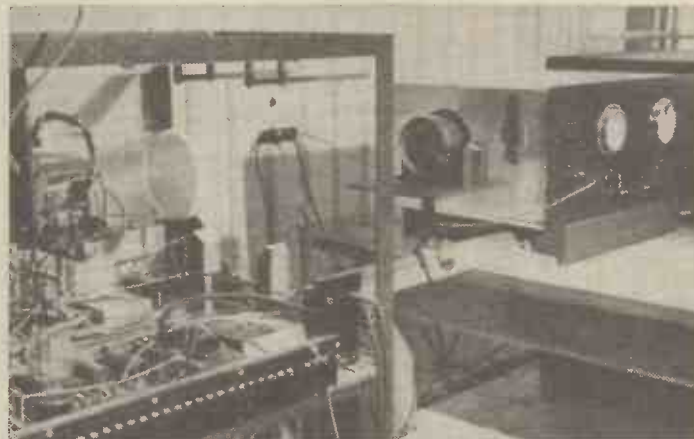
GENERAL VIEW OF THE APPARATUS



In this general view of Von Ardenne's apparatus, the transmitter is visible to the left.

device. A standard television tube and commercial double time-base are used at the receiving end, the tube being made suitable for receiving high-definition television images of very large numbers of lines by raising the anode potential to 7,500 volts, resulting in a reduction of the diameter of the fluorescent spot. Syn-

CLOSE-UP OF THE TRANSMITTER



The lens seen in the centre of this picture projects the short piece of film behind it on to the cathode-ray tube to the left.

chronising of the saw-tooth vibration is by means of a separate synchronising channel.

A general view of the experimental arrangement at Von Ardenne's laboratory is shown in one of the photographs, the transmitter unit being seen in front on the left.

A. G.

TELEVISION IN THE THEATRE

THAT television is destined to play a big part in the cinema-theatre programme of the future could be gauged by the reception given by the audience recently to the inauguration of its inclusion in a normal programme at the Dominion Theatre, London. The Baird system of big-screen television was employed.

This system, which employs multi-mesh scanning, has already been described in POPULAR WIRELESS. The screen was 8 ft. high.

The programme of television was very well presented, and consisted chiefly of variety turns and speeches by notabilities. It was heralded with the usual type of stage effects, which included a fanfare from six trumpeters.

The Quietness of Anticipation

There was a definite quietness of anticipation amongst the audience, many of whom probably had no idea just what they were going to see. Personally, I think the fact that lines could be seen on the picture was no drawback. It impressed on the non-technical that they were witnessing a scientific achievement. If the results had been too perfect they would have given the impression too much of film projection on a small screen.

The items were transmitted from a small studio at the top of the theatre, and connected to the receiver by landline. The fact that the system is as applicable to a radio link will probably prove of importance in the future when a number of cinemas will take the same items from a central station.

First of all, Mr. George Lansbury appeared, and made an opening speech. He was followed by Billie Bennett (complete with moustache).

Haver and Lee followed Billy Bennett in a novel manner. Lee appeared on the television screen and Haver in person on the stage itself. Then ensued the usual cross-talk, a huge Lee looking down from the television screen to the corner of the stage where a diminutive Haver stood.

Contrast

This contrast in size showed up an important asset of theatre television. In the large cinemas to which we are used these days, individual turns lose much because of the great distance from the stage of the majority of the audience. For many, a comedian's facial expressions cannot be followed. The television screen enables everyone to see the smallest movement of a moustache or the raising of the eyebrow.

For the final item, John Logie Baird himself appeared on the screen and said a few words.

There was no flicker of light at all, and one received the impression that theatre television, or "public address" vision certainly has a future.

A. S. C.

THE TRICKS OF "P.A." WORKING

By A. S. CLARK

"PUBLIC Address" is rather a terrifying description for a very fascinating branch of radio technique. Unfortunately there is really no other word which more aptly describes the use of amplifiers and loudspeakers to make a speech or announcement audible to a large gathering, or to provide music in a hall for dancing or entertainment.

In the case of small halls and gatherings this is a job which the amateur can undertake with ease. The apparatus required is not expensive, and if some knowledge of the vital considerations is possessed there is very little likelihood of failure under any of the varying circumstances that will be met.

It is the purpose of this article, which is written entirely as the outcome of practical experience, to deal with "the tricks of the trade," so to speak, and to put the reader on the right lines from the start. The article is written especially to link up with the "Super-Vol" Amplifier, which is described in this issue, but the information will prove just as valuable to users of other apparatus of a somewhat similar nature and to those who have experienced difficulty in getting satisfactory results from their attempts at "P.A." work.

Right from the beginning one has got to appreciate the tremendous difference between a radio receiver in the home and a "P.A." equipment in a hall. Not only must the volume be greater because a greater area has to be covered, but there are all the incidental noises made by a crowd of people which have to be drowned—shuffling of feet when dancing, conversation in an undertone, and so on.

Damping Effect of People

When you first rig your apparatus up the hall will probably be empty of people, and the hard surfaces of chairs, walls, floor and ceiling will reflect the sound, so that it will be easy to get loud results. But the damping effect of people is an obvious thing to allow for.

Actually the amount of damping you will have to allow for will vary very considerably with the type of hall. If the hall has a high roof and is good from an acoustic point of view, you will not need nearly so much reserve volume as you will if the hall is, say, one of the "ex-Army" type of huts which, incidentally, are often employed for concerts.

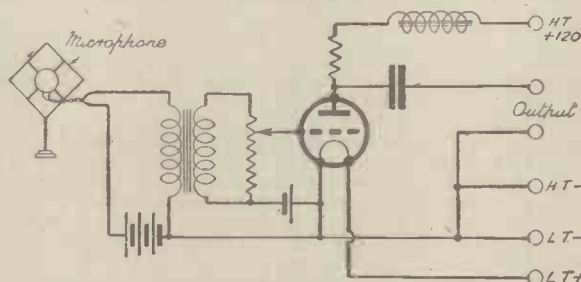
And, again, you will discover that the loss when people come into the hall is rather in the top notes than in main volume of the sound. This is an important point, because unless you have ample top to start with your speech reproduction may become "plummy" and unintelligible.

I had an outfit once which when tried in the house seemed to lack bass and to be very "topy." But in a hall full of people and going at full volume it was ideal, speech coming over with marked clarity.

And now a word about microphones. The cheap type of solid-back carbon microphone

While builders of the "Super-Vol" amplifier will find the information in this article especially useful, it will also appeal strongly to all who have occasion to rig up loudspeakers for public-address work

A PRE-AMPLIFIER CIRCUIT



The choke in the high-tension positive of this circuit may be omitted. It is used when a rising characteristic is required in the amplifier.

is not really good enough for the job. The better the microphone you buy the more satisfactory your results are going to be, especially if you are to cover singing and dance-band repeater work. Microphones vary so much that it is difficult to say how much you should pay for one, but personally I should reckon the minimum to be around £2 to £3. Test the microphone out with your apparatus before deciding on it if you can. A good selection of microphones is listed by Messrs. Electradix Radios.

Condenser microphones and electro-dynamic microphones are available, but these require special treatment so that they are not advisable, at least, for a start. The transverse-

so sensitive as the cheaper types with which you have probably experimented on the pick-up terminals of your receiver. Whilst the "Super-Vol" amplifier will work at full load with a sensitive pick-up as input, it is highly doubtful whether it could be loaded sufficiently with a good-class microphone connected direct.

What is termed a pre-amplifier is needed. Not only does this enable you to have plenty of volume but it helps in other ways too. You have sufficient amplification to be able to experiment with different voltages on the microphone in order to keep hiss down to a minimum; you can perform tone adjustments in the pre-amplifier if desired; and by running stronger currents through the leads you are less likely to get trouble from hum.

You will appreciate the latter point more when it is explained that the pre-amplifier usually goes as close to the microphone as possible. The diagram at the top of this page illustrates a suitable circuit for the pre-amplifier.

You will note that it is battery operated. It could be mains operated, but batteries are by far the simpler and cheaper method. To start with, hum is not easy to get rid of when a pre-amplifier is mains-driven. Then as the current consumption is a mere milliamp or two the power components would be rather expensive for the job they had to do. Thirdly the placing of the pre-amplifier near to the microphone would not be so easy in all cases because an adjacent power point would be required.

L.F. Choke Optional

An ordinary valve of the L type is suitable for the pre-amplifier, although I should mention that I have found the Mullard P.M.2D.X. particularly useful when hiss has proved rather prominent. A 10,000-ohm anode resistance and .01 coupling condenser are suitable.

The L.F. choke in series with the anode resistance is usually not required. Its purpose

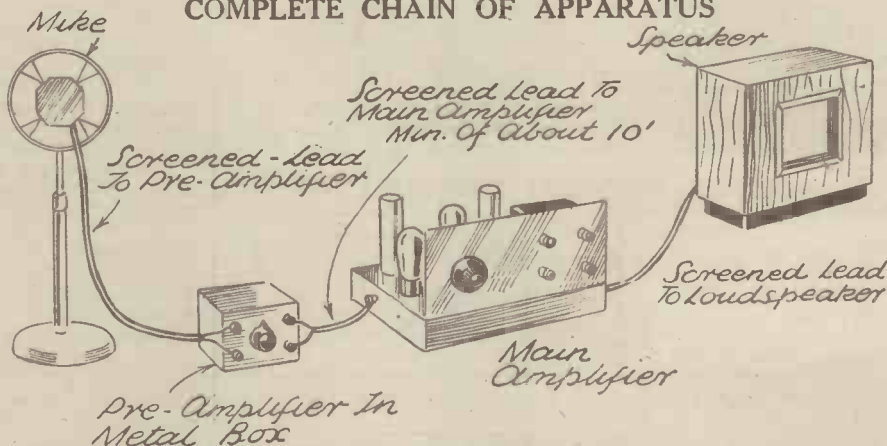
is to provide a rising characteristic so that high notes are emphasised. If your speaker proves somewhat bassy or for some other reason the top is not strong enough, it may be included. When used its value should be around 1 or 2 henrys.

Next in line of importance I think we can put the question of hum. This is probably what causes most trouble to the newcomer to "P.A." work. Nothing can detract from an installation so much. A very slight hum is permissible, because it will be inaudible in the body of the hall.

The secret of silent background is screening. Very often the provision of a true earth to a water pipe or earthing rod in the ground will simplify matters, but one has to be prepared to do entirely without this. The following method is inexpensive and has proved effective in entirely removing hum in many varied circumstances, it was even adopted at a

(Continued overleaf.)

COMPLETE CHAIN OF APPARATUS



Showing how screened leads are required between each item to prevent hum. The separation of pre-amplifier and main amplifier, though not always necessary, is sometimes of considerable importance.

current type of carbon microphone is extremely good.

The good-class microphone is not nearly

A SPECIAL ARTICLE DEALING WITH THE LEGAL ASPECTS OF "P.A." WORK APPEARS ON PAGE 538.

THE TRICKS OF "P.A." WORKING

(Continued from previous page.)

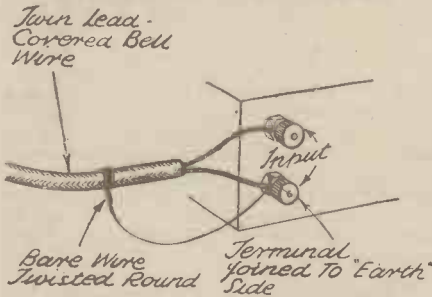
recording studio where the roof containing the "works" was getting on for 50 feet from the studio.

The pictorial sketch on the preceding page shows the various units in the installation. Note that screened twin leads are used for the microphone, pre-amplifier, main amplifier, and speaker.

The pre-amplifier itself is entirely screened, including, if possible, its batteries. The location of the pre-amplifier as already mentioned, should be as near to the microphone as possible, but the main amplifier may occur at any convenient point in the lead from pre-amplifier to loudspeaker. Circumstances and the positions of mains points will decide this in individual cases.

The minimum distance between pre-amplifier and main amplifier may not prove of any consequence in many cases, but I have mentioned it because the separation of these two amplifiers was the only way to remove the last bit of hum in one instance with which I had to deal. It was not an obvious thing to

EARTHING THE CABLE



The cable screening should be "earthed" at both ends in this manner. Scrape the lead clean before twisting on the bare copper wire.

do and took some time to find, so I hope it will at least prove a useful tip at some time to someone.

Normal shielded twin cable is not cheap, and it was this aspect that led me to investigate the possibilities of lead-covered twin bell wire. It proved highly successful, in spite of the fear that its high capacity might attenuate high notes considerably.

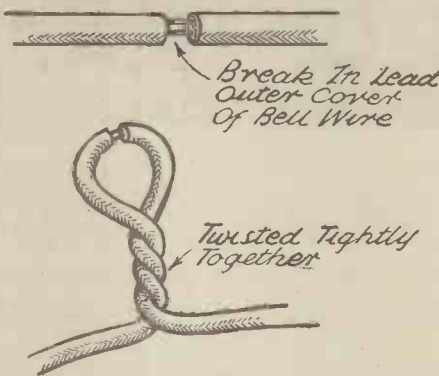
It has many advantages. You can push it into corners and it will stay just where laid, and it is the simplest matter to join up the screening.

After continual use the lead covering sometimes cracks while leaving the inside wires intact. When this occurs all you need do is to twist the wires together in the manner shown in one of the illustrations. Just take care that you do not bend the wire sharply at the point where the lead covering is broken.

Very Effective

This method is just as effective when you have had occasion to join together two short lengths of the cabling. The twisting together rubs the lead covering against itself sufficiently hard to provide a cleaning effect and so a good contact is achieved without first scraping the lead.

COMPLETING SCREENING



Lead covering sometimes becomes broken. This diagram illustrates a quick and efficient method of joining it up.

The lead covering should be connected at both ends of each length to the "earth" side or low-tension side of the unit to which it is joined. A piece of bare copper wire twisted a few times round it does the trick nicely.

Very often you will find yourself requiring to change from speech to record, and nothing detracts from a professional effect so much as a fumbling change-over in such cases. A fader control, as illustrated in one of the diagrams, makes such changes an easy matter. (The pre-amplifier is omitted in this particular diagram for the sake of clarity.)

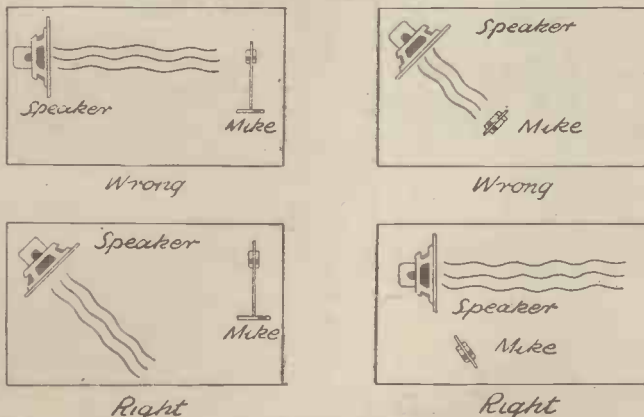
You will see that the fader control is really two potentiometers in series, the slider being on only one half at a time. If you liked, you could use two separate potentiometers, and then you could superimpose speech on faint music and obtain all sorts of effective combinations à la B.B.C. dramatic-control panel. The fader is more definite, though, and you need a bit of practice with the twin controls to obtain effective results.

The Loudspeaker Question

So far, we haven't given a thought to the loudspeaker or loudspeakers, but this is by no means because they are unimportant. They are very important.

It is a mistake to attempt to use two speakers just for the sake of using two, if one will serve the purpose. But when two are wanted, they are wanted badly, and it is really necessary that they should be identical, not only because of the matching up to the amplifier, but also because of their effect from the point of view of the audience.

VOLUME WITHOUT "SINGING"



The relative positions and directions of pointing of speaker and "mike" are most important if maximum volume is to be obtained without the danger of "singing round the ring."

P.M. speakers are recommended because of the additional equipment that would be required to supply field current for energised ones. Also a simple baffle-board mounting will prove best.

Whether you will use one or two speakers is largely dependent on the acoustics of the hall. Should the audience be facing one way all the time, as in the case of a lecture, do not place one speaker at each end of the hall. Those at the back would get the effect of the speaker being behind them. Put one speaker at the end of the hall to which people are facing and the other about half-way along, both loudspeakers pointing the same way.

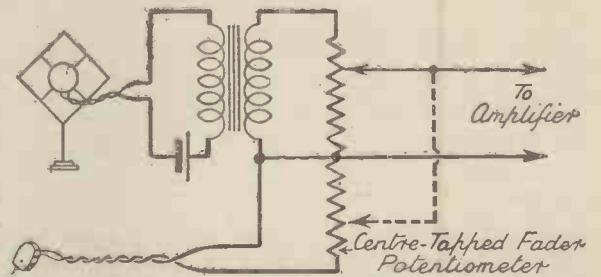
Two speakers will also be needed in the case of music provided to replace an orchestra. One should be placed at each side of the orchestra pit, but both should point towards the centre of the hall and upwards.

Positions of "Mike" and Speakers

A point that puzzles many is why "singing round the ring" is not more trouble when the microphone is in the same hall as the loudspeakers. Careful placing of the mike and speakers is the answer. But do not imagine that the easiest conditions are when the speaker is at the opposite end of the hall from the "mike." The contrary is very often the case.

I have given some small sketches which show the rights and wrongs of the matter. Wherever the speaker is, it should be pointing

FROM "MIKE" TO RECORD



How a "fader" can be wired up to provide a smooth change-over from microphone to record reproduction.

away from the "mike" as much as possible. Also it is best for the microphone to have its least sensitive side or angle pointing towards the speaker.

You can soon find out which this is by a simple test when the hall is empty. Turn up the volume till the ringing is just trying to start, then swivel the "mike" round. There will be one point where the ringing will get going properly. Keep the "mike" at right angles to this. The tendency to ringing will be much less when the hall is filled.

Never take up a request for "P.A." work until you know what the mains are. I once made this mistake and had everything nearly ready to switch on before asking what the voltage was. "200 D.C.!" I was informed, and had to pack up again, as my apparatus was A.C. If you want to cover D.C. working as well, a rotary generator is the best way out.

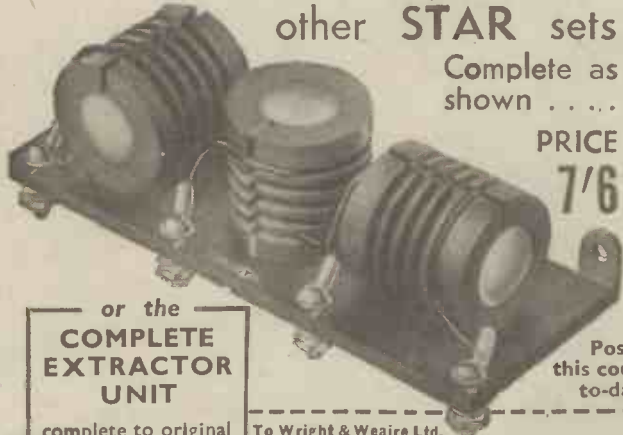
Very often if you are asked to provide a programme of music to fill in an interval or similar period, it will be left to you to choose the records. Always use newish records and semi-permanent needles to avoid long pauses.

Light orchestral items, special selections from shows, are good material and are easy to put over well. Organ records are not recommended unless you have a very powerful amplifier.

Outdoor work, for small sports meetings or garden parties, usually calls for more volume than indoor work, although it is surprising how well a speaker will carry out of doors. For the real enthusiast, logarithmic type horns on moving-coil speakers will project the sound better than flat baffles.

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SURPRISE PACKETS

I'M a world-wide listener for two reasons. One: It enables me to keep in touch with world opinion, world psychology and world technique. Two: It provides a never-ending cavalcade of keen interests and thrills. In other words, it's darn fine entertainment of the sort that appeals to me.

I don't suppose I am alone by a long chalk in welcoming the unexpected. That's why the super-efficient sometimes palls. It doesn't leave any room for "untoward incidents." Which reminds me. Just before Christmas I drifted into the London Lyceum to see them rehearsing "Puss in Boots." Everything went along swimmingly until, suddenly, huge slices of the scenery toppled over and crashed down, nearly squashing "one of the best cats in the business." Fortunately, no one was hurt. We had our thrills without any ills!

By the way, do any of you know if it is correct musketry to go straight into "present arms" from the attention position? I thought you had to "slope arms" first. Still, it may be pantomime licence, though my friend assures me that the chorus was trained under the eagle eye of a musketry expert.

However, this isn't radio. Of wireless thrills, here are two I've recently experienced. Tuned in one evening to Moscow and heard Paul Robeson delivering a talk eulogising the Soviet regime. He followed that with a half-hour recital of his best numbers.

Next evening was listening to and looking at the television from Alexandra Palace. Came a news reel and an extract of the recorded radio speech of the Duke of Windsor. Suddenly to hear that voice and those words again quite unexpectedly was a hundred per cent. thrill.

OUT OF THE MOUTHS . . .

I THINK I have before mentioned a mechanically-minded nephew whom I occasionally see. This small person has seen ten winters, if you include those early ones in which, in a manner of speaking, he had merely a reclining interest.

Naturally, this juvenile engineer welcomes my infrequent visits, particularly as his father knows less about science than most men. But lack of encouragement means nothing in his little life, such is his unconquerable enthusiasm. He produces about three "inventions" per day, and faithfully records them in an exercise book. And, of course, I have to wade through this volume of imaginative effort.

Invariably there are numerous perpetual-

motion devices and generally a few very ambitious efforts such as aeroplanes-cum-tanks-cum-submarines. Recently, television has made its appearance among Peter's notions, and on my last visit I was very much tickled by a communal seeing installation which he had invented.

Apparently he had asked his father why he hadn't bought a television set, and had been told that they were too expensive as yet. So he brought his active little mind to bear on to the problem, and evolved a scheme for making one outfit serve a whole row of houses, providing they were of the terrace type with evenly arranged backs.

The set would be fixed permanently in the one house, and its picture reflected along a tunnel running along the whole terrace. Into each house wanting to "look in" would run a branch tunnel through which the picture would be diverted. Peter realised that a lens arrangement at each point (like those in binoculars) would be needed. Not so bad for a ten-year-old inventor!

One of these days that lad will think of something pretty hot, but I note with alarm that frightful weapons of war, such as death rays and flame-throwers, figure prominently in his "invention book." Among them I spotted a development of the old chain shot idea—a shell which, on bursting, would emit thousands of shrapnel bullets tied together in pairs by means of long lengths of thin steel wire. Sort of thing they want to use against that B.B.C. mongoose!

GLISSANDO

THE Alexandra Palace television transmitter might well put in a few extra hours for the benefit of experimenters. Two hours a day is just too irritating for anything when one is chasing a thought with one's experimental gear.

The other day I awoke (clear-eyed and sweet-breathed as usual!) with a brain-wave all complete and straight from dreamland. Nothing less than a scheme for working a time-base with just one



MISS ROSE TEMPLE, who, as already announced in "P.W.," joined the staff of the B.B.C. recently as an assistant in the London Regional Children's Hour. This photograph of Miss Temple was taken at Covent Garden when she was stage-managing the light opera "Julia" last month.

ordinary power valve and no amplification. I looked at my watch. Seven o'clock. Should be all set to start in by eight. An hour for lunch, and that would still leave six hours before A.P. came on the air. But I didn't stop for grub, and three o'clock found me still in the last phases of fixing up the practical version of my brain-wave. Desperately accelerating, I just managed to get everything in fair order by four-five. But A.P. had shut down!

Five hours to wait for the next hour of transmission.

Why can't they run film through for an extra hour or two, I thought. Of course, there are out-of-hours experiments by the B.B.C. themselves. But the wretches conduct most of those on an artificial aerial.

Suppose I shall have to rig up a high definition transmitter of my own.

INTERESTING EXPERIMENTAL WORK

BY the way, it would make an interesting item or two for listeners if the B.B.C. were to put some of their experimental stuff on the air. You'd be surprised at the amount they carry out. Not so long ago I was watching the B.B.C. engineers at work testing the broadcasting possibilities of a cinema. I even plied the notes of the organ myself. Took special delight in manufacturing some cunning glissando.

Do you know how this is done? You run down, or up, the chromatic scale very quickly, at the same time shoving in some tremulant. You know, that wobbly, wavy effect. The tremulant makes adjacent notes seem to run together.

Honesty compels me to add that I am no
(Please turn to page 540.)

HOW TO BUILD

THE "SUPER-VOL" AMPLIFIER

THE "Super-Vol" Amplifier employs a type of circuit which is known in technical language as a "paraphase" circuit; not only has it high straight line amplification qualities, but even at low volume the quality of the output is maintained. For those who are technically minded a detailed description of the action of this type of circuit will be found in POPULAR WIRELESS, March 7th, 1936, page 745.

The amplifier is built in such a manner that, with the addition of a metal cover, it is both shock-proof and capable of withstanding rough usage. One important point is the method of protecting the terminals so that, although accessible terminals are employed, there is no fear of these terminals being broken off, as would be the case if they were allowed to project beyond the extremity of the amplifier. Secondly, with only two end runners and short side supports the removing of the base plate permits simple and rapid servicing. At the same time this base plate gives rigidity to the completed unit and simplifies the chassis construction by enabling a flat metal sheet to be used.

Preparing the End Runners

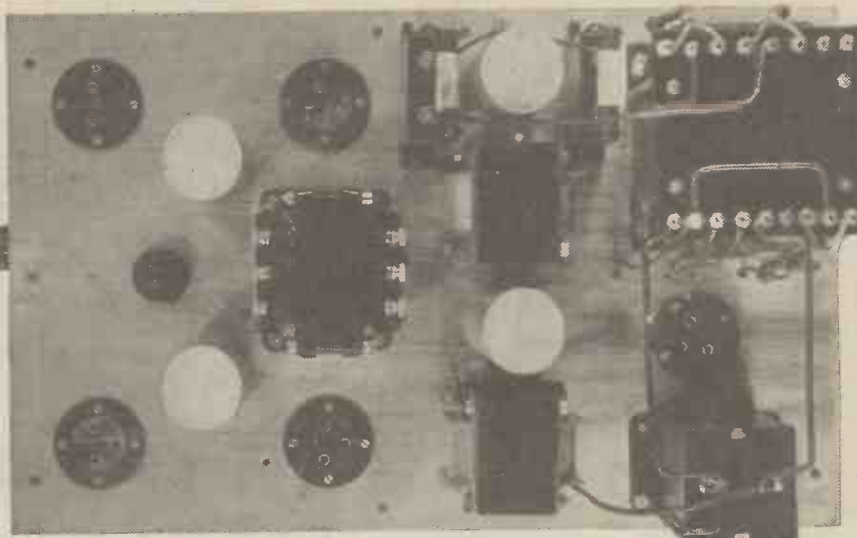
The main panel or chassis consists of a sheet of 16 gauge aluminium 16 in. by 10 in. Incidentally sheet aluminium is not essential, tin plate, sheet steel (suitably proofed against rust), or sheet brass, are all equally suitable. It is advisable to first prepare the two end runners. These consist essentially of two blocks of wood 10 in. long, 2½ in. wide, and ¾ in. thick. Also the two short side supports or runners which are 2½ in. long by 2¼ in. by ¾ in. thick. Having cut the end runners to the correct lengths, put aside and prepare the three ebonite terminal strips to the dimensions given in the list of components. The long terminal strip is drilled with four holes, the first hole being 1 in. in from one end, and

Full constructional details of the 10-watt Paraphase Amplifier for "P.A." work introduced to readers last week

the distance between the holes is 2 in., all holes being placed along the centre line of the terminal strip. The two shorter terminal strips carry the four "L.S." terminals, the holes in this case are ¾ in. in from the

it will be possible to mark the centre of the holes through which the terminal heads protrude. The correct sized holes for the terminals and volume control may now be drilled in the ebonite terminal strips, and also the 1½ in. diameter holes in the runners. Attach the terminals and volume control to their respective strips, and attach the terminal strips to the runners. These may now be placed on one side and the main chassis or panel prepared to the

A VIEW FROM ABOVE THE CHASSIS



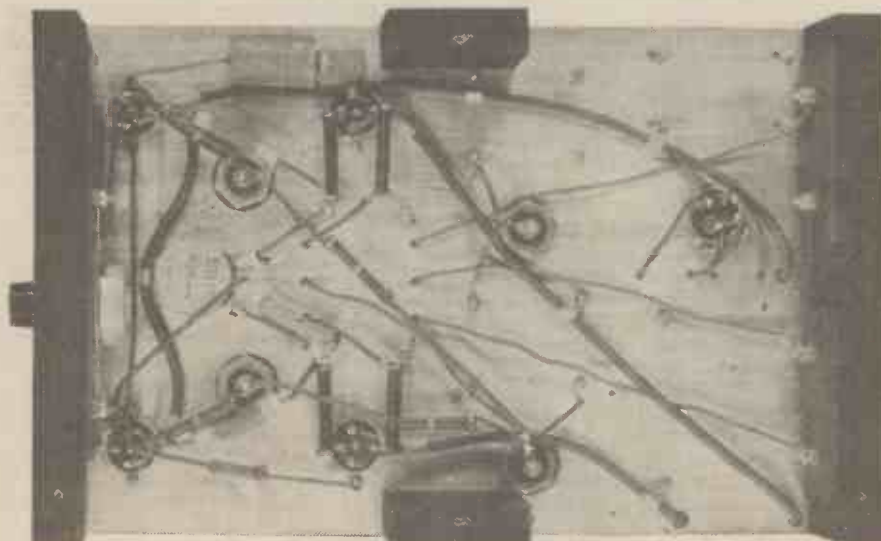
The major part of the wiring being carried out below the chassis, the top of the amplifier presents an extremely neat appearance.

end and 2 in. apart. The terminal strips should only be drilled with ½ in. diameter holes since they are to be used as templates for marking the 1½ in. diameter holes in the runners. If the terminal strips are now placed on the back face of the runners

correct size. Also cut to similar dimensions the ¾ in. thick wooden base plate.

It is quite a good plan at this point to assemble the chassis, base plate, and the four runners, for with these parts in their skeleton form the necessary fixing holes, etc., can be made more readily than when the amplifier is in a semi-completed state. Now remove the base plate, end runners and side runners, and place the whole of the components for the top side of the chassis in position, including the chassis valve holders, which may be laid face downwards, but with the exception of the output transformer. In order that this latter component may be fitted after the set is practically complete, the two fixing feet are removed and fitted to the opposite end of the transformer, so that the terminals are now at the opposite end from the fixing feet. Unless this is done you will find it is difficult to attach the six wires in the final wiring up.

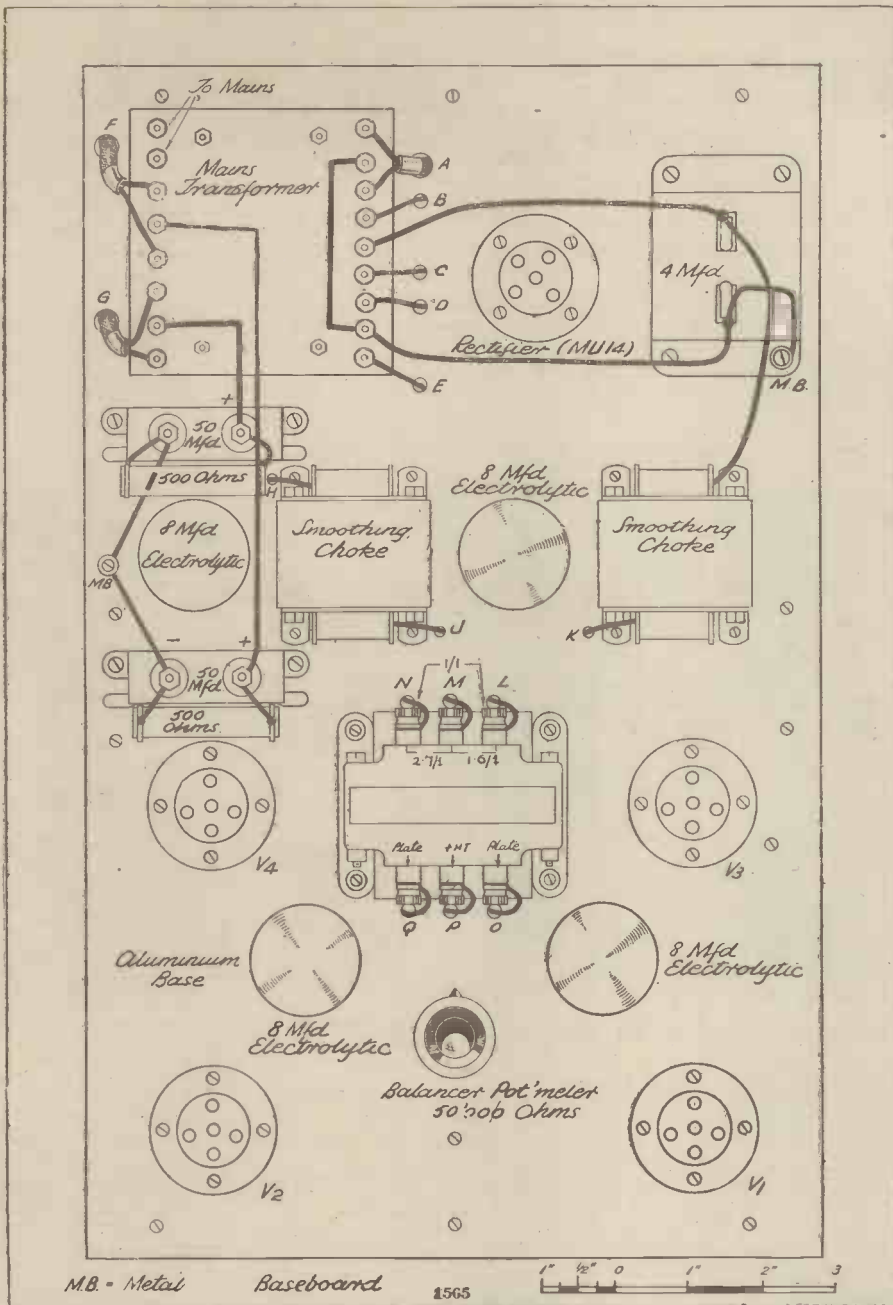
THE APPEARANCE FROM UNDERNEATH



Careful layout has resulted in straightforward wiring. Note the large clearance holes for the valveholder connecting pins.

Using a Dummy Layout

Having carefully marked the positions of all the fixing holes, and also the points through which wires pass to the underside of the chassis, remove the whole of the components and arrange them alongside you in a similar layout to that of the chassis. Each component in turn may now be placed on the true chassis and the correct size fixing holes made. By making a duplicate layout (Continued overleaf.)



The scale on this diagram will enable you to find the exact positions of all the components. Note that the side of the mains transformer with eight terminals is next to the edge of the chassis.

alongside you in this manner the drilling of the chassis may be undertaken in a businesslike manner and without fear of the components being damaged through their developing into a heap at the end of the table.

Certain holes in the chassis are $\frac{1}{16}$ in.

VALVES REQUIRED:

- V1 and V2: Hivac AC/HL.
- V3 and V4: Marconi or Osram PX 25.
- Rectifier: Marconi or Osram MU14.

diameter; these are the holes marked in the wiring diagram A, F and G, and they are for the circular heater flex.

The chassis should now be in a complete state from a drilling point of view, with the exception of the two holes for the bracket which carries the Dubilier Type 401 elec-

trolytic condenser which is mounted on the underside of the chassis. The bracket carrying this component is constructed from a strip of brass or aluminium $\frac{3}{4}$ in. wide and 2 in. long, bent at right angles in the centre with two holes in one face for fixing to the chassis, and a third hole in the other face $\frac{1}{4}$ in. in diameter, through which the condenser is attached to the bracket. It is now suggested that the two end runners and side runners be fixed permanently in position complete with the terminals and volume control. With the exception of the output transformer and the mains transformer all components should be mounted on the chassis, i.e. those which are actually attached in some way to the chassis and not held in position by wiring. If the output transformer and mains transformer are mounted at this point the amplifier becomes cumbersome to handle. The first stage in the wiring is the heaters.

You may say that this is impossible since the mains transformer is not mounted. This does not matter, since the height of the terminals above the chassis may be measured and sufficient extra wire may be left to connect to two of the sets of heater terminals. For the wiring of the heaters circular 23/36 twin flex is suggested. On the underside of the chassis the circular flex is held in position by small clips which are shown in the wiring diagram. These are not essential, but are advisable, since they prevent the wire from moving when transporting the amplifier and possibly breaking off where they are soldered to the heater terminals. In the case of the rectifier valve single rubber covered flex is used, not only for wiring the heater, but also for the "grid" and anode connections. This is advisable since a high potential exists between these points and the chassis.

Using Additional Sleeving

The remainder of the wiring is quite straightforward, and when as much wiring as is possible is completed, mount the mains transformer, and finally the output transformer. In the case of the latter component all six wires from same should be single rubber covered flex. The normal wiring is 18 gauge tinned copper wire encased in sleeving where any wire has to pass through the chassis, even if this is already insulated, as is so in the case of three of the leads from the smoothing chokes. Additional sleeving is a safeguard.

For the initial trial run the base plate need not be fitted in position, although care must be taken that the underside of the

COMPONENTS FOR THE "SUPER-VOL" AMPLIFIER

- 1 Erie 500,000-ohm potentiometer volume control.
- 1 Erie 50,000-ohm potentiometer.
- 1 Polar N.S.F. 200,000-ohm resistance, 1 watt.
- 1 Polar N.S.F. 250,000-ohm resistance, 1 watt.
- 2 Polar N.S.F. 50,000-ohm resistances, 1 watt.
- 2 Erie 10,000-ohm resistances, 1 watt.
- 2 Erie 5,000-ohm resistances, 1 watt.
- 1 Polar N.S.F. 500-ohm resistance, 2 watt.
- 2 Erie 500-ohm resistances, 2 watt.
- 2 Polar N.S.F. 100-ohm resistances, 1 watt.
- 2 Bulgin smoothing chokes, type L.F. 21S.
- 1 Ferranti output transformer, type OPM1(c).
- 2 Clix five-pin chassis-mounting valve holders, type V1 without terminals.
- 3 Clix four-pin ditto.
- 1 Premier mains transformer, type SP501T
- 2 Dubilier 8-mfd. electrolytic condensers, type 0281.
- 2 T.C.C. 8-mfd. electrolytic condensers, type 902.
- 2 T.C.C. 50-mfd. electrolytic condensers, type 521.
- 1 Dubilier 20-mfd. electrolytic, type 401.
- 1 T.C.C. 4-mfd. fixed condenser, type 901.
- 2 T.C.C. 1-mfd. tubular fixed condensers, type 250.
- 7 Belling-Lee terminals, type B.
- 1 16 gauge aluminium panel, 16 in. x 10 in.
- 1 Wood baseplate, 16 in. x 10 in. x $\frac{1}{8}$ in.
- 2 Wooden runners, 10 in. x $2\frac{1}{2}$ in. x $\frac{1}{4}$ in.
- 2 Wooden runners, 2 $\frac{1}{2}$ in. x $2\frac{1}{2}$ in. x $\frac{1}{4}$ in.
- 2 Ebonite terminal strips, $3\frac{1}{2}$ in. x $1\frac{1}{2}$ in. x $\frac{1}{8}$ in.
- 1 Ebonite terminal strip, $7\frac{1}{2}$ in. x $1\frac{1}{2}$ in. x $\frac{1}{8}$ in.
- Bolts, nuts, woodscrews, wire, insulating sleeving, flex, etc.

amplifier is not allowed to come into contact with any loose tools which may be on the bench.

With only one loudspeaker in use and the primary of the transformer adjusted to its normal super power output arrangement, the 1-1 ratio of the output push-pull transformer should be employed. With two similar loudspeakers arranged in series the 1-6-1 ratio should be employed. If more than two loudspeakers are in use, then the need for a specially designed output

transformer is necessary, arranged for the two output valves specified and the loudspeakers to be used.

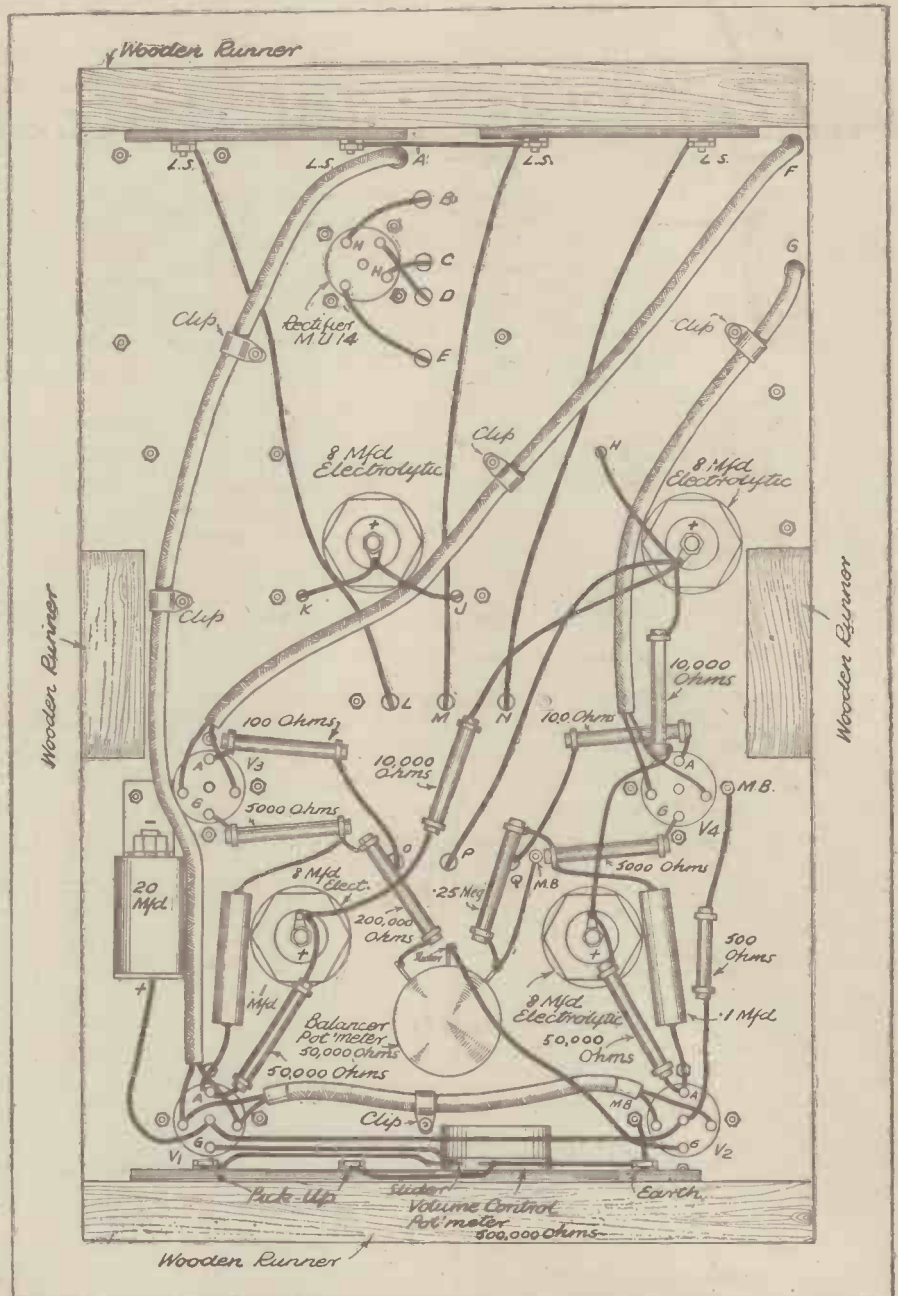
As to the question of types of loudspeaker, no provision is made for energising the field of the loudspeaker from the amplifier itself. There are two reasons for this: one, an expensive type of rectifier valve would be required; and, secondly, a mains transformer with a much higher secondary voltage would have to be used. In fact, the additional cost would be equal to half that of the whole amplifier. If, therefore, you prefer to use an energised type loudspeaker, a separate source of energising should be provided.

The volume control suggested is of a value advocated for use with most types of Piezo crystal pick-ups. If a different type of pick-up is employed, then the value for the volume control suggested by the actual manufacturer of the pick-up should be employed. The mains transformer is provided with tapped point which must be adjusted to suit the particular A.C. voltage available. Although the amplifier is referred to as a push-pull type amplifier, its correct type is a paraphase push-pull amplifier, hence the need for the extra 50,000-ohm potentiometer. The purpose of this potentiometer is to ensure that the input to the two push-pull output valves is balanced. This control must not be left at "any" point.

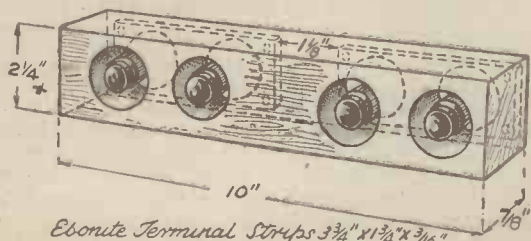
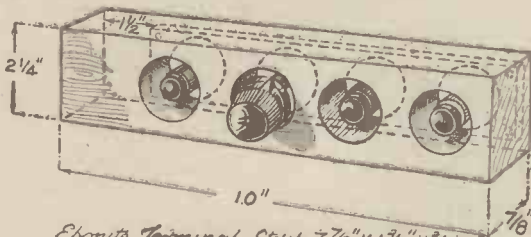
Balancing the Amplifier

The amplifier will work irrespective of where you set this control, but unless the arrangement is balanced only a very poor quality output will be obtained. The balancing operation consists of connecting a pair of telephones in series with the centre tap—i.e. + H.T. of the output transformer and H.T. plus point, to which this terminal is connected. Although the telephones may be connected direct it is preferable to use some form of isolating transformer, for it should be borne in mind that unless this is done there will be some 400 volts H.T. between the telephones and the wearer's head.

The method of balancing is to connect up the loudspeaker and to play a gramophone record, preferably one giving a constant output at a fixed frequency. The main volume control is set towards its minimum position and the balancer rotated until the signal in the telephones is at its



From the above view of the wiring below the chassis it will be seen that in some cases the lengths of the wire ends of the resistances have to be increased. Dimensional details of the terminal strips and end supports of the chassis are given in the diagrams to the left.



All Terminal Holes In Wooden Runners 1/2" dia.

minimum. Once this position has been found, this control should under no circumstances be touched. When making this test the output from the actual loudspeaker or any variations in the output should be ignored. The complete amplifier is now ready for use.

Do not forget, however, to screw the base plate into position, and if necessary for protection purposes construct a sheet iron metal box with ventilating holes at each end and also slots or holes so as to expose the terminal heads and the volume control knob. An alternative scheme is to arrange the amplifier in a super gramophone cabinet, mounting the pick-up and turntable on the normal motor board.

The remainder of the cabinet space can be fitted with the racks for carrying records, and also for storing the pre-amplifier, which is advisable for certain types of work.

When a pre-amplifier is in use or a pick-up fitted with a built-in volume control, do not attempt to control volume both on the main amplifier and on pick-up or pre-amplifier, otherwise you may experience some difficulty in reverting to a previous volume level. One or other of the volume controls should be set to give maximum volume, and the second employed as a master control; since the amplifier may be in an awkward corner it is preferable to use the pre-amplifier control as the master control. As to any change-over schemes from microphone to pick-up, this, too, should be mounted separately.

J. R. W.

QUESTIONS AND ANSWERS

By K. D. ROGERS

A TELEVISION PICTURE THAT JUMPS

K. T. F. (Hampstead).—*I have bought one of the commercial television receivers and have had excellent results for some time. But recently I have been experiencing a peculiar effect. Suddenly the image will jump, or part of it will jump sideways for a second or perhaps less, then it will go on perfectly all right until it jumps again. It is not a fault that ruins reception by any means, but it is rather disconcerting. What has gone wrong?*

It is difficult to say with any degree of certainty, but it would appear that the time base or the horizontal section to it is "misting." That is, the discharge valve circuits are not coming into action at the right time and are probably a bit too early or late. One of the valves may be developing a fault, or the line synchronisation may not be holding as firmly as it should. I am afraid I cannot tell you how to put it right, for it is not advisable to tamper with a television receiver of commercial type. But there is undoubtedly some time-base fault developing, and I should get in touch with the makers of the set as soon as possible.

It depends on the exact type of time-base discharge system what is wrong with the outfit. If soft valves (gas discharge types) are used, it may be that they are receiving wrong bias for some reason or other, or even a wrong H.T. voltage. There are many things that would throw them out of adjustment sufficiently for the synchronising to fail to hold them occasionally, causing this sudden discharge at the wrong time. In the case of the hard time base (using a system of ordinary valves), it may be that one or other of the valves is going soft or is losing its emission. It will take a television expert to find the cause of the trouble, and I should get the makers of the set to send a man round at once. Such a small thing as a faulty condenser, a partly shorting or intermittent break in a resistance, or even a small surface leak can cause quite a big effect in a television scanning circuit, and it is therefore impossible for me to tell you exactly what is wrong.

Can you strengthen the synchronising control in the type of set you have? If so, try that and see if with increased synchronisation—or perhaps increased signal strength—the scanning holds better. It may tie you over to the time when the firm can send their engineer to carry out some proper tests with the apparatus.

TWO VOLTS FROM THREE

A. N. H. (Aberdeen).—*As I live in a very inconvenient district for battery charging, I wonder if it is possible to get two volts from three volts, using two 1.5-volt wet cells. Can it be done with a resistance?*

It can, BUT— The first thing to find out is if the wet cells with which you are going to get your volts will provide sufficient CURRENT for the valves and at a constant rate. It depends how many valves you are going to use.

Also on the number of the valves and the amount of current they will take depends the value of the resistance which you will have to put in series with your battery in order to drop the voltage to two volts. This resistance can be worked out quite easily from the formula R (resistance required) is equal to the voltage drop required (that is, one volt) divided by the current you are going to pass. Thus, if the current is 5-amp. the resistance required is 5 divided into 1 or 2 ohms. But do not forget that with most types of wet cell you will not be able to take much more than .1 or .2 amp. for any length of time without the voltage of the cell dropping. The only way to ensure that the current could be taken would be to parallel a fairly large number of cells, so that you got a bank of cells in parallel connected in series with another bank of equal number also in parallel.

CAN YOU ANSWER THIS?

Here is a nasty query from W. H. S. (Devon). I have never had the experience and am frankly stumped as to the exact cause of the trouble. Perhaps some of you can help W. H. S. out.

"The circuit is that of 'P.W.' Blue-print No. 60, old but good, components similar. Valves pass 'Avomitor' tests O.K. L.T. and H.T. above suspicion. Aerial badly screened, unavoidably so.

"The trouble is irregular fading on Droitwich, as though L.T.'s were not up to standard, but the trouble is immediately corrected by releasing earth wire for two seconds from set, reattaching, and away it goes again at full volume.

"The fault sometimes occurs immediately upon switching on, but not always. H.T. consumption remains steady whether fading occurs or not, which, by inference, clears the L.T. side. No distortion, just a gradual fading. Average H.T. consumption 7 milliamps.

"Varying grid leak makes no difference. I presume H.F. leakage, but am frankly puzzled as to where or why. Absorption by interaction sounds big, but you will probably give a simpler reason."

BATTERY AND MAINS PORTABLE

G. E. (Aberystwyth).—*Can you tell me if there is a portable set on the market which can be used on the mains and also on the car battery?*

Yes, sir, there is—or was the last time I looked into the matter. Decca make such a set, and I have actually heard it working. It goes very well indeed, or at least the one I heard did; but as far as I know that is the only make available.

HERE'S-HOW

S. S. W. (Brighton).—*I have a couple of valves of the banana-pin type, and I am pretty sure that they make poor contact in the sockets. How do I open the pins?*

I don't know. This is how I open them—if I am lucky. Probably the banana pins have cost the radio men of this country more bad words than anything else in modern radio. They are brutes to open without damaging the valves. I believe I did tell you how to do this some time ago in "P.W.," but it won't hurt to do it again.

This is how I do the job: I get a nice sharp pen-knife, and with the utmost care I insert it (after untempted attempts) in the thin slits in the pin. But I am particularly careful to insert the knife very gently. It must not be forgotten that right down the centre of that pin runs a copper wire. That wire is connected to a blob of solder at the foot of the pin which is open until the wire is poked through at the factory and soldered.

If you break that wire you completely disconnect the pin from one of the electrodes of the valve, and it is rendered useless.

So with the knife we have to scratch about very delicately to make sure that we have not come up

WIRE DATA FOR THE EXPERIMENTER

An extremely useful wire table which shows the number of turns of wire which you can wind in an inch, and also the number of yards of wire which you get in a pound.

Standard Wire Gauge	Enamel Covered		Single Silk Covered		Double Silk Covered		Single Cotton Covered		Double Cotton Covered	
	Turns per inch	Yards per lb	Turns per inch	Yards per lb	Turns per inch	Yards per lb	Turns per inch	Yards per lb	Turns per inch	Yards per lb
16	15	26.4	15	26.4	14	26.1	14	26.1	13	25.6
18	20	46.9	20	46.8	19	46.3	18	46.3	17	45.4
20	26	83.3	26	83.3	25	82.5	24	81.7	21	79.4
22	33	137	33	137	32	134	30	134	26	129
24	41	221	42	222	40	218	37	219	32	203
26	50	330	52	332	49	325	43	311	37	294
28	60	488	62	488	57	478	50	452	42	422
30	73	694	73	695	67	675	57	634	47	587
32	83	915	82	912	75	887	63	835	50	755
34	98	1,202	95	1,250	85	1,220	70	1,280	55	1,024
36	116	1,840	112	1,815	90	1,750	86	1,610	64	1,477
38	143	2,810	137	2,871	118	3,760	100	2,550	71	2,287
40	182	4,576	164	4,416	137	4,128	112	3,910	78	3,456

PLEASE WRITE

J. W. C. B. (Weymouth).—*In our issue of December 26th we published a query from you concerning A.C. converters. Please will you send your full name and address as your previous letter has been mislaid, and we have an important communication for you. Sorry we cannot print its contents here, but it is a purely private matter. So, J. W. C. B., please let us have your address and we will forward the letter. Thanks.*

BE CAREFUL

T. K. R. (Woodford).—*I saw an advertisement the other day for a television receiver—viewer—for ten pounds. It said that it was in perfect working order, but did not mention anything about tests or demonstrations. Would the viewer be any good at that price?*

As the Scotsman said, I hae ma doots. In all probability it was one of the old 30-line viewers which are now obsolete except for experimental purposes should you want to play about with low-definition television. I am pretty sure that you will not see a high-definition television viewer for sale at anything like that figure for many a long day.

Go further into the matter if you like, but I would bet my boots that the viewer is one of the old brigade, and is of no use whatever except for experimental purposes such as I have mentioned.

against the wire, and then we thrust the knife (nice phrase that, and it sounds so easy) through the pin and out of one of the other slits. Then we lever a little to open the slits, withdrawing the knife when we have accomplished the task.

But for goodness' sake don't go and break that wire. You must be ever so careful. Keep the knife well to the side of the pin all the time, and then you will not be likely to come up against the wire.

You will not have to open the valve pin very much, as the slightest opening usually provides a very nice tight fit in the socket. Why the makers of the pins turn them out with the "banana" well closed up I don't know. But that is a little point in the characteristics of British industry that is so typical of this country we love in making things awkward for customers, and the banana valve pin is one of the radio industry's most treasured practical jokes, like those lovely terminal heads that are so fond of unscrewing underneath valveholders and other components immediately we have them screwed down on the baseboard or chassis.

AN R.A.F. RE-UNION

The Annual Re-union Dinner of the Past and Present Officers of the Electrical and Wireless School, Royal Air Force, Cranwell (one time Farnborough and Worthy-down) is to be held at 7.0 for 7.30 p.m. on Saturday next, the 23rd, at the R.A.F. Club, Piccadilly.

Particulars may be obtained through the Hon. Secretary F./Lt. F. S. Wainscot, Electrical and Wireless School, Cranwell, Lincs.

SEEN ON THE AIR

News and views on the Television Programmes

L. Marsland Gander

SEVERAL manufacturers have given me interesting information regarding the service area of Alexandra Palace since my criticisms last week of B.B.C. "hush-hush" on this subject. It appears that the farthest points east and west where satisfactory reception of the television may be obtained are approximately 35 miles away, namely the outskirts of Southend and Reading.

North and south the radiifs seems greater, approaching 50 miles. Cambridge and Brighton are the two extremities.

The G.E.C., I am informed, have already installed sets in ten counties within an area embracing a quarter of the population of Britain and covering more than 3,000 square miles. Towns at distances between 30 and 40 miles where G.E.C. sets are successfully working include East Grinstead (Sussex), Reading (Berks), Tunbridge Wells (Kent), and Southend (Essex).

A Cossor Set At 50 Miles

Cossor have a set working near Brighton, 50 miles from Alexandra Palace, and others at Leigh-on-Sea, 34 miles away, and at a number of places just outside the 25 miles' range, such as Reigate, Dorking, and Sevenoaks.

Among the places where H.M.V. receivers are successfully operating are Bedford, Cambridge, Farnham, King's Langley, Leigh-on-Sea, Reading, Reigate, St. Alban's, Sevenoaks, Southend, and Tunbridge Wells.

Naturally, within the wide area indicated by these reports there are a number of blind spots, so that on the whole this information seems to increase rather than diminish the necessity for an official publication of service contour lines.

An interesting situation has developed in connection with the first public demonstration of the new Baird big screen television at the Dominion Theatre. Regular entertainments are being given during the film shows, artists in a small studio near the roof having their faces televised by line.

The Television Advisory Committee are watching the development closely, because the B.B.C. has been granted a Government monopoly of television broadcasting to the public. This is not, of course, televising to the public in the ordinary sense of the word.

Central Film Transmitters

But obviously the future will see rapid development of the use of land-line for television purposes, over any distance. What, then, is to prevent a film organisation from having central studios and transmitters and televising films and variety shows to all the cinemas in its chain? Speed in the presentation of topical pictures would be greatly increased. Speaking without positive knowledge of the finance of picture-houses I should expect the resultant economies to be enormous.

I do not suggest that it would be desirable to abolish "live" performances. On the contrary, such a tendency should be resisted to the last ditch. But there is plenty of food for thought in the Dominion Theatre experiment.

I take genuine pleasure in preparing to write some pleasant things about the B.B.C. television programmes. The week under review was the most consistently enjoyable

from the entertainment point of view that I have yet experienced.

Make no mistake, if this goes on, television will astonish its most enthusiastic supporters with the rapidity of its growth in popularity. Already one of the largest firms tells me that it has increased production.

Billie Houston, the "boy" of the Houston Sisters act, came on the screen with a new partner early in the week. Though not, in my view, an uproarious success, Billie is, at any rate, to the television screen manner born.

I was vastly tickled and give the B.B.C. film department full marks for "Old Fashioned Movies." A modern American couple see a film of 1912 and supply a running commentary on its crude melodrama. It would be a good idea to show excerpts from some of these old-time "flickies" and contrast them with a similar scene done in the modern style.

New styles in hats, on the same day, was

an item with full feminine appeal. Next day, Philip Thornton showed us a number of quaint, primitive stringed instruments. Slightly "up-stage," but interesting.

In the middle of the week Sir Malcolm Campbell showed the record-breaking "Blue Bird," both in the grounds and later inside. The latter programme provided the first opportunity for using the production shop for a broadcast.

Three other items deserve special marks for merit. The two shows produced by Mr. Dallas Bower set a new standard in cabaret entertainment by television. They were ingeniously contrasted as "Paleface," a floor show, and "Burnt Sepia," an all-coloured cabaret.

And finally there was Gillie Potter on the Saturday, in good form, still capable of giving me a big laugh with material I had heard several times. I think I should be rather sorry if he changed it.

"A NEW EXPERIENCE"

says a user:



"Although quite satisfied with the speaker I had, I was persuaded by a friend to try your 1937 Stentorian Junior on my set," writes Mr. E. B., Farnborough. "The realism and beautiful quality which resulted were a new experience to me." Many thousands of listeners this year will be similarly surprised; for this new speaker, with its sensitivity, absence of "colouration," and extraordinarily level response has upset all existing standards of commercial speaker performance.

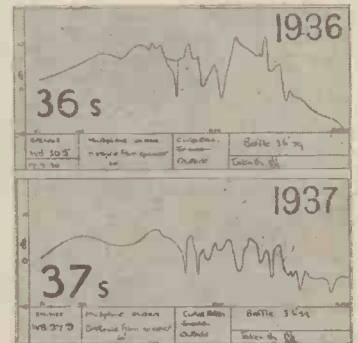
Hear one on your set, and know what 1937 reproduction can be!

The two curves shown on the right are taken from 1936 and 1937 Stentorian Senior speakers. Each in a commercial instrument represents an astounding performance; but the lack of resonances, extra high note response, and fuller bass reproduction of the new model leave no room for doubt as to the amount of progress achieved. Truly, in the words of the Editor of "Popular Wireless," this new instrument is a "momentous contribution to the technique of reproduction."



Ask your dealer to demonstrate, and hear for yourself!

1937 STENTORIAN PRICES			
Cabinet Models			
37SC (Senior)	...	...	63/-
37JC (Junior)	...	...	49/6
37CC (Cadet)	...	...	39/6
37BC (Baby)	...	...	29/6
Chassis Models			
37S.	...	...	42/-
37J.	...	...	32/6
37B.	...	...	23/6
37M.	...	...	17/6



The larger models are available on Hire Purchase through your dealer. Terms from 7/6 down.

1937 STENTORIAN

The NEW Speaker with the NEW realism

Whiteley Electrical Radio Co., Ltd. (Information Dept.), Mansfield, Notts.

★ WHY COPYRIGHT? ★

Anyone considering "P.A." work and the reproduction of records or radio in public has to remember that there are certain copyright rules governing this matter. They are explained fully in this article by Our Legal Expert

THE use of "P.A." equipment raises some interesting questions of copyright which deserve, on their merits, to be more generally understood, quite apart from the fact that ignorance of the law cannot be pleaded as an excuse by anyone who breaks it.

In the first place, copyright is the method adopted by the law to protect the author of a book or play, or the composer of a piece of music, or the writer of the words of a song from pirates who would otherwise be able to "pick their brains" without paying a fair price for the privilege.

Most people will agree that the author and the artist deserve to be paid at least as much for their labours as any other kind of skilled worker. The difficulty is that brainwork is an intangible kind of property. The owner of a horse or a motor-car has something which he can lock away in his stable or garage, and get the police to recover should it be stolen, but the author and the artist are not on quite the same simple footing.

The author, it is true, possesses a book on which his story or music is printed, but regarded as a piece of property the book is intrinsically worth only the few shillings represented by the cost of paper, printing and binding. The real value to the author lies in his copyright or "right to reproduce" the book—and this may be worth many thousands of pounds.

Disposal of an Author's Copyright

The author may dispose of his copyright as he pleases. He may, for instance, sell it outright for a lump sum, or he may carve it up into various parts, and sell the serial rights to an editor, the book rights to a publisher, the stage rights to a theatrical producer, the foreign rights to various people in different countries, and so on.

One particular and modern form of reproduction is by making a gramophone record, whilst another is by broadcasting through the ether. Both these methods have to be considered in using "P.A." equipment.

For instance, when the author of a copyright work agrees, for a certain fee, to allow it to be broadcast by the B.B.C., he does so on the understanding that the programme is intended solely for the entertainment of listeners in their own homes. In other words, he sells only a small part of his total copyright, just as he might dispose of, say, the serial rights to one editor whilst reserving the foreign, dramatic and other rights for other markets.

It stands to reason that if the proprietor of a dance-hall wishes to reproduce a broadcast item publicly, the original composer of the music is entitled to ask for an extra copyright fee. The dance-hall proprietor is obviously going to make some personal profit, either direct or indirect, out of the public reproduction, and why should it be at the expense of the author?

The present position is that, in all cases,

the agreement made by the B.B.C. with the Performing Right Society—which acts as the agent of the author—only covers the right to transmit a copyright work *via* the ether "for domestic and private reproduction only." In other words, the programmes are only licensed to be received by listeners in their own homes.

Since the B.B.C. cannot give away more than it has bought from the owner of the copyright, it has obviously no power to grant permission to the owner of "P.A." equipment to reproduce the programme in public.

Reproducing Broadcast Programmes

Accordingly, anyone who wishes to use "P.A." equipment in a restaurant, café, or other "public" place for reproducing broadcast programmes must first apply to the Performing Right Society, of "Copyright House," 33, Margaret Street, London, W.1, and pay them an additional copyright fee, which varies from one to six guineas a year according to the nature of the premises in which the public reproduction is to take place.

The position is much the same in the case of gramophone records. Take, for example, the recording of a well-known song. In the first place, there is copyright in the words and music. In addition there is also copyright in the performance of the artist who sings the song. A little reflection will make it clear that there is more artistic merit in a song sung, say, by Sir Harry Lauder than in the same song sung by an unknown performer. This "something that the other hasn't got" has to be well paid for in the first place by the maker of the record—though, of course, he passes on the extra cost to the public. But as an artistic performance the rendition of the song is covered by copyright law.

Last, but not least, the courts decided a few years ago that the principle of copyright law also protects the actual making of the record itself, apart from all other considerations. And it must be admitted that skill of a high order is required from the person in charge of the recording if the final result is to be an artistic success.

The Art of Recording

For instance, the acoustics of the studio require expert preparation, whilst the timing and control of the recording apparatus call for very careful handling, and there are other points which combine to make the actual process of recording an artistic piece of work, and entitled, as such, to the protection of copyright law.

Because of all this, the makers of a gramophone record are now in a position to dictate the conditions under which they are prepared to sell any record. The standard price only covers the use of the record for "domestic and private reproduction"—i.e. in one's own private home.

To use a gramophone record with "P.A." equipment in a public place, such as a concert-hall, restaurant, or dance-hall, it is necessary to apply to the owners of the copyright for permission to do so. This is given as a matter of course on payment of an appropriate fee for the privilege. The copyright for most of the well-known records is handled by "Phonographic Performance, Ltd.," of 144, Wigmore Street, London, W.1, and the fee charged varies from half-a-guinea a year in the case of boarding-houses to ten guineas a year for large restaurants seating over 200 people.

There are certain items in the broadcast programmes which are subject to other copyright restrictions. This applies, for instance, to the daily news bulletins, and to the special commentaries which are given from time to time on sporting and other events. Application for permission to reproduce these in public places by means of "P.A." equipment should be made direct to the B.B.C.



By G. T. KELSEY

THE last few months have witnessed a steady hardening in the prices of raw materials in practically all branches of industry, and as far as I can determine from inquiries I have been making, these increases are not unconnected with the country's present rearmament programme.

Not that the reason for the advancing prices is of any great consequence. What is far more important is that of the raw materials that are affected, the majority are those which are indispensable in the manufacture of radio apparatus, and it seems inevitable that sooner or later these increases will have to be passed on to the listener.

Perhaps I should make it quite clear that this is not intended to be a "scare" article. But as I see things, before very much longer you may have to pay more not only for components but for factory-built receivers, and as one of my objects in life is to watch your interests, this timely hint will not, I feel, be amiss.

In fairness to my manufacturing friends, I must not neglect to represent their side of the question too, and if, ultimately, prices are all advanced, I do ask you not to attach any blame to them. After all, no manufacturer can afford to sell his products at a loss, and the prices at which they can be retailed are necessarily governed by the cost of the raw materials from which they are made.

As an indication of the unwillingness of manufacturers generally to increase prices, it may be of interest to mention that there is hardly one of them that has not already been affected by increases in the prices of certain raw materials, yet only in one or two cases where very considerable increases have occurred have manufacturers been compelled to advance retail prices.

Belling & Lee, for instance, have very reluctantly had to advance the price of their shielded "Elimin-noise" cable from 8d. to 10d. per yard. My good friend Mr. Bryce, who is the energetic Sales Manager of this famous organisation, tells me that they have delayed making any changes to the list price for as long as possible, and that even now that it has been forced upon them, the increase is only in direct proportion to the increase in the cost of the raw material concerned. That is fair enough, isn't it?

The conclusion to be drawn from this item of news should be clear. If you contemplate buying anything in the radio line in the near future, take my advice and get busy now. Certainly prices cannot be lower, and the chances are that they will be higher before very much longer.

For the Gramophone Enthusiast

The new complete catalogue of "His Master's Voice" records, which was issued a few weeks ago, runs to nearly 500 pages, and contains particulars of over 6,000 records. Just imagine, if an attempt were made to play one copy of each record in the catalogue,

(Continued on next page.)

THE LINK BETWEEN

(Continued from previous page.)

It would take more than a month to hear every disc, playing night and day, and not accounting for the time taken for changing the records and needles.

But that is just by the way. The real fact of the matter is that I have been examining a copy of this closely packed volume, and it impresses me as a veritable pageant of musical art during the past 35 years. It is just the sort of thing that every gramophone enthusiast should possess—not merely a catalogue, but a compendium of recorded music and historical speeches from practically the beginning of this century.

The catalogue itself falls into three main sections. First, the general alphabetical list, comprehensively cross-indexed, enables a work to be traced under several different headings. Then there is the now famous connoisseur catalogue, followed by the historic section which goes back to the days of Patti, Santley and Tamagno. There is a special section of illustrated biographies of many famous artists, as well as a glossary of musical terms, and a pronunciation guide which tells you, for instance, how to pronounce such names as "Szostakowicz" and "Guslawicz." Before I received my copy of this wonderful catalogue, I always used to sneeze such names as these. And now I am certain I could hold my own, even with a B.B.C. announcer.

Naturally, one can hardly expect all that lot for nothing. Even so, I am quite certain that the modest sum of sixpence which is charged for this 500-page volume is but a fraction of what it must cost to produce, so that it is certainly a "snip." It is obtainable from your local H.M.V. dealer.

Bargains

I am not aware of any Scotch ancestors in my family, but there is nothing that pleases me more than to strike a real bargain. Possibly that accounts for the enthusiasm with which I periodically delve into my copy of the Electradix catalogue, for that consists of page after page of honest-to-goodness bargains. And what variety.

Electradix, who deal extensively in government surplus, list almost everything for radio, and in my humble opinion, their catalogue is invaluable to all who are interested in construction. As a matter of fact, their catalogue contains details of all kinds of apparatus outside radio, such as, for instance, electric motor pumps, telescopes, binoculars, range finders, thermometers, microscopes, compasses, tools, cycloidal counters, mirrors, X-ray tubes and screens, etc., etc.

It is certainly a grand fourpennyworth and, who knows, it may in the long run save you pounds.

Because of its interest to "P.W." readers generally, I propose to make it available through the medium of our postcard literature service, and I shall be pleased to make arrangements for copies to be forwarded to all who make application in the usual way, enclosing 4d. in stamps. (No. 37/12.)

[ED. NOTE.—All applications for catalogues reviewed in "The Link Between" should be addressed to G. T. Kelsey, John Carpenter House, John Carpenter Street, London, E.C.4.]

SIR JOHN REITH

(Continued from page 521.)

Parliament, "I understand one man in the B.B.C. was discovered as having been divorced and he was dismissed. We know the record of some of our members here, but we don't chuck them out. Sir John Reith in his paternalism wants a higher standard in the B.B.C. than was set in the House of Commons." One feels like adding, "And a good job, too."

Speaking in the House of Commons in July of last year the Postmaster-General said that during the space of two and a half years the B.B.C. had 64 retirements, dismissals or resignations from their monthly paid staff. Of these, 54 had no relation to private

conduct. Six were connected with financial irregularities; one was a case of intemperance, and the remaining three arose from divorce cases.

The B.B.C. have admittedly set a high standard of private conduct and possibly there have been cases of hardship. But in an organisation ostensibly for the purpose of improving the cultural state of the country, it is far better to err on the side of ultra respectability. One has only to consider what would be the public reaction to any sort of scandal in the B.B.C. to realise how unerring Sir John has been in his determination to keep the shield of the B.B.C. untarnished.

"Blown Sky-High"

If anyone thinks the B.B.C. is fundamentally prudish they will find a monument to the contrary in the sculpture of Ariel at the entrance to Broadcasting House. While the theory that Sir John is himself preoccupied with his own dignity is blown sky-high by his performance as a butler in "The Sport of Kings" by the B.B.C. Amateur Dramatic Society. He called members of his staff "sir," was cheeked by a page-boy, and produced roars of laughter with his, "I have no desire to dictate to the staff or interfere with your private lives. Now scram." The words "interfere with your private lives" were a gag introduced by Sir John himself.

The head of the B.B.C. would himself admit that he has made mistakes. But it is a dog-eared axiom that the man who never makes mistakes never makes anything. And Sir John has made the greatest broadcast organisation in the world. He manages the greatest theatre in the country, the biggest orchestra, he propagates mass philosophy, religion and culture, and provides news, education, music and right thinking for forty million souls.

Retirement is Unthinkable

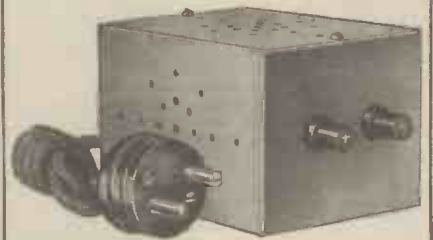
His critics are usually puny personalities compared with Sir John. They are too often little boys shouting "Yah" in the streets, and, even without a retort from the B.B.C., they come off second-best. If it has needed a dictator to give us broadcasting as it is, let us be glad that John Reith was in November, 1922, given the job. He recently confessed that retirement has several times occurred to him. With television in its swaddling clothes, this is now unthinkable. The nurse that brought up broadcasting is needed to rear the infinitely tougher baby that has now been left on our doorstep. This is a task worthy of his driving force, administrative genius and idealism.

J. S. T.

★ Owing to severe pressure on our space this week we regret that Part 45 of "Learning French Through Your Radio," Dr. Roberts' Technical Jottings, and Our Correspondence Page have been unavoidably held out. These will all appear in next week's "Popular Wireless." ★

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Blueprints now ready (BP 111, BP 112, BP 113), 6d. each. BP 114, 3d. post free.

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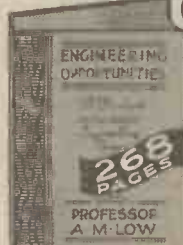


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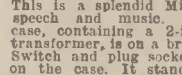
It is a general purpose, robust mike, with solid bakelite body, back terminals, front metal grille.

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No. "NW" 11 Table Mike. This is a splendid Microphone for speech and music. The bakelite case, containing a 2-in. mike and transformer, is on a bronze pedestal. Switch and plug sockets are fitted on the case. It stands unrivalled for quality and price, 15/-. For Record Making on your own gramophone, Acoustic de Luxe Model "MIVOIGE" complete in maker's carton. List 45/-. Sale Price 18/6. Speak-ease, 10/6. Junior Recorder, 5/6. Blank record discs, 6-in., 4/- doz. Sapphire Cutters, 3/6. Real diamond cutters, 7/6.



No. 11, 5/6.

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ELECTRADIX RADIOS

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Phone: Central 4611

The RADIO Bulletin

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

AFTER what might be termed a period of quiescence, there is a definite trend among the radio manufacturers in the direction of more new receivers. These receivers we may say are being produced mainly to fill gaps in the current ranges and are chiefly of the increasingly popular all-wave types.

*** * * FOUR PHILIPS SETS**

There are four new sets bearing the famous Philips *marque*: The first, which is known as the V5, is remarkable value for money. It is a five-valve (including rectifier) all-wave superhet, for A.C. mains and costs 8 guineas.

The manufacturers describe it as a receiver without a chassis, the conventional chassis construction having been abandoned and the various component parts positioned round the loudspeaker and mounted on projections which form part of the cabinet moulding. The result is an extremely compact and attractive receiver.

The tuning dial, which is inclined, extends the full width of the loudspeaker opening in the centre of the cabinet. The cabinet, incidentally, is of walnut-tinted bakelite, and sockets are provided for gramophone pick-up.

*** * * FOR BATTERY USERS**

In so far as all-wave sets of the superhet types are concerned the battery user has perhaps in the past been neglected. However, he is well catered for in the Philips range by the new five-valve de luxe superhet, embodying all the latest developments of the firm's mains operated receivers. The 714B, as this new set is known, costs 14 guineas including batteries, and among its many special features are the well-known Philips "Adaptovisor" dial, finger-tip silencing—with which a muting circuit can be introduced in order to provide inter-station quietness while tuning—automatic two-speed tuning and provision for pick-up and extra loudspeaker.

*** * * TWO A.C. DESIGNS**

Lastly we have two further mains sets, both for A.C., priced at 12½ and 15 guineas respectively. The lower priced model known as the type 748A is a five-valve (including rectifier) superhet. The chassis is rubber cushioned to prevent all-wave howling and there is a special circuit for suppressing whistle interference. The "Adaptovisor" dial is fitted, and the receiver is one with which a very large number of stations can be tuned in with ease.

At this stage we may say that the "Adaptovisor" dial is a unique fitment which permits the tuning scale to be placed at any angle to suit the convenience of the listener.

The 15 guinea model (No. 794A) also employs five valves, including rectifier, and embodies such refinements as Audioscopic reproduction—an exclusive Philips feature—finger-tip silencing, automatic two-speed tuning and variable selectivity. The "Adaptovisor" in this case is extra large and electron star tuning is also incorporated, which is a cathode-ray visual tuning device to which reference was recently made in this journal in the review of the Philips model 795A all-wave receiver.

With the exception of the model V5, the sets are housed in highly finished walnut cabinets of distinctive design and in the case

of all four sets the wavelengths coverage on the short waveband is from 16.7 to 51 metres.

The models 748A and 794A are also available in universal mains form for an additional guinea.

RANDOM RADIO REFLECTIONS

(Continued from page 532.)

Quentin Maclean, though I did once give a recital at a provincial cinema. There's glory for you!

Talking about effects, I was playing about with a set of Columbia effects records one evening not so long ago. Very amusing. I've got "crowds," "wind," "thunderstorm," "aeroplanes," "sirens," etc.

I was using a twenty-five watt public address hook-up, and you should have heard me rattle the windows with my artificial thunder!

Then I ran some steamship and factory sirens, bumping up the volume as my ears grew accustomed to the roar. Very thrilling. Then I heard the doors and windows of my neighbours begin to open. They must have thought war had broken out! Conscience-stricken at my thoughtlessness, I at once switched off and listened to the national programme on a crystal set.

Which reminds me; this loudspeaker nuisance. And don't indict me for the above. That was but a few minutes transgression in years of careful consideration for others. (Pass me my halo, please, James.)

I keep on hearing of bad cases. There is one of a young lady who lives in a flat. She always has to listen to the same programme as a loud, loudspeaking neighbour. Some friends tell me that they dance to next door's Henry Hall. A very phlegmatic gentleman tells me he has sold his set—"number 25" provides his radio via windows and party walls!

A Suggested Cure

In my view, the B.B.C. ought to do something about it. It is true that once a year they issue a plea for restraint in their official organ, and they once devoted a whole five minutes broadcast to the same purpose. But that's only toying with it. They ought to realise that the thoughtless ones aren't going to read printed pleas or switch on special announcements. That's the sort of thing which simply doesn't happen.

My suggestion is that they should break into popular programmes at irregular intervals. Bang in the middle of dance music and variety, I mean. It's going to take real gall for even those blighters who seem to delight in shouting their radio at their neighbours, to keep their wicks turned right up after an announcer has suddenly and unexpectedly come in with: "We trust you aren't running your set so loudly that it is causing annoyance to your neighbours." Even the most case-hardened volume-hog would surely be wary of allowing his set to bellow words like that over the fences. And he wouldn't be able to prevent it, except by keeping the volume down all the time because of the surprise nature of the announcements.

However, I fear the B.B.C. will never do anything like this; it would be too helpful for so many listeners! Their way of doing things is to go off the air with everything except chamber music whenever there is sufficient excuse.

1936 BROADCASTING REVIEWED

The third article of the special series giving an official summary of broadcasting during the past year

The Variety Department's Work

THE output of Light Entertainment still shows an upward trend. Programmes for a month number 95 (66 hours), as compared with 87 (59 hours) for a similar period a year ago.

Operettas and musical comedies stand out as the most elaborate items of the Variety Department's programmes. Adaptations of stage successes which were broadcast include "The Gipsy Princess," "My Lady Frayle" (with Edith Day, and Cecil Humphreys), "The Arcadians," "Gipsy Love" (with Hedde Nash), and "Princess Caprice" (with George Graves in his original part), "The Student Prince," "Rio Rita," "No No Nanette" (with Binnie Hale), "Monsieur Beaucaire," "La Vie Parisienne," and "The Vagabond King" (with Bebe Daniels). Perhaps one of the chief features of 1936 was the encouragement given to rising authors and composers, with the result that an even greater number of original productions than ever before found its way into the programmes. Examples of these include Philip Leaver's musical plays, "Never Talk to Strangers" and "The Three-Cornered Hat," the music for both of which was written by Kenneth Leslie-Smith; "I Scream Too Much," by Spike Hughes, and Holt Marvell's "Lots of Love." Drama to music was represented by "Death in the Dressing Room," by Max Kester, Betty Laidlaw and Bob Lively; while lighter trifles, more in the musical-comedy vein, were "Cottage Loaf" (A. A. Thomson and Ashley Sterne), "Love at Par" (Mabel and Denis Constanduros and George Barker), "Mr. Barley's Abroad" (Henrik Ege, Christopher Hassall and Geoffrey Henman), and "Money for Jam" (Max Kester and Peter Mendoza). John Watt, who developed a new technique in radio musical plays with his narrative-cum-dialogue treatment, added to his successes in this direction with "Lovely Women and Ugly Men," featuring W. H. Berry. For this production, as for the others, the music was written by Harry S. Pepper.

Entertainment of the revue order was provided by George Robey in "Here's George"; Ronald Frankan and his company in "You Ought to See Us"; Rex London, who wrote the words and music for "London's Latest"; Lauri Wylie, who established a radio name as the creator of "Wireless Puppets"; Sandy Powell in three editions of his Album; while three late-night revues of the more sophisticated order were broadcast in the late spring and autumn.

Winter Concert Parties

Until this year "The White Coons" had been a summer feature only, but it was decided to continue them throughout the winter, alternating with "Kentucky Minstrels." Concert Parties were very much to the fore in 1936. During the spring "The Air-Do-Wells" and Greatrex Newman's "Fol-de-Rols" broadcast regularly from the studio, followed by Clarkson Rose's "Twinkle." Then came the summer season, with the initiation of a series of outside broadcasts from the seaside resorts. These were organised by Harry S. Pepper in conjunction with Davy Burnaby, and embraced all the leading concert parties.

The B.B.C. Theatre Orchestra gave effective presentation to several potpourris arranged by Julius Buerger: "Liebestraum"; "A Festival of Folk Music"; and "Johann Strauss";

while it combined with the B.B.C. Variety Orchestra for two large-scale features: "The Life of Verdi" and "Puccini: the Man and his Music." Eight programmes of interesting excerpts from Light and Comic Operas were broadcast, involving a great deal of careful and judicious selection on the part of the arranger and producer, Gordon McConnel.

Light musical features by outside-orchestras form a part of the Variety Department's responsibilities. Some of the outstanding series were "Romance in Rhythm" and "The Music Shop" presented by Geraldo, "Music from the Movies" by Louis Levy, Carroll Gibbons and the Savoy Hotel Orpheans, and Van Phillips and his Two Orchestras.

Just as the conception of "In Town Tonight" was one of the outstanding events of broadcasting, last autumn saw the birth of another radio feature, unique in its idea. "Entertainment Parade" was a bold experiment. It set out to present to the public in tabloid form information of all that was going on in the show world not only in London and the provinces, but abroad, and to bring musical, operatic, dramatic, film and variety stars to the microphone.

A point well worthy of consideration is that, numerically, the well-known artists of the show world who were brought to the microphone in the first three editions of "Entertainment Parade" would have represented at least a year's broadcasting only four seasons ago.

Reminiscence is an ever-welcome offering in radio, so that it is not surprising that "Scrapbooks," presented by Leslie Baily and Charles Brewer, were still high in popular favour. Listeners have to thank Leslie Baily for another excellent broadcasting idea in "Star-Gazing," a series of radio biographies in which well-known figures of the musical stage present a panorama of their careers, assisted by many other equally famous names in whose company they have graced the West End theatre world.

(To be continued.)

THE "EVERY-BAND THREE"

(Continued from page 526.)

The first job is to trim the set on the medium waves. Turn coil base two points from the off position; this gives you the medium waves. Set 0001-mfd. trimmer next to C8 on coil base about one turn back from the fully screwed down position. Tune in to a station at the lower end of the medium waveband, reduce its strength by means of the series aerial condenser, and increase reaction to verge of oscillation. Now adjust the trimmer near C6 coil for maximum signal strength. The receiver is now trimmed for medium and long waves.

The 00005-mfd. pre-set condenser on top of baseboard should be adjusted on the 7-metre band, so that reaction is just obtainable.

The first position from the off position of the coil base is the long-wave band. The next the medium wave, next the "long-shorts" (approximately 28 to 80 metres), next the "short-shorts" (approximately 14 to 35 metres), and finally the television band.

The television sound signal will be found at approximately 10° on the tuning scale. On the "short-short" band the 16-metre band is approximately 50°, 19-metre band 70°, and 25-metre band 100°. On the "long-short" band the 31-metre band will be at approximately 30°, whilst the 49-metre band will be at approximately 85°.

The series aerial condenser acts as a volume control on the medium and long waves, whilst on the "short-shorts" and "long-shorts" it functions to some extent as a trimmer. It should be "full in" on the television band.

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G.P.O. ENGINEERING DEPT. (no experience required). Commencing £3.13.0 per week. Age 18-23. Excellent prospects. Free details of Entrance Exam. from

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"P.W." LIST OF EUROPEAN BROADCASTERS

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

WAVE-LENGTH.	STATION. MEDIUM WAVEBAND.	COUNTRY.	POWER KW.	WAVE-LENGTH.	STATION. MEDIUM WAVEBAND.	COUNTRY.	POWER KW.
203.5	Plymouth	Gt. Britain ..	0.3	356.7	Berlin	Germany ..	100
203.5	Bournemouth ..	" ..	1	360.6	Kiev	U.S.S.R. ..	35
206	Eiffel Tower (Paris)	France ..	5	364.5	Bucharest ..	Rumania ..	12
215.4	Radio-Lyons ..	" ..	25	368.6	Milan (No. 1) ..	Italy ..	50
233.5	Aberdeen	Gt. Britain ..	1	373.1	West Regional ..	Gt. Britain ..	70
236.8	Nürnberg	Germany ..	2	377.4	Lwów	Poland ..	50
238.5	Riga	Latvia ..	10	382.2	Leipzig	Germany ..	120
240.2	Saarbrücken ..	Germany ..	17	386.6	Toulouse (P T T)	France ..	120
241.9	Cork	Irish Free State	1	391.1	Scottish Regional	Gt. Britain ..	70
243.7	Gleiwitz	Germany ..	5	395.8	Burghead	" ..	60
245.5	Radio Marconi (Bologna)	Italy ..	50	400.5	Katowice	Poland ..	12
247.3	Lille (Radio P T T Nord)	France ..	60	405.4	Marseilles (P T T)	France ..	90
251	Frankfurt	Germany ..	25	410.4	Munich	Germany ..	100
253.2	Nice-Corse	France ..	60	415.4	Tallinn	Estonia ..	20
255.1	Copenhagen ..	Denmark ..	10	420.8	Kharkov (No. 1)	U.S.S.R. ..	10
257.1	Monte Ceneri ..	Switzerland ..	15	426.1	Rome (No. 1) ..	Italy ..	50
259.1	Kosice	Czechoslovakia	10	431.7	Stockholm ..	Sweden ..	55
	(West National	Gt. Britain ..	20	443.1	Paris (P T T) ..	France ..	120
261.1	North National	" ..	20	449.1	Sottens	Switzerland ..	100
	London National	" ..	20	455.9	North Regional	Gt. Britain ..	70
263.2	Trieste	Italy ..	10	463	Cologne	Germany ..	100
265.3	Hörby	Sweden ..	10	470.2	Lyons (P T T) ..	France ..	100
267.4	Newcastle	Gt. Britain ..	1	476.2	Prague (No. 1)	Czechoslovakia	5
269.5	Radio Normandie (Fécamp)	France ..	10	476.9	Lisbon	Portugal ..	15
269.5	Moravska-Ostrava	Czechoslovakia	11.2	479.9	Trondelag	Norway ..	20
271.7	Kuldiga	Latvia ..	50	483.9	Brussels (No. 1)	Belgium ..	15
274	Vinnitsa	U.S.S.R. ..	10	491.8	Florence	Italy ..	20
278.6	Bordeaux-Lafayette	France ..	12	499.2	Sundsvall	Sweden ..	10
283.3	Bari (No. 1) ..	Italy ..	20	499.2	Rabat	Morocco ..	25
285.7	Scottish National	Gt. Britain ..	50	506.8	Vienna	Austria ..	100
288.5	Rennes-Bretagne	France ..	120	522.6	Stuttgart	Germany ..	100
291	Königsberg (No. 1)	Germany ..	100	531	Athlone	Irish Free State	60
296.2	Midland Regional	Gt. Britain ..	70	539.6	Beromunster ..	Switzerland ..	100
298.8	Bratislava	Czechoslovakia	13.5	549.5	Budapest (No. 1)	Hungary ..	120
301.5	Hilversum (No. 2)	Holland ..	60	559.7	Wilno	Poland ..	16
304.3	Torun	Poland ..	24	559.7	Bolzano	Italy ..	10
304.3	Genoa	Italy ..	10	569.3	Viipuri	Finland ..	10
307.1	Northern Ireland Regional	Northern Ireland	100				
312.8	Poste Parisien ..	France ..	60	1107	Moscow (No. 2)	U.S.S.R. ..	100
315.8	Breslau	Germany ..	100	1153.8	Oslo	Norway ..	60
318.8	Goteborg	Sweden ..	10	1250	Kalundborg ..	Denmark ..	60
321.9	Brussels (No. 2)	Belgium ..	15	1293	Luxembourg ..	Luxembourg ..	150
325.4	Brno	Czechoslovakia	32	1339	Warsaw (No. 1)	Poland ..	120
328.6	Toulouse	France ..	60	1379	Novosibirsk ..	U.S.S.R. ..	100
331.9	Hamburg	Germany ..	100	1389	Motala	Sweden ..	150
335.2	Helsinki	Finland ..	10	1500	Droitwich	Gt. Britain ..	150
338.6	Linz	Austria ..	15	1571	Deutschlandsender	Germany ..	60
342.1	London Regional	Gt. Britain ..	70	1648	Radio-Paris ..	France ..	80
345.6	Poznan	Poland ..	16	1744	Moscow (No. 1)	U.S.S.R. ..	500
349.2	Strasbourg	France ..	100	1807	Lahti	Finland ..	150
				1875	Radio-Rumania	Rumania ..	150
				1875	Hilversum (No. 1)	Holland ..	100

LONG WAVEBAND

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Jan. 30th, 1937.

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*In This
Issue*
→







Editor: G. V. Dowding

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

ROYAL AMATEUR
STUDIO SURPRISE
SOCIETY NOTES

RADIO NOTES & NEWS

CABBY KINDNESS
"KNOCK-KNOCK"
WRONG "POP"!

"With the Greatest of Ease"

WOULD-BE aviators who long to glide through the air with the greatest of ease will be interested in the go-ahead policy of the Yorkshire Gliding Club. These cheery cloud-climbers have noted that radio receiving sets have been installed in gliders, but they now propose to fit apparatus enabling the pilot to talk with officials on the landing ground.

By the beginning of March it is hoped to have facilities for every-day flying in operation at the Club's aerodrome at Sutton Bank. Last year, when conditions were favourable, the launching crew could not get the machines into the air fast enough, so this year there is to be dual launching gear, to hasten the take-offs. I hasten to take off my hat to the Yorkshire Gliders.

Royal Amateur

THE list of royal personages with wireless habits grows longer every week. The latest is a member of the royal family of Johore, in the Malay Straits. He is a dyed-in-the-wool experimenter who has qualified as an electrical engineer in this country, and his name is Tengku Ahmad.

His station is the only one in the whole country owned by a Malay, so amateurs who make contact with him over the air are inclined to be a trifle high-hat about their royal acquaintance.

'Tis a pardonable attitude, methinks. He would be a dull wight who got no kick from calling up a near-Sultan and hailing him with the hundred-fold "Old Man" which is the prerogative of all true amateurs.

Out of the Fog

THOSE radio beacons at Croydon airport, which were recently described in "P.W.", made the airport officials rub their eyes the other day. Captain Borner, flying from Switzerland to Croydon, had been advised of a fog-belt at Croydon which he was advised to avoid, but he

decided to make a radio-guided landing along the beam.

Officials at the airport were soon afterwards astonished to see his machine loom up out of the gloom. It had landed safely on an aerodrome that was invisible from its own official buildings!

Just to show that this was no fluke, another machine repeated the performance a little later, when darkness complicated matters further! This, also, was a Swiss air liner, the pilot in this instance being Captain Nuffenegger. Good work, gentlemen!

AN UNOBTRUSIVE "MIKE"



Theo Ehrenberg, famous Vienna announcer, who in 1934 had to broadcast with a pistol at his head, interviews Miss Lizzie Holzschuh, the well-known Viennese film star. Note the microphone which outwardly resembles an ash-tray. You wouldn't realise they were broadcasting, would you?

Valdemar the Great

TWENTY years ago, Mr. Roy K. Johnson started on a world tour as a professional magician, Valdemar the Great. He did some wonderful turns, especially vanishing tricks. But he had left his infant son with the boy's grandparents, and when he returned from roaming he found that the boy—a regular chip of the old block—had vanished long before.

Time rolled on, and Mr. Johnson senr. settled down in Honolulu, where he operated an amateur radio station. The

other day he happened to mention his professional name over the air, and the missing son, listening haphazard at Los Angeles, heard it.

Recognising the name, he got in touch with Honolulu, and soon father and son were talking over the ether. It was the most magical moment in the eventful career of Valdemar the Great!

Studio Surprise

A BROADCAST by a deaf and dumb artist is a rare event, so when one of the out-of-the-way Polish stations arranged such a programme the announcer on duty was instructed to help the performer all he could. Until just before the turn was due on the air no performer or instruments had turned up, so the announcer was very relieved when he heard a conveyance draw up outside. Then a big fellow pushed open the studio door, looked interrogatively at him, and pointed vaguely to one corner of the room.

The announcer, heartily agreeing, nodded violently, and beckoned urgently, to signify great haste. A moment later the man returned and shot a sack of coals into the corner!

He proved to be nothing to do with the missing artist, but just a coalman who had lost his voice from a cold!

Society Notes

UNUSUALLY good facilities are available to the members and visitors of the Radio, Physical and Television Society. Meetings are held every Friday at 8 p.m., at 72a, North End Road, West Kensington. There is Morse instruction and assistance to would-be transmitters. A calibration service enables members to have their own apparatus accurately wavelengthed for them. And the assembly is often served with a "cup-o'" and a "slice-o'," to warm the inner man. All interested should write to V. R. Walker, 49, Fitz-James Avenue, London, W.14.

(Continued overleaf.)

COMING SHORTLY: JOHN SCOTT-TAGGART'S SPECIAL CORONATION SET

"ASTRAKHAN COLLAR" COMES TO BUY A CRYSTAL

Harco Radio Club, Greenwich, reports that membership is increasing, but recruits still welcome. Meetings every Tuesday at 8 p.m. in the Clubroom (Canteen Lounge), G. A. Harvey & Co., Woolwich Road, Charlton, London, S.E.7.

Cabby Kindness

DID you hear the good Jetsam story recently published in the "Evening News"? It told how Mr. Jetsam was perilously near being late for a television broadcast, so he leapt into a taxi, commanded "Alexandra Palace," and immediately set to with the application of the very powerful facial make-up that television demands.



When the cab arrived, the made-up Mr. Jetsam jumped out and said: "What's the fare?"

The driver gave him a very queer look and said: "Are you all right, Mister?" "Perfectly," was the reply. "What's the fare?"

"Sure I can't get you a glass of water?" persisted the driver. "You look terrible." "What do you mean—I look terrible?" demanded Mr. Jetsam.

"Well, you do, mister," affirmed the cabby. "You were healthy-looking when you got in, but now you look like a regular corpse."

"Look What You've Done . . ."

IT was highly commendable of the B.B.C. to brighten up the running commentaries with the aid of Miss Thelma Carpenter. She is a twenty-four-years-old brunette, a former amateur woman billiards champion, and a most delightful impressionistic informer of what's happening before her dark eyes.



In the interests of scientific accuracy, however, I must register a solemn protest against the description that has recently been often applied to Miss Carpenter; the papers keep saying she is the "First Woman Commentator," instead of the "First Woman Radio Commentator."

There is a world of difference, for there have been fluent women commentators ever since the first man made his first mistake!

News of New Stations

WHILE Greece is waiting for the wherewithal to push on with her full broadcasting scheme (which includes a 100-kilowatt for Athens and lower-powered stations for Salonika and Corfu), she is to break her radio duck with a 15-kw. temporary station. This will be erected first in Athens, and transferred to Salonika when Athens gets its own transmitter going.

Manchester Airport radio station is now available to R.A.F. machines for direction-finding, or for emergency work.

Singapore station is now on the air with tests, and should be radiating regular programmes next month.

Canada is to have a Regional Scheme, rather like our own, the areas being Ontario, Quebec, British Columbia, Prairie, and Maritime.

Late Start in Licence Race

BRTAIN started with a big handicap in the race for 1937 radio supremacy, for the total number of licences in force on Jan. 1st was 7,960,573. Germany, on the other hand, entered the year with 8,167,957. Of these 572,498 are free licences, issued to poor listeners exempted from paying the monthly fee of about 3s. 2d.

During December Germany put on some 230,000 new licences. That was in one

"MIKE" SLIPS AND QUIPS

Australian cricket commentator:
Robinson threw his leg forward and sent it straight to Grimmett.

During a talk:
The moon does not affect the tide; only the untied.

Announcer, during sponsored programme:
If you despair of ever being sick again, take—

Announcer, introducing household hints talks.
Here are some more hints from— She must be full of wrinkles.

During sponsored programme:
Ladies, when you had your last new dress fitted, did you find you'd spread, just, say, an inch in the wrong place, although it makes sitting more comfortable?

Announcer:
Now we will have the song of the henpecked husband, "I Hear You Calling Me."

During a sponsored programme:
Some people say you can't play a piano-accordion in a modern flat, as it will go through the walls.

month, but the British total shows an increase of only 558,527 for the preceding twelve months.

It looks as though it will be some time before we gain the rank of Europe's No. 1 radio country.

"Knock-Knock"

THERE is a lot of knock-knocking going on at Daventry these days. Workmen are hard at it from about 7.30 a.m. till after 10 p.m. most nights, and still there is any amount to do if all the proposed schemes are to be in working order by the Coronation.

Apart from the three big new transmitters which are being installed, there is a lot of polishing-up and hotting-up to be done, and it all has to be fitted in when the volts are off the aerials.

Incidentally, the inhabitants of Daventry are experiencing a mild boom in lodgings. The rumour of a vacant room is sure to start somebody else knock-knocking on the door.

Appearances are Deceptive

THE manager of a West London radio store was so determined to increase custom that he went to no end of trouble to rig up the latest form of television receiver behind the shop; and he told his young assistant not to attempt to serve any very important-looking customers, but rather to disturb the television experiments and rout out the manager himself, if circumstances warranted it.



The young fellow served several ordinary customers without any qualms. But presently there drove up to the shop a gentleman so distinguished-looking, so haughty, and so Ritz-all-over that the assistant never hesitated—he brought up the manager with a run to serve this pearl of a customer himself.

And when the manager bowed with what-can-I-get-for-you-to-day expression the Mighty One demanded: "I want a new crystal for my wireless set"!

"I'll Bet You Didn't Know . . ."

THAT the radio station in British Bechuanaland Protectorate is now broadcasting every night.

That the Chinese Government has issued a command instructing every privately-owned wireless station to make at least forty per cent of its daily programme of educational material.

That a wireless telephone service has been opened between Rangoon and Calcutta via Madras.

That its new charter empowers the B.B.C. to borrow £1,000,000 instead of the mere £500,000 previously allowed.

The Wrong "Pop"!

THOSE advertising radio stations that put on gramophone records but try to infer that the artists are present in the studio do not always have the best of luck with their harmless little deceptions, do they? There was the announcer who got his records in the wrong order, for instance. Unblushingly looking round the empty studio, he glanced quickly at the title of the next record and said: "We welcome to the studio So-and-So, who will now sing you "Pop-Eye, the Sailor Man"—and then, with only a second's pause, there boomed across the midnight clear, "When the Pop-eyes Bloom Again"!



It takes all an announcer's suavity and self-possession to explain a little lapse like that!

ARIEL

THE B.B.C.'s SECRET WAR PLANS

By BARRY KENT

TWO or three years ago the B.B.C. used as its motto, "Nation Shall Speak Peace Unto Nation." It has been suggested that this motto was dropped because the B.B.C. chiefs came to the conclusion that a policy of robust nationalism would be more to the liking of its listeners.

I am now able to reveal that this is entirely wrong. The slogan was discarded owing to its rather unfortunate wording. It was pointed out to the controllers of the "Big House" that it bore a dictatorial savour. If "can" had been used instead of "shall" it is very probable that the slogan would still be employed.

It is equally wrong to say that the "war plans" of the "Big House" derive from a feeling that this country must inevitably be involved in a European war.

"Be Prepared" Measures

As with the measure of rearmament decided upon by the Government, these plans are just "in case." In fact, they are part and parcel of the national "be prepared" defence measures, for it has been realised by the authorities that broadcasting would be just as important as battleships in the remote eventuality of this nation being involved in an armed conflict.

It would be the "front line" of the Ministry of Propaganda. Through it the people would be "fed" with official bulletins. Immediately upon the declaration of war the Government would assume complete control of the "Big House," and plans have been made to the smallest detail exactly as to how this control would be operated. These include provision for almost as much entertainment as is at present given. It has been appreciated to the full that broadcasting, as a means of co-ordinating the minds of the people, would lose much of its power if its services in that respect were seriously impaired.

It can be stated that the psychology of broadcasting in war-time has been closely studied. If war ever became imminent you needn't listen for a continual stream of exciting announcements. Should there be strong rumours supported by shreds of truth, on rushing to your radio you will hear your announcers calmly getting on with their jobs as if nothing had happened.

Maintenance of Full Programmes

There will never be any of those terrifically dramatic moments that have been conjured up by novelists and dramatists. There will never be any hoarse-voiced generals barking smoke and fire into the B.B.C. "mikes." On the contrary, you would hear calm, emotionless voices either getting on with their ordinary announcing tasks or placidly reading carefully devised items of "official news."

You wouldn't even know that rigid governmental control had been given effect. It would be done quietly and with no military ceremony in attendance. Even if you stood outside Broadcasting House for a few hours, you'd only see ordinary broadcasters coming and going, for it would be a "distant control" exercised from a room which has been prepared in one of the ministries.

Broadcasting in war-time would be as important as battleships, not only because of its propaganda power, but also because it would enable the Government to maintain a direct contact with practically every member of the community. The value of this cannot yet be fully estimated, for it has never been tested. We hope it never will be; but, as our contributor reveals, the B.B.C. is doing its best to be prepared for the worst!

Opinion is divided as to whether or not there should be only the one programme broadcast from all stations as during previous national crises, but there is a bias in the direction of the maintenance of full programme schedules with all-station "cutting-in" for "priority" bulletins. Thus

ADVISORY EXPERT



Colonel R. S. Stafford, who, it is understood, is bringing up to date the B.B.C.'s operational plans for use in the event of a national emergency. The fact that Colonel Stafford is at the present time engaged on this work has no special significance, since it is obviously a task which must be carried out from time to time to meet the changing conditions caused by the constant expansion and progress of this great broadcasting organisation.

the regional transmitters could be left free from a tied national link in order to disseminate announcements of regional interest.

It is common knowledge that for a long time practically all the B.B.C.'s plans for new stations, studios and other extensions have been made with the possibility of war well in mind.

Thus Daventry was equipped with its own studio, buried oil tanks and Diesel engine generating plant so that it should be entirely self-contained and independent from any external source of electricity supply.

The London studios at Maida Vale are underground, with the added protection of

large buildings above them, thus rendering them immune from aerial attack.

Broadcasting House is not necessarily regarded as a vital link in the broadcasting system. If it were razed to the ground programmes could still be transmitted without serious difficulty.

The building of high-power regional stations in remote corners of the country, which is still proceeding, is not entirely unconnected with the "secret war plans." Were it not for these it is most unlikely that Northern Ireland, for example, would have been provided with a new transmitter having such margins of reserve power.

Power in Reserve

Actually, all the transmitters are run well inside the limits of their available power. Thus, in the event of any one or more of the transmitters being silenced, the corresponding regions would be fed by means of increased radiations from other stations. In addition to this, points have been fixed in all the large towns where small temporary transmitters could be hastily erected.

It has been suggested in many quarters that the Government has planted a military gentleman at B.B.C. headquarters with powers to assume dictatorship at any moment of national crisis.

This is not correct. It should be evident to all who have followed the recent parliamentary debates dealing with broadcasting that Sir John Reith commands the full confidence not only of the Government but of many members of the Opposition parties—a very fine tribute to this great personality.

Full governmental control of broadcasting in no way implies the supersession of Sir John as executive head of the B.B.C. any more than does the addition of extra governors to the board. With his military adviser in residence with him, as it were, and a telephone at his elbow connected to "that room," he would still remain captain of the ship receiving instructions from "the owners."

Avoiding Jamming Difficulties

At the moment of writing this article the B.B.C. are carrying out secret experiments with ultra-short-wave transmissions. You may be told eventually that these have to do with television or that the wonderful quality obtainable on seven metres has incited the B.B.C. to contemplate giving all listeners the chance to hear ordinary broadcasting "down there." Well, maybe the work is justified on either score. But it should be noted that medium- and long-wave transmissions can be jammed over considerable distances. One can imagine the bedlam which would result from the whole of Europe pushing over-modulated waves by the score into the ether—a dozen nations trying to jam each other's programmes or to force propaganda over their borders.

But it is impossible to jam a five-, six- or seven-metre transmission from any distance exceeding forty or fifty miles. A programme on such a wave could proceed free from heterodynes while the rest of the ether was a hopeless mix-up from which no intelligible word could be extracted even with the most selective of sets.

A LOUDSPEAKER SWITCHBOARD

Constructional details of a simple unit which will be found of great value to those who use extension speakers

WHEN a house is more or less completely "wired up for wireless" and loudspeaker extension leads run to at least five rooms from one central point where the receiver itself is situated, it is very useful to have some form of control switchboard. If this is carefully designed it can be sufficiently simple to allow anyone to operate it. The one we are going to describe in this short article is simple in general design, easy to make, and perfectly straightforward in operation.

The original model is mounted on the wall of the wireless "den" close to the set. This latter is provided with a simple "On-off" switch so that when any members of the household require music they merely switch on the set and press in the switch knobs on the small switchboard corresponding with the rooms in which they require to hear the transmission. Each room has its own loudspeaker permanently connected. In addition, each room has a remote control switch and a loudspeaker shorting switch, and although the possibilities of such a combination are obviously immense, we fear that few listeners would take the trouble to install such a system. In any case, where so many wires are involved it is as well to have them "built" into the walls by the builders when decorations are carried out.

Controlling the Extensions

However, a simple extension control switch can be made and installed by anyone who has two or more pairs of extension leads in use. The switch we are going to describe is capable of dealing with five pairs of leads which can serve five rooms. In the one specific instance these are—drawing-room, dining-room, kitchen (ground floor), bedroom, and study, and the panel is lettered accordingly. But even although it is thought that at most only two or three extensions will be required, it is advisable to provide for at least five against the even remote possibility of future elaborations.

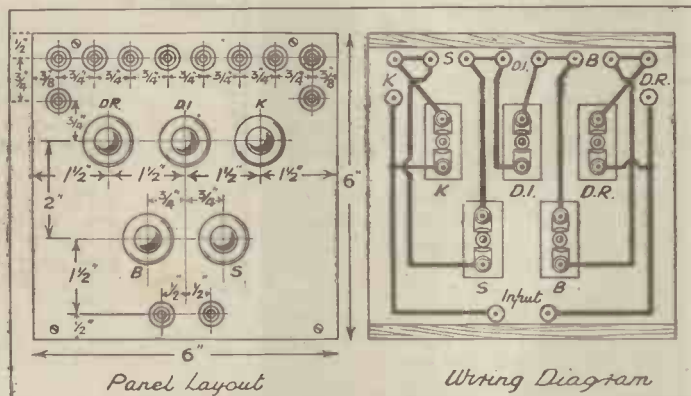
In addition, one pair of "output" terminals can serve for telephone receiving on those occasions when it is desired to make adjustments by this means. Another pair can be used to connect up experimental loudspeakers, and so on.

A choke-condenser bypass will be used in the receiver (this or a transformer is a necessity when long extension leads are used), so that placing all the loudspeakers in series is quite an efficient practice. It is more than this from a practical point of view when several pairs of leads are in use, for were they all in parallel, a short in one would cause the whole lot to be shorted out of action. With the series system any defective pair can be shorted without affecting any of the others.

Easily Made

The system is simplicity itself, as the theoretical diagram shows. As will be seen, all five pairs of "output" terminals are in series with those two to which are connected the loudspeaker leads running

FRONT AND BACK OF PANEL



These two practical diagrams give all the information needed for building the unit.

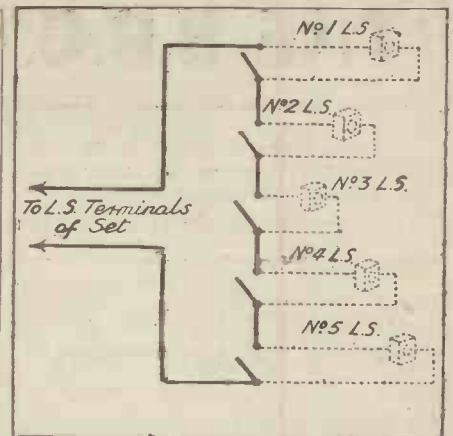
from the set itself. Five push-pull switches are employed, one directly across each of the five extension lead terminals. Those leads which it is not desired to use are merely "shorted out" by pulling out the appropriate switches.

Twelve ordinary terminals, five push-pull switches, and a small ebonite panel measuring 6 in. by 6 in., are all that is required. The panel should be drilled in accordance with the panel drilling diagram given above, or the layout can be varied to suit individual requirements.

The wiring is simplicity itself, as the wiring diagram clearly shows. Two one-inch strips of ebonite were screwed to the panel of the original model, and to these wall angle brackets were fixed. The device was securely mounted on the wall by means of ordinary screws and "Rawl-plugs."

If desired, "feet" of ebonite or wood could be fitted and the device stood on the table. In any case, it is really quite a simple "one-evening" sort of task, and only a few tools are necessary to complete it.

In some cases perhaps it might not be



The theoretical arrangement showing how the switches are joined so that any or all of the speakers can be used, as desired.

convenient to have all the terminals situated at the top of the panel; it might be handier to have them along the bottom with an "input" pair at one side or at the top, but such variations in design are of no consequence whatever providing that the wiring remains essentially the same.

It is not essential that loudspeakers be permanently connected to the ends of each pair of leads. One or two loudspeakers can still be moved about from room to room, for it doesn't matter at all what happens to the extension leads when they are shorted out of circuit.

POLISHING CABINETS

An inexpensive method with lasting results

CONSTRUCTORS are sometimes at a loss as to how to produce a high-class and professional finish to cabinets. French polishing is a lengthy operation and entails a great measure of care and patience if good results are to be obtained.

One of the simplest and most lasting polishes results in the application of raw linseed oil to the wood. This method is inexpensive, the results being permanent, and it is particularly suited to the various classes of wood from which cabinets are commonly made, while the application of the oil darkens the wood and brings out the natural marking in a pleasing manner.

A Simple Method

The cabinet should be thoroughly sanded, first with medium grade and finally with finest or "flour" paper, until the wood possesses a velvety smoothness to the touch. Raw linseed oil should then be applied liberally with a rag and rubbed well in.

The cabinet may then be set aside for a few days, when the oil will be found to have raised the grain of the wood. A further dressing with fine sandpaper and oil should be given, followed by at least fifteen minutes' vigorous polishing with a dry, soft duster, when the cabinet can be put into commission. Frequent polishing (without oil, of course) should be carried out at intervals, when an excellent finish will be obtained. A subsequent application of beeswax may be made, but is usually unnecessary.

The above method is carried out by many furniture makers.

TELEVISION TOPICS — Collected by A. S. Clark

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

ALEXANDRA PALACE ON HIGHER WAVELENGTHS

THERE have been a number of cases, and they have considerably puzzled readers, of reception of the television transmissions from Alexandra Palace on wavelengths higher than those on which the two transmissions are radiated.

Most readers know that radiations take place from a transmitter on wavelengths lower than the nominal, and that the programmes can be tuned in, though weaker, on these wavelengths. This is known as harmonic reception, the harmonics occurring at twice, three times, and so on, the fundamental frequency. It is the reception on longer wavelengths than the fundamental and therefore at lower frequencies that puzzles so much.

Heard on 21 Metres

Typical of the letters on the subject is that from S. R. D. of Highams Park, E.4. He has tuned in the sound programmes from Alexandra Palace loudly on about 21 metres. The set in use is the S.T. One-Point-Five with the S.T. "Hexoverter" short-wave superhet converter.

Actually the trouble is not difficult to trace, and is bound up with the question of harmonics in spite of the apparently higher wavelength in use. The set in use is a superhet arrangement, and as such employs an oscillator.

Now an oscillator is like a miniature transmitter, and as such generates harmonics

just like a broadcast transmitter. When the set is adjusted for 21 metres the oscillator will be oscillating also somewhere near this wavelength, in order to produce the necessary beat frequency for the intermediate stages. The harmonics of the oscillator will be around 10 metres and 5 metres for the first two harmonics.

It only requires the second harmonic to be somewhere about the right amount below the frequency of the television frequency to produce approximately the right intermediate frequency for the television sound programme to be capable of getting through the set. Of course, the television transmissions have got to be picked up on about 20 metres, but this is easily understandable when it is remembered that many cases of their "jamming" through even on the broadcast wavelengths have occurred.

It is a similar effect to that noted on early superhets with an insufficiently selective aerial circuit. Harmonics of the oscillator used to beat with stations off tune but still getting through, and produce numerous heterodyne whistles due to two frequencies nearly the same being applied to the intermediate stages.

The normal procedure of using ultra-short-wave chokes to prevent television break-through should stop the effect if it is desired to do so.

Incidentally, working on the same reasoning, it should be a safe bet that all cases of television reception on higher wavelengths than the normal occur with receivers working on the superhet principle.

It could occur on a straight set if a neighbour was working a set in an oscillating condition, a harmonic from which was beating with the television programme to form a wave of some higher frequency. But the superhet principle still applies!

A REFLECTOR FOR DI-POLES

READERS who live near the outskirts of the television service area, and who consequently have to watch carefully all points in order to get a strong signal either from the vision or sound transmissions, may consider it worth while experimenting with a simple reflector for their aerial.

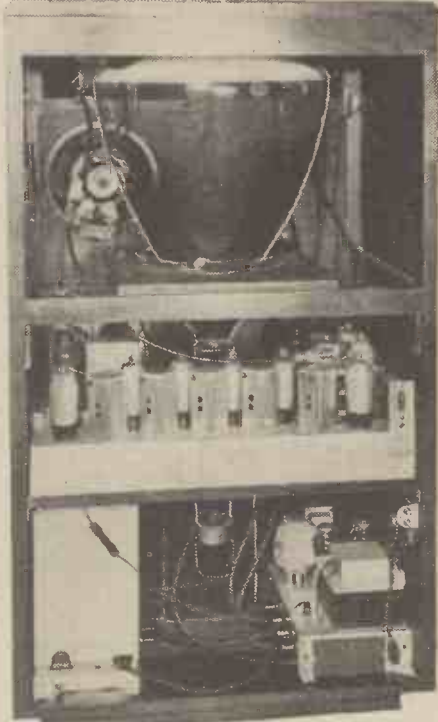
Reflectors consisting of various systems of wires are used behind the

aerials employed for beam stations which provide long-distance telephone conversations.

These act very similarly to a parabolic reflector behind a car headlight bulb in the case of the transmitter. At the receiver the effect is reversed and the reflecting system serves to concentrate the waves on to the receiving aerial.

A simple reflector for use on ultra-short-

A "TELEVISOR" RECEIVER



A back view of the Baird T5 model television receiver showing the various chassis and the 15-inch diameter cathode-ray tube.

waves consists of a single wire arranged behind the normal aerial. The aerial itself should be of the half-wave di-pole type arranged vertically. It is, of course, broken at the centre where the feeders are attached.

Immediately behind it and parallel to it is arranged another vertical wire. This is also a half-wave in length, but does not need to be broken in the centre. Actually, worked out very scientifically the reflector wire may not be exactly the same length as the aerial itself, but this consideration may be neglected for our purpose.

Locating the Direction

An important point is that the reflector wire should be exactly a quarter of a wavelength behind the aerial proper. You can find the exact direction behind the aerial for the reflector by means of a compass, knowing the bearing from Alexandra Palace. It is possible, however, that the best position might prove slightly different from the true compass bearing.

Such a single-wire reflector could be looked on as a plain mirror in relation to a light, and the multi-wire reflector as a curved mirror. Somewhat similar reflectors are used on the aerials at Alexandra Palace.

IN THE "P.W." LAB.

An interesting photograph taken some time ago showing experiments being conducted for the first cathode-ray television receiver developed in this country.



TELEVISION TOPICS—Continued

“TELEFRAMES”

Items of general interest

GOOD News! Those who are eagerly awaiting the time when television components will be less expensive will welcome the news that one firm at least is expected shortly to be marketing a range of cathode-ray tubes at prices considerably below those usually charged. We shall be giving full details of these as soon as the necessary particulars are available.

GETTING NEARER!

An interesting American television cartoon is divided into three pictures and illustrates the growth of the science in our cousins' country.

The first picture shows a chap looking through a powerful telescope at a speck on the distant landscape. This is labelled “In 1927.” The second, marked “In 1932,” illustrates a small plant in a flower-pot being nourished from a watering-can.

The third picture, marked “For 1937,” shows Uncle Sam looking at a fruit tree on the other side of a fence, and asking: “Are the Apples Ripe?”

The passage of the months alone will supply the answer to this question.

ACCURATE TELEVISION TUNING

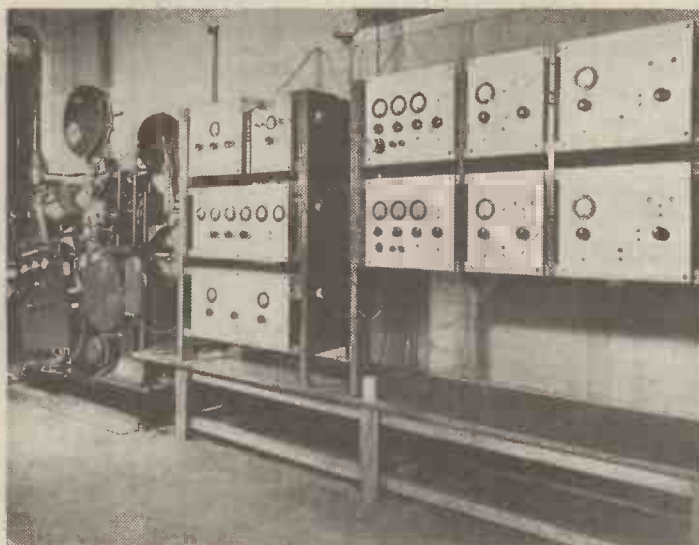
Here is an invention incorporating a novel idea. By pressing a button on a television receiver the cathode-ray tube is temporarily used as an oscillograph and indicates the correct tuning position.

The spot is deflected to the greatest extent when the carrier received is at its maximum.

TELEVISION D.F.

A recent Marconi Co. patent employs television as an indicator for direction-

A COMPLETE TRANSMITTER



This high-definition television film transmitter is installed in the G.E.C. works and makes the company independent of the A.P. programmes for set testing.

finding work. A compass scale, together with the name of the beacon, appears on the screen.

The scale moves, and when the bearing of the beacon station arrives in the centre of the screen, the overall illumination increases considerably. The point of maximum illumination is very definite.

SINGLE-SIDEBAND WORKING

A report from America states that television engineers over there have been experimenting with a variable degree of cut-off of one set of sidebands at the transmitter. This is somewhat similar to detuning at the receiver.

Considerably improved picture clarity is claimed for the scheme. Enthusiasts will await further details of this with interest.

DEAF-MUTES TELEPHONE

By means of the television-telephone service between Berlin and Leipzig, in Germany, two deaf-mutes have been able to carry on a telephone conversation by means of signs and lip reading. This is an interesting sidelight on the things television has made possible.

THE EFFECT OF HEIGHT

By fixing an aerial on a 400-foot tower good pictures have been received in America at a distance of 70 miles from New York. At 200 feet the aerial only produced fuzzy pictures, while at roof level they disappeared altogether.

TELEVISION FOR BEGINNERS

G. Stevens tells readers how the mysterious “D.C.” component is inserted into television

APPLYING the D.C. component to the cathode-ray tube simply means altering the bias of the tube to correspond with the value of anode current in the detector valve in the receiver.

As the amplitude of the carrier wave alters, the mean value of anode current in the rectifier circuit will alter; and if we can get this fluctuation applied to the grid of the tube we shall get a corresponding increase and decrease in brightness.

Saving Complication

It is a pity that the tube itself is not an efficient rectifier (see an earlier article in which it was shown that it isn't), because it would save a lot of complication if the carrier wave were applied directly to the grid. Then any increase in carrier amplitude would automatically bring about an increase in beam brightness, and the tube would act as its own brightness control.

This idea is not impossible—in fact, with an exceedingly strong

signal, which could make us afford to ignore the loss in efficiency, the “self-rectifying” tube arrangement would be well worth carrying out. With a superhet, which is a more common type of television receiver, the usual plan is to use a diode for a second detector and make the load resistance of the diode part of the tube bias circuit.

All this sounds very technical so it is better to take it easily. As a detector or, better, rectifier, the diode behaves in exactly the same way as a power rectifier in an H.T. mains rectifier circuit. Provided that the values of the components are chosen correctly the diode will rectify a voltage of several megacycles frequency as easily as 50 cycles. In the case of a television signal we are dealing with a fluctuating A.C. voltage which will produce a varying D.C. average voltage in the load resistance connected to the diode. This load resistance, by the way, corresponds to the load which is across any H.T. rectifying circuit.

The diagram shows the connections of the load resistance and

how it is arranged as part of the tube bias circuit. The D.C. fluctuations then alter the tube bias to correspond with the carrier amplitude. There is one snag in this method of connection due to the conventional method of con-

necting the anode of the tube (H.T.+) to the earth of the receiver.

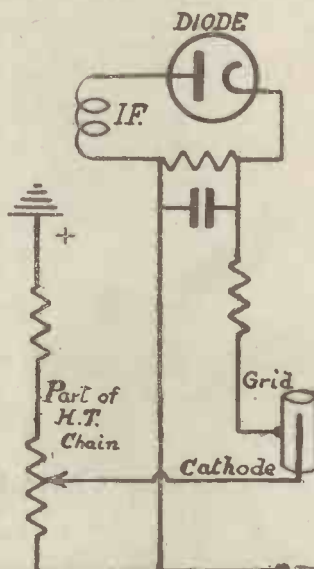
This “wrong way round” connection has several advantages in H.T. circuits, as there is less risk of picking up stray interference in the deflector plate circuits and leads which are connected to the final anode. But if we consider the grid circuit and the load resistance we shall find that there is a very high voltage between this resistance and earth.

Therefore it will not be possible to run the diode valve heater off the same transformer as the other valves. If we did, there would be about 4,000 volts between heater and cathode and the valve would last about three-quarters of a second! The diode will have to be fed from a small separate transformer which will require insulating to withstand the full voltage of the tube.

Shielding Necessary

There is also another point which may give trouble in practice, and that is the A.C. interference which may come into the tube circuit from the mains via the grid circuit. This will need very careful shielding of the diode and its resistance—in fact, the best plan would be to shut it up in a little box by itself, transformer and all.

A TYPICAL METHOD



How a diode is used to vary the general brightness of pictures.

FROM OUR READERS

THE B.B.C. AND AMERICAN S.W. PROGRAMMES

The Editor, POPULAR WIRELESS.

Dear Sir,—The attempts of the B.B.C. to suppress the sponsored programmes directed at British consumers of the advertised commodities sent out from Paris, Luxembourg, Normandy and Athlone, makes one speculate about what the B.B.C. will (or can) do about the advertising matter that is daily impinging upon our ears from the United States via the short waves.

Since the advent of the S.T.800, the more efficient of the commercial all-wave radios, and the increased power and efficiency of the short-wave transmitters, the programmes from the United States are being received over here in Britain as easily and clearly as those from the Continent; and if the advertising matter from the Continent is held by the B.B.C. to be not so good for the receptive ears of their (they hope) "uplifted" listeners, then the high-powered sales talk of the American "masters of putting-it-over" must be regarded by the B.B.C. as a positive menace.

All the goods advertised over the American radio systems are not obtainable over here, of course. But, again, many of them are. For instance, the

three most popular and long-established sponsored programmes—Amos 'n' Andy, Orphan Annie, and a daily series of news commentaries—are sponsored by manufacturers of a dentifrice, a cereal food and a motor oil respectively, and all three are widely known and used in Britain; and as many of the short-wave stations "beam" on Britain, it naturally follows that the advertisements are intended for the British listener as well as the "local" listener.

If the B.B.C. champions of duller broadcasting are still determined to shield their listeners from the "lowering" influence of commercial broadcasts they will, no doubt, have a tilt at these emanations from over the water, but, one can confidently forecast, in view of the vast number of dollars sunk in the American radio systems, with even less hope of success than had that gallant Don who tilted at the wind.

Perhaps we serfs of the mighty B.B.C. would benefit from a battle between commercialism and "uplift." Anything supplying the much-needed competition to encourage the B.B.C. to brighter and better efforts is only to be commended. So here's to American accents in your loudspeaker!

Yours truly,

A. E. ROSE,

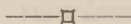
75, Breedon Street, Long Eaton, Notts.

CONSTRUCTIVE CRITICISM

The Editor, POPULAR WIRELESS.

Dear Sir,—In your issue of November 21st a tip with regard to making loops in wire is given. I am sure the reader who sent this tip will not mind my humbly offering an improvement on it. All that is necessary is to

A reader raises the question of how the B.B.C. feels about listeners tuning-in American sponsored programmes in view of the recent attempts to stop English programmes from the Continent



take a light hammer and on a flat metal surface (a flat-iron) gently flatten out the loop, so that for any given gauge of wire the available surface will be at least double. You will appreciate that by this method a better electrical contact is obtained, and also the loop is practically a washer. "Wiring up" takes definitely longer, but it is worth it.

In the same issue is a tip for a "dry lead-in." My method—again in all humility—is as per sketch; the rain will run off the ebonite lead-in and there is no need for any slack in the aerial.

I used my method of making wire loops before making the "Unidyne," and also my method of fixing a lead-in (in the country).

Long life to yourself and Staff and wishing you all every success.

Yours truly,

F. W. WHITE.

33, Lewis Flats, Dalston Lane, Hackney, E.8.

P.S.—And do not tell me there is still to be found anyone who places his loop of wire the wrong way round on its bolt.

AMERICANS BEFORE MIDNIGHT!

The Editor, POPULAR WIRELESS.

Dear Sir,—I see from a recent article that you would be glad of reports of reception of American medium-wave stations.

I use an old 1933 Cossor "Empire Melody Maker" kit. Screen grid, low frequency, and power output, working H.T. from A.C. mains. For best results I have G.B. at 1½ v. and H.T. at its lowest output.

I have received WOR on 422 m. before 11.30 p.m., also KDKA, Pittsburgh, came over but was jammed.

As Europeans close down I am able to hear more and more. I counted 16 stations on the night of Sun.-Mon., Dec., 20th-21st, including WOR, Newark, N.J., Mutual Broadcasting System; WLW, Cincinnati; WRVA, Richmond; KDKA, Pittsburgh; WJZ, New York; WGY; WBZ; identified by announcements. All stations were received on the loudspeaker.

They came over best between December 16th and 23rd.

Since, I have only been able to get the set to oscillate on them, or else they were badly jammed by Morse or Europeans.

I use an ordinary 80-ft. aerial, and am on top of a 230-ft. hill, overlooking the Stour valley.

A friend of mine in the valley reported good reception at the same time on a 3-valver.

Wishing "P.W." the best of luck for 1937.

Yours faithfully,

W. WALLACE BROAD.

The Haven, Stodmarsh Road, Canterbury.

AN ODE TO THE "DEN"

The Editor, POPULAR WIRELESS.

Dear Sir,—I wrote the following poem (?), which I dedicate to W. L. S., after reading Thackeray's "Cane-bottomed Chair."

You may say it's good and bung it into the "From Our Readers" page, or say it's rotten and bung it into the waste-paper basket.

Whatever you do with it, you won't stop me from getting sentimental about the "matey," "at-peace-with-the-world" atmosphere that exists in the den of every true radio-fan.

THE POEM

*In shabby old flannels that smell faintly of pitch,
And a tattered pull-over that's falling to bits,
Away from the world, and its toils, and its snares,
I've a snug little den up two flights of stairs.*

*To mount to this den is a toil to be sure,
But the walls there are bright, and the air fairly pure.*

*And the scene I behold on a sunshiny day
Is grand through the aerial poles over the way.*

*This snug little room is chock-full in all nooks,
With bits of condensers and radio books,
Transformer windings and baseboards galore,
And valves that have lived and have passed on before.*

*No better chair need Scott-Taggart require
Than my old basket-chair that is mended with wire.*

*And 'tis really amazing the stations I get
From my higgledy-piggledy radio-set.*

*Long thro' the hours, and the night, and the chimes,
I hark to hill-billies and stirring rag-times,
And perpetually sit in a mist of blue smoke,
In which a non-smoker would certainly choke.*

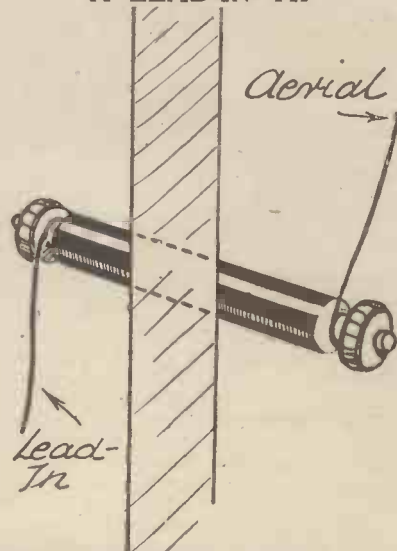
And, oh, the neat "veris" that garnish my nest!

They're what I'm proud of and cherish the best,

*For to gather together they took quite a while,
And they're pinned up as proof of my skill with the dial.*

(Continued overleaf.)

A LEAD-IN TIP



As Mr. F. W. White points out, the water will run off a lead-in tube sloped in this manner. The method does not require any slack in the down-lead.

FROM OUR READERS—Continued

When the clock points to three, and I must be gone.

*And the voices have ceased, and I am alone,
I bless pioneers who have struggled to give
A hobby that makes life a pleasure to live.*

DONALD T. KEAR.

Hang Hill, Bream, Glos.

STRAIGHT SETS VERSUS SUPERHETS

The Editor, "Popular Wireless."

Dear Sir,—I notice from reading your correspondents' letters that quite a number of them, like myself, still prefer the "straight" set to the superhet. My own preference is based on two "straights" I hear regularly against about half a dozen very modern supers I hear.

My pal has a real quality set of his own construction, a real class affair, whistle filter, tweeter and other refinements. This easily licks anything else I've heard, "straight" or "super." My own very humble affair—battery set (mains driven by mains unit), V.M. H.F. Pen., Det., and Super Power, bandpass tuning, iron-cored coils—will stand up to all superhets I've heard and lick most (for quality), whilst it will bring in all that's worth while on the two wavebands (one at a time).

Here's a tip for someone if you think it's worth publishing: When I changed my H.F. portion of the three-valve set (previously mentioned) from air-spaced coils and S.G. valve to V.M. H.F. Pen. and bandpass tuning, I was very disappointed in its sensitivity, and it compared very unfavourably with the old layout with aerial unchanged (about 60 feet inside aerial). After trying almost everything I took the aerial down and substituted 100 feet. What a transformation—it was really marvellous! Selectivity was as good as with the short aerial.

Here's wishing you a prosperous New Year.

Yours truly,

E. CONSTANTINE.

219, Turneroft Lane, Stockport.

MODERN CRYSTAL RESULTS

The Editor, POPULAR WIRELESS.

Dear Sir,—In these days of multi-valve sets, many of your readers almost despise one-valvers and crystal sets. A sixteen-year-old reader of "P.W.," lack of pocket-money and equipment, has limited my efforts to the above type of sets.

For 'phone reception I use either a crystal set or a Reinartz one-valver. I am fortunate in having an excellent aerial so that surprising results can be obtained. When I "bag" a new station of reasonable strength on the valve set, I try to pick it up on the crystal detector. To get some idea of where to search, I employ a common tuning circuit for both sets (see diagram).

By this method I was able to receive Athlone on the crystal set, at fair strength. This idea could be employed for comparing the sensitivity of two sets.

I sometimes use two Leclanché cells in series, for L.T. By carefully handling a variable 10-ohm. resistance, fitted in the circuit, these cells will work continuously for two hours or even longer, without polarising. When I go camping a two-cell cycle-lamp battery is just as satisfactory.

Nearly all my experiments are carried out upstairs in my bedroom, which necessitates a long earth-lead. Sometimes, however, I bring the set downstairs. A wire round the room was suitable for an aerial, but I was faced with the problem of finding some sort of an earth. A wire, jammed lightly in the oven door of the kitchen range provided an earth almost as efficient as the usual one. And that, Mr. Royle, is how I solved my earth problem!

Wishing you and "P.W." a very prosperous New Year.

Yours faithfully, A. PATE,
Kelso, Bye-Pass Road, Gobowen, Oswestry.

LOCAL RECEPTION

The Editor, "Popular Wireless."

Dear Sir,—I would like to tell you of an amusing story which is true. It happened in good old crystal days. We all recall those days. What times we had! Wireless then was wireless indeed!

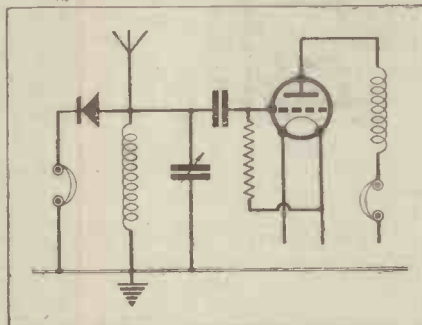
Well, let me tell you my story. It was one Sunday morning. I was making a super crystal set when I found I was a few screws short, so I went to my pal across the road. He also was making a set, which he had just finished when I got there. He told me to come in.

He was very excited and said he had picked up a station with a military band playing. I said, "Let me hear it." I donned the headphones but could not hear anything, so I gave him back the 'phones and told him he must be dreaming. But he said "I can hear it plainly." He put on the 'phones again and said that I was daft, he could hear it still. So I said, "You are hearing the Salvation Army band which is playing in the street outside," and I could not convince him until I took the cat's-whisker off the crystal and he said he could hear it still! Yours faithfully,

J. WILLIS.

13, Arthur Road, Reading, Berks.

A CHANGE-OVER SET



The circuit idea which Mr. A. Pate refers to in his letter.

W 2 X A F CALLING V K 2 M E

The Editor, POPULAR WIRELESS.

Dear Sir,—I had an unusual experience a short while ago, while "hunting" for a short-wave station. I am a marine engineer by trade, and find wireless a great help to relieve the monotony of life aboard ship.

At the time about which I am writing the ship I was on was travelling down the West Coast of South America, between Los Angeles and the Panama Canal. The time was 4.30 a.m. Pacific Standard Time, and I was attempting to locate a station on the 31-metre band. I tuned-in W 2 X A F, who appeared to be holding a conversation with someone. Subsequently it transpired they were talking to V K 2 M E, in Australia.

I re-tuned and located V K 2 M E which is on the same band, and by switching from station to station as the conversations ended, was able to listen to both sides. The two stations were comparing reception, and from time to time records played by W 2 X A F were picked up by V K 2 M E, and re-transmitted back to W 2 X A F.

Then the Australian S.W. station would transmit part of their local broadcast programme to W 2 X A F, who in turn would transmit it back to Australia. I listened to this very interesting demonstration for an hour, after which the test was completed.

I had never heard anything like this before, and although I "comb" the S.W. channels regularly have not heard another test similar to this one. Both stations were heard with good volume and clearness even when the programmes were re-transmitted back.

Yours faithfully,

ROBERT M. NICHOLSON,
40, Arlington Street, Anlaby Road, Hull.

THE DET. AND L.F.

The Editor, POPULAR WIRELESS.

Dear Sir,—Having noticed this year's tendency to enthuse over large all-wavers, I should like to remind readers of the merits of the small, short-wave detector and L.F. circuit, known to amateurs as O-v-1.

*A two-valve circuit born of yore,
The very first of all to score,
And still on short waves holds the floor—
O-v-1.*

*When with a superhet so dear,
No signals through the mush appear,
It'll pull them through—right in the clear—
O-v-1.*

*Through all the racket and the noise,
The good old-timer keeps its poise,
And keeps on pulling in the "boys"—
O-v-1.*

*Q R M rips the band to bits,
But still the operator sits
Singing out the "dahs" and "dits"—
O-v-1.*

*And while there's left one single niche,
Within a band just full of "spitch,"
It'll get you through without a hitch—
O-v-1.*

*And so I tell you, every soul,
If distant stations are your goal,
On this old circuit in they'll roll—
O-v-1.*

J. HAY.

29, Jerningham Road, Liverpool, 11.

THE MYSTERIOUS TELEPHONE CONVERSATION

The Editor, POPULAR WIRELESS.

Dear Sir,—After reading Mr. Clark's article on Aerials for the Short Waves I thought the flat installation mentioned might give a clue to "P.W." circuit designers for a signal frequency amplifier, modified for domestic use.

Such an amplifier, battery operated and built of standard components, should have a wide appeal to the enthusiast.

I would also like to mention a rather curious experience with radio I had some ten years ago in Western Canada: It was very cold at the time, the temperature around twenty below zero, and I was on a farm looking after the livestock. The daylight hours being short, we finished our work and were indoors most evenings by sunset.

The radio was a real thrill in those days out there. My set was a detector and two L.F.—a good set at that time. I was just in the act of changing coils, with one coil remaining in the sockets, when through the 'phones were heard voices raised in anger. I listened further, and I recognised the voice of the local storekeeper in argument with one of our neighbours.

It puzzled me at the time, but one thing was certain—it was a telephone conversation. The house did not possess a telephone, and the telephone line at its nearest point was just under a mile to the north.

The next day I did the same thing to the receiver, and once again I heard voices, this time more peaceful, two women, relatives, apparently, having a chat.

Soon after, I went to work in Winnipeg, and never solved the riddle of telephone voices.

Yours truly, BERTRAM F. HALLS,
"The Bungalow," London Road, Wheatley,
Oxfordshire.

[The production of an amplifier such as Mr. Halls suggests would probably prove too expensive to appeal to the ordinary set-user. Still, it is an idea we shall not forget.—EDITOR.]

B.T.S. ANTI-NOISE AERIAL

CUTS OUT NOISE AND INCREASES EFFICIENCY ON EVERY WAVEBAND. Abolish man-made static, with this amazing new All-British Aerial Outfit, 90% of the trouble experienced in all-wave reception is NOISE, which the B.T.S. Anti-Noise Aerial efficiently suppresses, vastly improving your radio reception on ALL wavebands. In addition to an aerial transformer, the outfit includes a special set transformer, fitted with switch for reception on ALL WAVEBANDS. This EXTRA component will improve the sensitivity and selectivity of your receiver. Suitable for all sets, A.C. Battery and D.C. and ALL WAVEBANDS. Complete Outfit ready for instant erection. Cash or C.O.D. Carriage Paid £1/5/0, or 2/6 down and 8 monthly payments of 3/3.



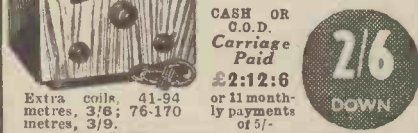
2/6
DOWN

MAKES YOUR SET an ALL-WAVER!

B.T.S. 1937 SHORT-WAVE ADAPTOR

HEAR AMERICA DIRECT with this famous unit.

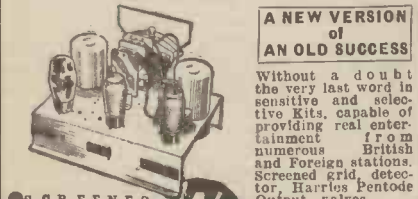
12-47 METRES
Simply plugs into your battery or A.C. Mains set. The only adaptor at the price with 100:1 ratio aerial tuning and slow-motion reaction: for use either as Plug-in or Superhet Adaptor. Walnut finished Cabinet (illustrated). With 2 plug-in coils, 12-26, 22-47 metres. Ready assembled.



CASH OR C.O.D. Carriage Paid £2:12:6 or 11 monthly payments of 5/-

2/6
DOWN

Peto-Scott 1937 SUPER SENSITIVE S.G.3 KIT



A NEW VERSION of an OLD SUCCESS

Without a doubt the very last word in sensitive and selective Kits, capable of providing real entertainment from numerous British and Foreign stations. Screened grid detector, Harries Pentode Output valves.

- SCREENED WAVE WOUND AIR CORE COILS.
- DRILLED GREY ENAMELLED CHASSIS.
- PICK-UP CONNECTIONS.
- FULL INSTRUCTIONS WITH EVERY KIT.

4-
DOWN

KIT "A" 47/6
Cash or C.O.D. Carriage Paid. Complete kit of parts including a ready-drilled enamelled steel chassis, less valves, cabinet and speaker.

And 11 monthly payments of 4/6.

Fully described in Booklet "B."

Peto-Scott 1937 DE LUXE RADIOGRAM CABINET



This lovely walnut veneered cabinet provides the perfect cabinet for the most ambitious set. Its graceful lines make it equally suitable for the beautifying of any size room. With its lid lifted, a perfectly flat surface obviates entirely the usual accumulation of dust and dirt. Radiogram features are easily added. Beautifully veneered panels, contrasted with inlays and cross banding. Hand French polished throughout. Automatic lid stay. Record storage for 48 records. Inside of lid covered brown felt.

MODEL A.C. Overall Dimensions: 15 1/2" deep. Takes set panel size 18" long, 10" high, base-board 18" x 14".

CASH or C.O.D. £6:17:6 Yours for 15/- and 11 monthly payments of 12/6. 3/6 extra.

When ordering, please state exactly what Radiogram equipment you propose fitting.

PETO-SCOTT EVERYTHING RADIO-CASH C.O.D. or EASY TERMS

INCREASED S.T.800 PRICES

Due to the increased retail price of the B.T.S. S.T.800 Tuner from 21/- to 23/6, we are reluctantly compelled to increase the prices accordingly of all S.T.800 Pilot Author Kits and Finished Receivers. The new prices were effective from Jan. 18th (our last week's advertisement went to press before we received notification of this increased price) and are subject to further alteration in the event of any other S.T.800 component prices being increased.

S.T.800 KIT "A" 70/- OR YOURS FOR 7/-
Complete Kit of Components exactly as FIRST specified and used by Mr. J. Scott-Taggart, with Konectakit (Gratis with Complete Kit) but less wander plugs, accumulator connectors, valves, Extractor Kit, Cabinet and Speaker.

KIT "B" Cash Price £4:16:6
Carriage Paid or yours for 9/-
As for Kit "A," but including set of 4 FIRST Specified valves only, less cabinet and speaker, etc.
and 11 monthly payments of 3/10

KIT "CT" Cash Price £5:14:0
Carriage Paid or yours for 10/6
As for Kit "A," but including FIRST SPECIFIED valves and Peto-Scott S.T.800 table cabinet only, less speaker, etc.
and 11 monthly payments of 10/6

KIT "CC" Cash Price £6:11:6
Carriage Paid or yours for 12/6
As for Kit "A," but including FIRST SPECIFIED valves and Peto-Scott S.T.800 Console cabinet only, with speaker baffle, and battery shelf, but less speaker, etc.
and 11 monthly payments of 12/-

KIT "CLL" Cash Price £6:14:0
Carriage Paid or yours for 12/3
As for Kit "A," but including FIRST SPECIFIED valves and Peto-Scott Console cabinet, Type "LL" only, with speaker baffle, but less speaker, etc.
and 11 monthly payments of 12/3

★ If Extractor, either ready-built or in Kit form, is required with any of the above Kits, add £1/4/0 to Cash Prices, or 2/3 to deposit and to each monthly payment. State if Kit or ready-built form required.
★ If the above Kits are required complete with 8 wander plugs and 2 accumulator connectors, as specified, ADD 1/9 to Cash prices or 1/9 to the deposit.

IMMEDIATE DELIVERY S.T.800 FINISHED INSTRUMENTS

Due to a shipper being unable to take delivery, we have in stock a limited number of S.T.800 Finished Receivers and we can therefore offer immediate delivery for cash while they last. Order NOW. First come—first served.

TABLE MODEL (BATTERY VERSION)

EXACT TO Mr. JOHN SCOTT-TAGGART'S SPECIFICATION
Built exactly to Mr. J. Scott-Taggart's specification by Peto-Scott's expert technicians. Complete with FOUR FIRST SPECIFIED valves and Peto-Scott Walnut table cabinet (illustrated on left), less batteries. **OVERALL DIMENSIONS:** Width 18 1/2"; Height 14 1/2"; Depth 12". **£7:5:0**
Cash or C.O.D. Carriage Paid
Or 13/3 down and 11 monthly payments of 13/3.

CONSOLETTA (BATTERY VERSION)

EXACT TO Mr. JOHN SCOTT-TAGGART'S SPECIFICATION
Exact to specification Complete with FIRST SPECIFIED valves. Peto-Scott Type 101 matched speaker and walnut consolette cabinet with Australian w.a. in u.l. veneered front and wings. Dimensions: 20in. wide, 24in. high, 12in. deep (illustrated on left). less batteries. **Cash or C.O.D. £9:2:0**
Paid
Or 16/9 down and 11 monthly payments of 16/8.

DO YOU KNOW? Do you know that you can obtain all your radio requirements from us either for CASH, C.O.D. or under our famous Easiway system? No matter what you require, complete Kits, or loudspeakers, eliminators, pick-ups, or a selection of special components for a set you intend to build, we will be pleased to quote you our EASY TERMS without obligation. We are the oldest Radio by Mail House in the country and have been established since 1919, so you can order with confidence.

SELECTION OF POPULAR EASIWAY LINES

GARRARD A.C.S. Induction ELECTRIC MOTOR. A.C. mains, 100/250-v., 50-60 cycles. 12" turntable mounted on motor plate, with fully automatic start and stop. **Cash or C.O.D. Carriage Paid £2/2/6.** Send 2/6 only. Balance in 11 monthly payments of 4/-.

GARRARD AUTOMATIC RECORD CHANGER. Type RC4. A.C. mains 200/250-v., 50/60 cycles. Mounted on Unit Plate, including pick-up, ready for fitting. **Cash or C.O.D. Carriage Paid £7/10/0.** Send 13/- only. Balance in 11 monthly payments of 13/9.

2/6
DOWN

PETO-SCOTT MODEL MA 10/30 Eliminator and TRICKLE CHARGER, L.T. Output 0.5 amp. H.T. 20 m/a. at 120 volts. Tappings for Screen, Det. Med. Power, High Power. **Cash or C.O.D. Carriage Paid £2/19/6.** or 5/- down and 11 monthly payments of 5/6. For A.C. Mains 200/250-v., 40/80 cycles. **2/6** only

B.T.H. NEW MINOR (UNIVERSAL) PICK-UP. With self-contained volume control. **Cash or C.O.D. Carriage Paid 17/6.** Balance in 7 monthly payments of 2/6. **2/6** only

AVOMINOR D.C. MAINS & BATTERY TEST METER. 10 ranges. Supplied in velvet lined case with leads, clips and probes. **Cash or C.O.D. Carriage Paid £2/0/0.** Balance in 10 monthly payments of 4/3. **2/6** only

W.B. SPEAKERS

MODEL 37SC (illustrated on left). A cabinet instrument giving superb reproduction with power handling capacity of up to 5 watts undistorted. The turn of a switch adjusts it to match any set made. With volume control. **Cash or C.O.D. Carriage Paid £3/3/0,** or 5/- down and 11 monthly payments of 5/9.

MODEL 37S. Amazing reproduction provided by new magnet and exponential moulded cone. Microphone matching device. **Cash or C.O.D. Carriage Paid £2/2/0,** or 2/6 down and 11 monthly payments of 4/-.
MODEL 37J (illustrated on right). Perfectly matches any receiver as principal or extra speaker. **Cash or C.O.D. Carriage Paid £1/12/6,** or 2/6 down and 11 monthly payments of 3/-.

2/6
DOWN

All Postal Orders should be crossed and made payable to Peto-Scott Co., Ltd. All currency should be registered. Head Office: 77 (P.W.15), City Road, London. Telephone: Clissold 987516. West End Showrooms: 62 (P.W.15), High Holborn, London, W.C.1. Holborn 3248.

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LEARNING FRENCH THROUGH YOUR RADIO

THIS week I want to talk about the **FUTURE** (T. No. 8) and the **FUTURE PERFECT** (T. No. 6). Were it not for English the use of these two **TENSES** in French would be quickly understood and practised. But we are so persistent in our misuse of **TENSES** that we are inclined to think that anything else is wrong. But the Frenchman will have none of it. He knows he is right, and I don't blame him for sticking to his guns.

Look at this English sentence:
He will go to bed **WHEN HE IS READY**.

Look particularly at the second half of the sentence—**WHEN HE IS READY**. Oh, yes! Said quickly it sounds perfectly correct. But dwell for a moment on the three words **HE IS READY**. Isn't this a **PRESENT TENSE** implying **NOW, AT THE PRESENT MOMENT?** Of course it is! But, surely, this can't be right, because the sentence above doesn't suggest at all "that he is ready to go to bed **NOW**." It is for this reason that the Frenchman does not say **WHEN HE IS READY**. He is for **CORRECTNESS**, and so insists on saying "When he **WILL BE** ready." This sentence, then, in French is:

Il se couchera **QUAND IL SERA PRÊT**.

You must grasp this very important rule: **AFTER CONJUNCTIONS OF TIME**—like **QUAND** (when), **AUSSITÔT QUE** (as soon as), **TANT QUE** (as long as), **COMME** (as)—**THE FUTURE TENSE IS USED WHENEVER FUTURE TIME IS IMPLIED, ALTHOUGH WE IN ENGLISH USE THE PRESENT**.

Let me give you a few further examples.

Quand le train **ARRIVERA** il y aura une foule de gens à la gare.
When the train arrives there will be a crowd of people at the station.
Nous viendrons vous voir quand nous **AURONS** le temps.
We will come and see you when we have time.
Quand il **REVIENDRA** je lui demanderai la même question.
When he comes back I will ask him the same question.
Tant que je **VIVRAI** j'aimerai ma patrie.
As long as I live I will love my country.
Faites comme vous **VOUDREZ**; c'est égal.
Do as you like; it's all the same to me.
Quand les coquelicots **REFLEURIRONT** je me souviendrai de toi.
When the poppies bloom again I'll remember you.

Similarly, the **FUTURE PERFECT** (T. No. 6) is used in French, where we English use the **PERFECT** (T. No. 4), **WHEN FUTURE (COMPLETED) TIME IS IMPLIED**.

One or two examples will make this rule clear.

Quand le petit Georges **AURA FINI** son devoir il se couchera.
When little George has finished his work he will go to bed.
Quand j'**AURAI PRIS** quelques leçons de natation je saurai nager.
When I have had a few swimming lessons I shall know how to swim.
Quand vous **AUREZ VISITÉ** le pays Basque vous verrez comme il est ravissant là.
When you have visited the Basque country you will see how delightful it is there.

Part 45 of the special series contributed exclusively to "Popular Wireless" by S. C. Gillard, M.A., a Cambridge teacher of languages.

Quand vous **AUREZ CACHÉ** le dé nous le chercherons.
When you have hidden the thimble we will look for it.
Quand j'**AURAI MIS** ces lettres à la poste je vais acheter des cigarettes.
When I have posted these letters I am going to buy some cigarettes.

N.	VENONS	œ(r)-no(ng)	
V.	VENEZ	œ(r)-neh	
MLS	VIENNENT	o'yen	
JE	VENAIS	œ(r)-neh	I was
TU	VENAIS	œ(r)-neh	coming,
IL	VENAIT	œ(r)-neh	etc.
N.	VENIONS	œ(r)-n'yo(ng)	
V.	VENIEZ	œ(r)-n'geh	
ILS	VENAIENT	œ(r)-neh	

Now for a few sentences which I want you to study carefully. Remember, for "I have just" the Frenchman **ALWAYS** says **I COME FROM**; and for "I had just," **I WAS COMING FROM**. That is, **JE VIENS DE plus INFINITIVE**, and **JE VENAIS DE plus INFINITIVE** respectively.

Je viens d'acheter un joli costume de bain.
I have just bought a pretty bathing costume.
Nous venons d'écouter La Chronique de Beauté de Luxembourg.
We have just listened to the Beauty Talk from Luxembourg.
Elle vient de se lever.
She has just got up.
Le docteur vient d'écrire une ordonnance pour le malade.
The doctor has just written a prescription for the patient.
Je venais de commander une brosse à dents chez le pharmacien.
I had just ordered a tooth-brush at the chemist's.
Il venait de me montrer sa collection de papillons.
He had just shown me his collection of butterflies.
Le petit garçon venait de briser la soucoupe.
The little boy had just broken the saucer.
L'orchestre venait de jouer une marche militaire.
The orchestra had just played a military march.

TELEVISIONING A NEW YEAR'S PARTY



Celebrating New Year's Eve in the German television programme. This was the first time that as many as six persons were simultaneously televised and also the first occasion on which a direct vision programme of more than 25 minutes had been broadcast from Berlin's direct vision studio.

Quand vous **AUREZ LU** cette page relisez-la.
When you have read this page read it again.

And now for something different. I want you to learn how to translate the two sentences—

I have just done something.
I had just done something.

Let me say immediately you will get nowhere if you begin your translation with **J'AI JUSTE—J'AVAIS JUSTE**—This isn't French. The Frenchman has his own special way of saying he has just done something, or he had just done something. His manner of expressing this is:

- JE VIENS DE FAIRE QUELQUE CHOSE
(I come from doing something)
- JE VENAIS DE FAIRE QUELQUE CHOSE
(I was coming from doing something)

And when you come to think of it, it isn't a bad way either. Obviously you **MUST** know how to conjugate the verb **VENIR** (to come) in its **PRESENT** and **IMPERFECT** tenses if you wish to translate this sort of sentence correctly. So here are these two Tenses:

JE	VIENS	o'yai(n)	I come.
TU	VIENS	o'yai(n)	etc.
IL	VIENT	o'yai(n)	

Le directeur vient de dicter sa correspondance.
Mon père venait de me donner un poste portatif à cinq lampes.
Le fruitier venait de recevoir une grosse commande.
Le bijoutier venait d'entrer dans sa boutique.
Deux trains venaient de partir de la gare.
Le pharmacien venait de préparer l'ordonnance.
Les membres viennent de finir un excellent dîner.

Make up other sentences containing the above words. Work hard at the new stuff I have given you this week.

While we are thinking about this verb **VENIR** it would be as well for me to remind you of the several **COMPOUNDS** of this verb. Remember they are all conjugated like the parent word. Here they are:

CONVENIR	to suit, fit, agree
PRÉVENIR	to prevent, ward off
DEVENIR	to become
PROVENIR	to arise, come from
REVENIR	to return
PARVENIR	to reach, attain, succeed in
SE SOUVENIR DE	to remember

For instance, the 3rd person singular of each of the **NINE TENSES** is as follows:

il convient, il convenait, il convint—il a convenu, il avait convenu, il aura convenu, il aurait convenu—il conviendra, il conviendrait

(Please turn to page 550.)

A FASCINATING RECEIVER

THE H.M.V. 482 A.C. SUPERHET

Tested by A. S. Clark



"Handsome is and handsome does," though a misquotation, suits this excellent receiver to a "T."

WHEN one is continually trying out fresh receivers, one gets a bit blasé, to use a modern way of expressing it. Things are taken for granted. Sets seem much alike. The new model freshly connected up is "just another set." The cabinet design is different, the arrangement of the controls probably varies a little from the previous set, and the results are not quite the same—perhaps they are slightly better, perhaps not so good.

But there are also peak points in this set-testing business, when even the old timer is shaken out of his "take it for granted" outlook. Somehow, one gets to know as soon as a set is unpacked whether it is outstanding or whether it is going to conform to type.

As soon as I lifted the 482 from its container my fingers itched to get at the controls. In fact, my enthusiasm was more like that of a listener with his first all-waver. (And this after testing some dozens of modern all-wave sets.)

I was anxious to see the green arcs of light converging on the fluid-light tuning indicator as the stations came in. I wanted to experience the vernier dial for logging settings on short wavebands. Every control, from the two-speed tuning knob to the wavechange switch with its direct-reading indicator offered possibilities of fascinating operation.

So I hurried on with the job of installation, first of all setting the mains-voltage tap. And in this connection it is interesting to note that the voltage range of the receiver is from 95 to 260 volts, and that there are twelve different settings for different voltage ranges. The frequencies covered are from 50 to 100 cycles.

Pentode Pre-H.F. Stage

Before telling you how my expectations were more than fulfilled, a few words about the circuit of the 482 will not be amiss. It is a six-valve superhet arrangement (plus the detector).

The heptode frequency-changer is preceded by a multi- μ pentode H.F. stage. Then there is the intermediate-frequency stage with a similar valve.

Next in the chain is the diode detector, which provides the A.V.C. control. This, of course, is of the delayed type. Finally, apart from the rectifier we have an L.F. valve followed by the output stage with its three watts undistorted volume.

The range on short-waves is 16.5 to 51.5 metres. This wide band is covered in one step.

The true object of a test report is to pass on to the reader the actual impressions gathered by oneself during the handling of the receiver. And I think the best way to do this is to

describe the features of the 482 just as they "struck" me while operating it and also in exactly the same order. So here goes.

Before switching the set on by means of the switch at the side of the cabinet, I decided on an interesting test. I would set the volume control at zero, adjust the tuning as near as possible to W 2 X A D, turn up the volume and see what happened.

The station names on the dial are illuminated in green on a dark background. The wave-range covered, appears in white figures in the top left-hand corner of the dial.

It shows 200-580 metres, so the wavechange switch—the middle one of the three at the

tone takes on a happy medium. This six-point tone-control is a *real* tone-control. No imagination needed here. The range is large enough to provide the right tone to please everybody.

Short-wave sensitivity is proved. The aerial and earth are poor; and so are conditions. A short check-up on the usual set proves this beyond a doubt.

So over to medium waves. Let's see how many stations we can get. One, two, three... No, there are too many, and the new fluid-light device looks far more interesting.

It is actually a tiny cathode-ray device, and is remarkably sensitive. Even the fading on a distant station is easily seen, though it is scarcely discernible by ear due to the A.V.C.

What about selectivity? It proves more than ample. Even heterodyning stations are made possible by a touch on that wide-range tone control.

And so on to the long waves. These go down to 725 metres. I tune in Moscow No. 3, the first time I have heard this station. Yes, selectivity is still good.

The first test is at an end. It has been an experience that will not be forgotten. Subsequent tests have confirmed the first impression that the 482 is a fine set.

There are a few remaining points which must not be overlooked.

The pick-up, when employed, can be left permanently plugged in, for a switch is provided on the back of the set for rapid change-over from radio to record.

There are alternative aerial sockets, and sockets are also provided for an extension loudspeaker. A third pick-up socket is also available for earthing the screening of the pick-up leads—a welcome convenience.

But this test report has got to finish somewhere, so to end up I advise you to go to a dealer and hear it for yourself.

Then you will go on talking about it!

SPECIFICATION

6 valves (plus detector), with A.V.C. 3-wavebands, 16.5-2,000 metres. New Fluid Light shows correct tuning positions. Rotatable vernier scale enables precise readings for reception of U.S.A. stations to be noted. Two-speed tuning, 80 station names shown on scale, 6-position tone control, waveband indicator, moving-coil speaker. Price 16 guineas cash. Generous hire purchase terms are available.

bottom—is manipulated. It moves very easily, but springs into the 16.5-51.5 position with a satisfying, definite feel.

Now for the tuning. There are two concentric knobs, giving two speeds, the larger knob moving the pointer across the dial more quickly than the other. I am struck by the extremely silky movement. Easy smooth controls are a good feature of this set.

As the pointer moves, so a vernier disc marked in 100 divisions revolves at the bottom of the dial. A change of one metre on the short-wave scale represents about 10 degrees on the vernier. So there can be no snags in logging short-wavers on this set.

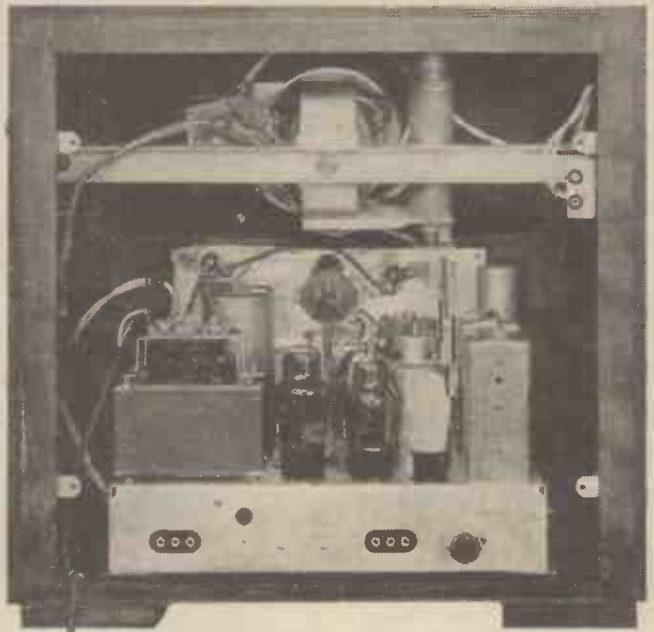
But what about W 2 X A D? The tuning is set about right, the volume control turned quickly up to maximum. But a "sensitive" background hiss is the only reward. The tuning is moved a tiny fraction, and . . .

"Yeah! Oh yeah, I remember . . ." says the loudspeaker, in the familiar nasal tone. We are listening to the cross-talk between a couple of items in one of those snappy American advertising programmes. The time is just before 9 p.m.

Now then, you "doubting Thomases" who think America is hard to get and requires early-morning sessions! How's that? The very first station to be heard.

But the tone seems rather "hissey." What about the tone-control to the right? It is turned through a couple of points and the

A SELDOM-SEEN VIEW



So renowned is H.M.V. reliability that the model 482 user is only likely to see this view of his set once—during the initial installation.

RANDOM RADIO REFLECTIONS

By VICTOR KING

WHAT CORRESPONDENTS SAY :: NOISY VOLUME CONTROLS :: ULTRA-SHORT-WAVE EXPERIMENTS ON SALISBURY PLAIN

HITHER AND THITHER

IT'S rather a long time, I think, since I commented on my mail-bag. That is, in print, for I've written dozens of personal letters this past week. The majority of my correspondents are just plain appreciative; all of them friendly. But some say they like these notes most when they are least frivolous; others that they don't find them such good reading when I dip seriously into technical matters. So what?

Seems to me the answer is that I should go along the same track as hitherto—penning my jottings as my fancy and mood dictate.

In this connection Mr. M. Fenton, of Chadwell Heath, raises an interesting point. He reckons to be able to tell how I'm feeling, almost what I'm thinking about from these paragraphs. Don't you believe it, Fenton, old boy! Only callow wielders of the pen give themselves away like that!

Reminds me of the way in which high-brows are supposed to be able to interpret music. An eighteenth century composer leaves posterity a melody entitled, let us say, "The Orchard," and two hundred years later it is introduced to a gullible radio audience by an announcer with spats in his voice by means of a blurb something like this: "In the first movement you hear the villagers assembling to offer thanksgiving for the good harvest. The strings take up the local shoemaker, who is also the owner of the best orchard in the countryside. In the second movement an impression of gently running water is conveyed, though it is not known whether the composer intended this as a rebuke against the local custom of restricting bathing to the third Friday after Michaelmas," and so on.

Whereas, if the truth were known, it is quite as probable that the composer called his piece a "Sonata," which was misprinted as "tomato," and subsequently mis-translated as "The Orchard."

WANTED—A VOLUME CONTROL

DOES anyone know of a volume control which will remain efficient and noise-free for an indefinite period? Four out of the five commercial sets I have been testing during the past few weeks have developed control troubles. One very badly indeed.

But perhaps I am hyper-critical. Maybe the average listener doesn't mind if his volume control scratches round into its various settings after a brief period of silent working, so long as it will eventually crackle and scratch its way into the desired condition?

Some time ago I was asked to design a piece of apparatus for a Government con-

tractor, and this gear necessitated the inclusion of a variable resistance. Now this last had to conform with a standard specification.

Believe it or not, that variable resistance came out as big as the rest of all the other bits put together. Studs and coils, stout and how! What a variable resistance that was. Yet I didn't laugh. That, I said to myself, would make a good volume control for that "XYZ" set if only it had another spare cubic yard or so of space!

POSTSCRIPT TO INVENTION

I BANGED into W.L.S. the other day—literally. I was leaving Tallis House just as he was entering and his momentum was greater than my manoeuvrability. "Glad I caught you, Vic," he said, and before I could slip in a pointed observation he added that he was able to contribute a sequel to my recent paragraph about the "Lone Experimenter" in the Cotswold Hills. But it is really a prologue. Anyway, this is what he told me.

Two years ago a bunch of amateurs distributed themselves over the Salisbury Plain in order to carry out some experiments on five metres. Three stations were erected in a line extending a considerable distance. They were about equally spaced and the one in the middle was on the top of a hill.

Now it was found that communication was possible through this chain with the centre station passing on the messages of the others. Later, they found that the two stations farthest apart, although well out of any quasi-optical line (the hill acted as a barrier) were able to contact each other, providing the di-pole aerial of the station on the hill was in position. Removing this at once removed any possibility of either transmitter being heard by the other's receiver.

So after the station on the hill was dismantled they left its di-pole there so as to enable their long-distance field tests to be continued when desired. And W.L.S. says that, so far as he knows, it is still to be seen, rather the worse for weather, fixed to an old army post bearing the label "Dangerous—Do Not Touch," or words to that effect.

I haven't been able to check up whether or not that "Lone Experimenter" is actually one of the amateurs who figured in those pioneer tests, or has anything to do with them. If he isn't, then it is quite clear that his claims have got a bit bent at



What programme has this fair listener tuned in? Maybe it's one of the Americans—that's easily possible on this H.M.V. Model 482 All-waver.

the edges in so far as the originality of the basic idea is concerned.

However, it is gratifying to my ego to learn that the scheme, though it can now not be regarded as brand new, is as practical as, you will remember, I suggested it might be. Of its importance there could never be the slightest shadow of doubt.

BRIEF REPLIES TO LETTERS

G. H. (Birmingham).—You put me right on the spot. If I were to tell you which of those four makes of sets I thought was the best, and you were to buy it— But they are all quite good.

L. S. B. (Wolverhampton).—I prefer a triode output. Yes, there is a definite advantage in piling on the power. Five watts is by no means extravagant to deal with the peaks which occur even in "ordinary room strengths." Over-powering a set is hardly possible. The Yanks think nothing of twenty-five watts. Under-powering a set is a crime.

A. S. K. (London).—To become a Marconi wireless operator you must first pass a special examination set by the Post Office, and in order to do that it is necessary to take a course of training at one or other of the wireless schools.

B. H. I. (Southend-on-Sea).—Your idea for recording television on a gramophone record is not new. It was first done by Baird many years ago. In any case, normal methods of recording and reproduction would not be possible with the new High Definition.

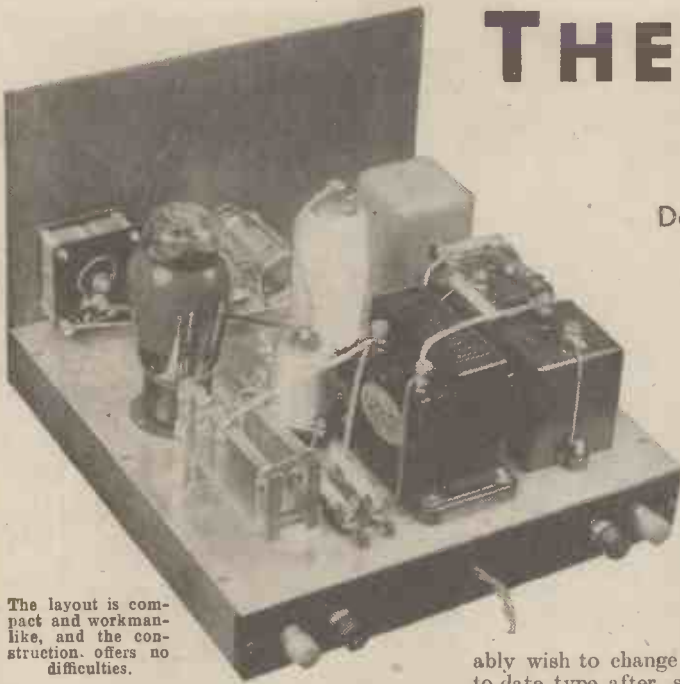
G. C. N. (London).—You did not see me in a public-house in the West Kensington district. My preferences lie in the direction of country inns.

T. S. L. (Manchester).—You need not be alarmed if your lights flicker when you switch on your mains set. The load distribution of my own mains is such that this happens with quite a small mains unit.

THE "DEE-CEE" II

A highly-efficient two-valve set for use on D.C. mains

Designed by the "P.W." Research Dept.



The layout is compact and workman-like, and the construction offers no difficulties.

THERE are plenty of sets for the battery user and the listener on A.C. mains, but comparatively few for those on D.C. It may be said by some that, in any case, D.C. mains will eventually be changed over to A.C. and that in the meantime there is nothing to prevent the D.C. listener from using either a battery or a universal set.

This is, of course, quite true, but it seems a pity to use batteries, even though it may be no more than a small L.T. accumulator, when it is possible to run the whole set from the mains.

On the other hand, the universal type of set is definitely more expensive to build

since it requires a rectifier valve and certain additional components and, moreover, in a great many cases existing D.C. mains will not be converted to A.C. for a number of years. Hence, the additional cost of the universal set is scarcely warranted in these instances, bearing in mind that the listener will probably wish to change his set for a more up-to-date type after, say, a couple of years.

The "Dee-Cee II" is a simple design for which we make no excessive claims as regards range of reception. It is as sensitive and as selective as it is possible for a two-valve design to be. We have, for example, used a pentode detector with the object of providing the utmost sensitivity and amplification from this part of the set.

Also, the output valve is again a pentode, so that the resultant step-up given by the two valves is very considerable.

As a receiver for listening to the alternative medium-wave B.B.C. programmes—Droitwich and, say, a dozen Continental transmissions, at really good strength—it is an ideal set.

The two valves used in the "Dee-Cee II" are of the indirectly-heated type: the first one, V₁, being designed for a heater voltage of 13, and the second for a heater voltage of 35.

These valves are in series and take .2 amps. The heaters are supplied with current from the mains by way of a tapped resistance, which can be adjusted to suit the voltage of the listener's individual supply.

Complete Mains Isolation

The mains switch is of the double-pole type, so that it is only necessary to switch the set off at this point, there being no need to withdraw the mains connector plug from its wall socket or lamp holder, as the case may be, as is desirable with some D.C. designs. This double-pole switch completely breaks the mains circuit.

There are also two fuses inside the set so that should an accidental short occur the mains circuit will be automatically broken.

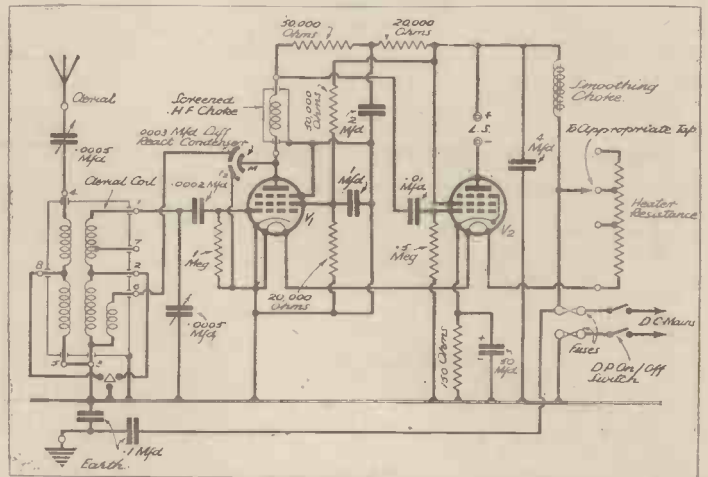
The earth terminal is completely isolated from the metal baseboard by a series condenser of .1 mfd. and a further .1 mfd. condenser is so arranged that the earth forms a centre point between these two condensers and the mains input, thus filtering any stray H.F. currents in the mains lead away to earth. This refinement tends to reduce extraneous noises conducted into the set by way of the mains.

The detector valve is resistance-capacity coupled to the output valve, a method giving excellent quality of reproduction, and this valve is also thoroughly decoupled by a 20,000-ohm resistance and a 2-mfd. condenser.

In the aerial circuit there is a variable condenser of .0005-mfd., which provides a simple method of adjusting the selectivity to suit the listener's own particular local conditions, and, moreover, this same condenser isolates the aerial terminal from the live portion of the set.

We have used differential reaction so as

A TWO-PENTODE CIRCUIT



The heaters of the two indirectly-heated pentodes are joined in series. A heater resistance having three tapings to suit different mains voltages is connected between the heaters and the mains to cut down the supply voltage to the correct value.

to give the utmost smoothness of control, and this, together with the selectivity condenser already mentioned, and the tuning control are the only variable adjustments in the set. In practice, of course, the selectivity control would be only occasionally used, which means that the two main adjustments are tuning and reaction.

Turning now to the construction, we feel that this is so ably explained in the diagrams that there is little for us to say. The "Dee-Cee II" is one of the most

(Continued overleaf.)

YOUR SHOPPING LIST

- 1 Wearite "Unigen" screened coil, type A.
- 1 J.B. Popular Log, slow-motion .0005-mfd. tuning condenser.
- 1 Polar .0005-mfd. "Compax" variable condenser.
- 1 J.B. .0003-mfd. differential reaction condenser, solid dielectric type.
- 1 Bulgin D.P. toggle on/off switch, type S.88.
- 1 Bulgin 3-pt. toggle switch, type S.87.
- 2 Clix 7-pin chassis-mounting valve holders, type V.2 without terminals.
- 1 B.T.S. heater resistance for one 35-v. and one 13-v. valve, .2 amp.
- 1 Ferranti smoothing choke, type B.10.
- 1 Bulgin twin fuse-holder, type F.16, with 1/2-amp. fuses.
- 1 Dubilier 4-mfd. fixed condenser, type B.B.
- 1 T.C.C. 2-mfd. fixed condenser, type 50.
- 1 T.C.C. 1-mfd. fixed condenser, type 50.
- 2 T.C.C. 1-mfd. tubular fixed condensers, type 250.
- 1 Dubilier .01-mfd. fixed condenser, type 610.
- 1 T.C.C. .0002-mfd. fixed condenser, type S.
- 1 T.C.C. 50-mfd. 12-v. tubular electrolytic condenser with wire ends.
- 1 Erie 1-meg. 1-watt resistance.
- 1 Erie .5-meg. 1-watt resistance.
- 2 Erie 50,000-ohm 1-watt resistances.
- 2 Erie 20,000-ohm 1-watt resistances.
- 1 Erie 150-ohm 1-watt resistance.
- 1 Varley "Nicore" H.F. choke, type B.P.26.
- 1 Aluminium base, 10 in. x 10 in. x 18 gauge (Peto-Scott).
- 1 Wood panel, 10 in. x 7 in. x 1/4 in. (Peto-Scott).
- 1 Ebonite terminal strip, 10 in. x 1 1/2 in. x 1/8 in. (Peto-Scott).
- 2 Wood runners, 9 1/2 in. x 1 1/2 in. x 1/2 in. plywood.
- 4 Clix indicating terminals, type B.
- 20 ft. 18-gauge T.C. wire (Peto-Scott).
- 4 lengths 2 mm. insulating sleeving.
- 6 B.A. nuts and screws, flex, etc.

VALVES

- V.1. Mazda V.P.1321
- V.2 Mazda Pen 3520

THE "DEE-CEE" II

(Continued from previous page.)

straightforward constructional jobs that it is possible to obtain.

Perhaps those who do not feel up to drilling the metal baseboard would be well advised to purchase this already drilled and with the two circular holes for the valve holders cut in accordance with the diagrams.

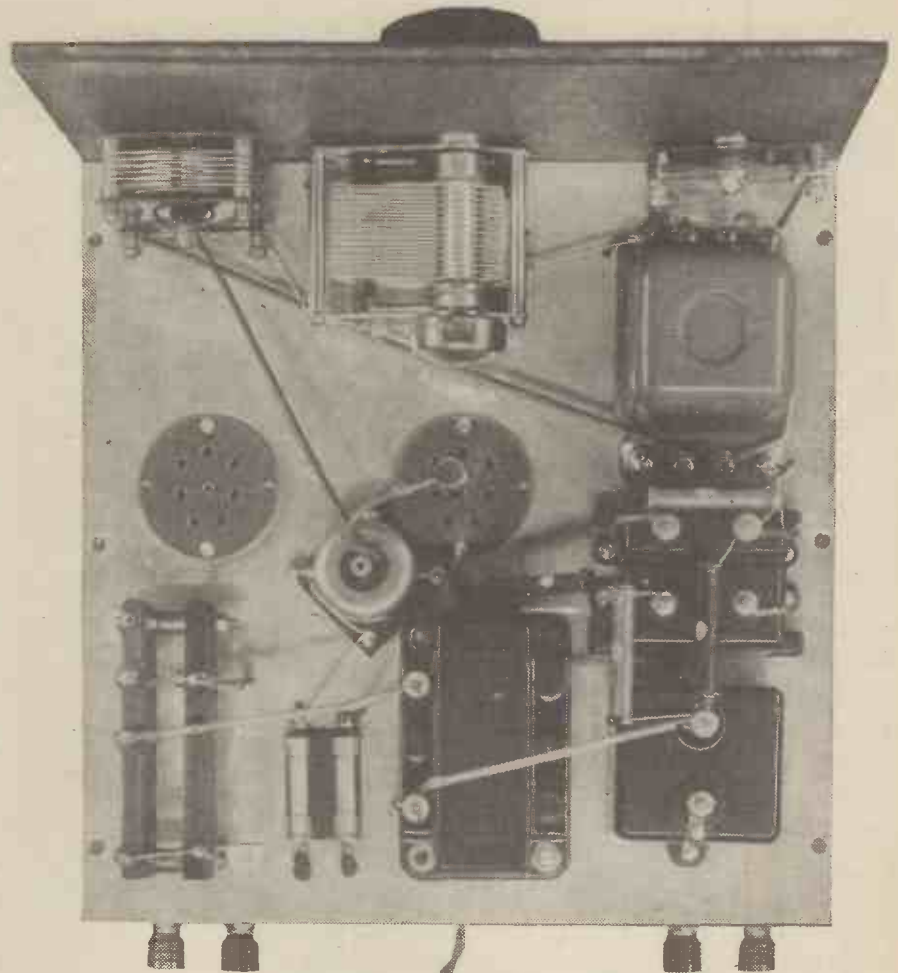
The Earth Connection

There is one point that we would mention, and that is in connection with the lead going to the earth terminal. You will notice that this lead goes from the earth terminal straight across underneath the metal baseboard to a screw on the right-hand chassis side-support (looking at the underside of the set). This screw is merely an anchorage and does not make contact with the metal baseboard. It merely serves as a junction between the lead from the earth terminal and the two wire connections from the .1-mfd. fixed condensers.

Now as regards the heater resistance, you will notice that this has six soldering tags. The two nearer the back of the baseboard are joined together with a piece of wire (see wiring diagram).

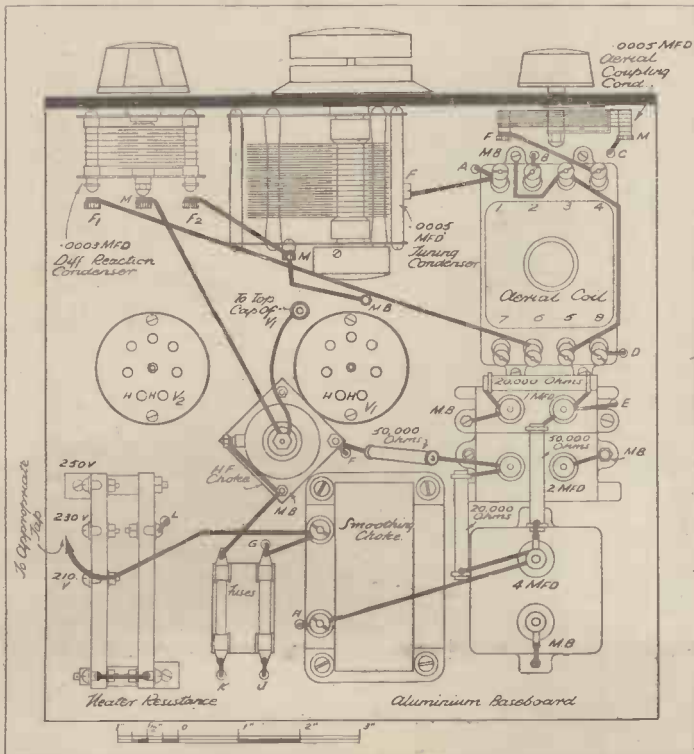
You will also notice that three of the tags are grouped together on the left-hand side of the heater resistance (looking from the back of the set). The lead which is joined to one side of the smoothing choke is connected to the appropriate tag which suits the voltage of mains supply.

The rearmost of the three tags which are grouped together is the 200-210-volt tapping; the middle tag is the 220-230-



The "Dee-Cee" II in plan. The lead from the smoothing choke to the heater resistance is in this view joined to the 200-210 volt tapping.

THE ABOVE-BASEBOARD LAYOUT



Points marked M.B. on this diagram go to the metal baseboard. It will be noted that certain leads pass through holes in the baseboard to components on the underside. The leads are lettered to correspond with those in the diagram on the next page.

volt tapping, and the tag nearest the V_2 valve holder is the 240-250-volt tapping. So if your mains are 200 or between 200 and 210 volts, use the rearmost tapping. If they are over 210 volts and not more than 230, use the middle tapping. If they are over 230, use the tapping nearest the valve holder V_2 .

On the panel are the three controls, the large knob in the centre being the tuning control, the knob on the left the series aerial condenser giving variable selectivity, and that on the right the differential reaction control. When the receiver is completed insert the Mazda V.P.1321 valve in the V_1 valve holder and

connect the lead with the push-on connection to the cap on the bulb. Insert the Mazda Pen. 3520 in the V_2 valve holder.

To operate the set, join a loudspeaker of the permanent-magnet type to the L.S. + and L.S.— terminals, using the pentode-tapping terminal on the input transformer of the loudspeaker (see instructions issued by makers with speaker). Join the aerial to the aerial terminal on the set and the earth to the earth terminal.

Operating the Receiver

Insert the mains plug in the mains socket, first of all seeing that the on-off switch—that is, the switch beneath the differential-reaction condenser knob, is off (switch arm up).

With the wavechange switch knob down (underneath the aerial series condenser), rotate the tuning control until you hear one of your local stations—either the Regional or the National—on the medium waves. You will have to wait for a few seconds for the valves to warm up since they are of the indirectly-heated type.

Adjust the selectivity control and the reaction control until the strength of the station meets your requirements. Remember not to use too much reaction; that is, don't turn the reaction knob too much to the right, since this will cause the set to oscillate and produce interference in neighbouring receivers. Moreover, such a procedure will distort your own reception and so nothing is gained by it.

(Continued at foot of next page.)

SEEN ON THE AIR

News and Views on the Television Programmes by our Special Radio-Screen Correspondent—L. Marsland Gander

IT is now widely known that big changes are pending in the B.B.C. television service. Mr. Gerald Cock, the Television Director, is determined that nothing shall stand in the path of rousing success.

He feels that one of the principal difficulties at Alexandra Palace is that which I have mentioned several times in these notes—namely, lack of accommodation and facilities for adequate rehearsal.

A new idea is now being explored—namely, that St. George's Hall should be converted into a television studio. I do not know how this suggestion is appealing to Mr. Eric Maschwitz. It may be that the Variety Director in the inner councils of the B.B.C. is fighting tooth and nail one way or the other. This is just the sort of story that one of my more sensational minded brethren might serve up hot.

Great Possibilities Opened

However, I will admit that I know nothing more than the fact that use of St. George's Hall for television has been mooted, but I regard the proposal as one of the most interesting made since television started.

It opens up the possibility that the sound and vision services of the B.B.C. will be worked together to the benefit of both. Most people realise that one day the two separate services must begin to merge. The welding

will not be a swift or an easy operation, and a start might well be made at once.

Why should not viewers see the Saturday night Music Hall show? It seems to me that there would be many advantages in this. There would only be one show to pay for and rehearse, instead of two. The objection of some listeners that they are paying for television experiments which they cannot see would be met half-way. They could, of course, at least be able to hear the show, as at present. Better artists would be available, provided the ban which some managements have introduced could be overcome.

Then there is another important point. Many listeners have objected to the "claque" in studio variety, the sycophantic studio audience which, equipped with free tickets, seems prepared to bellow with laughter at anything. I sympathise with the point of view, but when it comes to television the situation is different. I am convinced that the studio audience is not merely an asset to television vaudeville, but is essential. The applause tends to eliminate the awkward pauses that occur after a comedian has uttered his cracks. One of the reasons for the success of the Christmas Music Hall show was that the entertainment became a natural ebullition of high spirits—laughter, applause, cheers, jeers came naturally, automatically in the right places.

Now there is accommodation in St. George's

Hall for an audience of just about the right size. Yet I am afraid the St. George's Hall project will languish because, candidly, I do not think that the B.B.C. is fully alive to the importance of pictures. If it were, I feel sure there would be a great deal more evidence of it in Broadcasting House.

Some time ago I was informed that the plans for the new half of Broadcasting House included no television studio. A few weeks ago the plans had been so far amended that I was told one television studio would "probably" be built in the underground block which it is proposed to construct. I suppose the new Broadcasting House will still be standing ten years hence, when even the most conservative minded person expects television in the home to be a commonplace.

Co-axial-Cable Tests

"Probably one" television studio does not sound like brilliant foresight to me, though I candidly admit the difficulty of catering for the future in a fast moving science like radio. However, the fact that within twelve months the present Broadcasting House was found to be too small is still in our minds.

I should perhaps at the outset have explained that the St. George's Hall question has cropped up because of the testing of the co-axial television cable between Broadcasting House and Alexandra Palace. This is expected to emerge from its electrical tests shortly, and only a short extension would be needed to connect St. George's Hall to the television-transmitters.

Meanwhile Mr. Cock is pushing ahead with his preparations for televising the Coronation procession and the actual ceremony inside the Abbey. While it is now certain that the van

(Please turn to page 559.)

THE "DEE-CEE" II

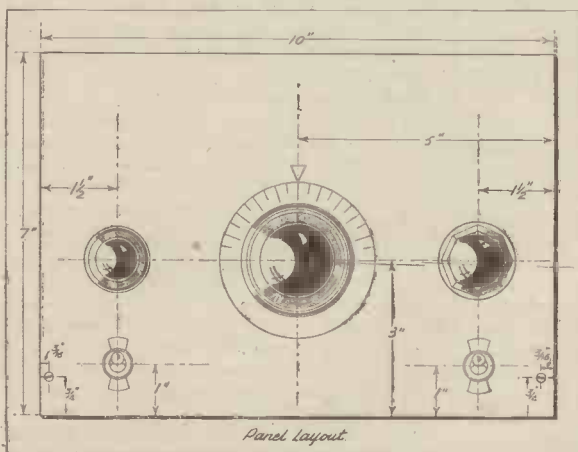
(Continued from previous page.)

This operating procedure applies to all the stations, but, of course, on the more distant ones you will need to adjust the reaction and the aerial series condenser with a little more care than on the B.B.C. transmissions. On these latter you may not need any reaction at all.

With the wavechange switch arm "up" the set is ready for reception on the long waves. Usually you will find it better to rotate the aerial series condenser knob fully clockwise on this waveband.

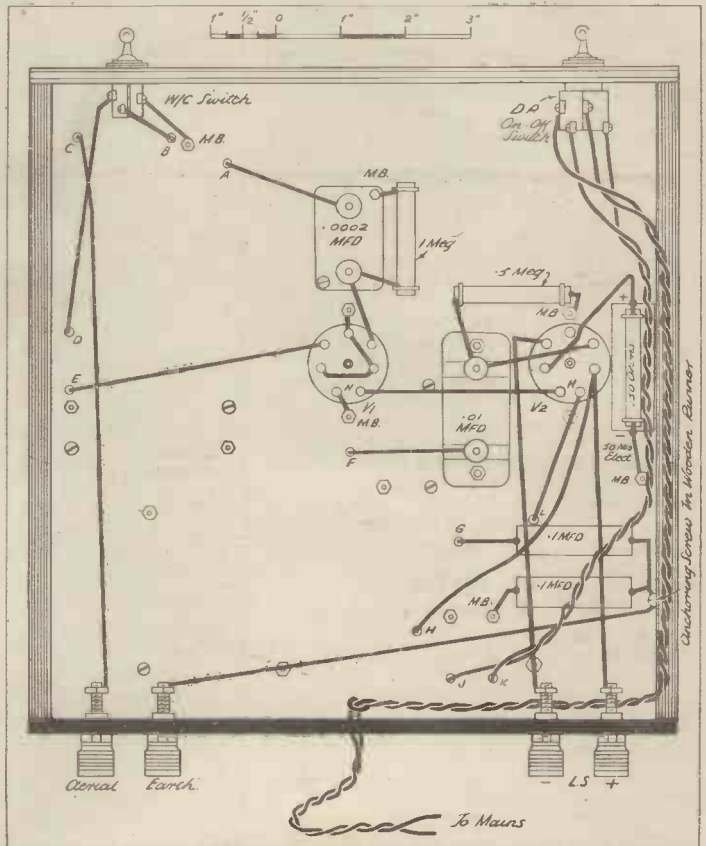
Incidentally, if when you insert the mains plug in the mains supply socket you find that the receiver does not work remove the plug and reverse it. Having found the correct way round for the plug there is no need to remove it again.

THE PANEL LAYOUT



Here are the panel drilling dimensions. The control knobs are: Series aerial condenser on the left; tuning condenser (centre), and right, the reaction control. The two switches, (left to right) are wavechange and mains "on-off."

THE UNDER-BASEBOARD WIRING



The wire going from the Earth terminal to the right hand wooden side piece is held in position by a wood screw which acts as an anchor for the junction of this lead and the two going to the 1-mfd. condensers.

NEW OSRAM VALVES

Details of a recently introduced range of indirectly heated A. C. types incorporating many valuable improvements

WITH the ever-increasing valve slopes and widening range of multiple valves which have been the vogue for the past few years, it is interesting to turn to a new range of valves now marketed by the General Electric Co. Ltd., on which an entirely new note in design is struck.

These valves, which are additions to the range of OSRAM 4-volt Indirectly Heated A.C. Mains types, are at present available in five varieties which, with the addition of an existing A.C. Rectifier, are adequate to design a complete A.C. receiver giving an extremely high order of reliability and modern characteristics.

High Degree of Consistency

Several new features have been incorporated in these valves, some of which are:

(1) Improved methods of manufacture adopted with this range, involving exceedingly close inspection and special precautions in handling between each stage, which render possible closer manufacturing tolerances. Thus a very high degree of consistency is realised with these valves which is of immense benefit to the set designer and manufacturer. Modern receiving sets made under mass-produced conditions, with price as a major controlling factor, demand the closest consistency in every component and the achievement of this factor in what has in the past sometimes been a variable component, namely the valve, is an important contribution to progress.

(2) A materially reduced heater wattage, with the exception of the Output Pentode where adequate reserve of electron emission is essential. The heater current in these valves has been reduced from the standard figure of 1.0 amp. to 0.6 amp. maintaining a voltage rating of 4 volts. This means that economies can be effected in the mains transformer design and there is less liability of voltage drop in the heater leads.

(3) Each of the valves in the range, with the exception of the Output Pentode, has the grid connection brought to a top cap on the bulb. While for purely technical reasons it is possibly difficult to argue as to whether the grid or anode top cap connection is better, there are undoubtedly reasons of lay-out in the actual circuit which favour the grid top cap connection and which will ultimately lead to simplicity and economy in the set design. Another advantage of this is the lower value of grid-cathode, or input capacity, which is permissible, thus extending the tuning range for a given value of tuning condenser. A particular feature of interest is the grid-top connection to the Triode in the range, which is an innovation in regard to valves of this class.

A Variable Mu Screen Pentode

Dealing with the types separately, we have first the W42.

Type W42 is a Variable Mu H.F. Screen Pentode, the general uses to which it is adaptable being:

(a) As an H.F. Amplifier, that is pre-Frequency Changer stage, or in a T.R.F. receiver.

(b) As an Intermediate Frequency Amplifier in a Superheterodyne receiver.

The valve operates with a screen voltage of 100 and with a minimum grid bias of 3 volts. At these figures, and assuming an anode voltage of 250, the anode current is of the

order of 7.6 mA with a screen current of 1.9 mA.

As in other valves in this range, no attempt is made to secure a high value of mutual conductance, the aim being maximum stage gain with complete stability and a very high order of consistency between valves. The mutual conductance is therefore rated at the moderate value of 1.5 mA/v. but bearing in mind that this is measured at -3 grid volts the actual stage gain with suitable coil design is as great as many valves showing a much higher paper value of slope.

A HANDY GOUGE FOR WOODWORKERS

AN exceedingly useful gouge for use in the final stages of cabinet construction may readily be made out of an old umbrella rib. Obtain a three- or four-inch length of umbrella rib and mount it in a suitable holder. The free end of the rib must now be filed down carefully with a small file so that it is given a sharp and definite "V" or "U" cross-section.



A short length of umbrella rib mounted in a holder as shown, makes a handy tool for cabinet work.

The gouge will now be complete.

When run along a wooden surface, it will make in the latter a groove or channel of uniform depth and cross-section and, used in such a manner, it will be of the greatest service in putting the finishing and ornamental touches to cabinet woodwork of all descriptions.

Remember that the metal out of which umbrella ribs are made is considerably hard and that, therefore, it is brittle. Do not press too heavily on the gouge, or else it may be liable to snap in two. Run the gouge lightly along the wood surface. This will give fine control of the depth of the groove so made.

J. F. S.

Type X42 is a Variable Mu Heptode Frequency Changer which differs from earlier forms of Heptodes on the market by reason of its lower inter-electrode capacities and more economical operation. This is on account of the short electrode assembly which is employed, and results in the ability to operate successfully down to short wavelengths of the order of 15 metres.

In common with the W42, the valve operates with a screen voltage of 100 and a minimum grid voltage of -3. Its conversion conductance is of the order of 490 micromhos under these conditions, which has been found adequate for all normal purposes, bearing in mind the features of ease of stability, economical set design, and close consistency.

The conventional type of tuned-grid oscillator circuit is recommended with the X42, precautions being taken by means of damping in the oscillator anode circuit, and the maintenance of a constant screen voltage by means of suitable potentiometer network being advisable.

Type H42 is a high amplification factor triode designed for use in the early stages of an audio-frequency amplifier. Due to its high amplification factor it is particularly suitable for use in a resistance coupled circuit.

Low Grid-Cathode Capacity

The features of interest in this type are the low value of grid-cathode capacity by reason of the grid being taken to the top cap, which prevents severe attenuation of the higher frequencies; and the non-microphonic construction which renders the valve particularly applicable as the first stage of an amplifier with reasonably high gain. A very low grid bias is necessary which could be suitably supplied by grid-bias cells of permanent type instead of a cathode-bias resistance, if desired.

The H42 is capable of loading up fully a PX4 operating at its maximum working conditions; thus an output in excess of 4 watts may be obtained from an input of about 0.5 volt with a total harmonic distortion of less than 5 per cent.

The heater current of the H42 is 0.6 amp. and the valve has an amplification factor of 100 for a mutual conductance of 1.5 mA/volt when measured at anode volts 250 and grid volts -2. With an anode load resistance of 250,000 ohms the stage gain is greater than fifty times.

Type DH42 is a multiple valve of the Double Diode Triode type, consisting of two diodes electrostatically screened from the triode section on a common cathode. The cathode is heated by a 4-volt 2.4-watt filament of special construction to reduce magnetic hum. The operation of such a valve depends largely on the particular requirements of the user, and the normal use is with the diodes connected to the tuned circuit of the I.F. transformer, the audio component being taken via a condenser and a potentiometer to the triode grid.

Excellent Stage Gain

For small inputs of say 0.2 volt R.M.S. a bias of -1.2 at 350 volts H.T., and -1 volt at 250 volts H.T. is suitable. The bias may be supplied by a resistance in the negative H.T. lead.

As the type is designed for use in conjunction with the Output Pentode N42 (described below), it has a somewhat higher amplification factor than similar valves at present available, this being a value of 70 for a mutual conductance of 1.2 mA/volt measured at anode volts 250, grid volts -3. A suitable value of anode-load resistance is 200,000 ohms, and the stage gain of the triode section is of the order of 32.

Type N42 is a Power Amplifying Pentode with Indirectly-Heated Cathode for use in the output stage, and has a heater rating of

(Please turn to Cover iii.)

ON THE SHORT WAVES



THIS "QSL" CRAZE
By our short-wave expert
W. L. S.

I MAKE no apology for coming back to this vexed question of QSL-cards and "veri's," since the subject has been responsible for more letters in the postbag than anything else during the past fortnight.

Readers write to me with the most unanswerable questions, such as, "How do I obtain QSL cards from the U.S.A.?" I don't even understand what that means.

Personally, I must confess that it is my private opinion that QSL's and verifications are nothing more than a nuisance—but I admit that in some cases they are a necessary nuisance. For one thing, if we said we would issue a nice certificate to everyone who said, or thought, that he had heard two stations from each of the six continents, I am afraid that several reprints of the certificates would be necessary.

As it is, we have insisted on the production of some kind of tangible proof of such reception, and the result has been that quite a modest supply of certificates have lasted quite a long time. I suppose a cynic would crack a nasty joke about that, but I'll leave it alone.

Sometimes Valuable

I said recently that there are some instances in which the sending of QSL cards is really valuable. It may be the means of telling a man in a remote spot that his transmitter really is getting out. On the other hand the reception of that man's reply (if he sends one, which he certainly should) may be the means of proving a DX record of some kind for the receiving station.

What I should like to squash completely in this awful indiscriminate circulation of cards to stations of all shapes and sizes, simply in the hope of getting back some pretty bits of wallpaper with which to start a kind of swank parade.

Take the 40-metre amateur band on a Sunday morning. There are, perhaps, three or four hundred British amateur transmitters working there, in a state of hopeless congestion. One man may suddenly come on, using far more power than the rest, and he will be lucky enough to break through the confusion, and to radiate a nice telephony transmission which carries to all parts of the country at good strength.

He knows, as well as anyone else, that he is doing this; and yet he will be the man who

finds a pile of cards on his doorstep on Monday morning. The low-power men who have been plodding away without getting anywhere will go unrewarded.

Why? Simply because these low-power fellows will only have been picked up by the owners of really decent receivers, who, in the usual way, hear so much on them that they have long since given up the idea of sending cards to everyone who they hear.

On the other hand, the dud receivers will hear our loud man and very little else, and their owners will all send him cards, which he certainly doesn't want. Suppose he is in Birmingham, and has worked, during the morning, with stations in Portsmouth, Aberdeen, Belfast, Hastings, London and Dublin. Is he going to be thrilled to receive cards from Wolverhampton, Rugby, Coventry, and hosts of other places? Not a bit of it. Unless he

transmitter, 90 per cent. of the reports that we receive are quite valueless. It is painfully obvious that many of them have been scribbled out in the most childish way, just as a plea for a return card. If some of these people would be honest, and just send a postcard worded, "I think I have heard you sometime, but in any case I would love one of your cards to put on the wall so that I can say I've heard you," that would be doing just as much good.

I suppose that the readers of these notes constitute quite a large percentage of the keener short-wave listeners in the country. I hope they all read this, and make a New Year's resolution not to circulate any more valueless wastepaper. Let them keep their QSL-ing down to reasonable dimensions, and send reports of value to the stations that they imagine will be really interested in them.

The centre of this page is given up to my idea of a really comprehensive report. It tells the other man—whether he runs a broadcast station or a 10-watt amateur transmitter—everything that he wants to know, but contains nothing superfluous. It can be overprinted with your initials and location in large coloured type, if you want it to be pretty. If you are a member of the R.S.G.B. it will probably display your "B.R.S." (British Receiving Station) number.

Discriminate!

If some of you writers of vague, meaningless reports will, in future, send something of this

kind, and restrict it to the stations that you know are not being picked up by everybody in the country who has a half-baked short-wave receiver, your percentage of replies will be higher than anything you've ever dreamed of.

And, when you proudly forward your twelve cards to me for your Certificate, you will have a distinct feeling that you've earned it.

It should be unnecessary for me to explain the "RST" scale of reporting—I have done it so often before. Sufficient to say that "R" means readability, on the old "QSA" scale of 0-5; "S" means strength, on the old "R" scale of 0-9; and "T" means tone, using the "T" scale from 1-9.

From : D. X. Hunter, "The Microhenries," 73, Earache Road,
Lowlossville, ENGLAND.

To Radio..... Your signals were heard at.....G.M.T.
on1937, at R.....S.....T.....

You were working with.....on { 'phone
C'W.

Your speech quality was.....

Conditions here were.....with.....atmospherics and
.....fading: Receiver in use is a.....

with { loudspeaker.
headphones.

General remarks.....

If this report is of any use to you, I should appreciate a card from
you.

Signed.....

A report card on these lines gives all the information the transmitter needs.

is a saint, he will throw the lot in the waste-paper basket unanswered.

The same argument applies even more strongly to the broadcast stations. The short-wave stations which use the highest power and get all over the world with the greatest consistency are those who get the floods of QSL cards, with demands for "veri's," which are quite worthless.

If only all receiving enthusiasts would make up their minds to circulate their reams of paper only to the lesser-known stations, the owners of which may conceivably find something interesting in listeners' reports, there would be much more sense in the whole business.

And another thing stands out a mile: Judging by my own experience as an amateur

ON THE SHORT WAVES—Page 2

POINTS from the POST-BAG

W. L. S. Replies to Correspondents

SEVERAL snippets of news concerning new stations have come in recently.

I have rather hoarded some of them, so that now they aren't so topical as they might be, but here are a few.

R. W. (Worksop) has logged XU6SW (China), HS1RJ (Siam) and OHBZ (a Finnish ship off the African coast), all on 20 metres.

H. L. (Plymouth), who goes in for letters of twelve pages or so, tells me that the owners of W2XE now have four transmitters working below 10 metres. They all use the call-sign W2XDV, and the wavelengths are 9.5, 8.43, 7.78 and 7.32 metres. H. L. also sends me a list of the twenty-four different stations in the Dutch East Indies.

On Many Different Wavelengths

Most of these stations are at Bandoeng, but there are also transmitters at Sourabaya, Tandjong Priok, Batavia and other places. Since the call-signs range from YDA to YDB7 and YDE4, and the wavelengths run all over the scale from 193 metres downwards, I don't think I will quote them all!

H. L. makes several suggestions for future articles, which I have filed in accordance with my wonderful system, and which I hope to refer to later. He asks, also, what I think of the subject of enclosing reply coupons with reports, to ensure the return of a "veri." Unfortunately, I fear they don't ensure anything of the sort, except a loss of the money expended on them!

Very often a reader asks me what is wrong with his set, and gives details which, I am afraid, are seldom sufficiently enlightening to help much. I generally make a "long shot," and occasionally, it seems, I score a bull. On extremely rare occasions I hear from a reader again when he writes to thank me and to tell me that I have done so.

Lots and lots of readers who are worried out of their lives by the poor performance of their sets might take a cue from F. G. E. (Derby), who found that the trouble was night-starvation; in other words, a dud H.T. battery. I believe this accounts for about 50 per cent. of the trouble experienced by owners of battery sets.

When the Earth Doesn't Help

F. W. (Hampstead) finds that he ruins his reception (which is quite good without an earth) by connecting an earth to the set. He tells me, though, that when he stands the set on a rubber mat, it will "accept" the earth-lead, but signals are fainter and selectivity higher. It seems to me that there's a serious snag hidden somewhere in this state of affairs. I am inclined to back up the advice given by the makers of the set, which is, "Leave the earth-lead off and let well alone."

G. W. G. (Ipswich) has come back to life again. He tells me that the local radio society, with a "static" membership of fifty and a "dynamic" attendance of

fifteen, continues to thrive. They manage to pick up the A.P. television transmissions down there, although I grieve to report that they use a super-regenerative set for the job.

G. W. G. has a three-letter call—i.e. an artificial aerial licence—and is experimenting with all sorts of transmitting circuits, which he finds more interesting than playing with receivers. Once a receiver works, it *does* work. When a transmitter is really "doing its stuff" to the utmost of its abilities, no one seems to know.

J. W. G. (Southampton) has built a single-valver which seems to go quite well, but he complains that there isn't much signal-strength about the place.

I often wonder whether readers expect too much in the way of volume from a single-valver. It won't give *very* much, running all-out on a local station, you know.

S.W. IN SINGAPORE



Good workmanship in the Far East. A photograph received from S. C. G. (Gloucester), of a set used by him in Singapore. It has the W.L.S. one-valver as a basis, but now boasts four valves.

You want a good pair of 'phones and a moderate pair of ears if you're going to deal with real DX work on a "single." Personally, I don't think it can be beaten for C.W. reception; the signals are always strong enough to come through the background which, though audible, is never liable to drown the signals.

J. W. G. says he has plugged his "single" in to the pick-up terminals on a broadcast receiver, but that operation is full of snags unless one knows the exact internal connections of the receiver concerned. Look at the output of the Adaptor described in the Show Numbers, J. W. G. (I hope you've kept them!); that shows you a fool-proof scheme.

By the way, your circuit diagram that you sent me shows the aerial connected beautifully to the earth side of the grid coil, instead of to the "live" end. I suppose you don't really mean that? If you do—well, that accounts for everything.

E. W. (Liverpool) wants to know something about this business of connecting adaptors to existing broadcast receivers. I think the reply to T. R. R. in the January 2nd issue applies to him.

AMATEUR BAND NEWS

Increasing activity on 10 metres

THE outstanding item of news—which, unfortunately, is not confirmed—is that a British amateur has been heard in the U.S.A. on 5 metres. Seeing that I have heard things like this before, I treat it with the greatest possible reserve. But if it is true, as it well may be, then we would appear to be in for some exciting times.

With my own "straight" receiver down there, I logged a station in French Morocco the other day, and he was coming in as loudly as I have ever heard him on 10 metres. Furthermore, he was working with a Finnish station, also on "five," and that's pretty good DX work, anyway.

Interesting stations heard on the amateur bands include the following: VK9BA New Guinea (40 metres); J8CF, Korea (20 metres); MX2A and MX2B, Manchukuo (20 metres); and VE5NO, Baffin Land (20 metres).

New Countries Heard

Various new countries have been heard on 10 metres, but as this is only a matter of course, as more stations get down there, they are hardly worth mentioning. Readers with good 10-metre rigs should remember, however, that they stand a good chance of logging some of those elusive Asiatics, such as VS6AH (Hong Kong) and the Japs, if they can listen between 9 and 10.30 a.m. on that band.

Have you ever heard of the Horse Traders' Association? Yes, this is still radio! The H.T.A. is a band of 5-metre amateurs in the states of Connecticut and Massachusetts. Among the somewhat whimsical rules of membership is the cryptic statement, "To trade horses, soap, grid leaks and standing waves with any member, letting your conscience be your guide as to how you stick the other horse." During last year's floods, members of the H.T.A. rendered valuable assistance with their well-organised network on the 5-metre waveband.

American 5-Metre Working

An enormous amount of short-distance traffic is now being handled on 5 metres in the States, and by "short" they don't mean quite what you think, since many of their amateurs have a reliable everyday range of 100 miles. For ordinary cross-town working, of course, 5 metres is ideal, and relieves the other wavebands of much congestion.

The operator of VS4CS, in British North Borneo, arrived home one day to find a monkey climbing out of the window of his shack carrying his portable transmitter! Most of his receiver was lying about the room in small pieces. On another occasion a fowl walked out as he walked in, having left a nice, warm egg in the middle of the rig! Condensers "trodden down to maximum capacity" indicated that the said fowl had been very painstaking. Life in the outposts isn't all that some of us imagine it to be, perhaps.

W. L. S.

SEEN ON THE AIR

(Continued from page 555.)

will be able to give viewers pictures of the procession, the question of televising from the Abbey is still a subject of negotiation.

Discussions have been going on during the last few days. One big problem is the provision of adequate flood-lighting for the television camera, while there is also the problem that if permission is given for televising the ceremony, cinema intrestests might expect to be allowed to film it.

I suppose the record for regular and reliable long-distance reception of television is still held by the Brighton viewer who, since my notes on this subject last week, has communicated with me. He is situated at a distance of about 52 miles from the transmitter. But he points out that his house is about 360 feet above sea-level, and it does not follow that hotels along the front or viewers in the town would be equally successful.

Aerial 420 Feet Above Sea-level

He has an aerial mast on his house, the total height of the aerial above sea-level being 420 feet. Sound is being received at about twice the strength of the vision. Some interference is experienced from passing motor-cars, but that is the only thing that tends to mar the enjoyment of those who watch the screen.

I should be most interested to hear from viewers who can beat this record, not with casual or freak reception of either sound or vision, but with genuine regular reception of both at a distance more than 50 miles from the transmitter.

During the week under review I am afraid I rather blotted my copy-book as the most persistent and indefatigable televiewer in the world. The reason was no flagging of interest, but pressure of other business.

However, I saw a number of transmissions—bad and indifferent from the point of view of material. One of the most successful artists was the 20-years-old American girl, Carolyn Marsh, now appearing in "Laughter Over London" at the Victoria Palace. She has "it"—which, being interpreted in this case, means television personality:

★.....★

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

JOHN SCOTT-TAGGART'S

**Special
Coronation
Receiver**

COMING SHORTLY
IN
"POPULAR WIRELESS"

★.....★

"Flotilla," the naval Music Hall culminating with Arthur Prince and Jim, was another good programme. "Picture Page" came of age, with its 21st edition. Altogether 170 persons have been brought to the studio for this feature, which is, after all, the most consistently successful television feature.

**LEARNING FRENCH
THROUGH YOUR RADIO**

(Continued from page 550.)

TENSE No. 3 is worthy of notice. I will give you it in full:

convins, convins, convint,
convinmes, convintes, convinrent

Also the FUTURE (T. No. 8) and CON-DITIONAL (T. No. 9)

conviendrai conviendrais
conviendras conviendrais
conviendra conviendrait
conviendrons conviendriez
conviendrez conviendriez
conviendront conviendraient.

A word I always associate with VENIR is TENIR (to hold), because it is conjugated just like it. The only difference between the two words is the initial letter. Remember this, will you?

Again, TENIR has a number of COM-POUNDS which behave in the same way as TENIR. They are, moreover, easy to learn because they all exist in English as -tain words, such as ConTAIN, ObTAIN, MainTAIN, etc.

RETENIR to retain
SOUTENIR to sustain
DÉTENIR to detain
CONTENIR to contain
MAINTENIR to maintain
ENTRETENIR to entertain

Try to find more verbs of this kind in English, but above all remember how they are conjugated. I would write some of them out in full if I were you.

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



No. 1070
8/9

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

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

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

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

The movement can be mounted from panel or baseboard.

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

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

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

**EDDYSTONE FULL VISION
DUAL SPEED DIAL**

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**B.T.S. QUADWAVE
TUNER**

EXCLUSIVELY
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by Mr.
JOHN
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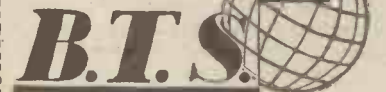
was especially designed by B.T.S. at the request of Mr. John Scott-Taggart, and therefore is the ONLY Unit for the S.T.800. Since the introduction of the S.T.800 thousands of B.T.S. Quadwave Tuners have been sold, many on recommendation. What better proof of quality can there be? There is NO substitute for the B.T.S. Quadwave Tuner for your S.T.800. Covering all wavebands, long, medium, short, it is completely assembled in metal case with black chrysaline finish, and is ready for instant mounting. PRICE **23/6**

ALSO SPECIFIED
B.T.S. S.T. 800

H.F. CHOKE
Mr. John Scott-Taggart says "No other possible." To make sure of obtaining none other than B.T.S. look for the orange carton with the B.T.S. trade mark. REFUSE ALL SUBSTITUTES. **1/9**

Due to the following advances in the prices of raw materials: Copper Wire 20% advance. Screws and Terminals 25% advance. Steel Sheet 15% advance and the increased cost of labour, we are reluctantly compelled to increase the price of B.T.S. S.T.800 Quadwave Tuner to 23/6. This new price is effective from Jan. 18, 1937.

FROM ALL GOOD RADIO DEALERS, or send cash direct. Send for list of other B.T.S. Components and for No. 2 issue of "The Short Wave Constructor."



BRITISH TELEVISION SUPPLIES, LTD.,
FARADAY HOUSE, CHARING CROSS ROAD, LONDON, W.C.2

"OVER THERE"

A feature devoted to various aspects of American radio, giving interesting sidelights on the artists and microphone methods of that country

JUST WILF!

WILFORD DAVIDSON, Canadian Broadcasting Corporation baritone, has almost given up hope of ever seeing his name spelled correctly. Just why the first name should be spelled Wilford is beside the point, but listeners who write him, radio editors, and even his home studio office workers, apparently delight in twisting the monicker. Most common of the variations is Wilfred. Then comes Wilfrid, Wilfred, Wilfren, Wilfrad, and so on. He is seriously considering ending the guess-again game by changing the offending name to just ordinary Wilf.

TOO MUCH BALLYHOO

THE trek of radio towards Hollywood gained impetus in 1936; modernistic studios made filmland quite a broadcasting centre. But radio in drawing from the screen for talent found it extremely difficult to avoid over-publicising the artists and their new pictures. These broadcasts are often marred by too much ballyhoo.

MINNIE SINGS

MINNIE, the world's only lyric soprano mouse, had been looking forward to offers from stage and screen. She made her sensational world premiere broadcast on N.B.C.'s Jamboree over the N.B.C.-Blue Network recently.

The precocious rodent sang twice for the radio audience and obligingly repeated her performance for news-reel photographers. She sang the difficult aria from the complicated Mousekowsky symphony.

ALL-WAVERS

OF the 24,269,000 homes now equipped with radios in the United States, according to estimates of the Radio Manufacturers' Association, about 6,700,000 have so-called all-wave receiving sets, which means that they can pick up foreign short-wave broadcasts as well as domestic programmes.

DOUBLE CHECK

MEREDITH WILLSON, N.B.C.'s Western Division General Musical Director, has discovered that a Chicago bank clerk is checking up on him. The conductor has frequent occasion to forward cheques to that city, and on examining cancelled vouchers the other day was surprised to find notes scribbled on their backs. "Fine concert, last night; keep up the good work, old boy," is a sample of the observations made by the unknown Chicago admirer.

THEIR OWN LITTLE SET

A JUDGE recently had to rule in a divorce action, partly growing out of complaints by husband that he preferred light music on the radio, and by wife that she preferred Wagner. The husband threw the set out of the window, smashing it. The judge suggested they buy two radio sets, each equipped with earphones, so both might listen without annoyance to one another. This seemed to satisfy the litigants, and presumably they are now living happily together.

MUSIC FOR TOTS

BECAUSE Irene Wicker, the *Singing Lady*, couldn't find any adaptations of musical children's plays that tots could play and sing, she went to work and simplified some of the great operas and plays based on fairy tales.

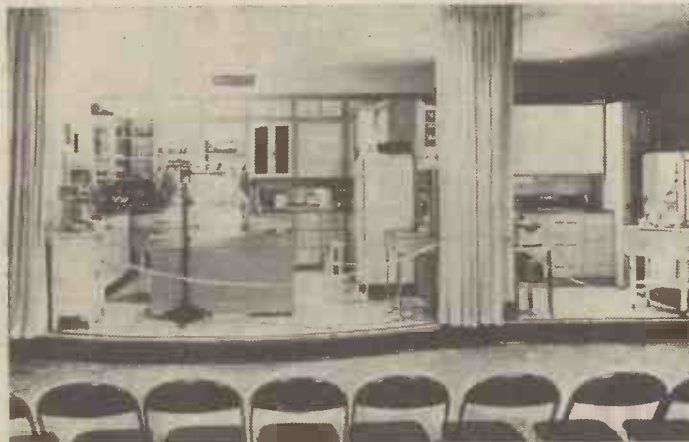
HIS GAGS WILL LIVE ON!

DAVE FREEDMAN is dead, but the humour that he brought to radio will live on. He died on the second day of his Federal Court suit against Eddie Cantor for alleged debts on radio and other writings.

DO YOU DOODLE?

VINCENT LOPEZ, C.B.S. "Speedshow" maestro, has added "How Do You Doodle?" to his growing list of song novelties. Now, to "doodle" is to scribble surrealist nothings on telephone scratch-pads while listening to a long-winded caller, on tablecloths while absorbed in thoughts of the steak dinner momentarily to arrive, on magazine cover margins in abstract moods, and on a variety of other scarcely apt places. The word was popularised in the

STUDIO KITCHENS



A glimpse inside one of the studios of the American station W K Y, showing two well-equipped kitchens. The one on the right has an electric-stove, and that on the left a gas-stove.

film "Mr. Deeds Goes to Town." Lopez tells the story of doodling in his song. He's an inveterate one himself.

HE SPREAD HIS WINGS!

"**LINDBERGH** took a chance and made it—so will I," Jack Oakie claims he reasoned when he contemplated a trip to Hollywood and a fling at the films.

Jack Oakie (heard every Tuesday on Camel Caravan over the W.A.B.C.-Columbia network) was born at Missouri on November 12th, 1903. He insists with all seriousness that he found inspiration in Lindbergh's flight for his own projected trip to Hollywood.

SNIPPY-SNIPS

LITTLE Orphan Annie, radio serial heard Mondays to Fridays at 5.45 and 6.45 p.m. E.S.T., over the N.B.C.-Red Network, celebrated the completion of its sixth year on the air on Christmas Day.

Ed Wynn has to sprint over 100 yards during the course of his N.B.C. broadcasts. He dashes on to the studio stage with Graham MacNamee for each comedy spot, and leaves just as quickly at the end of the last gag. This

circuit is repeated five or six times during a broadcast.

Before radio made its debut Michael Romano was secretary to Rudolph Valentino, famed lover of the silent movies. Now Romano is a talented radio actor.

"I am a great believer in lying," says Irvin S. Cobb, the sage of the Palucah Plantation, heard on N.B.C. "I don't know how we could get along with our fellow-men if we didn't do a powerful lot of lying and use an awful small amount of truth."

Fred Allen, who spoofs mystery thrillers on N.B.C. through the medium of the Mighty Allen Art Players, is ambitious to write serious detective stories. He browses in a large library of books on criminology and scientific deduction methods and revels in a collection of the world's best mystery novels.

WHY?

WRITING a new song every week for his Sunday programme, "Driftwood," broadcast from Winnipeg over the Western Network of the Canadian Broadcasting Corporation, is no difficulty for Organist Allan Caron. He can write the music, he claims, in fifteen minutes. But he gets inspiration for the words only between 10 p.m. and midnight on Mondays.

Allan is at a loss to explain what causes this. But it is a fact. He can sit down and compose music for a new song at any time of any day. All he needs are the first two notes and a likely title. But, with the words it is different. He can't get what he wants until Mondays between the last two hours of the day. Then they come almost without effort.

STARS OF TO-MORROW

A MATEUR actors who may become radio's dramatic stars of to-morrow are displaying their talent in a new weekly N.B.C. programme entitled "Do You Want To Be an Actor?"

"Do You Want To Be an Actor?" is a paradise for amateur actors and actresses who are here given their first opportunity to show their histrionic skill before a microphone.

During the broadcast they are coached in technique of reading dramatic lines before they take roles in the final production of a play or scene.

AN ANGEL'S VOICE

JESSICA DRAGONETTE, now one of America's most prolific broadcasters, was born in Calcutta, India, of French parentage. She lived six years in India, then travelled with her father throughout Europe. She made her theatrical debut in the Max Reinhardt production "The Miracle." Was listed on the programme as "the voice of an angel." But was unseen by her audience as she sang from the fly-loft of the stage.

The following season was featured in "The Student Prince" as Kathe. Broadway next saw Jessica in "The Grand Street Follies," when still in 'teens. A cold, official-looking envelope started her radio career. It asked her to consider radio as a career. So she passed up a promising theatrical career to accept.

1936 BROADCASTING REVIEWED

Some interesting facts about the B.B.C. Dance Orchestra, and broadcasts from abroad are included in this week's summary of the B.B.C.'s work during the past year.

THE first musical programme of the New Year was given by Henry Hall and the B.B.C. Dance Orchestra in the first half-hour of New Year's Day, and by the end of the year a total of nearly four hundred hours' broadcasting had been achieved.

"Henry Hall's Hour" continued at fortnightly intervals on the lines already established; i.e. dance music by the B.B.C. Dance Orchestra, a novelty presentation of song and story, "resident" comedians, and occasionally the inclusion of outstanding guest artists.

The band celebrated its birthday on March 15, and considerable development took place for the start of its fifth year of broadcasting. The band itself was increased to twenty-one instrumentalists by additions to the brass and string sections. Additional singers, including a girls' trio (Molly, Marie and Mary) were also introduced.

A month later there was a further development arising out of the possibilities of this enlarged orchestra. A small combination consisting of strings, wood wind and rhythm was drawn from it and given the title "Henry Hall's Music Makers." A new series of programmes called "Midnight Music" was inaugurated and given from 11.40 p.m. to midnight on alternate Saturdays since that date. The programmes consisted almost entirely of old favourites, and the new combination met with such success that it was later introduced from time to time during the normal programme of the full B.B.C. Dance Orchestra.

In May Henry Hall was invited to be guest conductor for the broadcasts by the "Queen Mary" Dance Orchestra on the maiden voyage to New York. Mr. Hall was responsible for no less than fourteen broadcasts from the ship in four days. The programmes were re-broadcast from coast to coast on the two main American networks, N.B.C. and C.B.S.

After the enlargement of the B.B.C. Dance Orchestra various feature programmes were broadcast during the mid-evening periods from time to time. These programmes were built around some central theme, such as "The Everlasting Waltz," "Continuous Performance" (programmes of film tunes presented in an unbroken selection), "Continental Tunes," and "What I Heard In America." These provided a useful contrast to the orchestra's principal programmes of current dance tunes.

The orchestra made one of its rare public appearances at the London Palladium during the week beginning July 6, and this was so successful that it was found necessary to appear for a further week beginning August 10. The last day of this particular week was a very busy one for the orchestra, since, in addition to three performances at the Palladium, it also broadcast in "Henry Hall's Hour" during the late night period.

After the orchestral holidays the band resumed its programmes early in September. Oliver Wakefield, a young South African

comedian who had been appearing in America with Rudy Vallee and Paul Whiteman, was introduced into "Henry Hall's Hour" as "resident" comedian. He had never previously broadcast in this country and was an overnight success.

Developments in the band itself were also continued by recruiting the services of orchestrators of international repute, and with the further extension of the work of the "Music makers," the utmost flexibility in the style of programmes was possible.

Foreign Broadcasts

In 1936 there was an increase in the number of programmes taken from abroad by land line, by radio channel, and by direct pick-up from foreign short-wave transmitters. Three regular series of programmes were taken: "Transatlantic Bulletin" news commentaries; "Five Hours Back," light variety programmes from the United States; and a series in the summer consisting of light concerts from different European cities. Programmes were taken for the first time from Reykjavik, Seville, Hendaye, Garmisch, Vimy, Linz and Tennessee. The system of engaging speakers to talk from studios on political and topical events for the news bulletins was further developed.

Corresponding interest was shown by foreign countries in B.B.C. programmes. America, as usual, was the principal relay, and took during the year sixty programmes, ranging from symphony concerts to commentaries on boxing matches.

Studios and other necessary facilities were also provided in this country for foreign broadcasting organisations to broadcast in their own countries programmes not transmitted in Great Britain. The B.B.C. was also granted these facilities by its foreign colleagues.

Corporation delegates attended the two meetings of the International Broadcasting Union in Paris and Lausanne. The former was preceded by the first inter-continental meeting of broadcasting services.

Religion

A new book of prayers for the daily broadcast religious service was published in October. "New Every Morning" was compiled with the help of a committee representative of the Anglican and Free Churches and the Church of Scotland; nearly 70,000 copies were sold within two months of publication; and the book figured in the "Newsagent-Bookseller's Review" among the seven "best-sellers" of autumn books.

The religious lectures given by the Dean of St. Paul's and President J. S. Whale provoked several thousand letters from listeners, and, from the wide range of religious talks, Howard Marshall's "What is the Church For?" have led to the widest interest and the heaviest correspondence.

Three Sequences of music, poetry and prose have been broadcast at the times of Christian Festivals; and Sir Walford Davies has completed the third year of his "Melodies of Christendom."

The largest amount ever subscribed to a single broadcast appeal—£27,408 9s. 5d.—was received in response to the appeal on January 5th for Red Cross work in Abyssinia. The appeal was made in England by Canon H. R. L. Sheppard, and in Scotland by Lord Kinnaid.

(To be continued.)

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QUESTIONS AND ANSWERS

By K. D. ROGERS

WORKING TWO SETS FROM ONE AERIAL

W. F. (Glasgow).—*I have a good aerial on which I work a superhet. My brother has come to live with us and wants to work his superhet and his short-wave set from the same aerial. Can he do that?*

Technically, yes. Socially, it depends on you. There is no reason why he should not connect up his set or sets to your aerial, run down his own earth (a separate earth will probably be preferable, though not essential), and go right ahead receiving his programmes. Unless his short-wave set is particularly vile, it will not have the slightest effect on your superhet, and his superhet will also have no effect on yours.

You are quite right in saying, in a later part of your letter, that the use of two or three sets on the same aerial will cut down the strength of signals on each set. But with modern sets the amount of cut-down is more than compensated for by the amplification available in the sets. If you were going to use crystal sets, in which all the energy for operating the telephones has to come from the received signal itself, then the use of more than one set on the same aerial would reduce the strength of reception very noticeably.

In your case, with modern valve receivers, the loss of strength will certainly not be audible, even on the most distant stations. Nor, if the sets are worthy of the name, will you find that the change of tuning on one will in any way affect the tuning on the others. I have myself operated perfectly satisfactorily four or five superhets on one aerial together with an ordinary short-wave set of the two-valve type.

In each case the sets had loose-coupled aerial circuits, and I was able to change about on the tuning and the wavelengths of the sets without any mutual upset of tuning or signal strength. So I don't think you will experience any trouble if you let your brother share your aerial, always provided that his set is a properly built one with loose-coupled aerial. You could let him share the earth, too, if you like, but usually if the sets are going to be in different rooms it will be more convenient and probably more efficient to have your own earths.

REMOTE TUNING CONTROL

G. S. (Golders Green).—*I have several questions to ask, and hope you will be able to answer them. The first is: Can I use the ordinary crystal used in a crystal detector to rectify mains current for H.T.? The second: If I wanted to change the station when listening in on an extension speaker would it be practicable to carry wires from the main tuning condenser to another condenser in the other room? Can you tell me what gauge to use for centring a W.B. Junior chassis?*

First, as regards the W.B. speaker, the makers state that they much prefer listeners to send their speakers to them for centring, which is then done on a special jig and can be guaranteed accurate.

I am afraid you cannot use the ordinary radio crystal for rectifying mains current. These crystals will carry only an infinitesimal amount of current, and are absolutely unsuitable for the purpose you suggest.

Your method of remote tuning is also impracticable, as it would be very bad technically to run tuning leads from your condenser to another room. If you want to change stations from another room the simplest way is to arrange some form of magnetically controlled switch that can be operated in much the same way as a remote control on-off switch.

The switch would be connected to a small pre-set condenser connected across the main tuning condenser. You would be restricted to a choice of two stations, but with the electrically operated switch you could set the receiver to tune to one station when the switch was open and to another when closed.

What would happen would be that the open switch would disconnect the pre-set condenser from the circuit, so that the receiver would be tuned by its own variable condenser only. This would be set to the lower in wavelength of the two stations you have decided to listen to.

When the switch is closed it connects in circuit the pre-set condenser across the tuning condenser, and while the latter is left set as before, the pre-set is set to add sufficient capacity to bring the wavelength to which the set is tuned to the higher wavelength which is required.

By this means you can sit in your armchair in the distant room and switch from one station to another perfectly easily and with complete success. There is one point on which I must touch. If your set has reaction you must see that the reaction is set so that it will not spill over when you switch from one station to the other.

In fixing up the arrangement you must have the pre-set condenser as close to the wiring of the tuning condenser as possible, so that both the pre-set and the remote control mechanism must be placed close to the receiver. You must not have long trailing tuning leads, or you will lose efficiency and signal strength.

GRID-TRANSFORMER INTERFERENCE

L. N. (Barnsley).—*I read with interest your correspondent's letter in January 2nd "P.W." regarding*

interference from a mains transformer situated near his aerial, and whilst I cannot tell him how to stop it, I can, I believe, say why it is worse in foggy and frosty weather. The reason, I think, is, assuming that the transformer supplies a domestic scheme, that in bad weather there would probably be twice as much load on the transformer. That is, twice as much power being used.

The transformer would radiate electromagnetic waves which would possibly be picked up by his aerial, therefore the more load on the transformer the worse would be the radiation, and the worse the interference.

I should think the only way to stop interference would be to shield the transformer and the overhead wires. Wishing "P.W." every success.

Thank you, L. N. Has anyone else a solution to the problem?

A BAD BOOM

S. T. G. D. (Grantham).—*I have just bought a new speaker which is very good in the bass. I have attached it to the old set which uses a shunt-fed transformer in the L.F. circuit. Unfortunately, I get a nasty boom round about 120 cycles, a boom which does not seem to be due to anything in the way of box or baffle resonance, but to the speaker. I cannot understand it, because the speaker sounded perfectly O.K. when I tried it on a friend's set.*

I expect that the trouble is due to the L.F. circuit of your set. You do not state what the transformer is or what coupling condenser you are using for the shunt-feed arrangement, but probably the trouble lies in that condenser.

You must not lose sight of the fact that when you use a shunt-feed arrangement like that you actually tune the transformer, and the tuning is carried out by the condenser coupling the transformer with the valve.

Now, if you have tuned that transformer to give a bass peak or a maximum bass amplification at 120 cycles you may be overdoing it with your present speaker, which is a good bass reproducer. In addition, it may be that the speaker has a diaphragm resonance at about 120 cycles, but there is also often by the makers so that the speaker shall sound good down the bass end of the musical scale.

If that is the fact you are obtaining not only a bass peak amplification from your transformer coupling at about 120 cycles, but you are obtaining maximum bass sensitivity from your speaker at round about the same frequency.

The cure is to alter the coupling arrangement of the transformer. You can try a smaller condenser, which will give you your amplification peak at a higher frequency and so avoid the coincidence of peaks, or you can try a larger condenser which may enable you to get an amplification peak below 120 and so avoid the trouble that way.

It is a case where experiment is necessary. If you use a smaller condenser you may find that you have not enough bass in your reproduction. That depends on the speaker. If you use a larger condenser you may find that you still have too much bass—if the speaker is one that gives very pronounced bass reproduction. But it is very unlikely that you will get held up by both snags. Probably one or the other will suit, and I expect that the increase in condenser size will be the better way out of the trouble.

It depends, of course, on the size of condenser you are using now. You can go too far in the matter of capacity and cause a definite time lag which will be audible and will give you very poor results, but I should certainly try the effect of adding capacity to the condenser you are using now.

There is no need to get a bigger condenser. You can add others in parallel with it until you find out the right capacity. Then you can put in a new condenser so that the set is kept neat.

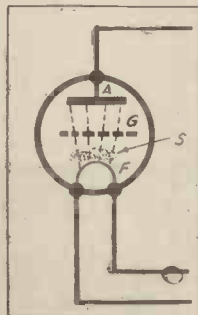
When reducing the capacity of the coupling arrangement you can place other condensers in series with the one you have in use now, changing to a single condenser when the right capacity has been found.

If the speaker is one that "goes well down" it will probably be a good plan to so arrange the capacity that the amplification peak comes right at the lower end of the speaker compass. Then you will get an automatic compensating arrangement that will give you good bass reproduction.

The Editor cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped, addressed envelope must be sent with every article. All Editorial communications should be addressed to the Editor, "Popular Wireless," Tallis House, Tallis Street, London, E.C.4. All inquiries concerning advertising rates, etc., to be addressed to the Advertisement Offices, John Carpenter House, John Carpenter Street, London, E.C.4. The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concern the most recent developments in the radio world, some of the arrangements and specialties described may be the subjects of Letters Patent, and the amateur and the Trader would be well advised to obtain permission of the patentees to use the patents before doing so.

TECHNICALITIES EXPLAINED—No. 37

SPACE CHARGE



When electrons are given off by the heated filament or cathode of a valve they tend to collect around the filament from which they have been "boiled" off. The only way to remove them is to apply anode potential, and this results in the flow of the electrons from filament to anode.

The grouping of the electrons round the filament is called the space charge, and though the majority of the electrons are attracted to the anode there are always a few left hanging around the filament. These are the space charge electrons, and are a hindrance to the flow of the others coming off the filament.

These space charge electrons are of negative potential, and so repel the arrival of any more of their negative brothers from the filament.

TECHNICAL JOTTINGS

Some items of interest

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

Screening-Grid Voltages

THE voltage applied to the screening grid of an S.G. valve should be pretty accurate to the amount specified. The voltages applied to other parts of the circuit, for example to the anode of the detector valve, may be allowed to vary within certain limits, and whilst this also applies to some extent to the voltage of the screening grid, the limits within which it may vary are distinctly narrower.

If you are using batteries for supplying this voltage, and the batteries are in good condition, you will be quite safe by simply connecting the screening grid to the appropriate tapping on the battery. But if, as is more likely, you are using some kind of mains unit, then there is a word of caution to be given. The tapping on the unit which you will find most appropriate for the screening grid is the detector tapping, and this often has an output voltage of 70 to 80 volts.

Small Current Consumption

The important point to notice is that whereas the detector may consume a current of 2 milliampères or more, the current consumption of the screening-grid is only a fraction of this amount. Now, with a battery in good condition, the differences in these amounts of current consumption will make practically no difference at all to the voltage output. But with a mains unit the difference in the currents drawn off may make quite a large difference in the output voltage. The mains unit, as you know, derives its various tapping voltages from one highest voltage output from the transformer by means of a series of dropping-resistances, and therefore it depends for its very operation on the consumption of current pulling the voltage down. The result of all this is that the voltage of the tappings will be much higher on open circuit, or when a very small current is being drawn off (which is nearly the same thing), than when an appreciable current is flowing from the tapping.

The Detector Tapping

The unit is so arranged that the detector tapping, to take the one in question, gives the right output voltage when the current which is being taken from it is the current consumed by the average detector valve. If, therefore, you use such a tapping for the screening grid, unless the tapping is already carrying the intended load, this voltage will be much too high and you will not get the best results.

It is a good plan to test the voltage of the screening-grid tapping—or any other tapping for that matter—whilst the unit is actually in operation. This can be done by means of a voltmeter, but the internal resistance of the voltmeter must be so high that the current which it draws is small compared to the current which is already flowing from the tapping before the voltmeter is connected to it. If the current flowing is of the order of a few milliamps, this condition will probably be

fulfilled, but if the current is only a fraction of a milliamp, as in the case of the screening grid, it is unlikely that the current drawn by the voltmeter will be small enough not to upset things, unless the voltmeter is a high-grade instrument.

Using a Loading Resistance

What you can do—and probably this is the simplest thing after all—is to connect a suitable resistance from the tapping in question to the negative terminal of the unit, the resistance being so chosen that it represents the same load as a detector valve, that is, that it consumes the same current as the detector. The additional current due to the screening-grid will be negligible, and by loading the tapping in this way you will pull down its voltage to a suitable value and will be pretty sure to be near enough to the mark.

Ganged Circuits

One of the most important parts of most modern sets is the ganged circuit, and this is a part of the circuit which many constructors find it most difficult to understand.

Perhaps the first thing to remember is the importance of using the proper components. If you are making a circuit according to published design, the components will all be very definitely specified, and all you have to do (although many people do not seem able to do it) is to stick to the components recommended. But if you are not working to a published design, you want to take very special care with the choice of components, especially the coils.

Effect of Trimmers

Another point which, although pretty obvious when mentioned, seems to escape the attention of many experimenters, is that the trimming condensers do not have the same effect at all parts of the tuning scale. The maximum capacity of the trimmer condensers is only a very small fraction of that of the main tuning condensers, and the ratio of the capacity of the trimmer to the capacity of the main condenser will obviously be greatest when the trimmer is turned to its maximum capacity and the main condenser is turned to its minimum capacity. If the reverse is the case, and the main condenser is at its maximum capacity, then the effect of any adjustment of the trimmer is at a minimum.

Consequently you want to make any adjustments with the main condenser at the lower end of the dial.

Dealing With a Bandpass Filter

A typical case, which will serve for explanation, is the popular three-gang condenser arrangement with a bandpass filter and inter-valve coil. There will be a trimmer for each of the three sections of the condenser unit and, in starting to adjust, the best thing to do is to fix the trimmers to their maximum capacity, and then to adjust them all by the same amount.

Another point is that the adjustment of the trimmers will depend upon a number of factors, including the characteristics of the valves themselves. This is why you have to re-adjust the whole of the ganging when you change a valve, notwithstanding that the new valve may be reputed to be identical with the one which it replaces.

(Continued on next page.)

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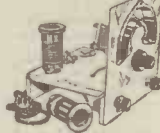


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TECHNICAL JOTTINGS

(Continued from previous page.)

Condensers Out of Balance

You may sometimes find that one of the trimmers seems to have more effect than the others, as though the main condensers were out of balance. If so, it is probable that the out-of-balance is caused by some stray capacity getting in parallel with the condenser section in question, and you should follow out the wiring and see if this can be avoided.

The "Slope" of a Valve

A term which, although familiar to the old hands, often puzzles beginners in radio (and as I know from my correspondence we have a goodly group of beginners year after year), is the "slope" of a valve. It is obvious that the slope has nothing to do with the valve itself, and in point of fact it refers to one of the characteristic curves of the valve, the "slope" being the slope of the curve and not the valve.

Perhaps I can best explain this by dealing first of all with the term "mu," which is simply the name of the Greek letter which is employed in radio mathematics to denote the amplification factor (or amplification ratio) of a valve. To understand the amplification ratio let us consider a valve in which the grid bias is varied whilst the anode voltage is kept constant. You know that if the grid bias is increased the anode current will decrease, and vice-versa. If the grid bias is increased and we want to bring the anode current up to its original value, we have to increase the anode voltage, and the ratio of the additional volts necessary to keep the current constant to the increase in the grid voltage which caused the change is the amplification ratio: thus if 3 volts increase on the grid made an additional 24 volts necessary on the anode to keep the current constant, the ratio would be 24 divided by 3—that is 8.

An Important Characteristic

Now let us look at the matter in another way. Instead of increasing the anode voltage, in order to counteract the effect of an increase in the grid voltage, let us assume that we merely increase the grid voltage and leave the anode voltage alone. As we have already mentioned, the increase in the grid voltage will cause a reduction in the anode current. If we then determine the change in the anode current brought about by a change of 1 volt in the grid voltage or, to put it more generally, if we divide the change in grid volts into the change in anode current (which gives us the change in the anode current *per volt* change in the grid voltage) this ratio is called the "slope" of the valve. To come to actual figures, let us suppose that 1 volt change in the grid voltage causes a change of 3 milliamperes in the anode current, then the slope of the valve is 3 m/a per volt.

This particular factor or characteristics of a valve, called the slope, is very important because upon it depends the suitability of the valve for certain purposes. Some people have the idea that the only criterion of a valve is the amplification factor or amplification ratio; but, whilst this also is very important, it is not of itself sufficient to determine the suitability of the valve for any particular purpose. It is sometimes better to use a valve with a relatively low amplification factor, provided the slope is of the proper amount.



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

A.C./D.C. "PEOPLE'S" SET

THE Philco "People's" set, which was introduced to the public last Autumn, is now available in A.C./D.C. form. This receiver is therefore now made in three models: for battery users, for those on A.C. mains, and for universal mains, as mentioned above.

The new model costs 7 guineas and incorporates a four-valve superhet circuit (plus barretter). It has full A.V.C., an illuminated full-vision dial marked in station names, kilocycles and metres, and gives an output of 2½ watts. The cabinet is a bakelite moulding with a brown walnut finish.

* * *

ALL-WAVE SUPPRESSOR

Messrs. Belling & Lee announce that they have discontinued their type 1256 set lead interference suppressor. This was a unit for medium and long-wave suppression and it has now been superseded by an all-wave suppressor known as the type 300 and priced at 21s. This unit is rated at 1 amp. and is capable of giving suppression down to 10 metres. The fact that the earth lead is filtered makes it a better suppressor on all waves up to 2,000 metres. Although suppression is not claimed below 10 metres, in practice the makers have found this model will, in many cases, substantially clear up the residual "sandstorm" effect on a television screen.

* * *

UP-TO-DATE SERVICING

The G.E.C. inform us that the existing range of receivers will be continued unchanged until June, 1937, at the earliest, and also that no alteration in the prices of existing receivers is contemplated.

New sets in the higher price class will be introduced shortly to fill gaps in the present programme.

Those who already own G.E.C. receivers, or who are contemplating the purchase of one of this firm's models, will be interested to know that a thoroughly well-equipped radio service depot is in existence at Greycoat Street, London, S.W.1.

This depot operates in close co-operation with the company's works at Coventry and Hammersmith. At the Greycoat Street depot there is always a comprehensive stock of parts for old and new G.E.C. sets, and dealers can always rely upon every assistance being given to them in connection with the installation of anti-interference devices, television installations and any other special problems which may arise.

Sets sent to this depot for repair undergo the most stringent tests, and before despatch have to pass a final inspection and test in a specially equipped sound-proof room.

For a moderate charge all types of wooden cabinets can be reconditioned in any colour with the aid of the spraying plant, with which the polishing department is equipped.

A special point of interest is the fact that every valve in each receiver returned for servicing is separately tested, so that when the receiver is returned to its consignor as mechanically and electrically satisfactory, intimation can accompany it directing

(Continued on next page.)

THE RADIO BULLETIN

(Continued from previous page.)

attention to the need or otherwise for the replacement of individual valves.]

The G.E.C. are to be congratulated on this thoroughly up-to-date after-sales organisation.

AVO PRICE INCREASES

The Automatic Coil Winder and Electrical Equipment Co. inform us that the prices of Avo instruments have been increased as from the 15th of this month.

Among the instruments of special interest to "P.W." readers which are affected are the AvoMinor D.C. model, which is now £2 5s. 0d., and the Universal AvoMinor, which now costs £5 10s. 0d. The AvoDapter is now £1 7s. 0d.

NEW OSRAM VALVES

(Continued from page 556.)

4 volts 1 ampere. The N42 can be either transformer or resistance coupled to the previous stage and with the latter it is possible to use the high "m" type such as the H42 or DH42. When employed as a single output stage in a Class "A" amplifier the order of power output is 3 watts for a total harmonic distortion of 7 per cent. This is obtained with a grid input peak voltage of 16.5 and a load resistance of 7,000 ohms. The valve will, therefore, be seen to have a considerable undistorted power output, and it is also possible to employ two such valves in Class "A-B" push-pull where an output of the order of 5.5 watts is obtainable with a total harmonic distortion of 4 per cent, using automatic grid bias.

To operate in conjunction with the above series of valves an existing rectifier—OSRAM U12—is recommended. This is a well-tryed Directly Heated Full Wave Rectifier rated for an output of 120 milliamps at 350 + 350 volts, and is probably the most widely used rectifier of its type in this country.

All the above types are fitted with the standard 7-pin base, with the exception of the U12, and may of course be operated in conjunction with any of the existing valves, if desired, such as the High Slope Output Pentode N41 in conjunction with a Diode D41, in place of the combination N42-DH42; or with a Triode Output of the PX4 type. Suggested alternative combinations are given below:

- (1) **Standard Superhet**
Frequency Changer : X42.
I.F. Amplifier : W42.
Double Diode Triode : DH42.
Output Pentode : N42.
Rectifier : U12.
- (2) **T.R.F. Receiver**
H.F. Amplifier : W42.
Grid Bias Detector : W42 or H42.
Output Pentode : N42 or N41.
Rectifier : U12.
- (3) **Short-wave Superhet**
H.F. Amplifier : W42.
Frequency Changer : X42.
I.F. Amplifier : W42.
Double Diode : D41.
High Slope Output Pentode : N41.
Rectifier : U12.
- (4) **Short-wave Superhet with Triode Output**
H.F. Amplifier : W42.
Frequency Changer : X42.
I.F. Amplifier : W42.
Double Diode : D41.
L.F. Triode : H42.
Output Triode : PX4 (or 2 PX4's in push pull).
Rectifier : U12.

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All Goods Guaranteed and sent Post Paid.

RECEIVERS.—BELMONT. 6-Valve Superhet Receivers, complete in handsome cabinet with moving-coil speaker and six valves. For use on A.C./D.C. mains 100/250 volts. Ready for use on any mains, £4. **VIDOR.** 3-Valve Battery Sets. Model C.N.212. Complete in attractive Walnut Cabinet with three Mullard Valves, Moving-Coil Speaker, Batteries and Accumulator. New, in sealed cartons, £3. 17s. 6d. (List, 6½ gns.)

LUCILLE. 5-Valve American Midget Sets. Complete with 5 Valves. Moving-Coil Speaker. Ready for use on any mains 100/250 volts A.C./D.C. Long and Medium Waves; £3 15s. 0d. New, in sealed cartons.

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COLLARO Single Spring Gramophone Motors with 10-in. turntables complete with all accessories, 11/-.

COLLARO Battery Radiogram Units. Comprising Double Spring Motor and Pick-up mounted on plate with all accessories, 35/- each. All Collaro Motors are Brand New in Sealed Cartons.

SPEAKERS.—CELESTION Soundex permanent magnet, 10/-. TELSEN permanent magnet, with 10-ratio Transformers to suit any Receiver, 12/6. Telsen Loud-Speaker Units, 2/6. All Brand New and Boxed.

COILS.—Telsen Iron Core, W.349 (Midget size), 4/-. Type W.478 (Twin), 9/- pair. Type W.477 (triple), 16/- per set. Type W.476 (triple Superhet, Selector and Oscillator), 16/- per set. All ganged coils complete on base with switch. Telsen I.F. Transformer Coils. 110 kc., 5/-.

Telsen Dual Range Coils, with aerial series condenser incorporated, type W.76, 4/-.

Telsen Aerial condensers with shunting switch, 2/-.

All Telsen components Brand New in sealed cartons.

CAR RADIO AERIALS.—Ekco copper mesh aerials can be used on roof or floor of car, 36-in x 20-in., 4/-; 36-in. x 20-in., 5/-.

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

MISCELLANEOUS BARGAINS.—All brand new in original sealed cartons: Telsen A.C./D.C. Multimeters, test anything radio or electrical, 8/6. Telsen 2-range Voltmeters, 3/-; 3-range meters, including milliamps., 4/-.

Ace (P.O.) Microphones, with transformer ready for use with any receiver, 4/6; 36 assorted Tru-ohm Resistances, 1 watt, colour-coded and marked, 36 on card, 6/- per card. Bell Transformers, 200/250 volts, input 3, 5 and 8 volts output, 3/6; Morse Signal Units, incorporating buzzer, tapper and flash with international code, complete with batteries and bulb, 3/9 each. Varley Square Peak Coils, B.P.5, 2/-; Marconi V.24 and Q type valves (useful for short-wave experiments), 1/6; glass insulators, 4d. Lightweight headphones, double pole, 4,000 ohms each ear piece, 3/- pair. A.C. Trickle Chargers, for 2, 4 and 6 volts, 17/6.

CAR and RADIO BATTERY CHARGERS, incorporating Westinghouse Metal Rectifier. This Charger will enable you to keep your car batteries fully charged, for use on 2, 6 and 12 volts, 45/- each.

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SOUTHERN RADIO. Branches at 271-275, High Road, Willesden Green, N.W.1.; 46, Lisle Street, London, W.C.2. All mail orders to 323, Euston Road, London, N.W.1.

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Wave-length.	Station.	Call-Sign.	Power.	Wave-length.	Station.	Call-Sign.	Power.
13.93	Pittsburgh	W8XK	40	31.07	Lisbon	CT1AA	25
13.93	Daventry	GSJ	10	31.13	Rome	2RO	25
13.94	Wayne, New Jersey	W2XE	1	31.25	Moscow	RAN	20
13.97	Daventry	GSH	10	31.27	Radio Nations	HBL	20
15.93	Bandoeng, Java	PLE	60	31.28	Philadelphia, Pa.	W3XAU	10
16.86	Daventry	GSG	10	31.28	Sydney	VK2ME	20
16.87	Bound Brook	W3XAL	35	31.28	Eindhoven	PCJ	20
16.88	Huizen	PHI	23	31.32	Daventry	GSC	15
16.89	Zeesen	DJE	5	31.32	Lyndhurst, Australia	VK3LR	1
16.89	Wayne, New Jersey	W2XE	1	31.35	Millis, Mass.	W1XK	10
19.52	Budapest	HAS3	20	31.36	Bombay	VUB	45
19.57	Schenectady	W2XAD	18	31.38	Zeesen	DJA	5
19.60	Daventry	GSP	10	31.45	Zeesen	DJN	5
19.62	Buenos Aires	LRU	5	31.48	Jeloy	LKJ1	1
19.63	Zeesen	DJQ	5	31.48	Tokio	JZI	20
19.65	Wayne, New Jersey	W2XE	1	31.48	Schenectady, New York	W2XAF	30
19.66	Daventry	GSI	10	31.55	Melbourne, Australia	VK3ME	15
19.68	Radio Colonial, Paris	TPA2	12	31.55	Daventry	GSB	15
19.69	Podebrady, Prague	OLR	30	31.58	Rio de Janeiro	PRF5	5
19.71	Eindhoven	PCJ	20	32.88	Budapest	HAT4	5
19.72	Pittsburgh	W8XK	40	38.48	Radio Nations	HBP	20
19.74	Zeesen	DJB	5	39.89	Moscow	RV96	20
19.76	Daventry	GSO	10	48.78	Winnipeg	CJRO	2
19.82	Daventry	GSF	10	48.86	Pittsburgh	W8XK	40
19.84	Vatican City	HVJ	10	49.02	Wayne, New Jersey	W2XE	1
19.85	Zeesen	DJL	5	49.10	Daventry	GSL	15
22.00	Warsaw	SPW	10	49.18	Chicago, Ill.	W9XF	10
24.52	Reykjavik	TFJ	7.5	49.18	Bound Brook	W3XAL	35
25.00	Moscow	RNE	20	49.20	Johannesburg	ZTJ	5
25.23	Radio Colonial, Paris	TPA3	12	49.26	Hong Kong	ZBW2	2
25.27	Pittsburgh	W8XK	40	49.50	Philadelphia, Pa.	W3XAU	10
25.29	Daventry	GSE	15	49.50	Cincinnati	W8XAL	10
25.36	Wayne, New Jersey	W2XE	1	49.59	Daventry	GSA	15
25.36	Lisbon	CT1AA	2	49.67	Miami	W4XB	25
25.38	Daventry	GSN	15	49.67	Boston, Mass.	W1XAL	10
25.40	Rome	2RO	25	49.83	Zeesen	DJC	5
25.45	Boston, Mass.	W1XAL	10	49.85	Bogota, Colombia	HJ3ABH	16
25.49	Zeesen	DJD	5	49.92	Podebrady, Prague	OLR	30
25.51	Podebrady, Prague	OLR	30	49.96	Montreal, Canada	CFCX	6
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