

POPULAR WIRELESS, December 17th, 1927.

REGISTERED AT THE G.P.O. AS A NEWSPAPER.

# HOW TO MAKE THE "PROGRESSIVE" THREE (See Page 835.)

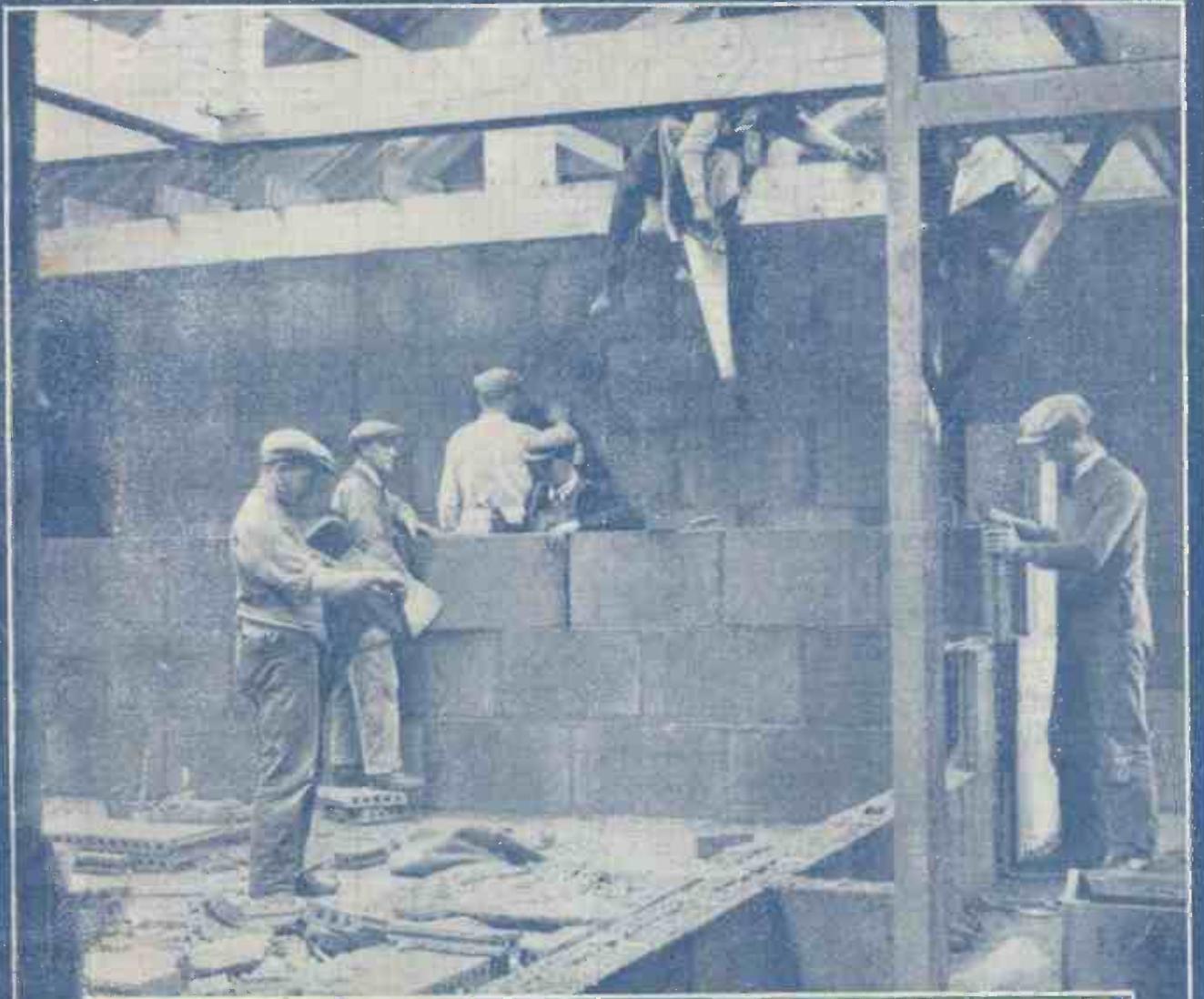
# Popular Wireless

Every Thursday  
PRICE  
3d

No. 289. Vol. XII.

INCORPORATING "WIRELESS"

December 17th, 1927.



#### SPECIAL FEATURES IN THIS ISSUE

Light In Our Valves. B.B.C. Personalities of To-Day  
The ABC of H.F. Amplification. Adding That Amplifier

Our cover photograph shows the new Belfast studio in the course of construction.



## *A great little condenser!*

THE Dubilier fixed condenser with its di-electric of best India Ruby Mica, is hermetically sealed into its bakelite case to render it absolutely immune from the effects of damp or dust.

Before being sealed, however, the condenser element is subjected to enormous pressure, immersed in boiling wax, and kept so rigidly clamped when assembled that the excluded air can never regain entry. Finally the excellent bakelite moulding acts as an extremely high resistance and prevents losses through current "creeping" across between the terminals.

Years of experience and specialised craftsmanship go to the making of this great little condenser; see that it figures prominently in every set you build.

All Dubilier Products are fully described in the catalogue shown here. In addition there is a lot of information which you may find interesting. If your dealer has run out of copies we will forward you one free.



# DUBILIER

REGISTERED TRADE MARK

Advt. of The Dubilier Condenser Co. (1925) Ltd., Ducon Works, North Acton, London, W.3.

## DUBILIER DICTA



Truly we progress in cycles. What must have been the first wireless set to be used on active service had an aerial consisting of paraffin tin cans strapped up on bottles.

The mighty spans of aerial covering acres of ground and supported on masts over eight hundred feet high connect the peak of the curve, and we are already descending again via the modern directional aerial of increasingly diminutive proportions.

If this sort of thing spreads to receiver practice we may soon expect to be building the "Cocheret five" or the "Maggie Super eight."

When the small accumulator was sold mostly for running trembler coils on cars, perhaps it was legitimate to rate it at double its actual capacity. Now, when we want an accumulator for valve lighting, we are careful to see that the capacity is rated in terms of continuous, not intermittent, discharge.

There is another little matter in which it will pay you to exercise a spot of circumspection.

It concerns the practice of referring to Mansbridge Condensers in terms of their "test" voltages.

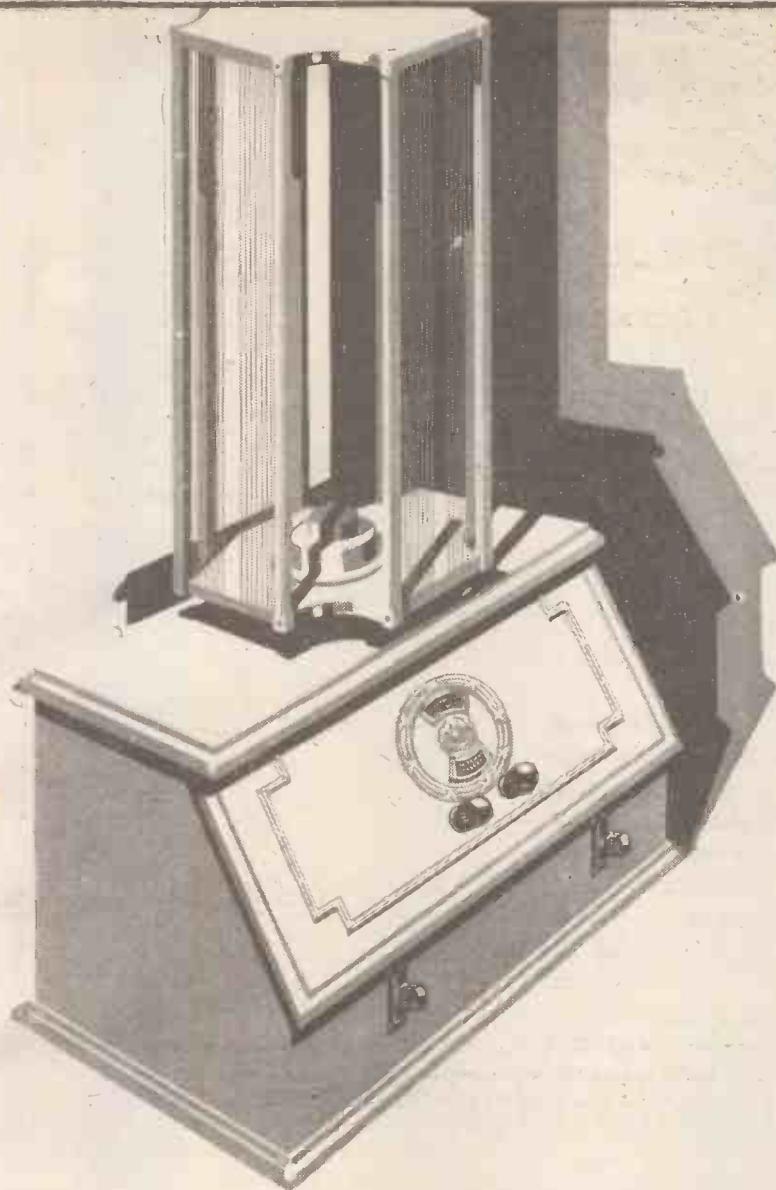
You may be perfectly safe in working a Paper Condenser at half its stated test voltage; on the other hand you may find that it deteriorates rapidly at considerably less than this figure. It all depends upon what is meant by the word "test."

But after all, "test" voltages are things that mainly concern the manufacturer.

What you are interested in is the maximum voltage at which your Mansbridge will work in safety to itself and to your set or battery eliminator.

Turn to the Mansbridge Condenser section of our catalogue (pp. 9 to 12) and you will find that for your convenience all condensers are referred to in terms of their safe working voltages.

# MARCONIPHONE



From the immense Marconiphone organisation comes a stream of inventions, minor as well as major, so that to them falls naturally the lead in wireless evolution.

## YOU GET MORE FROM MARCONIPHONE

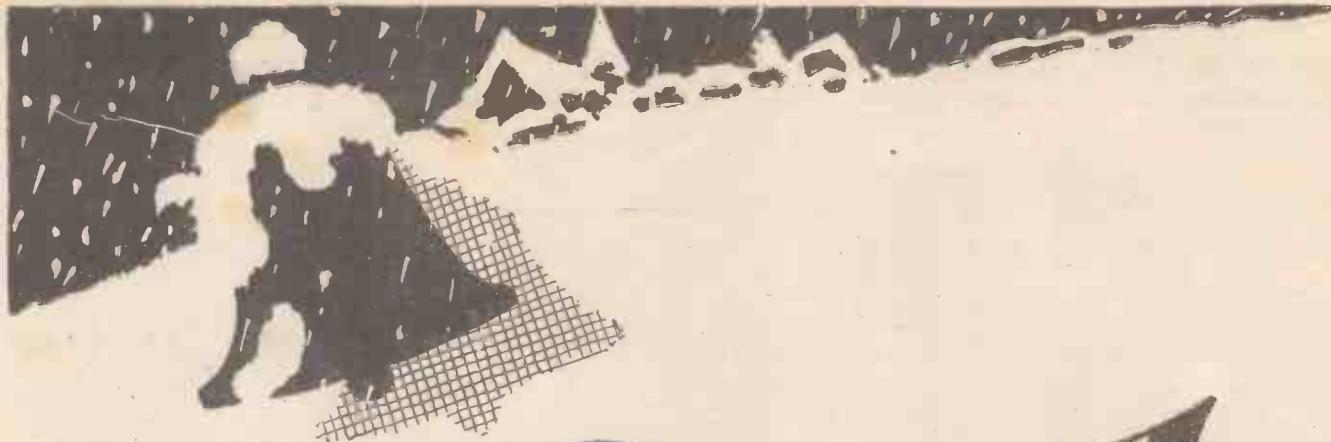
The Marconiphone Super-Eight (8-valve) receiver comes startlingly near to achieving the impossible ideal of perfection. There is only one Tuning Control and, as you turn it, signals from thousands of miles away are picked up and transformed into powerful crystal-clear tones.

Then there is the convenience of the Power Control (which you operate from your chair) and a host of other refinements which make the Super-Eight the most perfect of all receivers. May we send you our booklet No. 438? Receiver only, £53 0 0 (Royalty £6 5 0)

### DEFERRED PAYMENTS.

Marconiphone "Super Eight" Receiving Set, Complete with Valves, Batteries, Leads, and Sterling Type 33 Loud Speaker, Royalty Paid, may be obtained on a first payment of £7 16s. 9d., and twelve monthly payments of £6 3s. 5d. Full particulars on request.

*The Marconiphone Company, Ltd., 210-212, Tottenham Court Road, W.1.*



The  
Cabinet  
£6. 6s.



The  
H.Q.  
£6.



The  
Mascot  
£4. 10s.

# A Present that Speaks

NOT only on Christmas Day, but every day of the coming year, the BROWN Loud Speaker you give will speak your good wishes. Often, during the months that are yet to come, will the recipient of your gift hear expressed in the sweet music of the BROWN, the kind thoughts which prompted the giving. Again and again will he thank you for the rich treasure that you have made his. For the priceless boon of pure and undefiled Music. For the bringing to his home of all that is best in the World's Literature and Speech. For the rich tonic of Humour. And only those who have heard the BROWN know how the uncanny realism of its reproduction makes one and all live.

Here we show three of the many types of Brown Loud Speakers. Your Dealer will be proud to let you hear these and others. From 30/- to £15. 15s.

**BROWN**  
**LOUD SPEAKER**

S. G. BROWN, LTD.,

Western Avenue, North Acton, London, W. 3.  
Showrooms; 19, Mortimer Street, W. 1;  
13, Moorfields, Liverpool; 67, High Street,  
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the Country.

# AN APOLOGY

## Owing to the abnormal demand for NEW R.C. THREESOME COUPLING UNITS

which, commencing at the Radio Exhibition, far exceeded all anticipations, many constructors have not yet been able to obtain these components.

The disappointment which must have been felt by so many people, and the inconvenience which may have been experienced, is much regretted.

Superhuman efforts in manufacture have now placed us in a position to cope with the demand for Coupling Units and your dealer should have ample supplies now.

If any difficulty is experienced in obtaining these units, write and tell us the name of your dealer.

**EDISWAN**  
**VALVES**  
**Clearest. Strongest.  
Last the Longest**

To THE EDISON SWAN ELECTRIC CO., LTD.

(Publicity), 123/5, Queen Victoria St., London, E.C.4.

Please send, post free, presentation copies of the New  
R.C. Threesome Instruction Book and Blue Print.

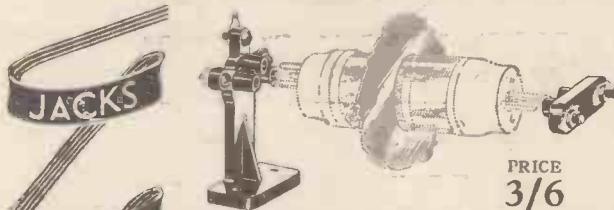
P. W.

NAME .....

ADDRESS .....



## SCREENED-VALVE HOLDER

PRICE  
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## JACKS

## PLUGS

## RESISTORS

## RESISTANCES

## R.C.C. UNITS

## VALVE HOLDERS

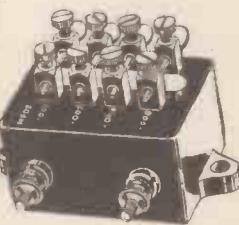
## LOUD SPEAKERS

Conveniently made in two pieces, enabling the valve to be inserted or extracted at will. Fitted with Terminals and Soldering Tags. GENUINE BAKELITE.

## MULTIPLE FIXED CONDENSERS

Although cheap enough to be incorporated permanently their main function is to determine the correct capacity of fixed condenser required in any specific circuit. Two ranges of capacity are made and capacities varying from .0001 to .0015 are obtainable in steps of .0001 and similar variations are to be obtained with the second unit the minimum capacity of which is .001. The acme of neatness and efficiency

PRICE 5/6

Resistance Capacity Coupling Unit.  
(A & B)

Made to suit the valves now marketed for R.C. circuits it is a first rate example of what can be accomplished by a careful study of up-to-date requirements in every direction. So far as can be determined it represents the best ideas in practice, the more remarkable in consideration of its compactness. The "A" unit suits all valves the impedance of which is less than 40,000 ohms and is recommended especially for the detector stage. For valves with an impedance value of over 40,000 ohms the "B" unit can be most effectively used.

If your dealer cannot supply, we send post free.

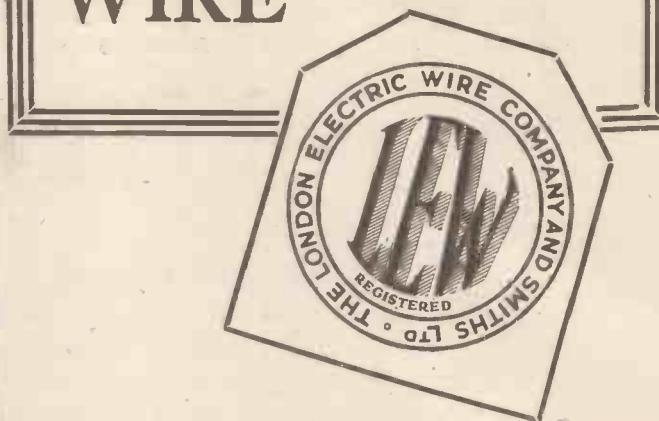
PRICE  
5/6  
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## MULTIPLE FIXED CONDENSERS ETC.

ASHLEY WIRELESS TELEPHONE  
CO. (1925) LTD.,  
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all  
Guaranteed  
Components

Be sure to see  
this mark on  
all COLOURED  
CONNECTING  
WIRE



This LEW trade mark on the label guarantees that it is the original GLAZITE coloured connecting wire. Since its introduction, hundreds of thousands of home constructors have proved the advantages of GLAZITE. It makes wiring simpler, quicker, more efficient and cheaper. Always wire your sets with GLAZITE Coloured Connecting Wire. But be sure it is genuine—insist on the LEW trade mark.

Made in Red, Blue, Green, Yellow, Black and White. Price : 1d. per 10-ft. coil, 9d. per packet of four 2-ft. lengths (Assorted Colours).

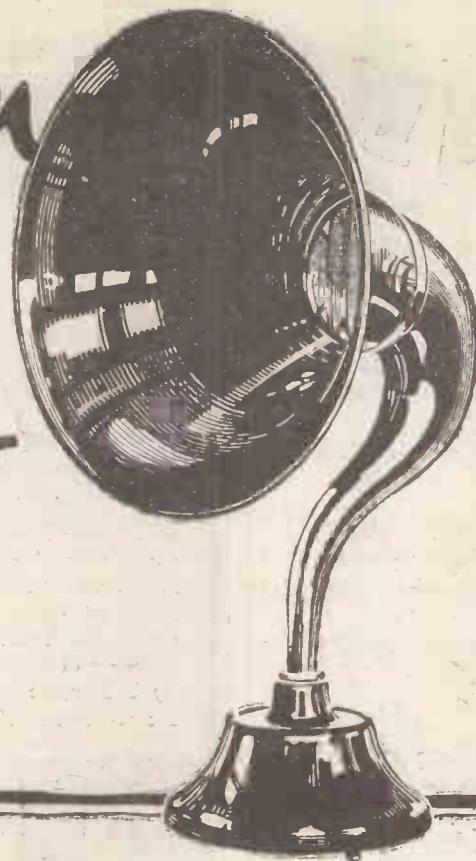
The  
LONDON ELECTRIC  
WIRE CO. & SMITHS LTD.  
Playhouse Yard, Golden Lane, E.C.2.

# GLAZITE

BRITISH MADE REGD

THE ORIGINAL  
COLOURED CONNECTING WIRE

Reduction  
in price



WE have pleasure in announcing that the price of the B.T.H. Type C2 Loud Speaker has been reduced from £3 0 0 to

£2-10-0

The loud speaker itself will remain unchanged and will still be in the future, as it has been in the past, the finest instrument of its kind and class. Give a B.T.H. Loud Speaker this Christmas and you give a present that is sure to please.

*The above price is applicable in Great Britain and Northern Ireland only.*



**LOUD SPEAKER**  
TYPE C2

*The British Thomson-Houston Co. Ltd.*

# Where men meet

**free**

Apply to your Dealer at once for a free copy of the large chart "How to build the Cossor 'Melody Maker'." Nothing quite like it has ever been published before. Soldering eliminated. Every wire shown individually bent to shape and numbered. As easy to build as Mecano. Success guaranteed. If your dealer cannot supply send postcard to A. C. Cossor Ltd., Highbury Grove, London, N.5.

**AT THE CLUB** you'll hear them say "I've just built a Cossor 'Melody Maker.' It's an amazing Set. Picked up eight Stations last night. Beautifully clear. So simple to use."

**ON THE GOLF COURSE**—"Yes, I built my Cossor 'Melody Maker' in one evening. The chart showed me exactly what to do. No soldering was necessary. By building it myself I saved over £5."

**IN THE TRAIN**—"There's nothing to beat a Cossor 'Melody Maker.' I can always be sure of getting at least six different programmes any evening. Such perfect music, too —no one would want anything better."



**The Cossor  
"Melody Maker"**

The sensation of the season. Never before such an amazing response from the public. Many dealers report waiting lists of customers wanting to buy Cossor "Melody Maker" parts. Costs little to buy—yet gives better performance than many factory-built Sets costing more than twice its price. Gives broadcasting from France, Germany, Holland, Italy, Spain, Switzerland as well as all B.B.C. Alternative Programmes.

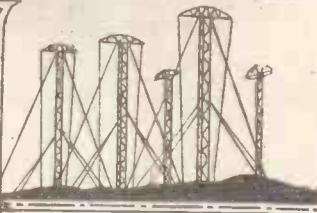
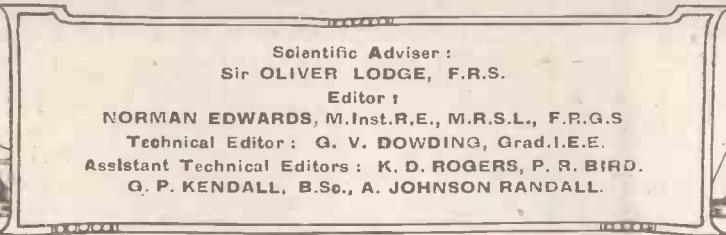
You'll hear them talking about the

# COSSOR

"*Melody Maker*"

Backed by the reputation of Cossor Valves

# Popular Wireless



## RADIO NOTES AND NEWS.

The Regional Scheme—Listen for Kootwyk—Covering the Canary—The Australian Stations—This Week's Technical Hint—The "Sydney" Two.

### The Regional Scheme.

AS I understand the latest proposals, the B.B.C. is aiming at putting two alternative programmes within range of every crystal set. Some people ask, "Why all this tenderness for crystal users?" The reply is that so long as a person pays his 10s. per annum he is entitled to the fullest possible benefits of the B.B.C.'s service, whether he can afford a valve set or not. The B.B.C. could not possibly take any other view.

### What is Progress.

ACCORDING to the "New York Times," Senator Marconi, during his trip to America in October, said that America had progressed in radio ahead of all other countries. As I know from personal experience that an American reporter will invent a half-column interview if he fails to get the interview, I am not sure what the Senator said, or if he said anything. But I regret to have to disagree with the alleged statement. What have the Americans which is good in radio that we have not?

### Telephony Distress Call.

IF you are listening-in and happen to hear a voice calling "Mayday," do not consult the calendar under the impression that your astronomy is all wrong, or that a gentleman from Colney Hatch has escaped and is announcing that he is "Queen of the May." No, the Radio Conference at Washington has formally adopted the word "Mayday" as the distress call for radio telephony. It is derived from "M'aider."

### Heard in the Street.

FOREMAN (to dullard assistant): "Neow! Not the spanner! The 'ammer! Lumme! if there ain't enough blinkin' wood in yore nob to make one of those there blooming wireless 'beams'!"

### Mystery of the Voice.

THAT incident of the little invalid girl who begged to be allowed to hear over the ether the cheery and kindly "Good-night, everybody. Good-night," of one of 2 L.O.'s announcers is to my mind something of a revelation. I never dreamed that the voice, divorced from the actual

presence of the speaker could so deeply affect the listener, especially when transmitted telephonically. I have experienced the difference between various voices, some arriving only as intelligible sounds, and others charged with personality, but this incident has a deeper meaning altogether.

### Listen for Kootwyk.

THE telephony transmitter at Kootwyk (Holland) is provided with a beam aerial, and experiments have shown that thereby the angle of radiation in the vicinity of the station has been reduced to 30 degrees. Kootwyk sends out messages in French, German, English and Italian every Wednesday between 14 and 15 G.M.T. asking for reports on strength, modulation, and constancy. Take note that the call is P C L L, and the wave 18 metres.

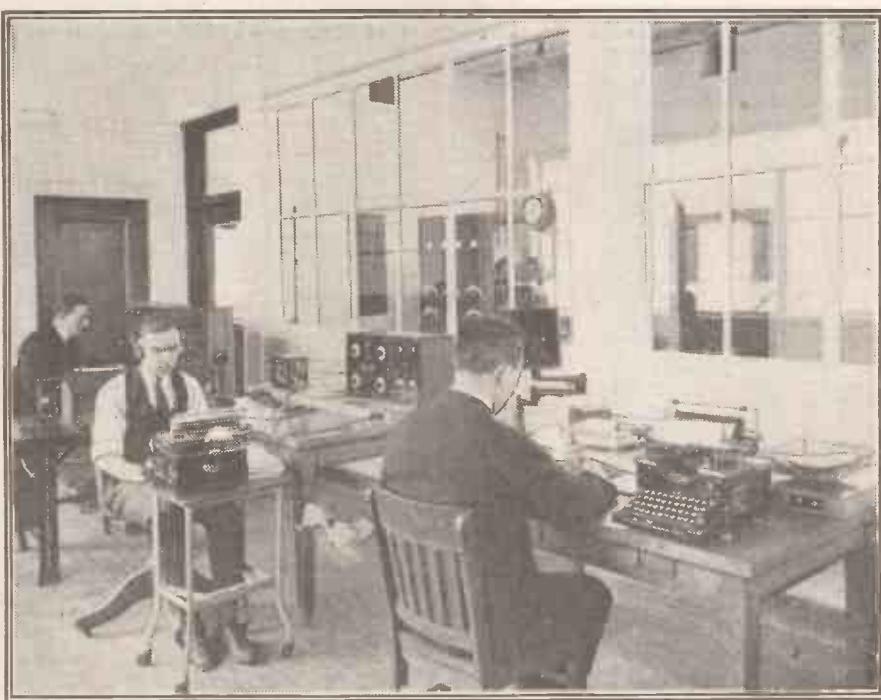
### Iceland Calling.

IF you should hear a broadcasting station sending out messages, music and news in English and gibberish, it may be a station in Iceland called Akureyri, which transmits on 192 metres every Saturday from 7 to 8 p.m. G.M.T. The call is N I 2 S H and the gibberish is Icelandic.

### High Voltage versus Rubber.

THE deplorable accident to Mr. Miller, who was killed not long ago at the Daventry Station through touching a conductor carrying current at high pressure, raises a serious question. The engineer-in-charge is reported to have stated that the voltage in question was between 5,000 and 9,000, and that rubber gloves would be useless as a protection against such voltages. I thought, at the time, that this was not

(Continued on next page.)



Mr. Henry Ford maintains one of the largest commercial radio stations in America. The photograph shows one of the offices, where wireless messages are taken down on typewriters.

## NOTES AND NEWS.

(Continued from previous page.)

quite correct, though no contradiction from "P.W." appeared to be called for; but I am glad to see that the India Rubber Manufacturers' Association have now stated publicly that electrical gloves can be made to withstand voltages up to 30,000.

### Covering the Canary.

THAT was rather a funny incident last month which took place during a dinner of the National Union of Manufacturers, when the microphone in front of a speaker developed a piercing squeak and stopped the flow of oratory. Then the Home Secretary, who, I suppose, must know about canaries, had the presence of mind to throw a napkin over the instrument, which took the hint and closed down.

### Short-Wave Stations.

**PORPSMOUTH** Signal School, B Z C, 33·5; S.S. Cap Polonio, D C P, 25, 34; Royal Danish Dockyard, D N S C, 47; Mengam, F U E, 38·5; Montenourg, F U M, 37; Rome (Cento Celle), I C D, 63; Chisimai, I S T, 38; Tobruk Radio, I C U, 54; Rufisque, O C R U, 39; S.S. Slamat, O L Q, 19, 22·5, 37; Motorliner Gripsholm, S K B, 37·5; Rio do Janeiro, S P W, 29·3, and S P X, 40·5; Buenos Aires, S P I (not S P I, as reported); Atlantic Broadcasting Corp., W A B C, 64; Rocky Point (U.S.A.), W B V, 14·09; Newark, N.J., W K C, 17·5, 27·9.

### The Australian Stations.

"**REGULAR READER**" (Deal) writes to say he has intercepted 3 L O (Melbourne) and is mystified as a result. Why should he be mystified when his receiver is the "P.W." Every Purpose Two"? Well, now! This is the state of affairs. 2 F C is Sydney, N.S.W., and 3 L O is Melbourne. The first sends on 32 metres and the second on 29·8 metres. They are both stations connected with the commercial Beam service, and relay the programmes of the ordinary broadcasting stations at Sydney and Melbourne respectively, using the call-signs of those stations.

### Once Upon a Time!

WHEN the dreams of all good B.B.C. uncles come true they will materialise into the sort of palace which houses the National Broadcasting Company of New York City. The palace wonderful has only a mere fifteen stories! This is a wretched hovel, of course. It has guest reception rooms, cloak-room, smoke-rooms, and all sorts of other rooms. The area of the thirteenth floor is about 13,000 sq. ft., and contains five studios, foyer, artistes' reception room, and main control room. The foyer has a resilient cork-tile floor, light-green walls and polychromed and acoustically-treated ceiling. Gee! There are dressing-rooms and shower-baths for the staff, and in the largest studio (40 x 80 ft.) is an auditorium for 250 people.

### This Week's Technical Hint.

DEAR old "Reynolds'" for November 27th tells its wireless readers that if the acid of an accumulator has a specific gravity of less than 1·250 there will be a "fallacious" reading on the hydro-

meter." Evidently, then, your hydrometer must be trained to register a specific gravity of 1·250—I like the 0—and nothing else. But why should the hydrometer go wrong just because the acid does? These experts are too profound for poor old Ariel

### New Light.

**A FELLOW-SUFFERER**, who gives a Mononmark BM/GEL, writes sobbingly about chamber music, and states his opinion that it might not be so bad if it were not "controlled" so much. He says that he has heard chamber music from Continental stations, whose "control"

### SHORT WAVES.

"Who owns the air?" asks a headline. We don't know; Mussolini hasn't told us yet. — "Everybody's Weekly."

**TOO MANY TUNING DIALS.**  
Neighbour: "How many controls are there on your radio set?"  
Owner: "Three; my mother-in-law, my wife and my daughter."

Somebody is always taking the joy out of life. The short waves now used by amateurs carry as well in the daytime as at night, and there is no longer any excuse for staying up till morning.

Bobby: "You shouldn't whistle while you're building a wireless set, you know."  
Radio Fan: "Why not, young man?"  
Bobby: "Well, daddy whistled when he was building ours, and now it whistles all the time."

**QUITE ENOUGH.**  
There are no heating appliances in the majority of broadcasting studios.  
We understand that the wireless lectures supply the hot air.

A thought for to-day: The wheels of the Postmaster-General grind slowly, but they grind exceeding "fine."

**LUCKY HUSBAND.**  
"Oh, Charley," sobs the young bride; "it's awful! I was right in the middle of making a fine cake and listening to the radio set when the valves burned out, and I couldn't hear the rest of the recipe. What shall I do?"

"If you wish to please your parrot let him listen in," we read in a provincial newspaper.  
We do not, however, recommend this in many cases; most parrots know enough bad language already.

operators had either less zeal or more discretion. I commend this to Mr. Jefferies—if he is still "controlling" at 2 L O.

### A Commercial Hint.

THIS is the age of advertisement, yet apart from the series of cigarette pictures which dealt with radio terms, I do not think commercial people in general have taken half the advantage they might of the craze for radio. For instance, the makers of Players' Navy Cut cigarettes have introduced for Christmas a specially "posh" container, ornamented, and so forth. Very nice, but what about packing "fags" in a small loud speaker, or enclosing a small radio component in every box of one hundred?

### 5 I T's "Close Downs."

CERTAIN poetry-like lines which have been read by Mr. Percy Edgar from 5 I T are now published in a lump for half-a-crown. I am not quite sure why. I am not an expert on poetry, though I have read a lot of it and believe that I have a fairly accurate nose for the real stuff. The authoress of the book, to wit, Ida Mary Downing, knows a lot of words, but

fails to give one a happy, magic moment. Too much Silence, Bells, Passion, Love, Tragedy! All the words of real poets, but no inspiration or new thoughts. Sorry! Possibly 5 I T listeners may like to "blue" half-a-crown on the book for auld lang syne.

### N U—6 H M.

BY the way, the amateur station 6 H M—a photograph of which appeared on page 639, "P.W." No. 286—is not a British-owned transmitter, as was stated. The full call-sign is N U—6 H M, and the owner and operator is Colonel G. Foster, of Carmel, California, U.S.A.

### "Modern Wireless."

THE Christmas Number of this leading wireless monthly is a "bumper."

Why not, if you have any love for "P.W." treat yourself to a copy as a Christmas present? Thereafter you will not wish to miss it—though I really cannot imagine a "P.W." reader who does not already subscribe. It is a big thing, and will fill your mind with new ideas and your bosom with new ambitions. This is an exclusive "Ariel" tip. Cut out the monthly bob's-worth of sob stories and come into the "M.W." gang!

### Another Rectification Method.

**H.** H. P. (Westerham), for whose letter we thank him heartily, says that he has been trying out a different method of rectification, with pleasing results. He abolishes the usual grid leak and condenser in favour of an L.F. transformer, whose secondary is connected in series with the grid leak and the 0005 condenser which is placed across the A.T. coil. He comments on the clarity of reproduction obtained. This is an interesting variant, but, as Mr. Dowding tells me, not a new one, as it appears in a number of American circuits.

### Worth Hearing.

DECEMBER 16th.—"Sambo and the Forty Thieves"; all Scottish stations. December 17th.—Running commentary on Scotland v. Waratahs match; all Scottish stations. December 18th.—Symphony concert, 2 L O. December 19th.—Orchestral concert from Grosvenor Hall: Belfast. December 21st.—A. J. Alan, short story, 2 L O. Ah! and on December 17th, a brass band contest arranged by the Newcastle Station and relayed from the Town Hall. Test piece: "The White Rider."

### The "Sydney" Two.

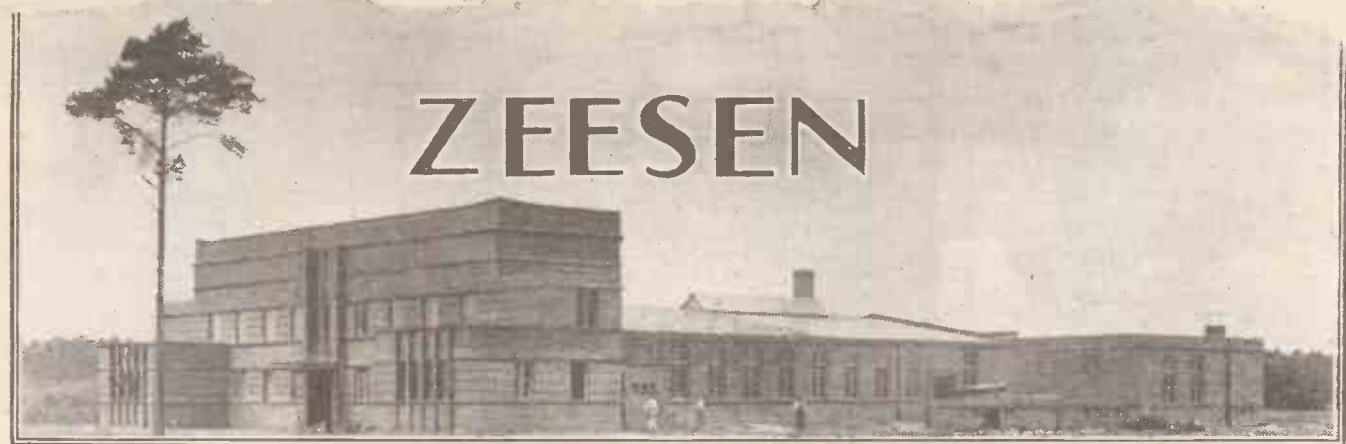
THIS set seems to have hit the bull's-eye first shot. It eats short-wave stations, and many readers who made it up early are now sitting up late. F. G. B. (Greenwich, S.E.) says he is surprised at the ease of control, which is equal to that obtainable on 500 metres.

### Work on One Valve.

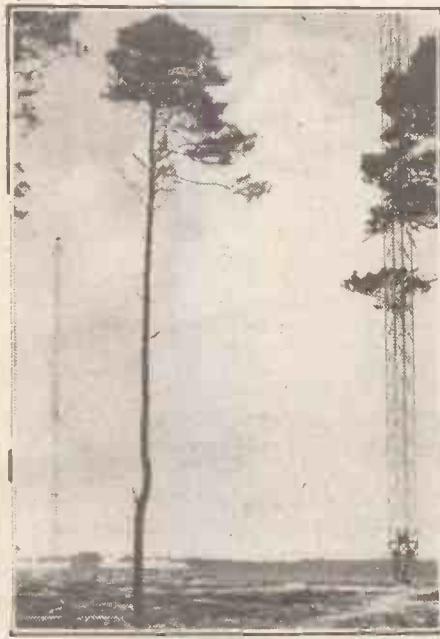
THAT "P.W." Inexpensive One-Valver" is a little gem—a Rolls-Royce on the chassis of a Showitt Seven. J. H. (Weymouth) made it, and in one evening logged the two Daventrys, Paris, Hilversum, Langenberg, Hamburg, Vienna, Glasgów, Plymouth, and eight other foreign stations; including Barcelona. Why use a crystal?

ARIEL.

# ZEESEN



THERE have been three distinct stages in the development of German broadcasting. During the first two years all efforts were made towards one end—that of providing as far as possible a trans-



A general view of the aerial system and the station building.

mitter in each of the nine transmitting districts into which the country had been divided. The output of each of these transmitters was 7 kw., this type being then available as a handy makeshift.

It was, of course, realised that this power would be insufficient to supply all the various places uniformly, but at the same time plans were made to replace the transmitters of the principal localities by more powerful units.

#### Increase in Power.

The second stage was therefore characterised by an increase of radiating energy in connection with new transmitters, individual outputs being raised to 6 times, and the useful aerial height to 2-3 times the former figures, thus corresponding to about 25 times the former amount of radiated energy. This, however, entailed the provision of masts 250-350 ft. high to carry the aerials.

#### Germany's Latest High-Power Broadcasting Station.

By Dr. ALFRED GRADENWITZ.

New transmitters were therefore installed at distances of a few miles from centres of inhabited areas. Finally, during the third stage, the erection of what could be described as high-power transmitters was commenced. These comprise the Langenberg (Rhineland) transmitter and the powerful plant now under construction near Koenigswusterhausen, which is to take the place of the old "Germany" transmitter.

It is thus to be substituted for the old Koenigswusterhausen transmitter familiar to many radio listeners, and is being installed in the neighbourhood of Zeesen, a small locality near Koenigswusterhausen. Messrs. Telefunken were, in October, 1926, entrusted by the German Postal and Telegraph Department with the design and construction of the plant, and an experimental service is now being commenced.

The station building is a hall, adjoining which there has been erected a front

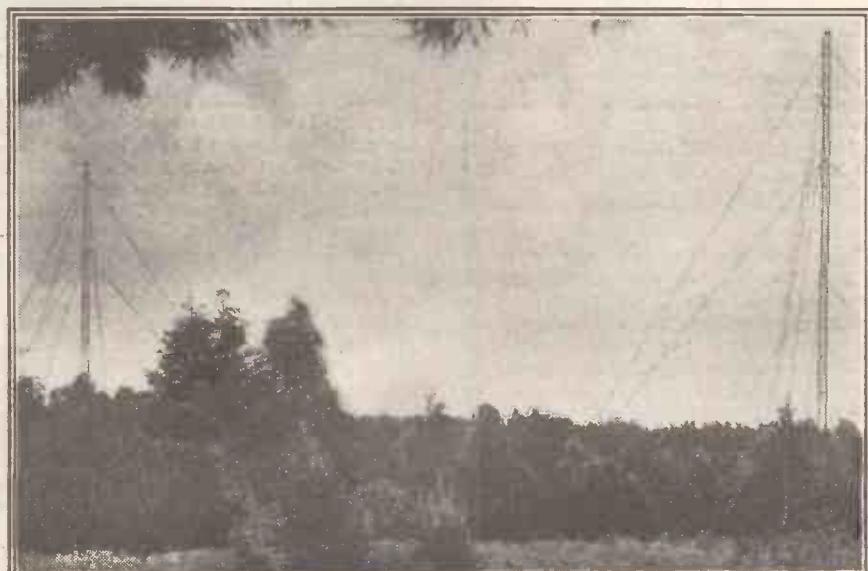
building of quite modern design. The hall comprises the service rooms—studio, rectifier room, engine room, amplifier room, battery room, measuring room, workshop, stores, heating plant, etc. In the front building, which comprises two stores, there are the offices, another amplifier and battery room, a small studio and two spacious flats for the staff of the station. Another small building has been erected in the immediate neighbourhood to accommodate the cooling plant of the transmitter tubes.

#### 1,250 metres.

The transmitter has been designed on the separately-controlled valve-transmitter principle with intermediate circuit, and is likely to be fitted also with a tertiary circuit. It is arranged for an operating wave-length of 1,250 metres, though there is a possibility of variation over a range of 100 metres.

The transmitter comprises three stages, the modulating transmitter, the intermediate amplifier and the output amplifier. The anode tension of 10,000 volts for the three stages is derived from one high vacuum rectifier arrangement which, through an H.T. transformer is operated direct from the three-phase current system.

(Continued on next page.)



The Zeesen station is situated in remarkably beautiful surroundings.

# PROTECTING THE FILAMENT.

A Simple Device which May Save You Pounds.  
By G. T. WATSON.

**I**N the days of the bright-emitter valve consuming .75 amp. it was a wise policy to insure the filament against high tension burn-out by placing an ordinary flash-lamp bulb in series with the negative H.T. lead; but with the modern valve, taking as low a current as .06 amp., such a device affords little protection.

Several current-limiting devices and fuses will suggest themselves. Let us assume that the filament current must not exceed .06 amp. A resistance of 800 ohms, such as a 220-volt 30-watt lamp, placed in the negative H.T. lead would only allow .06 amp. to pass in the event of a 120-volt battery being shorted to the filament circuit, and the valves would not be overrun. But this resistance, in addition to reducing the value of the anode voltage, would probably result in a bad low-frequency howl because of the coupling effects produced in the anode circuits.

#### Easily Devised Fuse.

It would seem, therefore, that the ideal protective device should be of low ohmic resistance, and non-inductive. The difficulty is to get a slender enough "fuse" to blow at such low currents. Few amateurs possess a steady enough hand to cut tin foil down to the requisite thickness, and material must be sought elsewhere.

Under normal conditions the filament of a 220-volt 30-watt lamp passes about .125 amp. If, however, we break the glass of the lamp and destroy its vacuum, then the carrying capacity of the filament drops enormously. By breaking one of these lamps open it is easy to obtain a dozen short lengths of filament. Lamps which have been discarded with broken filaments make excellent sources for filament fuse wire.

The wire will be found to be brittle and requires careful handling. A convenient mount has been found to take the form as shown.

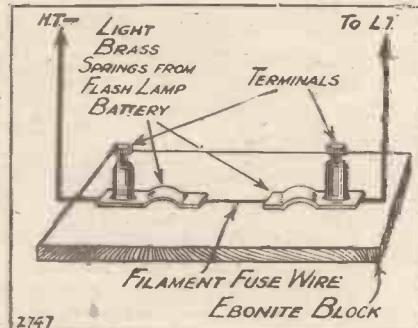
With reasonable care the wire can be slipped under the light springy brass holders, and its insertion is no harder than

that of an ordinary domestic fuse. Spare fuses are easy to obtain, easy to renew, and cost practically nothing. The 30-watt type of filament under ordinary atmospheric conditions will blow with about 50 milliamps, a convenient figure, allowing ample H.T. even for a multi-valve set, and yet falling below the .06 of the lightest dull-emitter filament.

#### No Coupling Effect.

Such a fuse has, of course, no coupling effect, since its valve will not be more than 20 ohms, and has no external field to give complications in the rest of the circuit. Its great value to the experimenter is that he can depend on the fuse blowing always at a fixed current value, since lamp filaments do not vary in carrying capacity to any appreciable extent.

Various fusing points can be obtained by inserting two or more lengths of the fuse wire under the springy brass holders in parallel. It may be found convenient to mount several pairs of holders on an



ebonite strip, and thus place a fuse in the anode supply to every valve. Such a device is particularly useful to the experimenter, whether he works with a battery eliminator, with dry batteries, or H.T. accumulators.



The special mooring arrangements of the bracing cables for the lattice masts.

## ZEESEN.

(Continued from previous page.)

The first transmitter stage generates oscillations which are amplified and modulated in the second stage, being eventually supplied to the third stage and there raised to the required strength. Special connections have been provided to prevent any feed-back to the preceding stage.

#### Similar to Langenberg.

The transmitter comprises the following valves: Twelve water-cooled high vacuum rectifier valves, one 1 kw. valve (first stage), one water-cooled 10 kw. valve (second stage), six 20 kw. valves arranged in

parallel (third stage), three modulating valves, and one rectifier valve for generating the grid bias for the modulating valves.

The rectifier valves, the output valves of the third stage and the modulating valves are heated by means of transformers operating from the 6,000-volt three-phase system, the H.T. being at first reduced to 400 volts. The 400-volt alternating current is eventually used to feed the heating transformers proper.

The cooling-water consumption of all valves works out at about 10 cubic metres per hour, with an initial pressure of about 3 atmospheres. The difference of temperatures between the admitted and discharged cooling water should not exceed about 10 degrees.

The terminal amplifier and the measuring instruments of the modulating plant have been combined with the transmitter proper, and have a similar arrangement of con-

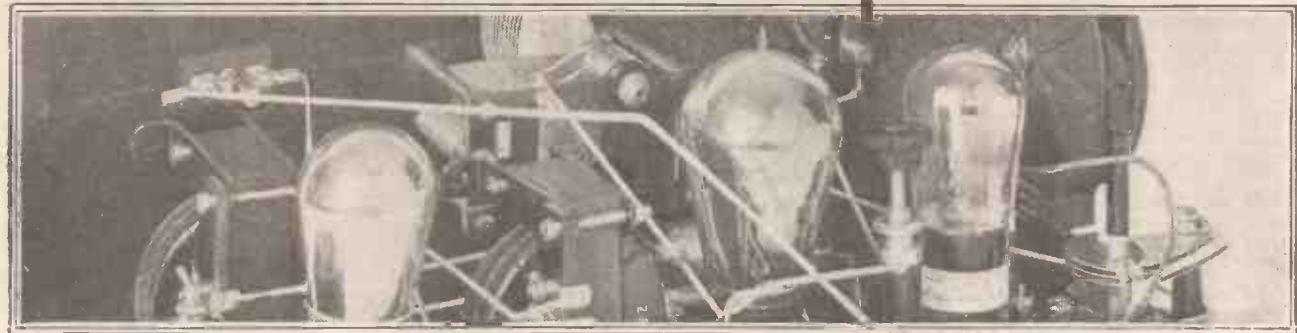
nnections to that of the Langenberg transmitter.

#### The Aerial System.

Two insulated wire-braced iron frame masts, 700 ft. long, have been installed at distances of 1,500 ft. apart to carry the antenna. A T-aerial about 1,000 ft. long and 20 ft. wide has been provided to serve as aerial; this has a capacity of about 3,500 cm., and a characteristic wave of about 2,300 metres. These dimensions have been chosen in order that the contemplated mode of operation with a wave of 1,250 metres may correspond to about 6 times the characteristic wave, thus ensuring a radiation resistance as large as possible.

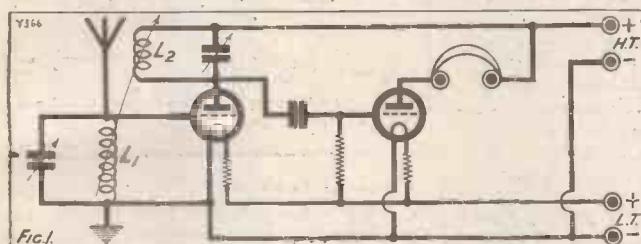
A small-meshed earth network about 2,500 ft. long and 1,000 ft. wide dug into the ground is used as earth conductor network; this is rounded off in a semi-circle at each of its wide sides.

# The ABC of H.F. Amplification



In my last article I mentioned that certain high-frequency circuits were more stable than others, although I did not enter into details and explain exactly what I meant by "stability," and this may have been a little puzzling to the beginner who has been assuming that a high-frequency valve is simply something which amplifies the signals at high frequency, and does nothing else.

Actually, we come at this point to one of the most difficult problems of high-frequency amplification, one, moreover, which affects practically every receiver ever built which includes high-frequency valves. It arises from the very important fact that a high-frequency valve of the ordinary type has a strong tendency to oscillate, and will actually do so in the great majority of cases unless special precautions are taken to stop it, or unless the receiver is such an



inefficient type as to "hold it down" by means of heavy losses at some point or other.

## Why It Oscillates.

Let us now see why it is that a high-frequency valve has this tendency to self-oscillation. Taking, for the sake of simplicity, a tuned-anode circuit once more as being one of the easiest to understand in a general way; we may suppose that the anode coil is coupled magnetically to the aerial coil, as shown in Fig. 1. It will be seen at once that we have here, so far as the first valve is concerned, something very much like the single valve reaction circuit with which the reader is already familiar, and it will be understood at once that if the coupling between the two coils is made sufficiently tight the valve will be thrown into self-oscillation, and proper reception of telephony will become impossible.

Now, the first point to notice in this connection is that high-frequency valves oscillate much more easily than simple detectors, because there are very much stronger high-frequency currents flowing in the tuned-anode circuit than are nor-

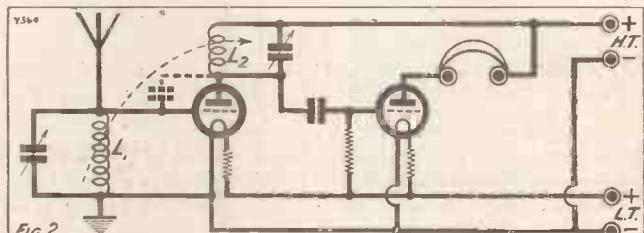
This easy-to-understand article is the second of a Series for the Beginner, and deals with PART 2: INSTABILITY.

By G. P. KENDALL, B.Sc.

mally present in the reaction coil in the case of a single-valve circuit. Thus, very much weaker coupling between the two coils will be sufficient to cause self-oscillation.

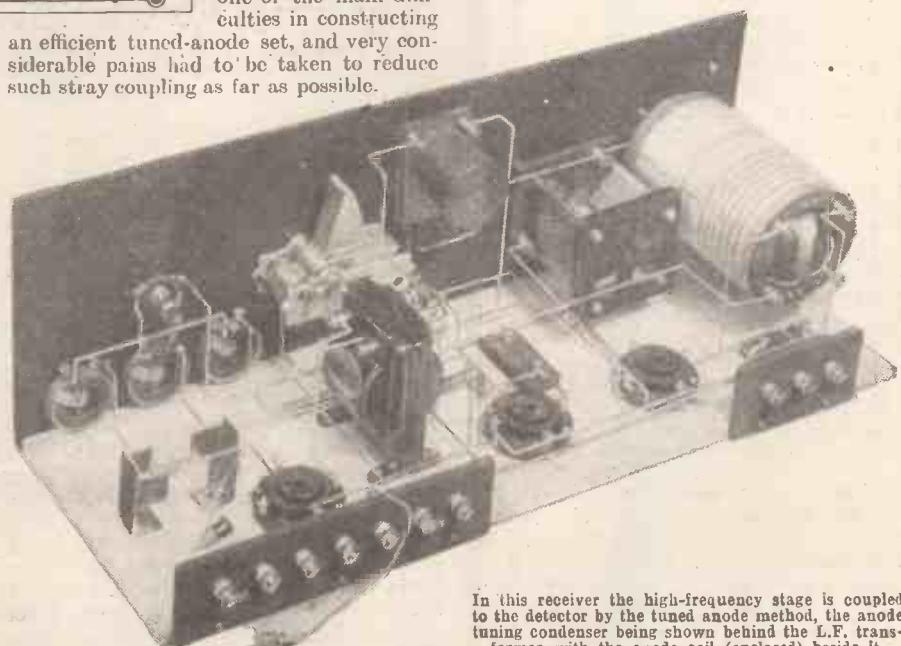
It will, therefore, be easily understood that it is quite possible, unless we are careful in our lay-out, the two

In a carefully laid out set, of course, this trouble of interaction between coils can be reduced very largely, and even eliminated, by the use of special coils and more particularly of screening, and the same applies in a large measure to interaction between wiring and so on, but there is unfortunately another cause of instability in high-fre-



an efficient tuned-anode set, and very considerable pains had to be taken to reduce such stray coupling as far as possible.

(Continued on next page.)



In this receiver the high-frequency stage is coupled to the detector by the tuned anode method, the anode tuning condenser being shown behind the L.F. transformer, with the anode coil (enclosed) beside it.

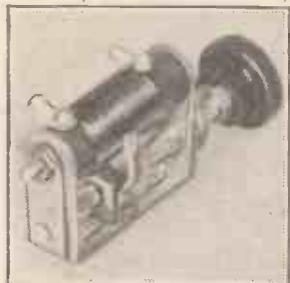
## THE A.B.C OF H.F. AMPLIFICATION.

(Continued from previous page.)

for producing reaction. Now, one of these methods of producing what we may call "feed-back" for brevity's sake, is to connect a condenser directly between plate and grid, and this used to be done at one time in some types of sets as a method of obtaining reaction.

### Internal Capacity.

Such capacity feed-back may well be present in many receivers between various wires and components, and although this can be reduced by carefully spacing the wiring, etc., unfortunately it is also present actually inside the valve. The trouble is that in the ordinary valve there is a capacity between plate and grid, these two electrodes forming the equivalent of two plates of a small condenser. Although this



The practical form of the potentiometer, shown theoretically in Fig. 4. The voltage on the grid will vary according to the position of the slide.

capacity is really very small, it may on occasion be large enough to feed back a sufficient amount of energy to make the valve oscillate, and in the more modern and more efficient type of high-frequency valve, in particular, this is quite a real danger.

### Early Valves.

These two possible sources of feed-back in a high-frequency valve and its circuit are indicated in Fig. 2, where a dotted arrow between the coils represents the possible stray coupling between them, and the dotted condenser between plate and grid indicates what is called the inter-electrode capacity.

In the earlier days of the use of high-frequency amplification, the tendency to

very much less efficient than the modern ones, giving less amplification, so that the amplified signals flowing in the anode circuit were not nearly so strong in proportion to those in the grid circuit, and hence the danger of feed-back was naturally less.

Furthermore, the ill-effects of the plate to grid capacity were not so pronounced, because the electrodes of the valves themselves were relatively small, and further the space between plate and grid might be considerably larger, again reducing the capacity.

Again, it was usual in those days to use a simple aerial circuit consisting of a coil and condenser in parallel, or sometimes in series, and this was rather useful in stabilising the receiver, for the aerial circuit is usually quite a high-resistance one, with high damping which prevents it from being thrown into oscillation at all easily. Thus, quite a considerable amount of feed-back could take place without actually making the set oscillate, and, indeed, it was often necessary to add a certain amount of reaction to bring the set up to its most sensitive condition.

### Reaction.

This was often done by coupling the anode coil to the aerial coil, as in Fig. 1; although it was soon found that this was not at all an efficient scheme, since the slightest variation of coupling between the coils caused considerable alterations in the adjustments of the tuned circuits, besides giving a very sudden and fierce control of reaction. Much better results, it was soon found, could be obtained by breaking the anode circuit of the detector valve and inserting a reaction coil here in the ordinary way, which was coupled back to the aerial.

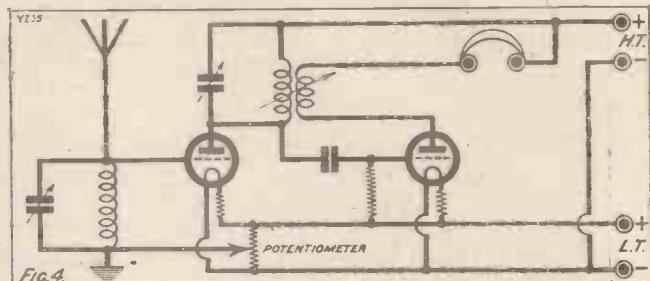
The development of receiving circuits in general very soon led us to start using more selective aerial tuning arrangements, and the plain type of tuned circuit began to decline in popularity. Instead, more selective arrangements with some scheme of inductive or auto-coupling to the aerial, with a tuned secondary circuit across which the high-frequency valve was connected, began to be used, and with these the instability difficulty became very much

more acute since more selective circuits were naturally more lightly damped, and were, therefore, much more liable to go into oscillation. Self-oscillation of high-frequency valves became a very real factor, and the better our circuits became the more awkward it was, so that a great deal of attention had to be paid to methods of stabilisation.

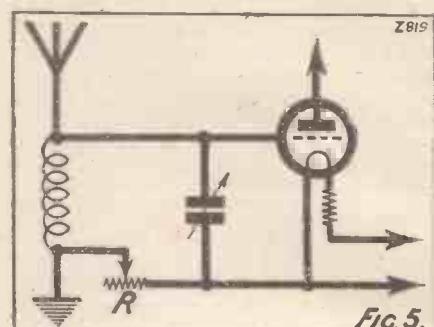
Obviously, one simple way of stabilising a circuit tending to oscillate was to introduce losses at some point or other, so that the energy which was fed back could be absorbed before it got a chance to make the receiver oscillate. One very simple way of doing this was to apply a certain amount

of positive bias upon the grid of the high-frequency valve, which had the effect of producing grid current in the tuned circuit, damping it so considerably that in most cases it stabilised the valve.

Such a positive bias could be quite easily obtained by taking the lower end of the tuned circuit to the positive end of the



filament instead of the usual connection at the negative end, as we see in Fig. 3. This positive bias scheme was quite effective in preventing self-oscillation, but it was found that it damped the receiving circuit rather heavily and flattened out tuning a great deal; it also reduced the amplification obtainable. When it was used it was customary to apply the reaction to the tuned anode circuit, since it was found that distinctly better results could be obtained in this way than by reacting on the aerial circuit. This is also shown in Fig. 3.

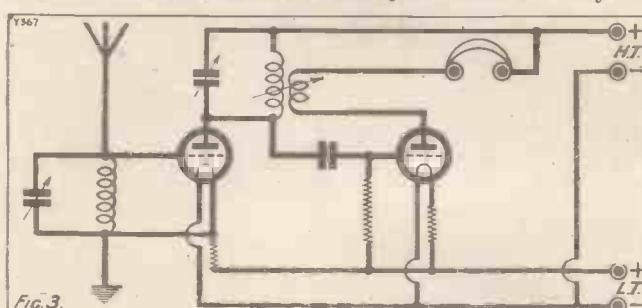


Since the damping produced by applying the full positive potential from the positive end of the filament was rather excessive for most purposes, and led to rather poor selectivity, another scheme often used was to employ a potentiometer connected up as in Fig. 4, where it will be seen that the lower end of the tuned circuit is taken to the slider of the potentiometer, so that it is possible to apply either the usual zero potential to the grid of the valve by placing the slider at the negative end, or any amount of positive bias up to the full potential of the positive end.

### Losser Methods.

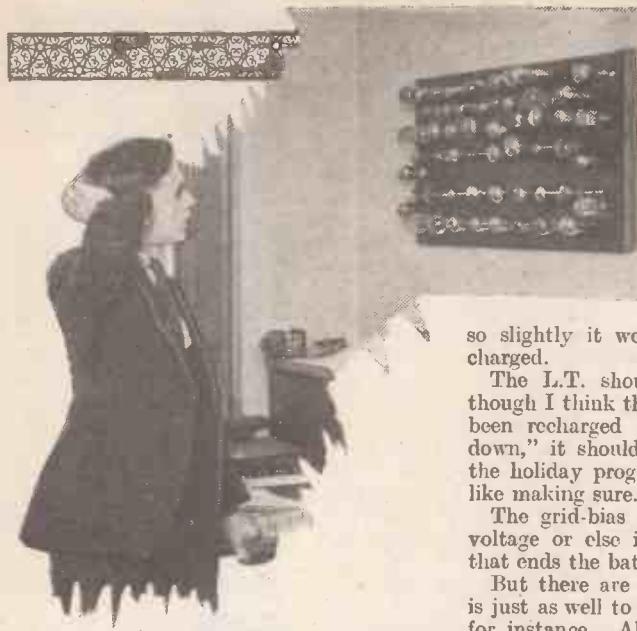
Distinctly better results were obtainable in this way, but even so, a good deal of efficiency was lost by the use of any damping method of this sort, since it was obvious that by introducing such losses the circuit was merely artificially held down by its own inefficiency.

Before leaving the subject of these "losser" methods of stabilisation, it may be remarked that another form often used, and which has certain recommendations, is the insertion of a variable resistance in series with the tuned circuit, as shown in Fig. 5.



oscillate produced by feed-back was not nearly so serious as it is to-day, and it was very often sufficient to see that there was not too much stray coupling between the coils to ensure that the receiver would be reasonably stable.

This was partly because the high-frequency valves used in those days were



# Light in Our Valves.

How to Avoid a Dark Christmas.

By K. D. ROGERS.

so slightly it were best that it were recharged.

The L.T. should have the same test, though I think that, unless it has only just been recharged and "can't possibly run down," it should be charged specially for the holiday programmes. There's nothing like making sure.

The grid-bias battery should be up to voltage or else it *may* give trouble—and that ends the battery problem.

But there are other little points that it is just as well to watch. Those H.T. leads, for instance. All those bits of wire, flex perhaps, frayed at the edges and put on the terminals anyhow, with match sticks for wander plugs at their business ends—scrap them! Get fresh leads or overhaul them, and use wander plugs and spade terminals; it's best and it's safer.

It may save you 10/-, 14/-, 21/-, or many pounds, for a doubtful flex may short with the next one, slip off its terminal and get on to the next, pop out of the H.T. battery and make rotten contact and cause crackling noises; and the L.T. positive lead from the accumulator may—if placed near the H.T.—slip off and decide to have a look at one

those of you who have screened valves must also remember you have two H.T.+ for each screened valve to go a-wandering, so keep an eye on them.

You'll want a valve or two as stand-by's in case of accident, but if you have these, don't be reckless with the others. Tend them carefully and they will last you well.

Then, having everything O.K., be careful on the fateful day not to over-run your valves. If grandma can't hear those carols very well add another valve, and shift the old soul nearer the spout of the speaker; don't try to increase signal strength by turning up the filaments—it's bad for the valves. You may increase their lighting capacity, but you'll decrease their lives, and the result may be a "general depression centering round everybody" on the next night when you find the valve emission has gone west.

## Those Distant Stations.

Reaction will bring up those weak signals to a certain point, but don't push it too far, or your next door neighbour will give up listening in and will start his gramophone (old type), or even his pianola. Just imagine

A FEW more days and it will be Christmas—that festival of good spirit, comradeship and happy laughter. A time of general holiday, and general oscillation, too. But it is not of laughter or oscillation that I want to speak, though possibly both may depend to a certain extent upon my words. Rather is it of the few days preceding the 25th that I wish to talk, days of preparation, of eager looking forward, of feverish effort to "get the new set ready in time," of anticipation, bustle everywhere, at business, at the shops and at home.

## Watch the Batteries.

And in that bustle we forget. Yes, it is always the case, the most important, though perhaps apparently less obvious, points slip our memories, and later on we find ourselves "in the cart."

Aunt Betty's present is forgotten, we find we have given Uncle George the same as we did last year, and last, but by no means least, we forget that general overhaul of the set and omit to have our batteries recharged.

For in these days of dull emitters, when no perceptible glow emanates from our valves we forget the L.T. is running down until we turn on the set on Boxing Day for the early evening's fun—and the little lights in our valves fade more or less slowly away. And this year is to have two "Boxing Days," for a Bank Holiday is ordered for the Tuesday, and we have three whole days to go without a chance of getting a new H.T. or rejuvenating our juice supply. What a disaster! And yet it is so easily avoidable.

## General Overhaul.

So, I would advise all of you to do as I shall do. Run over the H.T. and L.T. and grid-bias supply very carefully, about three days before Christmas. If the H.T. is more than 20 per cent below its proper voltage—with the set having been in operation for at least half an hour—in the case of a dry battery—I should get a new one, *in case*. If the H.T. supply is of the accumulator type, have it recharged if the time period of holding its charge is approaching its end, whether the battery has dropped voltage or not. Should it have dropped voltage ever



Senatore Marconi at the microphone of W C D A, the New York station that never sends out jazz!

of the H.T. wander plug sockets. Result: brilliant but transitory illumination in the valves, very pretty but very costly, and then—silence!

Clean up those dirty plug-in contacts, valve legs, coil pins, and have another look at the aerial—possibly the first after its erection months or years ago—to see if it is still there, and is likely to remain there.

And especially have a look at those internal connections, see that no bits of wire, grid-bias leads, etc., are hanging about inside and just waiting an opportunity to cause a firework display. Remember it's December 25th, not November 5th, and

it! And finally, on the night of nights when all the relations are sitting tight waiting for the fun to begin, don't forget to switch on not only the L.T. and H.T., but also the aerial. It makes such a difference and may save your reputation as a constructor of "P.W." sets. And start with the local station. If you promise them America or Sydney you may not be able to fulfil your promise; in fact it's ten to one against your doing so, if you mention your intentions beforehand. Just let those distant stations come in by accident, as it were; it's far more impressive, and if you don't get them—well, what does it matter?

A LITTLE booklet entitled "What is Amateur Radio?" has been sent to me by the Secretary-Editor of the Radio Society of Great Britain, and I have read it with considerable interest.

The intentions of this booklet, and of those who produced it, are obviously of the best—namely, the desire to increase the membership of the R.S.G.B. and to enhance the prestige of amateur radio in this country.

But although the R.S.G.B. has those and other admirable objectives in view, and although I am sure that the policy of the R.S.G.B. as a whole is dictated by a sincere desire to serve the interests of the radio amateur, recent events in connection with the Washington Conference compel a careful analysis of the *modus operandi* of the society in its attempts to act as an organised body on behalf of British Amateurs.

As I have explained in previous articles, the society did not send a representative to the Washington Conference because the Post Office assured the committee that it was not necessary and that the P.O. delegates would do all that was necessary in the interests of the British amateur.

#### The P.M.G.'s Monopoly.

The result, as we all know, was a lamentable display of ignorance by the P.O. delegates, and the unsatisfactory expedient of two American amateurs representing British amateurs was eventually adopted.

The editorial explanation of this state of affairs, as published in the T. & R. Bulletin, makes it clear that the British amateur was not invited to participate in the conference at Washington, and the editorial makes it still clearer that British radio legislation as it now stands does not permit the amateur experimenter any control in the administration of the ether.

## THE RADIO AMATEUR.

America and Great Britain—  
A Contrast.

By THE EDITOR.

That control is vested entirely in the Postmaster-General, who in turn appears to be greatly influenced by the views of the W.T. Board, which is composed of representatives of all Government departments who make use of wireless communication.

#### At the Mercy of Officialdom.

There can be no doubt that this state of affairs leaves the British amateur in a very precarious and unsatisfactory position.

From time to time the R.S.G.B. makes representations to the P.M.G. on behalf of the amateur, but in nine cases out of ten those representations are made chiefly on behalf of the amateur transmitter.

Sometimes concessions are gained, sometimes not. More often than not, let it be said, what is gained may be likened to scraps from the rich man's table.

The British amateur has to put up with what the P.M.G. and the W.T. Board think good and sufficient. There is little co-operation and, obviously, little real concern in the ranks of officialdom for the amateur.

It is grudgingly recognised by officialdom that a few amateur transmitters and experimenters, when relegated to the shorter wave-lengths, did good experimental work and collected much data of value in connection with short-wave, low-power long-distance communication; but the

fact remains that the members of the W.T. Board do not regard the amateur movement as of vital importance, and the liaison and good feeling engendered by close co-operation and sympathetic working existing between American officialdom and the American Amateur Movement scarcely exists in this country at all.

Amateurs in this country are, to put it bluntly, at the mercy of officialdom. In America officialdom "puts its foot down" no doubt—but it looks very carefully first to see where it puts its foot; if it doesn't the American equivalent of the R.S.G.B., representing a large and united body of amateurs and exercising no mean influence, squeals, and squeaks with often very satisfactory results.

But in Great Britain officialdom can light-heartedly put its foot down where and when it pleases. It controls the ether; what it says "goes," and if the amateur doesn't like it he can lump it.

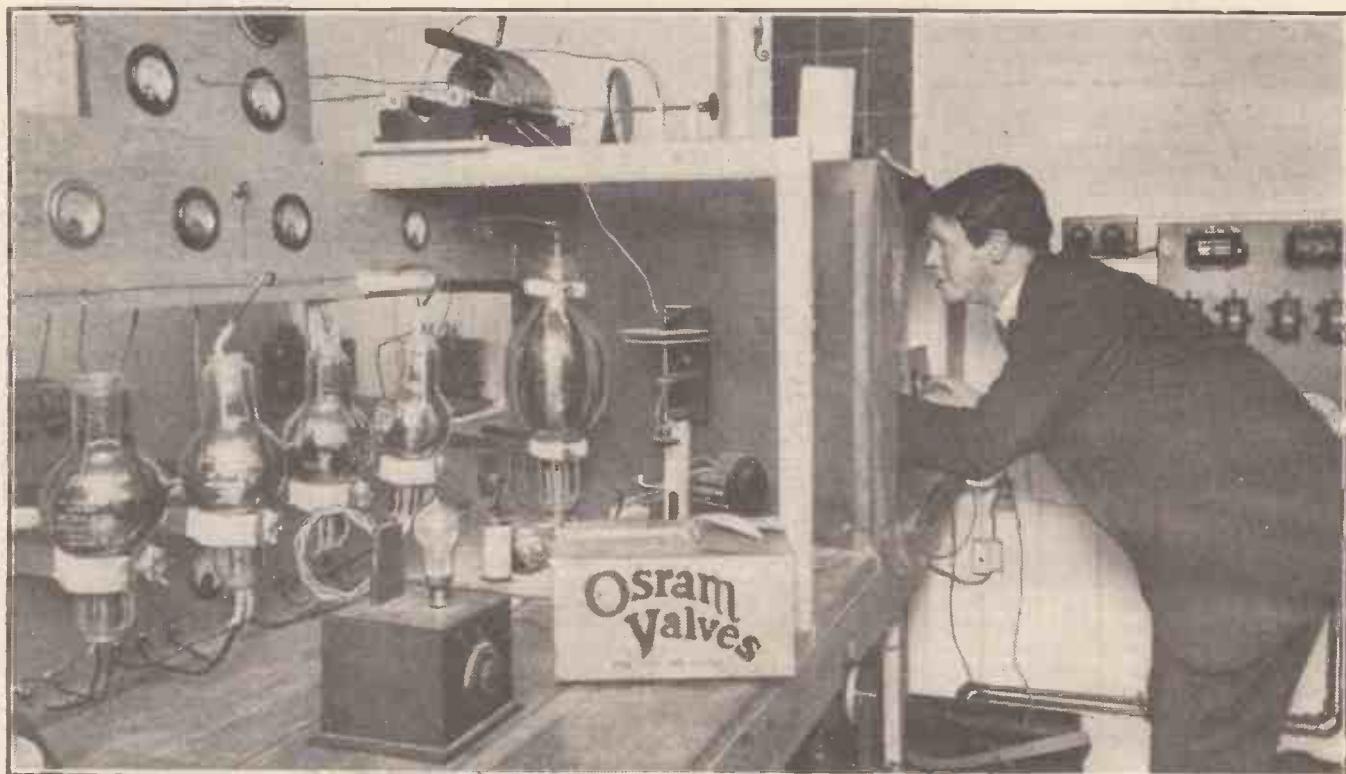
If he's very good and politely requests officialdom to "have a heart," officialdom magnanimously and often condescendingly grants a few unimportant favours.

#### More Members Wanted.

But officialdom over here is absolutely top-dog, and the amateur has no means of exercising any real influence. He has a mouthpiece in the R.S.G.B. That is necessary—and the R.S.G.B., as far as lies in its power, does its job, and exercises its limited functions, satisfactorily.

But it should also act as a lever. It does not. It cannot. The reason? It has not the strength. It has in this country approximately 1,200 radio experimenters on its books. It should have many times more.

In a future article I will suggest why this figure should be possible and why it has not been attained up to the present.



Mr. Gerald Marcuse, the well-known transmitting amateur, operating his gear during one of his recent successful relays. On this particular occasion he handed on the Armistice Remembrance Festival Broadcast to the Empire and, although he used only 1 kw. of power, his station, 2 N.M., was heard and appreciated at points as far distant as Bombay.

# THE PROGRESSIVE THREE



**Y**OU must not attempt this third stage in the construction of the four-valve set until you are fully satisfied that you are getting really efficient results from the two-valve arrangement. The whole object of this step-by-step receiver is to obtain maximum efficiency from every one of its sections. It is only two or three weeks since I commenced the series and it is possible that you have only just completed the second stage. If this is the case, do not

## THE EXTRA COMPONENTS YOU WILL NEED.

- 1 Low-frequency transformer (any good make such as B.L., Ferranti, etc.).
- 1 Valve holder (Lotus, Benjamin, Lissen, etc.)
- 1 Baseboard-mounting filament resistance.
- Terminals, wire, etc. (See Text before purchasing the new components.)

attempt to keep pace with these articles, but carefully place them aside and devote plenty of time to each step forward.

The actual construction of a receiver is only half the battle; subsequently you must learn how to handle it properly. And you should wait until you are able to handle the two-valve arrangement so that you can bring in stations easily and in fair numbers on telephone receivers before you even think about adding a stage of L.F. amplification. Anyway, I will assume that by the time you are ready to do this that you have thoroughly mastered the tuning controls and are fully conversant with the capabilities and limitations of the previous two stages.

## Will Work Loud Speaker.

I now propose to deal with the addition of one stage of transformer-coupled audio-frequency amplification. You will appreciate that this will not increase the range of reception of the receiver to any considerable extent, but will magnify the strength of existing stations received. A station that gives fairly good telephone receiver signals on the two valves should be brought up in strength sufficiently to enable a medium-sized loud speaker to be operated.

If you have not built the previous "Progressive" sets there is no reason why you should not construct this week's three-valver, although it is better first to get the previous two stages working individually. But the novel scheme, as you will see, is surprisingly elastic.

By G. V. DOWDING, Grad.I.E.E.  
(Technical Editor.)

The primary winding of a low-frequency transformer will take the place of the telephone receivers and the energy from the detector valve will be passed through this and transferred to the secondary winding of the transformer. This last passes the energy on to the grid of the third valve which amplifies it and hands it on to the loud speaker or telephone receivers in a considerably magnified form. I hope you will be able to follow this simple series of operations in the theoretical circuit.

"G. Bias" is short for Grid-Bias Battery. A small battery is inserted between the two small points so marked in order to give the grid of the third valve a certain voltage

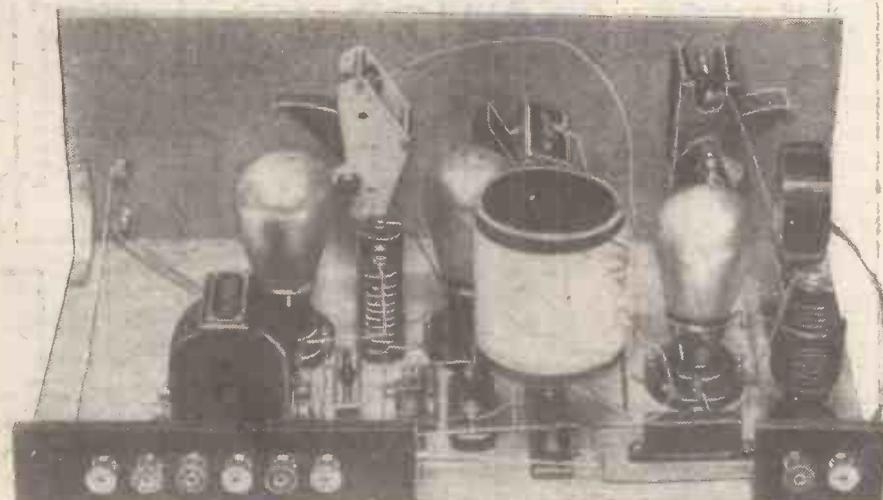
bias, the value of which will depend upon the valve used.

You will require but three additional components for this low-frequency stage. The valve holder should match the other two valve holders in order to preserve a certain degree of uniformity, but the additional filament resistor that will be needed can be of a different make and type from the original one, as it is not placed in a particularly symmetrical manner on the baseboard. This filament resistor should be of the variable type and should be capable of providing a maximum resistance of at least 15 ohms.

## False Economy.

The low-frequency inter-valve transformer is, perhaps, the most important item we have yet employed in this receiver, and upon its efficiency will depend, to a very great extent, the quality of reproduction given by the set. It will not be worth your while to economise at this point. Buy the best transformer that you can afford. A nice heavy one carrying a reputable name. Regard with suspicion any transformer that

(Continued on next page.)



The baseboard, as you will see, is beginning to fill up. The set is now capable of bringing in distant stations on the loud speaker.

## THE PROGRESSIVE THREE.

(Continued from previous page.)

weighs anything under a pound or so and is not much larger than an eggcup in size. Bulkiness in a low-frequency transformer can almost be regarded as a virtue! You have a wide variety of excellent transformers to choose from, including such notables as the R. I. & Varley, the Brandes, the Ferranti, the Ediswan, the Marconi-phone, the Pye, etc., etc. I used a Gecophone, and found it to be well up to the exacting standard I set for such a component.

### Spacing of Components.

The low-frequency transformer should have a ratio of  $3\frac{1}{2}$  to 1 or 4 to 1, and will cost you just above or just below a pound. Any one of the makes mentioned is well worth its money, and will be the equivalent in value

to half-a-dozen cheap foreign transformers, even if all the virtues of every one of these made could be embodied in one article. It has been said that a good transformer is worth an extra valve, and certainly a good transformer suitably employed can hold its own against even R.C. coupling at its best.

Now you will notice, as progress is made

with this receiver, that the baseboard begins to fill up. At the high-frequency end plenty of separation between components was allowed, and this is very necessary; but at the low-frequency end everything can be closed up much more compactly, as the bugbear of interaction

(Continued on next page.)

### WIRING INSTRUCTIONS

Disconnect lead number (9) from H.T.+ terminal and join it to plate socket of third (new) valve holder (9).

Disconnect lead number (10) from 'phone terminal and join it to "A" of low-frequency transformer.

Now proceed with the new leads.

Join one filament socket of new valve holder to one terminal of new filament resistor (29).

Join other filament socket of new valve holder to filament socket of detector-valve holder, which is connected to L.T.- (30). (This is the same as taking lead direct to L.T. minus in effect.)

Join G.B. terminal (secondary winding)

of low-frequency transformer to G.B.-1 terminal (31).

Join "G" terminal (secondary winding) of low-frequency transformer to grid socket of new valve holder (32).

Join "X" (primary winding) terminal of low-frequency transformer to H.T.+1 terminal (33).

Join H.T.+2 terminal to one 'phone terminal (34).

Join remaining terminal of new filament resistor to terminal of grid leak which is connected directly to the L.T.+ terminal (35). (This is same in effect as taking lead direct to L.T.+.)

There are now 35 leads in all.

THE "PROGRESSIVE" THREE  
WIRING DIAGRAM



PHONES

3RD VALVE  
HOLDER

L.F. TRANS.<sup>FR</sup>

G.B.

X

A

FIL. RES.

TII G.B.-1 +L.T.- -H.T.+/H.T.+2

cinchonate magnesite

E A

## THE PROGRESSIVE THREE.

*(Continued from previous page.)*

will not be so much in evidence here. Therefore, as you mount these three components remember that space must be left for yet another stage, although, with care, you will find that there will be no necessity for undue crowding. Have a glance at the photographs and notice the space I have allotted for the final group of components. If you leave as much space as that all will be well.

Lay out your three new components as closely as possible in the manner shown in these photographs, and remember that as you approach the end of the task every quarter of an inch in space becomes in-

G.B.-1, and more will be said as to its use later on.

Having mounted the new components and terminals the wiring can be tackled. This you will find to be a most simple task, as it involves but the alteration of two of the original leads, and the addition of merely seven new leads. Now you will begin to appreciate my new wiring scheme I hope, and will find the wiring instructions and the wiring diagram fully explanatory. On the top left-hand corner of this latter two of the original numbers are shown in double-ringed circles, and the numbers of the new leads are enclosed within single ringed circles. Do not forget to run your pencil through these numbers as the leads concerned are dealt with.

### The Additional Wiring.

Both leads Nos. 9 and 10 appear in the previous wiring diagram, but this time they take different routes. No. 9, instead of

pieces of wire in both cases, but, after all, this is quite a small point. Nothing much need be said about the seven new leads, although, as before, you should keep these well down on the baseboard. Also, you must not forget that further components have yet to be mounted, and lead No. 34 especially should be carefully run with this fact well in mind. It should be carried along the baseboard as far over towards the end of this as possible, and it should be kept parallel with the end of the baseboard and taken at a sharp right angle closely along behind the terminal strip to its terminal. Don't give way to the temptation to run a lead such as this diagonally across, jumping over intervening objects and narrowly escaping causing short circuits at various points along its route.

When you have crossed out the last lead number and have carefully checked the wiring and cleaned the whole job up, you can reconnect the set and give it a test.

You should use a power valve in this third stage. Not a super-power valve, but a power valve of the P.V. (Ediswan), D.E.P. (Marconi or Osram), P.M. (Mullard), or similar type. Such valves are obtainable in all three filament voltages.

### The H.T. Battery.

Now H.T.+1 terminal will serve the first two valves as previously, while H.T.+2 terminal will carry the H.T.+wander plug allotted to the third valve. The same H.T. battery can, of course, be used for all the lot, although it will now be necessary to have two H.T.+wander plugs, as well as the H.T.-one. The third valve will need about 120 volts for best results, although it will operate fairly satisfactorily with a voltage as low as 75 or so. The exact figure for optimum results will vary with different types of power valves, but the makers always supply with each valve the necessary operating instructions.

You will require a grid-bias battery and, as there is to be yet another valve, I would advise you to obtain one giving a maximum of at least 15 volts, although 9 will be ample for this first low-frequency magnifier. Special grid-bias batteries are obtainable. They are like small H.T. batteries, and

*(Continued on next page.)*

creasingly valuable if you would avoid really cramping the fourth stage when you come to it.

Take a careful note of the position I have given to the transformer. You will see that its terminals become nicely placed for the wiring. The transformer you purchase, if it is not a Gecophone, may have differently marked terminals. On the Gecophone the primary winding terminals are "+" and "A." The "+" stands for H.T. positive for it is to an H.T. positive terminal to which it is connected. The "A" means "Anode" or Plate, and this terminal is connected to the plate terminal of the detector-valve holder through the H.F. choke. These two terminals, "+" and "A," may be shown as IP or OP or by abbreviations appropriately indicating any one of the above terms.

### Two New Terminals.

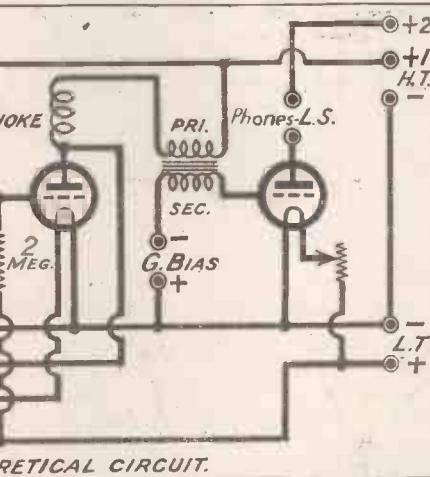
The secondary-winding terminals are shown as "G" and "F" and the former goes to the grid of the third valve, and the latter to the Grid-Bias minus 1 terminal.

Additionally to the three components you will require two more terminals, one being added at each end of the terminal strip. If your terminal strip already carries its full eight terminals it merely means that you will have to bring two more of them into use.

One of these terminals will be known as the "H.T.+2" terminal, the original H.T.+ terminal now becoming the H.T.+1. The second new terminal can be marked

Exactly the same applies to lead No. 10, one end of which can remain joined to the high-frequency choke. Personally, I would prefer to employ new

The terminals at present on the larger terminal strip are as follows, reading from left to right: G.B.-1, L.T.+, L.T.-, H.T.-, H.T.+1, and H.T.+2. Keep the wiring as close to the baseboard as possible, so that the valves can be inserted without the danger of interfering with any of the leads.



THE  
PROGRESSIVE THREE.  
(Continued from previous page.)

similarly to these are provided with sockets into which ordinary wander plugs can be inserted.

The positive end of the grid-bias battery should be connected to either the L.T.—or the H.T.—terminal. It may be more convenient to connect it to either the L.T.—or H.T.—battery terminal itself, especially if the batteries are to be stowed away beneath a table. Thus, one lead from the batteries to the set can be saved.

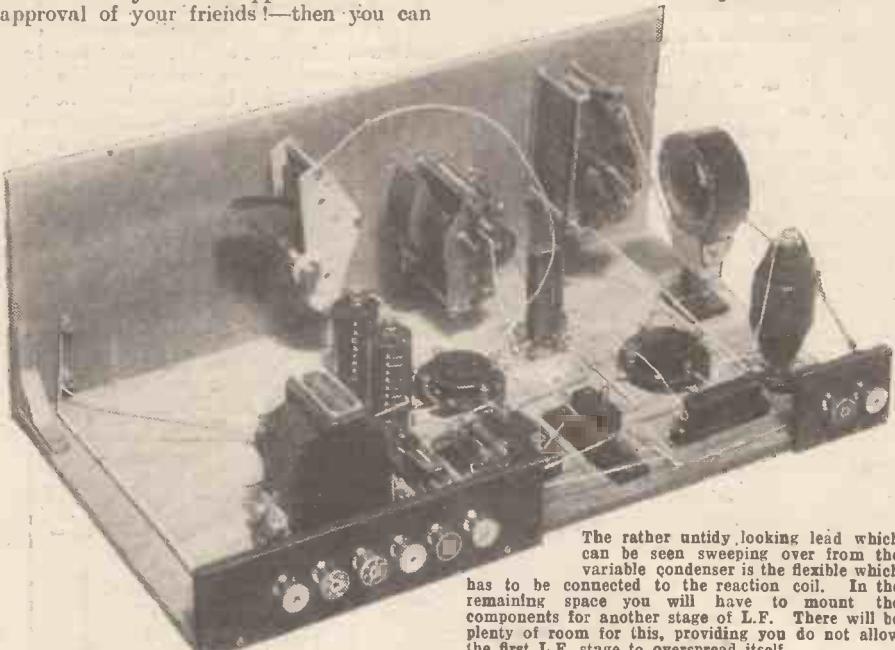
**The Grid Bias.**

A lead with a wander plug attached to its end should be connected to the G.B.—1 terminal on the set, and this plug should be tapped into the socket of the grid-bias battery, which appears to be most suitable. About  $7\frac{1}{2}$  volts will be O.K. for most valves.

I am not anticipating that you will have the slightest trouble in getting good results, providing that you have fairly closely followed my instructions. Some of you may comment on the apparent neglect of fixed condensers and other such "refinements." Of these I will have more to say later on. I am purposely keeping the components down to a minimum in order that there shall be small possibilities of any sort of trouble occurring in these initial stages. Take it from me that you have everything necessary to give you first-class three-valve results.

And when you are able to tune in quite a number of distant stations on the loud speaker, and the reproductions from these meet with your full approval—and the approval of your friends!—then you can

that points raised cannot, therefore, be dealt with in subsequent articles, but where queries of general interest are raised, these will be dealt with in our Q. and A. columns.

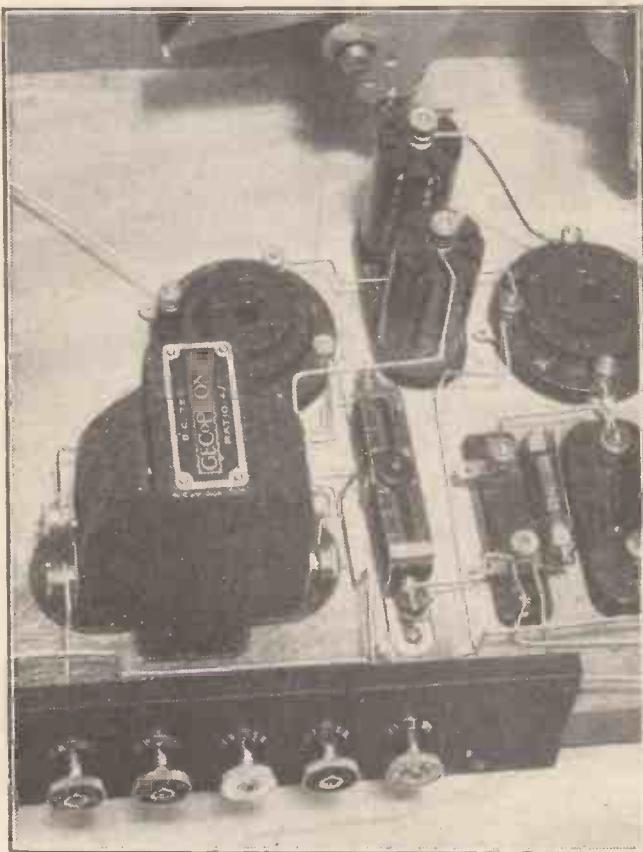


The rather untidy looking lead which can be seen sweeping over from the variable condenser is the flexible which has to be connected to the reaction coil. In the remaining space you will have to mount the components for another stage of L.F. There will be plenty of room for this, providing you do not allow the first L.F. stage to overspread itself.

By the way, I note with gratification that a large number of readers have reached the second stage quite safely! Further, no failures to do so have yet been reported, and this is even more satisfactory.

I would like particularly to extend my thanks to P. H., of Ealing and H. A. of Nottingham for their cheery communications respecting "Progressive" One and Two respectively. H. A. is cutting out his local station and bringing in foreigners in a very lively fashion. My great hope is that every "Progressive" constructor is as satisfied as the many who have already written to me.

\* \* \* \* \*  
**FLEXIBLE  
CONNECTIONS.**  
\* \* \* \* \*



A "close-up" of the additional stage, which forms the subject of the accompanying article.

The above article was written before that detailing the "Progressive." One was published. In fact, as previously stated, the whole scheme was completed and all the necessary diagrams drawn and every photograph taken before the first step was detailed.

By adopting this procedure, it was hoped that every conceivable little "snag" could be eliminated—and I firmly believe that this has actually been the happy result.

But readers will appreciate the fact

FLEXIBLE connections to grid-bias and H.T. batteries should be carefully examined at intervals. These are constant causes of trouble; for the flexible wire which will not develop a fault after constant use has yet to be invented. And do not take too much advantage of the flexible nature of flexible wires. Do not subject them to strain or allow them to kink. And keep the grid-bias flexibles well away from all the other wiring.

One of the grid-bias flexible connections will be joined to the L.T. negative and it may so happen that the H.T. negative is taken to L.T. positive. If that grid-bias negative lead is allowed to make a short circuit with any lead in metallic connection with H.T. positive, the full voltage of the H.T. battery will be brought across the filaments of the valves with disastrous consequences. Therefore, you will see that it is necessary to treat the grid-bias negative flexible with consideration, and if you remove the grid-bias battery for any reason do not allow that lead to drop negligently into the interior of the receiver.



## LISSEN NEW PROCESS BATTERY

60 VOLTS 7'II

100 VOLTS 12'II

9 VOLTS 1'6

Firing a furnace gives you power, but for Radio the power for your valves comes best from the LISSEN NEW PROCESS BATTERY. Upon this your loud speaker depends for its strength and truth of utterance, and its clarity of tone.

The oxygen content of the Lissen Battery is so great that hour after hour your reproduction will go on unimpaired. Throughout the longest programme the Lissen Battery will serve you and stand up unflinchingly to its work. Night after night for month after month it will do this because of the new chemical combination and process used only by LISSEN, because LISSEN alone holds the secret.

(N.B.—The success of this secret process is now so widely recognised that other manufacturers would willingly sacrifice a fortune to possess it.)

You get pure D.C. current always from the LISSEN Battery—strong, sustained, and noiseless in its flow. There are no moving parts to cause a hum, so there is no hum to be eliminated. The LISSEN Battery is safe (no risk to children) and is now so low in price that it is brought within the reach of all.

Obtainable at every good Radio Dealers—ask for it in a way which shows you will take no other.

**LISSEN LIMITED**  
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Managing Director : Thos. N. Cole.

**TECHNICAL NOTES**

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

**SINGLE DIAL CONTROL.****GANG CONDENSERS—EBONITE v. BAKELITE—RADIO VISION, Etc.****Single Dial Control.**

THE attention of set designers has long been devoted to the multi-valve receiver with single control. Where only low-frequency amplification is used the problem is comparatively simple, but for distant reception and for selectivity, high-frequency amplification becomes essential (not considering for a moment "super" circuits) and some rather difficult problems have at once to be met.

Taking a circuit with two neutralised high-frequency stages, and including the aerial circuit, we have three separate controls which have to be carefully adjusted in relation to one another for the proper reception of a distant station. If the circuit is to cover long-wave stations, such as Daventry and Hilversum, as well as stations in the ordinary broadcast range, the problem is complicated a little further.

**Gang Condensers.**

One of the commonest methods of controlling three tuned circuits simultaneously by a single control is to use a "gang" of tuning condensers, that is, in effect, one long condenser divided electrically (but not mechanically) into three separate condensers, these three condensers controlling the three tuned circuits respectively. For this system, it is, of course, necessary to match the inter-valve circuits by making the inductances, leads, etc., as nearly equal as possible, and by using valves of as nearly as possible the same characteristics. Even then it is usually difficult in practice to obtain satisfactory results over any considerable range of wave-length, although the arrangement may be excellent over a limited wave-length range.

**Logarithmic Condensers.**

More recently condensers have been designed in which the movable vanes are shaped to a specially designed curve in order to compensate for variations in the aerial and inter-valve circuits which are under control.

**Switch Tuning.**

Another arrangement, which has the merit of great simplicity, is to provide various permanently-tuned circuits (which may be obtained by means of tappings or otherwise), and to fit upon the panel of the receiver a number of switches, each switch throwing in a different circuit. If the various receiving circuits are permanently tuned to the wave-lengths of particular broadcast stations, it is evident that all the set user has to do is to close the switch corresponding to the station he wishes to receive, leaving all the other switches open.

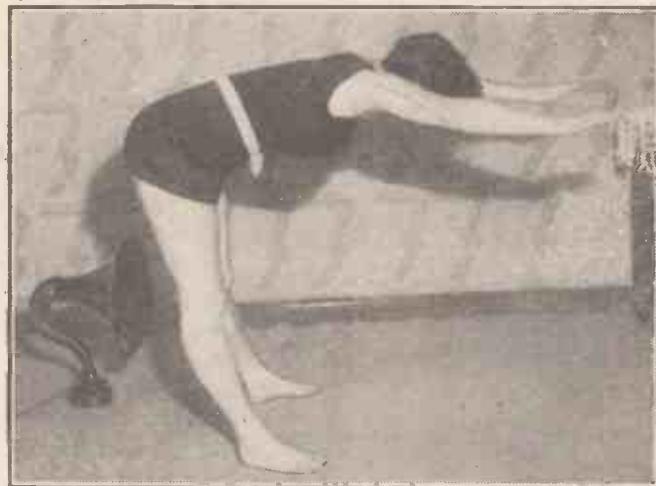
This has, as I have already remarked, great attractions for the entirely unskilled user, but it has obvious limitations, in that the set can only receive a comparatively

small number of stations. Moreover, in the event of the tuning being thrown out of adjustment for any reason, the correction is a matter involving probably more experience than is required for the operation of a receiver tunable in the usual way.

Sets with "tuning switches" for particular stations, however, are on the market, and show promise of becoming very popular.

**Ebonite v. Bakelite.**

Although ebonite is much more commonly used in this country than bakelite for radio panels and components, there seems to be an impression, amongst experimenters who have not had experience of



A German lady athlete doing her morning exercises to directions from one of the broadcasting stations.

bakelite, that this material has numerous advantages over ebonite.

The fact is that bakelite, which has been very largely used and boosted in the United States, has certain advantages, but, on the other hand, in many respects a good quality of ebonite is to be preferred to bakelite.

In actual breakdown voltage, for example, the best quality of ebonite has been shown to give a figure nearly three times that of bakelite.

**Working Advantages.**

Bakelite has the advantages that it is very hard (without being brittle), that it stands considerable exposure to sunlight and other influences without deterioration, and that it takes and retains an excellent polish without developing surface leakage. Ebonite, on the other hand, is easier to cut and to drill, although its surface requires to be rather carefully watched, or it is liable to be injured by the influences mentioned above. Ebonite, if exposed to warmth or even in any case with ageing is apt to warp—a drawback which is not experienced with bakelite.

Taking a broad comparison of the two materials, and assuming always that we are considering a good grade of ebonite, it seems that there is not a great deal to choose between them as regards actual service in use, whilst the ebonite is easier to manipulate from the experimenter's point of view.

Incidentally, the two materials are quite different in composition, ebonite being a hard-vulcanised rubber, whilst bakelite is a special synthetic composition into which formaldehyde largely enters.

**Radio Vision.**

In the current issue of "The Proceedings of the Institute of Radio Engineers" is a very interesting paper by Mr. C. Francis Jenkins, the well-known United States television expert, entitled "Radio Vision." In this paper he gives a very full and interesting account of his early experiments on picture transmission and of the development of his original methods and apparatus for the purposes of what is usually called "television."

It is interesting to note that Jenkins confines the term "television" to the transmission of moving pictures by wire and uses the term "radio vision" to describe the transmission of moving pictures by wireless. Therefore, what is commonly called "television" in this country would be called "radio vision" by Jenkins. I think this distinction of terms is rather useful, as the word "television" has up to now been used rather loosely to describe the transmission either by wire or radio.

**First Experiments.**

The following quotation, from the article will be interesting to those of my readers who follow the progress of experiments in this subject:

"The art of electrical picture transmission is very old relatively, for more than 50 years ago successful demonstrations were made in sending pictures by wire. And there have been many workers, too, but the attainment of each was given but passing notice until the stamp of approval was put thereon by the great laboratories of the Bell Telephone Company, when, in April last, they made their spectacular demonstration between Washington and New York. This demonstration gave a great impetus to the development of electrical transmission of all kinds of pictorial representation.

"Our first public demonstration of radio vision occurred on June 13th, 1925, when we showed in the laboratory in Washington, in the presence of Navy Secretary Wilber, Admirals Taylor and Robinson, and many others, what was happening at the time at the naval air station at Anacostia, some miles distant. It was the first radio demonstration ever made, I believe, and quite an historical event to many of us."

(Continued on page 867.)

New-amazing-simple  
built in one hour!



|| The finest three-valve  
receiver ever produced.  
Used in London—  
cuts out London. ||

Ask your nearest dealer now!

*Look  
at your face in  
the tea-pot*

THERE you will see a reduced, distorted and almost unrecognizable reproduction of your own features. A travesty of the truth—an insolence to the original.

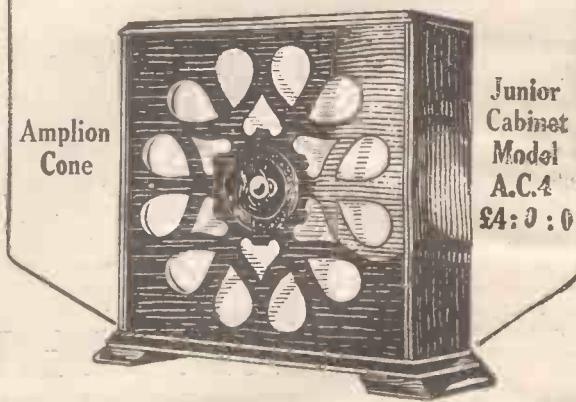
You may have heard the same sort of thing in Radio. DO NOT BLAME RADIO—you might with equal justice blame your own face.

Just as a good mirror can provide a truly realistic reproduction of your features so can good radio apparatus reproduce with fidelity the original studio performance. But it must be good radio apparatus, properly installed and properly maintained, and—of course, there must be a good loud speaker.

*The  
AMPLION  
is a  
Good loud speaker*



The world-famous  
**AMPLION**  
**LOUD SPEAKER**  
is obtainable in  
Cone, Cabinet and Horn types.  
25 models at prices from 37/6



# ADDING THAT AMPLIFIER

SOONER or later most listeners wish to add an amplifier to their existing set.

In some cases they may desire to increase the range of their receivers in order to pick up Continental and other distant stations. If so, they need a stage of high frequency.

Now a high-frequency valve is not always easy to adopt. For instance, if the receiver already possesses a stage of high-frequency amplification it is highly probable that the addition of another high-frequency valve will cause uncontrollable oscillation unless the unit is very carefully designed. In view of this I never recommend a second high-frequency valve to be added to a receiver already containing a tuned high-frequency circuit. It is far too risky. The constructor who really considers that he needs two high-frequency valves should choose one of the tested designs which appear from time to time in the wireless journals, and follow the author's instructions to the letter. This is the only method of ensuring success.

## Adding an H.F. Unit.

In the case of a detector valve it is a somewhat simpler matter to add a high-frequency unit. The easy method is to use the existing aerial coil as a tuned grid winding and to employ what is known as a parallel feed scheme, neutralising the high-frequency valve with the aid of a split-secondary aerial circuit. Such a unit can be made very cheaply and is of great value in bringing in the distant stations. Signals which were practically inaudible can be brought in at good telephone strength.

A high-frequency stage, however, is not of a very great advantage in cases where loud-speaker volume is required from stations already obtainable at fair strength. If one wishes to work a loud speaker on local broadcasting the correct thing to do is to build a low-frequency amplifier.

A simple Reinartz detector will give really good telephone strength at distances up to 15 or 20 miles from a local main station. To magnify these signals to sufficient volume to work a loud speaker a two-valve low-frequency amplifier is necessary. The question is what type of amplifier is best from the point of view of maximum volume combined with good reproduction.

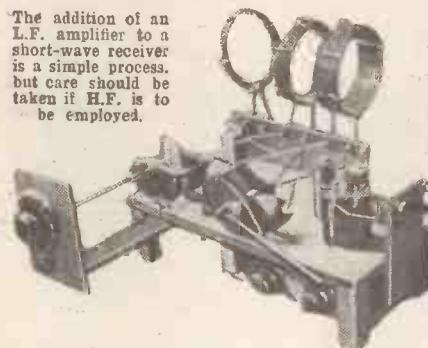
It is useless to magnify the signals if the results are not worth listening to. Two

An article of practical value to all set owners.

By A. JOHNSON RANDALL.

transformer stages will give enormous volume, but such an arrangement requires very skilled treatment if good reproduction is to be maintained. Moreover, only the most expensive transformers are suitable and care must be exercised both in arranging the lay-out and in the choice of a suitable pair of instruments. There is always a danger of the H.T. battery producing a coupling effect, and this in turn causes low-frequency oscillation and distortion. On the other hand, even the veriest novice can obtain good results from a stage of resistance coupling followed by a transformer. In

The addition of an L.F. amplifier to a short-wave receiver is a simple process, but care should be taken if H.F. is to be employed.



addition, the combination is cheaper and will give quite good reproduction with a moderately priced transformer.

The overall amplification is not very far short of two transformer stages. With regard to values, much depends upon the loud speaker.

## Suitable Values.

With the average horn type very good results are obtainable with a 200,000-ohm anode resistance, .005 coupling condenser, and a 2-megohm leak. The transformer can have a ratio of 3 or 4-1.

For a cone-type instrument the coupling condenser could be .01 mfd. and the transformer a 2-7 or 3-1 ratio.

For volume control a high-resistance potentiometer across the secondary of the transformer is a very convenient arrange-

ment, and such potentiometers as the G.E.C., Igranic, Dubilier, Centralab, etc., are quite suitable.

Constructors often wish to add an extra low-frequency valve to reflex receivers already incorporating two stages, usually transformer coupled. The two-valve Hale is an example. This addition is not really advisable since there is every likelihood of low-frequency reaction troubles unless special precautions are taken. I would never recommend a third transformer, but, with care it is possible to employ a choke or resistance-coupled stage. With every additional valve, however, it becomes vitally important to ensure that the rest of the set cannot introduce any unwanted effects capable of producing oscillation or distortion.

On the other hand, three resistance-coupled stages or two of resistance followed by a transformer are a workable combination, and their construction can be undertaken with every chance of success provided too high a magnification is not aimed at.

## H.T. Connections.

For the ordinary listener a properly designed two-stage amplifier will give all the volume necessary and if greater strength is required then a high-frequency stage is desirable. This combination, namely, a high-frequency unit, detector with reaction, and a two-stage low-frequency amplifier will do practically everything that the average listener wants.

In adding an amplifier to an existing set it is unnecessary to employ two H.T. negative terminals. One battery will suffice and only one H.T. lead is required. I mention this because some sets may have L.T. + joined to H.T. -, whereas in the unit L.T. - may be connected to H.T. -. Hence, joining the two H.T. negatives together would short-circuit the L.T. battery. One H.T. - connection will serve for both the set and amplifier because the L.T. terminals will be joined together and the H.T. circuit thus completed. This obviates the danger of damaging the L.T. battery, but I always prefer to remove any risk by joining negative to negative throughout, and I am of the opinion that the practice of connecting H.T. - to L.T. - will become standardised shortly.

For all round work, which includes a certain amount of distant reception, a two-stage amplifier will be found the most useful.

# BROADCAST NOTES

FROM OUR BROADCASTING CORRESPONDENTS.

Festive Season Programmes—Mr. St. John Ervine's Play—"Rigoletto" Again—Provincial Features—"Christmas in Ulster"—Charity Ball at Newcastle—"The Magic Hour" at Liverpool—5 G B Morsels—In Scotland—Ghosts at Aberdeen—2Z7 Helps Infirmary.

### Festive Season Programmes.

THE special programmes arranged by Savoy Hill for the festive season extend from Sunday, December 18th, until the last day of 1927, and will be given from London, Daventry (5 X X), and the relay stations. Most of the items will, of course, emanate from the London Station, either as studio performances or as outside broadcasts, but others will be drawn from the various provincial stations, such as the play entitled "The Ship," and Verdi's opera "Rigoletto," for the performances of which the Manchester Station is responsible on Monday, December 19th, and Wednesday, December 21st, respectively.

### Mr. St. John Ervine's Play.

It is now possible to give some further details of these transmissions and the artistes engaged for their presentation "The Ship" is a three-act piece by St. John Ervine, and falls, therefore, into the category of long plays, to which listeners in the North are particularly partial. It has already been given in the provinces, but this will be its "baptismal" broadcast from London.

Briefly the play deals with a conflict between an ambitious father and an easy-going son—quite a familiar plot, you will say—but treated here in an original and intensely dramatic manner. Miss Nancy Price, the well-known London actress, is to take a leading part, the other characters being portrayed by members of the Manchester Station Repertory Players.

### "Rigoletto" Again.

"Rigoletto" undoubtedly ranks among the most popular operas that the B.B.C. broadcasts from time to time, and there is no necessity to extol its merits. Listeners will no doubt be interested to learn that the cast will include May Huxley, Gladys Palmer, Dennis Noble, Parry Jones, William Anderson, Reginald Whitehead, Norris Parker, Harold Marsden and Herbert Ruddock.

### Provincial Features.

In addition to these special programmes, each B.B.C. station will give its own individual Yuletide programme, some of which are here described. Manchester has quite a number of seasonal transmissions, the first being on Tuesday, December 20th, when the Mid-day Society's Concert, consisting of Christmas Carols, will be sung by the Manchester Cathedral Choir. Christmas dance tunes and the old Yuletide game of charades figure in the programme on Thursday, December 22nd, while on Christmas Eve listeners will renew their acquaintance with "The Browns of Owdham" in a short play entitled, "Christmas Eve at Browns".

### "Christmas in Ulster."

Belfast has a festive entertainment down for December 24th, under the somewhat

comprehensive title of "Christmas in Ulster." All those who know of Mrs. Rooney and Mat Mulcahey, the "Owl Besom Man from County Tyrone," will be listening.

It should be a jolly evening—these worthies and other items, such as, for instance, the traditional Ulster entertainment, "The Christmas Rhymers," collected and set down by H. Richard Hayward. This is really a dialogue which has never been in written form, but handed down by word of mouth from generation to generation. Others in the programme are W. R. Gordon, whose valuable work in collecting old Irish folk songs is well known; the Yuletide Singers, who are contributing carols and some rousing choruses; and the Station Orchestra.

### Charity Ball at Newcastle.

From Newcastle comes the news of a Charity Ball, which is to take place at 9 p.m. on Friday, December 23rd, in the Grand Assembly Rooms, Barras Bridge. The event will, of course, be full of Christmas fun and merriment, though the entire

by the Gloucester Cathedral choristers, relayed from the Chapter House, Gloucester Cathedral, on Wednesday, December 21st; a Pickwick party, taking the form of a Dickens' Dream Phantasy, in which some immortal characters come to life and attend a present-day party given by Pickwick, on Friday, December 23rd; a concert of Christmas music and carols on Saturday, December 24th; to be followed by "A Christmas Fantasy," by John Overton, with incidental music by the Birmingham Studio Orchestra; and a play, a symphony concert, variety and musical comedy programmes, with plenty of dance music on Monday and Tuesday, December 26th and 27th.

### In Scotland.

Most of us who live south of the Tweed have always had the impression that Christmas in Scotland takes a very secondary place by comparison with the New Year. It would hardly be true, perhaps, to say that the B.B.C. is attempting in any way to introduce changes in the preferences of our Scottish friends, or that Scotsmen when they migrate South become so enthralled with the traditional spirit of an English Christmas that they are smitten (perhaps unconsciously) with some irresistible desire to implant among their compatriots these most laudable characteristics of the Sassenach. Whatever is the explanation, a glance at the Christmas programmes of the Scottish stations reveals very little, if any, difference from those of the English stations.



The Air Ministry's new D.F. station at Mitcham is almost complete. Above can be seen the arrangement of the four masts.

proceeds will be handed over to the Lord Mayor's "Holiday Camp for Poor Children" Fund, with which the Newcastle Station has for a long time been identified. Music by Tilley's Dance Orchestra will be broadcast, and I am asked to say that inquiries for tickets should be made to the Station Director, B.B.C. Offices, Newcastle-on-Tyne

### "The Magic Hour" at Liverpool.

Liverpool has two interesting Christmas features—carols by the choristers and organ solos relayed from St. Luke's Church, Bold Street, on December 22nd, and a Christmas Fantasy for children on Christmas Eve. The fantasy, entitled "The Magic Hour," deals with the adventures of two children who visit a toy shop after dark.

### 5 G B Morsels.

It should be mentioned that the Christmas programmes from 5 G B, the Daventry Experimental Station, will provide distinct alternatives to those from London and those stations which take the London programmes. They include a carol concert lasting an hour

### Ghosts at Aberdeen.

Aberdeen has gone so far as to put on a "Ghost Programme" on Thursday, December 22nd, quite a novel idea which does not seem to have been thought of by those at Savoy Hill. The most interesting item, to my mind, is a play entitled "Out of the Shadow," which promises to be a real hair-raiser. If you want a big thrill, and do not suffer from a weak heart, turn out the light when you listen to this programme.

### 2Z7 Helps Infirmary.

A special service, relayed from the Manchester Royal Infirmary, will be broadcast at 7.45 p.m. Sunday evening, Dec. 18th, when the address will be given by the Rev. Benjamin Pollard, Rector of St. Chrysostom's, and chaplain to the Infirmary. Organ music by Mr. Edward Rorke will also be broadcast, both before and after the service, and this will be followed by a special Christmas appeal on behalf of the Institution by Mr. R. P. Goldschmidt, Chairman of the Infirmary.

# SOME BROADCASTING LIMITATIONS

By De Groot

In an interview with "Ariel" De Groot, the well-known leader of the Piccadilly Hotel Orchestra, gives his views on radio.

**D**E GROOT, tall, silver-haired, debonair, is to-day, at forty-six years of age, an example of the triumph of genius and grit over disappointment, discouragement, and misfortune. De Groot at fourteen was what is now called a "boy-wonder"; so great was his promise that he was to have been sent to Berlin to study under Joachim—the greatest of all masters.

Just as his ambition and hopes were about to be realised, De Groot's father—himself a musician—had a serious accident and was crippled. The support of his family—mother, father, and younger brother—devolved upon this child; and for hours a day he played his violin in orchestras, cafés, cabarets, wheresoever he could. Imagine anything more soul deadening for this boy of inborn musical talent, whose hopes and aspirations some few months before had been so great, than the hour-long playing of that ear-jangling claptrap associated with the dance-hall and cabaret! He pulled through, and, what is more, salved his artistic soul.

During those years of struggle, De Groot, having realised his life's ambition had gone by the board, made up his mind to give the world the best of what they really wanted, with the best of what he could give. When he came to London he was little known, and when he joined the Piccadilly Hotel, some nineteen years ago, he went with the fixed determination of giving his public music of a quality and refinement never before heard outside a concert hall.

#### Unique Popularity.

The lighter operas of Verdi, Puccini, Mozart, and Bizet, the Lieder of Schumann and Schubert, the bergerettes of Réynaldo Hahn, the songs of Liza Lehmann, Landon Ronald, etc., were played to the public with a delicacy and perfection hitherto undreamed of; the large clientele of the Piccadilly Hotel became familiar with music they were rather apt to fight shy of; but when De Groot played a violin solo they realised they were listening to genius. They listened—and returned. Gradually he led them higher, to the music of Chopin and Strauss, Wagner, to the moderns, such as Rimsky-Korsakov, Stravinsky, and Dvorák, until to-day he has an unrivalled position in London.

His success, though not immediate, was immense, and to De Groot must be given the honour of raising the standard of music in the great London restaurants. All have copied him, many have tried to find his equal; none has succeeded.

De Groot has received many honours and distinctions—one of his most treasured, the personally expressed appreciation of his playing by their Majesties on a recent occasion; but above all he holds dear the numberless letters he received during the war from men and women of all classes and nationalities, thanking him for easing, if only for a few moments, the misery of their lives.

#### Omit Classical Selections.

De Groot was one of the first, with his orchestra, to broadcast for the British Broadcasting Corporation, and it is safe



A recent portrait of De Groot, the popular violinist-conductor.

to say that that body has never employed an artiste, the popularity of whose concerts was so universal or general.

Unfortunately, some time ago, owing to a most regrettable misunderstanding, it became impossible to renew the contract between the B.B.C. and Mr. De Groot, with the result that many of his admirers have been denied the pleasure of hearing his playing. There is reason to believe, however, that the existing difficulties may be smoothed over, and that before long De Groot will be again a central attraction of the B.B.C. programmes. No one hopes this more than De Groot himself.

Under the circumstances it is hardly possible to expect him to criticise either the B.B.C. or their programmes, although the latter, in his opinion, are capable of improvement.

Of the general principles of broadcasting music, and its limitations, De Groot is intensely interested. In his mind he divides



music into classical music, good music—and trash.

"Classical music," he said, "the compositions of the masters, such as Brahms, Bach, and Beethoven—to understand which needs a musical education in itself—should never, in my opinion, be broadcast.

"They must be played with a full orchestra—must be read not only through the medium of the music but also by the rendering of the conductor; just as one gains one's impression of a play not only through the spoken word but also through the actions of the player.

"The foundation and basis of all music and melody is the bass; without this, and with only treble and soprano, music is as strawberries without cream. The brass and tuba instruments so far have never been satisfactorily rendered in broadcasting. Whether it be the fault of the microphone or receiving set, it appears to be impossible to transmit a true rendering of the longer sound waves, truly proportioned to the shorter and more delicate waves of the reed and string instruments. Until this is achieved, classical music should not be attempted, as it disappoints the few who can truly understand, and gives no pleasure to the multitude.

#### Light Music Required.

"Good music, carefully selected, intermingled with chosen and artistically played dance music, is what the public wants.

"I found that my concerts were so popular because I chose with the utmost care only those pieces which, from twenty years' experience in London, have been always in demand.

"But the careful choosing of one's programme is not the only point in producing a successful concert. I have my platform placed at a suitable distance and height from the microphone; I arrange my orchestra so that the reed instruments—the flute, clarinet, and oboe, the most delicate in sound—are in front, the violins next, the cellos and piano behind.

"I rehearse the pieces for at least three hours, so that throughout my concert there is an evenness of tone and volume.

"This careful arrangement of one's orchestra and realisation of the present limitations of the broadcasting machine are essential, in my mind, to the presentation of what is always my ambition, and, I hope, my achievement—a truly artistic performance."

# B.B.C. PERSONALITIES OF TO-DAY.

In which some well-known broadcasters are brought for once into the limelight.

By THE EDITOR.

THE rigid and appropriate application of anonymity gives the public hardly any opportunity of assessing or appreciating personalities within the B.B.C. It has been part of my business, however, to maintain close contact with all the heads of the various branches of the work of the B.B.C.

I propose now to give some account of the outstanding personalities concerned with the broadcast programmes, their administration, execution, and transmission. The one personality which, above all others, is indelibly stamped on the B.B.C. is that of Sir John Reith. He is rightly accepted as one of the greatest administrators of the age.

#### Controller of the B.B.C.

There are probably not more than five or six other men in Europe with anything approaching his genius for organisation, and his dynamic energy. Its pre-eminence as an organisation, its high moral tone, its ethical and educational outlook; and its dignity—these and kindred virtues of the B.B.C. may be put solely to the account of Sir John Reith.

Whilst still in the Navy, Admiral Carpendale (now controller of the B.B.C.) had a world-wide reputation as a disciplinarian of uncanny efficiency. He has carried forward his tradition at the B.B.C. The staff is handled in the best naval manner, not unmixed with kindness. Off duty, Admiral Carpendale resumes his normal juvenility ; he is then the brightest and cheeriest of companions.

It speaks well for the adaptability of the B.B.C. controller that, although up to two years ago he had had little or no contact with diplomacy or international affairs, he is now the head of the Union Internationale de Radiophonie. In this capacity he travels a great deal on the Continent, and is warmly welcomed as a splendid specimen of the Englishmen of his class and tradition. The fine flavour of the sea is always present with the gallant admiral.

Captain Eckersley, one of the few old-timers still on deck, is perhaps the best-known personality in the B.B.C. He has made a religion of broadcasting. With him it is very nearly the be-all and end-all of his existence. Such devotion has brought him more responsibility and anxiety than material reward. He is much more than Chief Engineer ; he is a master of the microphone manner, and is a considerable success as a programme builder.

#### Behind the Scenes.

Captain Eckersley belongs to that rare and fortunate group who, although occupying high position, have sufficient reserve of self-confidence, personality, and natural dignity to make it possible for them to conduct their work in the manner of friendly intimacy with all subordinates. The devotion of the four hundred engineers of the B.B.C. to their chief is tremendous, yet there is no artificial atmosphere of

respect. Captain Eckersley, with Admiral Carpendale, has done a lot on the international side. In addition, Captain Eckersley is a journalist of capacity and reputation.

A man few listeners know anything about is Major Gladstone Murray. Before the war he was a Rhodes Scholar at Oxford, but after a distinguished career in the Army he is now installed at Savoy Hill in the capacity of Director of Publicity, propaganda, spell binder, and general diplomatist for the B.B.C.

He has been described as "the brilliant mystery merchant," and certainly, in Major

waters. He is the guide, philosopher, and friend to Savoy Hill. Turbulent spirits, distraught artistes, embittered composers, thwarted conductors, and over-worked officials restore their shattered mind in the pervading peace of the sanctum of the Head of Programmes.

Then there is Mr. Thomas Lochhead, Chief Accountant of the B.B.C.

#### Provincial Personalities.

It is perhaps fitting that Mr. Lochhead hails from the other side of the Tweed. Anyway, the B.B.C. auditors, who are the only people qualified to judge, have declared repeatedly that Mr. Lochhead is nothing short of a financial genius, and that he handles the gigantic accounts of the B.B.C. with scarcely any staff at all. But Mr. Lochhead's interests in life are not bounded at one end by the multiplication table and at the other by the rate of exchange.

It is common knowledge among book-lovers that Mr. Lochhead is a dangerous opponent at all the more exclusive



The new studio at Belfast under construction. It will, when finished, be the largest in Ireland and will embody the latest improvements.

Murray, the B.B.C. have a man with not only a Class A brain, but a mind as subtle as—well, never mind who's ! An unassuming, quiet, softly spoken man, Major Murray might be imagined in the rôle of "Mr. X." of the Secret Service and Intelligence Bureau in one of Mr. Oppenheim's stories. The only drawback to that bit of imagination is that he is too intelligent for a fiction rôle.

There must be something in the theory of eminent qualities running in families. Only perhaps they take longer to come out in some cases than they do in others. Thus we get Mr. R. H. Eckersley as much a genius in his own line as is his brother, the Chief Engineer, or his other brother, the renowned research scientist. "Roger," as he is affectionately known by his chief and by his subordinates alike, has included the Foreign Office and poultry farming in his varied career. Roger's special function in life at present is to spread oil on troubled

sales of treasured volumes and limited editions.

Of picturesque personalities outside London, Mr. Neil Maclean, Station Director at Aberdeen, is easily first. Mr. Maclean wears the kilt from day to day. He is Celtic in outlook, in personality, in accent, and in ambition. Throughout the Highlands, to the remotest of the Western Isles, Neil Maclean as a Gaelic singer is a household tradition.

Down in Cardiff is Mr. E. R. Appleton. Perhaps it is by way of contrast, or maybe I am wrong, when I suggest that there is no smoke or rain or drabness at Cardiff. But anyway, whether by contrast or to be in tune with existing conditions, Mr. Appleton has created a host of Sunbeams and Moonbeams, and organisations of Sunbeams and Moonbeams, in the vast area from the mining villages of the Rhondda to the western terminus of the Cornish Riviera Express.



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- 2 Lissen Key Switches or Lissen 2-way Switches (Price 1/6 each).
- 2 .0003 Lissen Mica Fixed Condensers (grid leak clips are included) (Price 1/- each).
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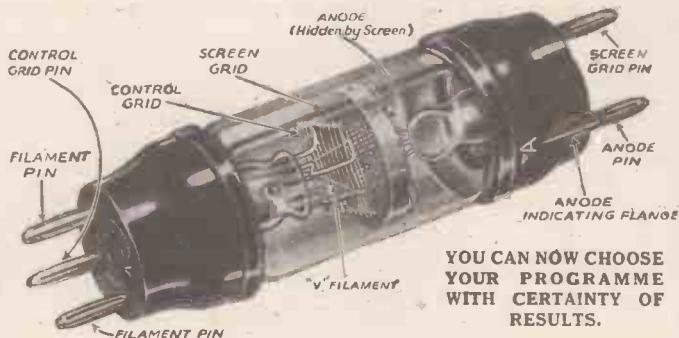
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# MAKESHIFT NEUTRODYNE CONDENSERS.

You can damage your batteries or even burn out your valves if you do not take precautions when using improvised or "shaky" components in your set.

By O. J. RANKIN.

THE small balancing or neutrodyne condenser is such a simple device that many constructors regard the commercial product as an extravagance which can be easily avoided by making up a substitute from any odd parts and materials that happen to be lying about.

Generally, this is a great mistake, for in radio it is often the small and insignificant components which call for the greatest care in design and construction. One is sometimes bored to distraction over the old cry about using only the best quality components, but in the long run it is often realised that it is better to be bored than sorry.

#### Note This Possibility.

The novice who constructs and uses a makeshift neutralising condenser is "playing with fire," and before fitting the device to his receiver he will do well to consider the fact that the very best "neut" on the market—something which can always be

connecting the H.T. negative. If this is joined to L.T. negative, as shown in Fig. 1, then the result is that the whole of the H.T. battery is ruined by a short circuit.

Imagine the moving plate of the N.C. to be touching the fixed plate. Trace the dotted line from the H.T. positive, and you will see that it passes first through the top half of the anode coil, across the defective N.C., through the aerial tuning coil (which, being of 35 or 50 turns for the usual broadcasting wave-lengths offers very little resistance), and straight along the L.T. negative lead to the H.T. negative, thus short circuiting the H.T. battery.

This, of course, is a serious matter, yet it fades into insignificance when compared with what might happen when the H.T. negative is connected to the L.T. positive, as in Fig. 2. In a single word the result will now be "Phut"—which is a more or less scientific description of a bright blue flash indicating the burning out of all valves in circuit.

#### May Burn Out Valves.

In Fig. 2 I have endeavoured to show exactly how this happens, and by following the dotted lines as in the previous example (from H.T. positive to the short-circuited N.C.) it will be observed that we get as far as the L.T. negative lead, via the A.T.I., as before, and then, not being able to run direct to the H.T. negative, part of the H.T. current passes through the valve filaments, and so "home," the filament resistances being totally incapable of dropping the high voltage. But the matter does not end here. The remainder of the H.T. current, seeking another path of destruction, runs through the L.T. battery to H.T. negative ("home") and thus both batteries are damaged.

Such risks cannot be ignored. The best policy is, of course, to use a condenser of

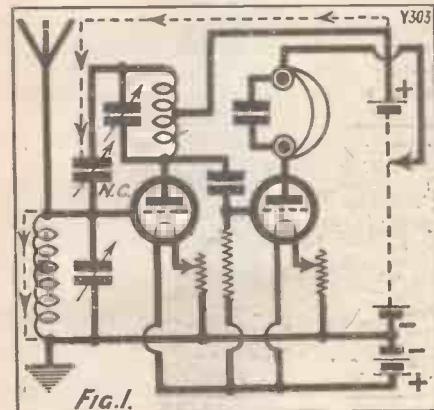


FIG. 1.

relied upon—costs but a few shillings, and that valves are still expensive items to replace, in spite of the recent price reductions.

But let us see what atrocities may be perpetrated by using a faulty "neut." The accompanying diagrams duplicate a simple two-valve circuit employing a neutrodyne stage of high-frequency amplification, followed by detector, and the small neutralising condenser (N.C.) is connected as usual, between the grid of the high-frequency valve and one end of the centre-tapped tuned-anode coil, i.e. between the grid and plate of the high-frequency valve, via the coil.

Now, one of the greatest faults in a badly made N.C. is lack of rigidity, and this invariably means that sooner or later the two plates will touch, or otherwise short-circuit. If such a thing happens, then, as the student said when unravelling the problem of what happens when an irresistible force meets an irresistible object, "something's got to go." Just what "goes" will depend upon the method of

reputed make and leave nothing to chance; but if any amateur is at present in possession of a doubtful component I would strongly recommend the simple method outlined in Fig. 3, where a small fixed condenser

ser  $\bar{A}$ , having a capacity of about .001 mfd., is inserted between the N.C. and the coil in order to block the H.T. current in the event of an accident. This is a safeguard which is found in almost every neutrodyne circuit used in France, and in cases where the proper component is not available it is certainly a necessity, too often ignored.

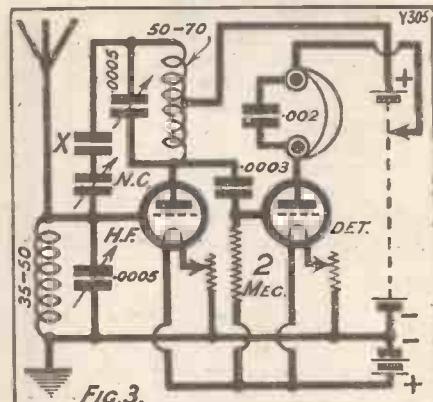


FIG. 3.

## RADIO REMINDERS.

A constant humming noise is generally due to the fact that either the aerial lead, the earth lead, or the set itself is too close to the electric-light mains. (Remember that these are sometimes concealed in the wall.)

The capacity of the average 100 ft. (or thereabouts) amateur aerial is in the neighbourhood of .0002 or .0003 mfd.

Where trams or other electrical machinery produce interference with reception it is often found that a counterpoise earth will give better results than a direct connection to a buried plate.

The proper way to disconnect battery leads is at the battery end, not at the set end? If the wires are left on the battery and unfastened at the other end, there is a great danger of shorting the battery.

If an L.T. battery is allowed to stand in a discharged condition for very long it will be seriously attacked by sulphate, and may be injured rather badly.

It does not matter in the least if the accumulator has been accidentally connected the wrong way round—i.e. its negative to L.T. plus on the set and its positive to L.T. negative. Very often, as a matter of fact, this improves reception.

An ordinary flash-lamp bulb connected in the H.T. negative lead makes a very good fuse, and may save your valves.

If sulphuric acid from an accumulator is spilt upon a floor or a carpet it will rapidly "eat it away" unless the sulphuric acid is neutralised? This can be done by ordinary washing soda, bicarbonate of soda, or ammonia, if applied freely and at the fullest possible strength.

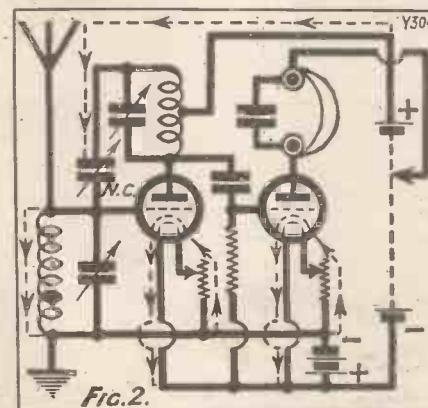


FIG. 2.

## A CHEAP EARTHING SWITCH.

**A**N efficient and cheap earthing switch and safety gap combined can be constructed from the contents of the average listener's "junk box."

The parts required are as follows:

- 1 Ebonite panel,  $2\frac{1}{2}$  in.  $\times$  2 in.
- 1 Ebonite strip, 2 in.  $\times$   $\frac{1}{2}$  in.
- 4 Valve sockets (flush-mounting type).
- 4 Valve pins.
- 2 Soldering tags.
- 1 2 in. length of  $\frac{1}{2}$  in.  $\times$   $\frac{1}{4}$  in. brass.
- 1 2 in. length of  $\frac{1}{2}$  in.  $\times$   $\frac{1}{16}$  in. brass.
- Panel transfers.
- 2 Wood screws.

First, square up the ebonite panel and slightly bevel the front edges.

Turn the panel face downwards and score a line at dead centre, i.e.  $1\frac{1}{2}$  in. from the top and bottom. At a  $\frac{1}{4}$  in. from each end of this line drill a  $\frac{3}{16}$  in. or  $\frac{1}{4}$  in. hole, according to the size of the wood screws. Countersink these holes from front of panel until the screws fit snugly.

### Constructional Details.

Next score a line  $\frac{1}{4}$  in. from the top, and another  $\frac{1}{2}$  in. from the bottom of the panel. On each of these lines drill two holes  $\frac{1}{8}$  in. from the sides, and sufficiently large to take the sockets chosen. Fig. 1.

Now take the  $\frac{1}{16}$  in. brass strip and drill a hole  $\frac{1}{8}$  in. from each end; these holes being the same size as those provided for the sockets.

On either side of one of these holes, drill a further hole, and merge all into one oval slit by means of a small file. Fig. 2.

Next cut this strip into two pieces and, with a fine file, serrate the newly formed edges. Fig. 2. This will be found easy if both parts are clamped in a vice and filed together.

The panel can now be assembled. First apply the transfers as shown, then insert the sockets in position.

The sockets marked A and E should each be fitted with one of the prepared brass strips, to form the spark gap. (This can be

This strip is labelled A and E, and is provided with two wires to the aerial and earth terminals of set.

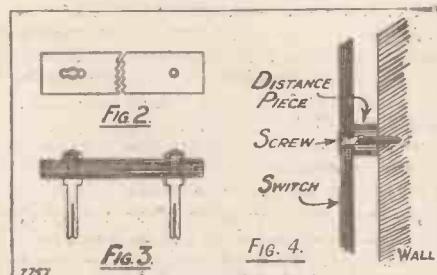
The  $\frac{1}{2}$  in. brass strip is now prepared in a similar manner, except that no wires are fitted. Now solder aerial and earth to their respective sockets and screw the switch to the wall.

By using distance-pieces of ebonite tube or wood the sockets can be kept clear of the wall. Fig. 4.

### The Device in Use.

To operate, the ebonite strip is plugged into the switch, so that A joins A, and E joins E. This can be left undisturbed during the whole time that the set is in use.

When switching off, the brass strip, which has meanwhile been safely housed in



the "off" sockets, can replace the ebonite strip and will completely isolate the set.

Although there is a general belief that such a switch is useful only in the summer months, when lightning and thunderstorms are prevalent, it should not be forgotten that rain, snow, and sleet, are all liable to convey static electrical charges to the aerial. If no switch of the kind described above is provided, and if the set is fitted with a series aerial condenser, it is possible to receive an unpleasant shock when touching the aerial wire or terminal. This can be completely obviated by the use of this little switch, easily constructed from spare components or parts, as described above.

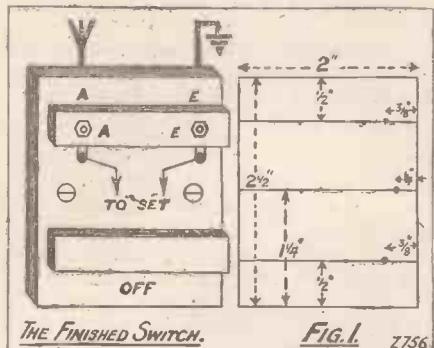
## DO YOU KNOW THAT—

When a set which has hitherto been well-behaved starts to howl and distort, the most likely cause of the trouble is the H.T. battery running down.

It is generally the almost too-obvious troubles—such as the use of a piece of broken flex, or a valve which is making faulty contact with its valve holder—that get overlooked longest.

Every time a pair of telephones is dropped from the table on to the floor the magnetism is weakened, and the life of the telephones made shorter.

A good rough-and-ready test for oscillation in a receiver is to wet the finger and touch the aerial terminal with it? If a loud "click" is heard every time the finger goes on and off the aerial terminal you can be pretty sure that the set is oscillating.



arranged either in front or behind the panel, but is neater in the latter position.)

By means of the oval slit the gap can be adjusted until the serrations are almost, but not quite, touching.

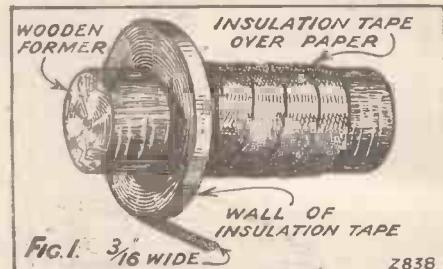
The strip of ebonite is now drilled  $\frac{1}{8}$  in. from each end, and the valve pins, each carrying a soldering tag, are fixed. Fig. 3.

## FILLING "WAVY" EBONITE PANELS.

MANY, no doubt, are in the habit of filling drillings in old panels with cobbler's wax, "glitterwax," or other appropriate substances, but those who have wavy finish panels to rejuvenate probably do not like tackling the job. It is quite simple, however. Just fill up the hole in the usual way with some black substance which sets hard, and then take an extremely fine needle scriber, and scratch the filling to a similar pattern. Most wavy finish panels have a machine-made repeat pattern, and if the lines of a small section are studied, it will be found to be quite easy to make a duplicate figuring. A magnifying glass will prove useful to those who wish to execute such work with real skill and care.

## EASILY-MADE CHOKE FORMERS.

EBONITE is, of course, the best material for constructing the former to carry the winding of an L.F. choke, but if you like making your own apparatus and are not fortunate enough to possess a lathe, you will find it hard to make a satisfactory one-piece ebonite bobbin. The black adhesive tape which is sold for insulation



purposes can be built up into excellent formers in the way shown in the sketch.

Determine first the dimensions of the iron core, and then make an equivalent wooden former. Round this wrap a piece of cartridge paper of the correct length for the former, sticking its overlapping edges together, but being careful that the paper does not adhere to the wood. Over the paper wind a strip of the insulation tape. Now unwind a long strip of the tape from the roll and tear from it a strip about  $\frac{3}{16}$  in. wide. Wind this round one end of the former, building up a narrow wall of tape. Keep the wall upright, squeezing it firm with your fingers, warming the tape if it does not stick properly. Build up a wall of tape at each end of the former high enough to retain the coil winding.

Formers made in this way will be found to be surprisingly strong. The wire is wound on with the wooden former still in position, the ends of the wire being pushed through the walls with the help of a needle. The winding is then taped over, the bobbin is slipped off the wooden former, and the iron core is put in.



And it really is stupendous! Never in the history of Radio has such a wonderful success been attained. Six-Sixty experts have achieved the almost impossible in the design of the New Six-Sixty Speakers. They have combined the clear cut notes of the Horn Speaker with the mellow beauty of the Cone. Until now, this has been reckoned an utter impossibility. Hearing is Believing. Go to-day to your dealer and ask him to demonstrate the New Six-Sixty Speakers. You will be amazed! You will hear what you have never heard before — Crystal clear reproduction which is absolutely natural and true to life. Every high and low note of the orchestra is reproduced with an unequalled clarity. Nobody has ever heard anything like it.

SIX-SIXTY SPEAKERS WILL, LIKE THE FAMOUS SIX SIXTY VALVES, BE THE MEANS OF ATTRACTING THOUSANDS TO RADIO.

PRICES: PEDESTAL TYPE £2 : 5 : 0  
CABINET TYPE £4 : 4 : 0

*The Six-Sixty Speakers will be gladly demonstrated at any of the 170 depots of Messrs. Currys, the Cycle People.*

In any case of difficulty write direct to us, enclosing your dealer's name and address.

## SIX-SIXTY SUPREME CONE SPEAKERS

The Electron Co., Ltd., 122-124, Charing Cross Road, London, W.C.2. Tel. Regent 4366.

**THE "SYDNEY" TWO.**

The Editor, POPULAR WIRELESS.

Dear Sir,—I built up your "Sydney" Two on Saturday and within an hour I logged 2 X A D transmitting a New York and W G Y programme.

I heard every word of Miss Ruth Elder's homecoming speech. On Sunday I had many English and foreign amateurs.

The only difficulty I had was with the reaction. I remedied this by adding more turns, maybe about 4, making 11 in all the reaction coil.

I am only waiting for a suitable night, or day, to attempt to receive 2 F C.

Thanking the "P.W." Staff for such a good set,  
I am yours,

G. S.

Smethwick:

**THE EDITOR, POPULAR WIRELESS.**

Dear Sir,—Having made up the "Sydney" Two wireless set from instructions in "P.W." I should like to state that I received 3 L O Melbourne direct on Sunday 19th. This station was testing on 36 metres and strength was about R4 during the whole programme. I first picked up the station at 6.45 p.m. 7 o'clock time signal. Then followed a programme of gramophone records, including songs by Albert O'Jay, tenor, news reports, and readings from "The Morning Argus." The station closed down at 8.25, with the announcement that these tests were to be continued every Sunday at 18.30 G.M.T. until further notice. I can also receive K D K A, and W Y G any night at excellent strength. Thanking you for such a splendid set, with every success to "P.W."

Yours faithfully,  
A. B.

Broadstairs, Kent.

**"ADVICE FROM AMERICA."**

The Editor, POPULAR WIRELESS.

Dear Sir,—Undoubtedly your article entitled "Advice From America" will by this time have been read and discussed by all keen British Radio Amateurs.

All agree, I think, that British amateurs feel keenly their forlorn position as they grope their way towards a discovery of their true status, but, even down to the youngest among us, all must resent this superior attitude which our American cousins endeavour to hold over us.

Since the war there seems to have swept over this country an idea that, in all our actions and interests, work or play, arts and science, we must compare our standards of attainment with those achieved across the water. Politics, education, sport in all its branches, motoring and radio are all examples in which America has recently "shown us how things ought to be done." I am afraid the British amateur is a lumbering fellow, scarcely having the courage to support his own convictions at times, but nevertheless, he "gets there" in that unassuming manner which is typical of the Briton. We make no pretence to "superior knowledge" in so far as radio is concerned; nor do we desire to compete in the international race for the Radio Laurel Wreath.

It is extremely difficult to teach the American Radio amateur (I disdain the Americanisms "fan" and "ham") anything about Radio and we are sorry to read of the opinion which he holds of us, but probably time will reveal to him that British amateurs have "got on to themselves" and been there a long time!

To touch once more upon the question of the status of the British Radio amateur, there seems to be but one possible means of achieving recognition in the eyes of our government. It cannot be expected that a government will recognise any one of a number of societies devoted to a common cause. Amalgamation, may I suggest, is the surest method of enabling the British amateur to remain unto himself and lead the way in amateur Radio.

I am, yours faithfully,  
A. W. B.

Skelmanthorpe.

**THE R.S.G.B. AND Q.S.T.**

The Editor, POPULAR WIRELESS.

Dear Sir,—I feel that I should like to say a few words concerning your article in a recent issue of "P.W." in which you mention extracts from the editorial of Q.S.T. for December, dealing with amateurs in U.S.A. and Great Britain. Being a regular reader of Q.S.T. I have been following amateur radio in U.S.A., and comparing the situations "over there" with conditions here.

I must certainly say that we are a long way behind here in amateur radio matters. The A.R.R.L. is undoubtedly the most "go-ahead" body existing for amateurs at the present time. Our R.S.G.B. is very much appreciated; of course, but they do not assist the amateur in problems which deal with the subject of separate wave-lengths for amateurs. The A.R.R.L. is seeing to it that the exclusive wave-bands at present in force for amateurs in U.S.A. are to be kept for such if possible.

What is the R.S.G.B. doing in this matter for amateurs in this country? The A.R.R.L. also does all in its power to bring the different branches working in its name together at annual, and even more frequent events, to enable secretaries and members to discuss problems which occur in their own particular sections.

In closing, I would say that I fully agree with all your remarks in your article.

**CORRESPONDENCE.****THE  
"SYDNEY" TWO****"ADVICE FROM AMERICA"—  
THE "NOVEL" ONE.**

Letters from readers discussing interesting and topical wireless events, or recording unusual experiences, are always welcomed; but it must be clearly understood that the publication of such does in no way indicate that we associate ourselves with the views expressed by our correspondents, and we cannot accept any responsibility for information given.—EDITOR.

I am, of course, open to criticism, and will welcome other letters on this subject.

I am, sir,  
Yours faithfully,  
Farnham, Surrey. J. N. R.

**THE "INEXPENSIVE" ONE-VALVER.**

The Editor, POPULAR WIRELESS.  
—Dear Sir,—I have pleasure in writing to tell you of the results obtained from an "Inexpensive" One-Valver.

I have received over ten stations, including Dublin, Langenberg, Stuttgart and Radio-Paris. The last three can be obtained at any time.

I have tried many valve circuits, including one with H.F. amplification, but your set beats the lot.

Yours faithfully,  
W. E. N.

**SHORT-WAVE RECEPTION.**

The Editor, POPULAR WIRELESS.

Dear Sir,—Re G. M. O.'s letter in the November 19th issue of POPULAR WIRELESS. It may interest you to know, I have been receiving on short waves for the last two years, using a broadcast receiver (1-v-2 tuned anode, reaction on anode coil) ("Four-valve Family receiver"). I can get down to 14 metres, using home-made coils. Using an indoor aerial and counterpoise, telephony has been heard from 2 X A D, 2 X A F, 2 X G, K D K A, 2 M E, P C J, C F, A N H, also from two Australian amateurs, 7 C W and 6 A G. On Morse, I have heard amateurs from E A, E B, E C, E D, E E, E F, E G, E I, E J, E K, E L, E M, E N, E O, E P, E S, E T, E U, A F, A I, A M, I N, N E, N J, N P, N R, N U, S A, S B, S C, S U, F C, F M, F O, F Q, O A and O Z.

The anode coil and aerial coil are both tuned by 0005 variable condensers. Best of luck to "P.W."

Yours faithfully,  
T. H. S., JUNR.

A. R. R. L., T. and R. R. S. G. B.

P.S.—I do not use the high-frequency valve on the short waves, as I get just as loud signals with the valve turned out.

Middlesex.

**DID YOU KNOW THAT . . .**

ONE of the commonest causes of poor reception in a crystal set is a dirty contact at the lead-in, or at the earthing switch.

When working on the short waves the aerial coil should be coupled loosely or the set will refuse to oscillate.

A hydrometer will enable you to test an accumulator quite as well as, if not better than, a voltmeter.

When a set with Reinartz reaction persists in oscillating fiercely at a certain reading of the dial, the trouble is often due to a high-frequency choke with an insufficient number of turns.

It is not safe for an unskilled person to interfere with the electric-light wiring in the house.

**A GRID BIAS NOTE.**

The Editor, POPULAR WIRELESS.

Dear Sir,—In usual practice the detector grid leak is taken to the positive side of the L.T. battery. I have found that an improvement in volume and tone can be obtained by connecting the negative side of the L.T. battery to the negative end of a grid-bias battery, the positive end of which is then connected to the lower end of the detector grid leak. By this means the positive bias on the detector grid can be varied—i.e. reduced to  $\frac{1}{4}$  volts or increased at will. It will be found that reduced potential has quite a wonderful effect, especially in cases where old valves are being used. By this method I have improved a number of sets in this neighbourhood past all recognition, both as regards volume and purity of tone.

An additional grid-bias battery is not really needed. If the lead from the L.T. negative be taken to the centre of the L.F. grid-bias battery, the lead to the detector grid can be taken from the positive side of this centre tap and the lead to the L.T. grid from the negative side.

Where a combined H.T. and grid-bias battery is in use, it is essential that the negative ends of the L.T. and H.T. batteries be connected, and not the L.T. positive to H.T. negative as is the case in many sets. Where the L.T. positive and H.T. negative connection exists, it must be altered, otherwise a step-up in potential on the detector grid would result.

Yours faithfully,  
R. D. G. MUSSETT.

Sanderstead.

**EMPIRE BROADCASTING.**

The Editor, POPULAR WIRELESS.

Dear Sir,—With reference to your article on "Empire Broadcasting" in "P.W." of August 27th, I have to advise that were it not for broadcasting on the short waves we would be in a sorry plight, as far as radio reception is concerned in this part of the world.

Reception other than short waves is only possible here, and then not consistent, during November, December, and January. Short-wave reception is consistent throughout the year. It is impossible to hear from your side except on short waves, even during the cooler months.

The test from 5 S W, Chelmsford, on 24 metres last week-end was received by me with loud-speaker strength. Quality excellent and fading practically nil. This B.B.C. station should come in well, seeing that I received 2 N M, Mr. Marcuse's experimental short-wave station regularly, and that this gentleman was using 2 kw. of power, whereas the B.B.C. is supposed to be using 30 kw.

I take this opportunity of offering my congratulations to the B.B.C. and also to Mr. Gerald Marcuse, who, in my opinion, successfully proved that the transmission of programmes over long distances on short waves is possible.

Trinidad is an island situated on the north-east coast of South America, where tropical static is to be encountered the year round on the longer waves.

By the use of short waves this static is reduced to practically nil.

Yours faithfully,  
A. R. MCLEAN.

Pointe-a-Pierre,  
Trinidad, B.W.I.

**THE "NOVEL" ONE.**

The Editor, POPULAR WIRELESS.

Dear Sir,—May I congratulate Mr. C. T. Perrin on his excellent circuit, the "Novel" One, which you published in a recent issue.

I have hooked up this set and, with one stage of note magnification, results are all that can be desired. Using a 75-turn coil (Edison Bell) the following stations "came in" at good phone strength Daventry (5 G B), Berlin, Toulouse, Hamburg, Manchester, Frankfurt, Stuttgart, Madrid, London, Leipzig, Dublin, Stoke and one or two unidentified. All these on my indoor aerial, consisting of 100 ft. "Electron" and 30 ft. No. 20 D.C.C.

Should it be of interest to your readers, I may say that a power valve is most suitable and the grid-leak value 3 megohms. H.T. — 60 volts detector, and 100 volts L.F. Rheostat adjustment is somewhat critical, otherwise tuning is exceedingly simple.

At any rate this circuit is the finest I have yet experienced with and is well worth trying out.

Wishing your paper every success, and thanking you for its many useful hints, etc. I remain,

Yours very truly,  
J. H. H.

Burton-on-Trent.

The Editor, POPULAR WIRELESS.

Dear Sir,—While looking through the letters I came across a letter by C. T. Perrin, and the "Novel" One. I have had a set built with the circuit for the last three years, and can trace it back as far as 1920. The circuit is a form of Colpitts oscillator, as for DX. It is A1. I have had all the B.B.C. stations except Manchester and a good dozen foreign stations, and I never use more than 24 H.T. I am an old reader of "P.W." and wish it every success.

Yours truly,  
S. HALL.

Blaydon.



## Now no home need lack a Loud Speaker

The introduction of the LISSENOLA at the amazingly low price of 13/6 created an unparalleled stir. Unbiased critics seated behind a screen and asked to distinguish between a thirteen-and-sixpenny LISSENOLA and other loud speakers selling at several pounds have been completely at a loss.

*Make the test for yourself: go to your nearest dealer and ask him to put on the best loud speaker in his stock. Then use the same horn on the Lissenola, and see if you can notice any difference.*

The "Lissenola" instantly converts any gramophone into a loud speaker.



A cone Diaphragm loud speaker can easily be constructed. The illustration shows one method of mounting.

THE LISSENOLA is sold exactly as illustrated above, and with every instrument are simple directions and full-size exact patterns which show you clearly how for a few pence to make a horn of proved efficiency to attach to it. Or if you possess a gramophone or any loud-speaker horn—or any horn or trumpet—that will serve admirably.

GET A LISSENOLA for your home—and build yourself a loud-speaker fully equal in performance to the finest that money can buy. You can cover the horn with fancy paper, or wallpaper, and paint it to resemble a factory article. Also by using the Lissen Reed (sold separately for 1/-) the Lissenola will carry a cone, or any other diaphragm working on the reed principle.

Your dealer will gladly demonstrate and supply—or send postal order direct

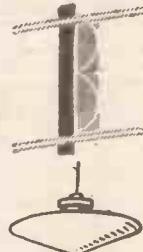
### BUY THE LISSENOLA and build your own loud speaker

LISSEN LTD. (Managing Director: T. N. COLE), Lissenium Works, 8-16, Friars Lane, Richmond, Surrey.

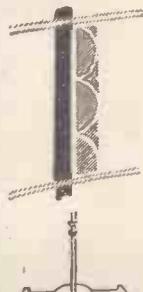
Phone: RICHMOND 2285 (4 lines).

'Grams: "Lissenium, Phone, London."

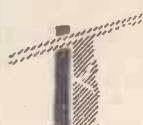
Full directions for making this horn are given with every "Lissenola."



Another way of utilising the cone diaphragm method of construction.



The "Lissen" Reed Attachment (pat. pending) for use with cone diaphragm loud speaker. Price 1/-



# Apparatus Tested

Traders and manufacturers are invited to submit wireless sets and components to the "P.W." Technical Department for test. All tests are carried out with strict impartiality in the "P.W." test-room, under the supervision of the Technical Editor, and the general reader is asked to note that this weekly article is also intended to provide a reliable and unbiased guide as to what to buy and what to avoid.—EDITOR.

## L.S.A. DRY BATTERIES.

THERE recently arrived in our office some dry batteries made by the original manufacturers of Leclanché cells. They were sent by Messrs. Thomson & Company, Old Swan Lane, London, E.C.4, who have been appointed sole British agents for them in this country. The batteries are made in Switzerland and are distinctive for their bright red and black coverings.

The 60-volt H.T. battery which retails at 8s. 6d. embodies novel features. On the top are a series of pairs of small white labels, one of each pair bearing an H.T. voltage indication. The other disc of each pair consists of thin paper and can be broken to reveal the socket. Thus it acts both as a seal and as a protection against dust should the particular socket not be required for use.

Another commendable point is that the battery is tapped at every  $\frac{1}{2}$ -volts up to 9 volts. It is compact and well assembled

and the tests we have been able to give it would appear to indicate that it should possess a good average working life. The small  $4\frac{1}{2}$ -volt batteries, which are to be retailed at 10s. 6d. per dozen, also incorporate a novel feature. Instead of two sockets, each possesses one socket and one small piece of flex. This latter is the negative to which is attached a small combined plug and socket.

Thus it is but a moment's task to connect any number of the batteries in series or parallel or in series-parallel arrangements. White terminal indicating tablets are let in the top of each battery. There is also a large capacity type which should prove useful for running 1 or .06 valves. It is stated that it will operate one .06 valve or lamp for fifteen hundred hours.

## SOME LISSEN COMPONENTS.

The Lissen headphones are the lightest and most comfortable telephone receivers

we have had the pleasure of donning within our memory. And one screw on each of the two light earpieces enables the headphones to be instantly set at the best position and locked there with the one movement. Again, when wearing these Lissen 'phones one can sit right back in one's chair, for a specially long and light lead is provided.

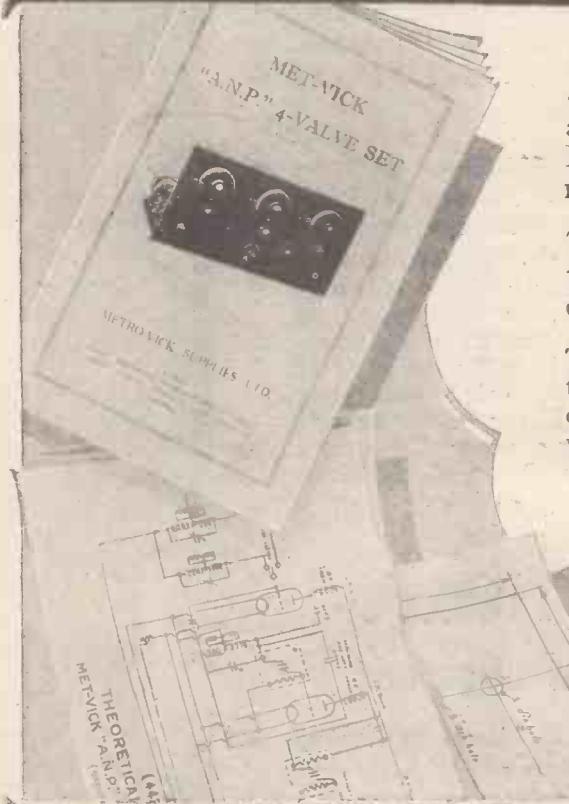
The earpieces are undoubtedly most sensitive, but they are made to appear almost abnormally so owing to an arrangement of four holes in each cap through which sound is projected direct into one's ears from almost the entire surfaces of the diaphragms. Tone is good and the 'phones respond equally well to either very weak and very loud signals, even though no adjustments are provided, the absence of which, in the circumstances, is a commendable feature of the instruments. They are well made, neat, and attractive in appearance, and are as good as anything Lissen's have produced, and that is saying something.

The Lissen two-way coil holder almost bristles with good features. In its design and production it is Lissen at its best. It incorporates a friction gearing which could not be improved upon for the purpose. The movement is entirely free from backlash or harshness, and has just that right amount of smooth resistance which we so often look for in vain in the adjustment of a component of this nature.

The long spindle and large milled knob can be reversed in quite a simple manner in order to make the moving-coil holder operate on the left hand side should this

(Continued on page 856.)

## The Met-Vick 4-Valve A.N.P. Constructor Set



Another Met-Vick sensitive, simply-constructed, easily-tuned wireless receiver having great stability and exceptional selectivity on all wave-lengths. It is moderate in cost and gives loud-speaker reproduction of high quality without distortion.

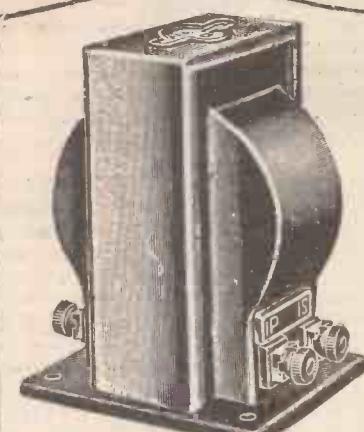
The Booklet here illustrated, No. 7117/5 gives full details for its construction, and is complete with a drilling template and two wiring diagrams.

The components required are similar to those used in the Met-Vick 3-Valve Local-Daventry Set, and are given complete with prices in the booklet. A similar set for working off the mains is described in Booklet No. 7117/4.

*Ask for them at your local dealers.*

# MET-VICK

METRO-VICK SUPPLIES LIMITED  
155, Charing Cross Road,  
LONDON, W.C.2.



**IGRANIC L.F.  
TRANSFORMER, TYPE "G"**  
In designing this transformer the object was to obtain equal amplification of all the essential notes of the musical scale *under working conditions*. The measurements made by the National Physical Laboratory effectively demonstrate the remarkable success obtained.  
Perfect curves obtained under ideal laboratory conditions are useless for giving an idea of the transformer's performance when placed in an average receiver, and this fact should be borne in mind when comparing the curves of the Igranic "G" Type Transformer with others.  
A leaflet giving curves and full particulars will gladly be sent on request.  
It is made in two ratios, 3·6 : 1 for first and single stages (with 20,000-30,000 ohm valves), and 7·2 : 1 for second stage (with low impedance valves). Two 3·6 : 1 ratio transformers may be used if desired.

Price 30/-

## Each the leader in its class

Backed by an unique experience in low frequency transformer design and aided by the resources of the Igranic Electric Co., Ltd., the Igranic Engineers set out to design two transformers, the best at a popular price and the best at any price. That they have been outstandingly successful is evidenced by the demand for the "F" and "G" Type L.F. Transformers, the former undoubtedly the best medium-priced transformer on the market and the latter the nearest to perfection.

Write for List No. R.69—it gives full particulars and will aid you in your selection.



**IGRANIC L.F.  
TRANSFORMER, TYPE "F"**  
This Transformer is a development and improvement on the famous "E" Type Transformer. Its external appearance is the same, but internally it contains many improvements suggested by experience which increase its efficiency, reduce the cost of manufacture, and thus make possible its very reasonable price.

It can be relied upon to give good quality results with freedom from breakdown when used under the recommended conditions. One ratio only is made, i.e., 3½ : 1, the transformer functioning equally well in either first or third stages.

Price 16/-

**IGRANIC  
ELECTRIC CO., LTD.,  
149, Queen Victoria Street,  
London, E.C.4.**

Works: BEDFORD.

Branches: BIRMINGHAM, BRISTOL, CARDIFF, GLASGOW, LEEDS,  
MANCHESTER, NEWCASTLE.

## THAT WIRELESS SET

you are constructing CANNOT BE a really NEAT and DURABLE one WITHOUT THE AID OF a

## BRITINOL "POPULAR" SOLDERING OUTFIT

The "BRITINOL" SOLDER contained therein does not require the use of a separate flux as the flux is combined with the solder, and, furthermore, it is of a non-corrosive nature.

THE OUTFIT CONTAINS: 1 spirit blow lamp, 1 telescopic soldering iron, 1 tin self-fluxing paste solder, 1 coil self-fluxing wire solder, 1 extra pair wicks for lamp.

From your dealer at 7/6 complete or direct from us at 8/- post free.

**BI-METALS LTD.** Sugar House Lane, LONDON, E.15.

## FREE!

To advertise the Eagle Electric Irons we are giving away one free with each of the first ten orders we receive each week for a

## CHAKOPHONE WIRELESS SET

which is complete in every detail and includes a free insurance policy.

10/- per month for valve sets, no deposit.

Radio Dealers can supply on our H.P. terms.

For free Booklet write your name and address on the back of this advertisement and send in 1d. stamped open envelope to:

**EAGLE H.P. RADIO (P.W.),**

45, Pall Mall, London, S.W.1.

## APPARATUS TESTED.

(Continued from page 854.)

be desired. It should be noted that either a standard or a long spindle type can be provided. Another good point is that the four terminals are permanently mounted on the base so that the necessity for flexible connections does not arise.

The Lissen Mansbridge type fixed condenser of the high-voltage class is tested at 1,000 volts D.C. It is, of course, designed for incorporation in mains units. As we write we have one of 4 mfd. capacity in front of us, and this we have just tested and found to be quite satisfactory. But constructors should note that the casing is of rather brittle material, and that the feet of the component are liable to break easily. This small criticism, if such it can be called, is notable in that it is the first one we have had occasion to bring against a Lissen component for a very long time!

### TWO NEW DARIO VALVES.

Two new valves, which complete the series of Darios, were recently sent us by the Impex Electrical Ltd., of High Road, Leytonstone, E.11. These are both designed for resistance-capacity coupling. The Dario Resistron is one of the little bi-volters which, taking only .05 ampere as filament current, operates at 1.8 volts. It is of the high mu type and has an amplification factor of 50 and an impedance of 150,000 ohms. The price is 7s. 6d.

The other Dario Resistron operates at 3.5 volts taking .07 ampere of current. This has also an impedance of 150,000 ohms and an amplification factor of 50. The price, similarly, is 7s. 6d. We do not advocate the use of very high mu valves in L.F. positions, but as detectors preceding R.C. and in such H.F. stages, these Darios gave very good results, despite their low filament consumptions. The 5-volter, by the way,

requires a filament current slightly exceeding .05 for best results, except when it is operating as an anode bend detector, where it will function at slightly less. These Darios are remarkably small valves and are well turned out. They are made in France and are, in our opinion, equal to the best foreigners on the British market.

### SIFAM POCKET VOLTMETER.

There is now a Sifam Pocket Voltmeter specially designed to appeal to radio enthusiasts. It has two ranges, one of from zero to 6 volts and the other from zero to 120 volts. Two distinctively coloured contact points enable either range to be brought into use.

It is a very nicely made instrument and has carefully marked scales. Now these pocket meters are not generally particularly accurate and we have usually employed them merely as articles for providing useful indications of the condition of a battery, but within the limits of its fairly small scale this Sifam has a surprising accuracy.

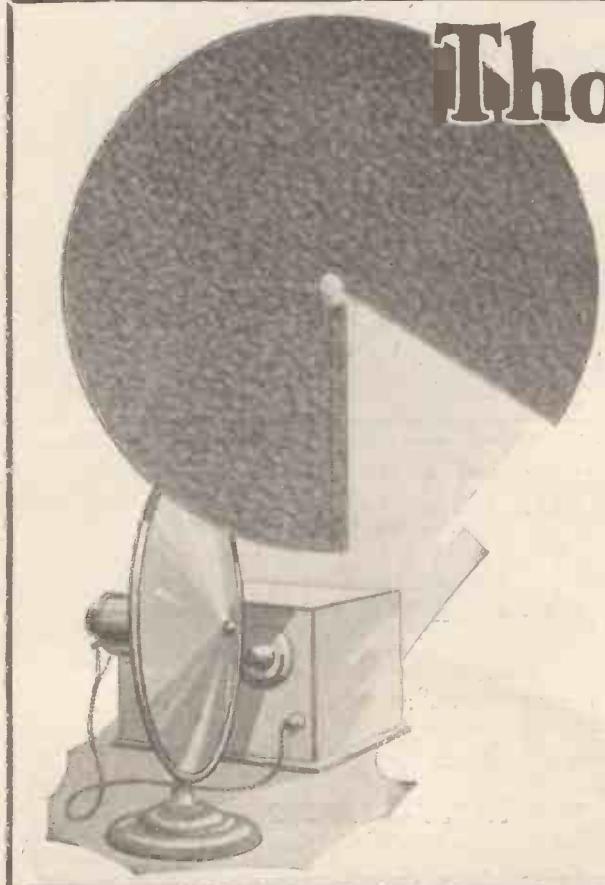
Both on its upper and lower ranges the test sample gave dead readings down to about an eighth of a volt on the lower range, and to within a volt or two on the 120-volt range. For ordinary battery maintenance service this is all that is necessary. This Sifam also has the useful resistance of 4,000 ohms and is as good as anything of the kind we have yet tested in medium-priced meters. It is certainly just the thing for the pocket of the average radio enthusiast in more senses than one. The voltages of both H.T. and L.T. batteries must be closely watched if trouble-free radio reception be desired.



Dr. Brooke Nicholls, whose Coral and Pacific Island talks are a popular feature at 3 LO of Melbourne.

(Photo Ruskin Studio, Melbourne.)

# Thousands are using it !



Six-Sixty Cone Speaker Paper has been available to the Wireless enthusiast for only three months, and yet to-day, literally thousands of people are using this unique material for their Cone speakers. The reason for this tremendous demand is that no other Cone material is capable of reproducing with that wonderful degree of purity attained by Six-Sixty Cone Speaker Paper.

Why are people buying Loudspeaker units in their thousands? Because they know that for a moderate outlay they can, with the aid of Six-Sixty Cone Speaker Paper, construct a Speaker which will yield results as excellent as the most expensive types.

If you want a Cone Speaker which will certainly give you the purest and most natural reproduction possible, buy one of the well-known Loudspeaker units, together with a supply of Six-Sixty Cone Speaker Paper, spend a pleasant half-hour in constructing the Speaker, and THERE YOU ARE. Six-Sixty Cone Speaker Paper is made in two sizes, 12 ins. diameter and 19 ins. diameter.

Prices 2/6 and 3/6. Brass Washer 3d. extra.

If you have any difficulty in obtaining, write direct to us, enclosing your dealer's name and address.

**THE ELECTRON CO., LTD., Dept. P.W.,  
122-124, CHARING CROSS ROAD, LONDON, W.C.2.**

**A NEW  
AND  
DIFFERENT  
LOUD SPEAKER**

**THE  
EDISWAN  
ONE-DER  
LOUD  
SPEAKER**

**FULL SIZE MODEL**



Coloured a deep brown tone, the ONE-DER is a speaker of such refined appearance that it will tone with almost any scheme of decoration.

Fully licensed under Patent Nos. 239331, 243431 and 243432.

PRICE:

**£2.10.0**

If you have A.C. current you can charge your own batteries with the Ediswan Low Tension Accumulator Charger. Save time and money. Ask your dealer.



## **EDISWAN VALVES CLEAREST-STRONGEST LAST THE LONGEST**

*A type for every purpose.*

The EDISON SWAN ELECTRIC CO., LTD.  
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**THE  
NEW NO. 7**



**RECUPERATING AGENT  
IN THE  
HELLESEN  
DRY BATTERIES**

**T**O-DAY radio programmes extend from mid-day to midnight, and Hellesen H.T. Dry Batteries are built especially to stand the strain. They give uniform, silent H.T. supply at the minimum cost per hour.

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**60-volt "WIRIN" 12/6**

**99-volt "WIRUP" 21/-**

(Postage Extra.)

*All types, voltages, etc., in Double and Treble capacities for H.T. and L.T. Supply. Ask your dealer for the type to suit your set and get the maximum service, or write us for full particulars.*

*Obtainable at all Radio, Electrical and General Stores, Harrods, Selfridges, etc., or direct from*

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**TRADE HUNTS MARK**  
*They Last Longer*



Model No. 44.

**The IDEAL CONE LOUD SPEAKER Only £2 : 2s.**  
Complete.

The driving unit of this fine cone speaker is the Ideal Four-pole Balanced Armature Driving Unit. This unit finally eliminates distortion and false resonances, and gives full, harmonious, and loud reproduction of music, song, and speech, and can cope with the highest energies. Very attractive in appearance. Can be used as a wall or table speaker.

**The IDEAL FOUR POLE BALANCED ARMATURE UNIT Only 25/-**

There is no better driving unit for the basis of a cone type loud speaker than the Ideal patent Balanced Armature Unit. Special steel is used for the magnet. This enables a very powerful flux to be obtained, making the unit extremely sensitive. The armature is carefully damped to obviate all resonances liable to distort reception. Gives pure and powerful signals.



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they're  
labelled

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Telephone: Museum 8630 (3 lines).

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# RADIOTORIAL

All Editorial Communications to be addressed to The Editor, POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

The Editor will be pleased to consider articles and photographs dealing with all subjects appertaining to wireless work. The Editor cannot accept responsibility for manuscripts and photos. Every care will be taken to return MSS. not accepted for publication. A stamped and addressed envelope must be sent with every article. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents, Messrs. John H. Lile, Ltd., 4, Ludgate Circus, 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 receivers. 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 subject 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.

## QUESTIONS AND ANSWERS.

### SPILT ACCUMULATOR ACID.

T. C. (Chatham, Kent).—“My last lodger spilt some acid from an accumulator on to the floor and ruined the carpet. Isn't there any method of removing the stuff before it does this damage ?”

You can “neutralise” the acid by powdering ordinary washing soda, and applying liberally a strong solution of this to the spilt acid. The stronger

the soda—the better. Do not be afraid to leave it “working” all night, as to be efficacious it must penetrate at full strength to every place attacked by the acid.

As the latter acts quickly it is important to lose no time in neutralising it. If washing soda is not available, bi-carbonate of soda may be used, or ammonia.

### TWO SETS, ONE LICENCE?

J. M. (Nottingham).—“So now we are going to have two sets in the one house. Do I need another licence ?”

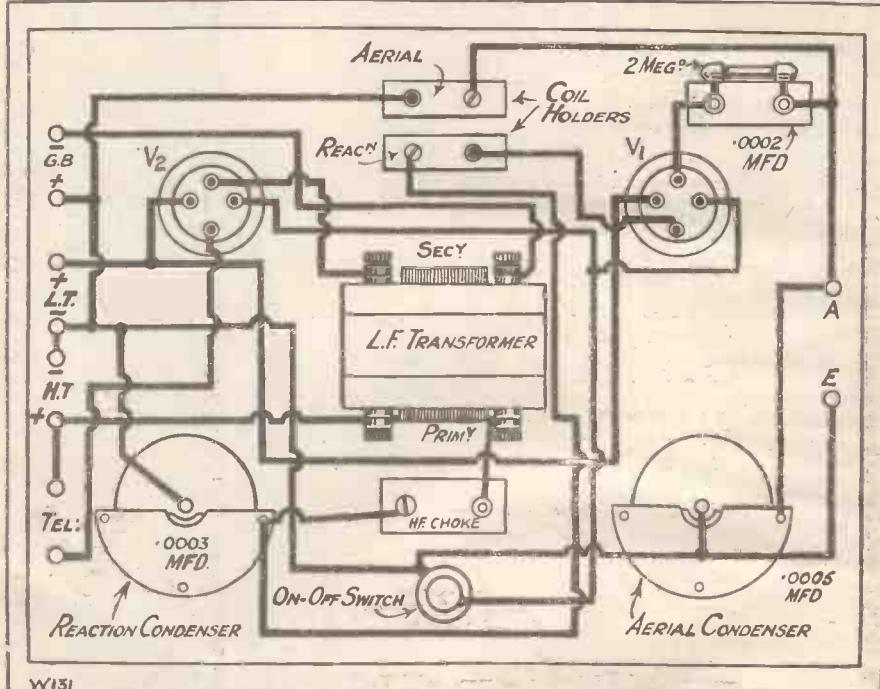
A wireless receiving licence entitles the licensee to use wireless apparatus in the premises occupied by him. One licence will cover any number of sets installed on the same premises for the use of the licensee, his family, or his servants. But it should be noted that if any other person occupying a portion of the same house under a separate tenancy desires to install wireless receiving apparatus, he must take out a separate licence.

### SWITCHING OFF H.T. and L.T.

L. P. (Poultry, London, E.C.2).—“I have an L.T. switch in my set. It is connected on one side to L.T. plus, and H.T. negative, and on the other side to filaments, but owing to the H.T. minus being still connected right through the L.T. battery and set, I lose quite a lot of H.T. juice through leakage. Can you give me particulars of a really simple switch

(Continued on page 860.)

### A TWO-VALVE SET (DET. & L.F.)



The correct connections for a Det. and L.F. receiver are shown above. In the “What is Wrong?” diagram last week there was no H.T. to the 1st valve, and no H.F. Choke. The “on-off” was connected across the L.T. battery, and the Grid Bias plus should have been taken to L.T. minus. (Another “What Is Wrong?” diagram will appear next week.)

## FOR ALL GOOD RECEIVERS

The Terminal which will give real Finish and Distinction to your Receiver. Beautifully finished and Bakelite insulated. Made in 30 different engravings.



Patented.

Type "B" illustrated, sold in attractive carton carrying a year's guarantee. Price 9d. each.  
Type "M" as type "B" but non-insulated. Price 6d. each.

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## BELLING-LEE TERMINALS

BELLING & LEE, Ltd., Queensway Works, Ponders End, Midx.

Build the

### "L. & P. 3·20 EXPRESS"

Price 10/6  
Price without Slow-motion Dial 7/6



(3 Valves—  
20 Stations  
—Express  
Tuning.)

One-dial tuning—Razor-sharp Selectivity—  
Real Music—20 Stations on Loud Speaker—  
Cost of Components, £5 : 10 : 0, including  
the L. & P. Two-way Coil Tuner.

That's what you're looking for, isn't it? And  
it's a straight, quick job for any beginner.

This amazing simple circuit is becoming  
the rage of the season, and is already the  
envy and despair of H.F. screening and  
neutralising devotees.

Free Constructional sheet and wiring  
diagram. If your dealer cannot supply,  
we will send you copies post free. Mention  
your dealer's name in applying.

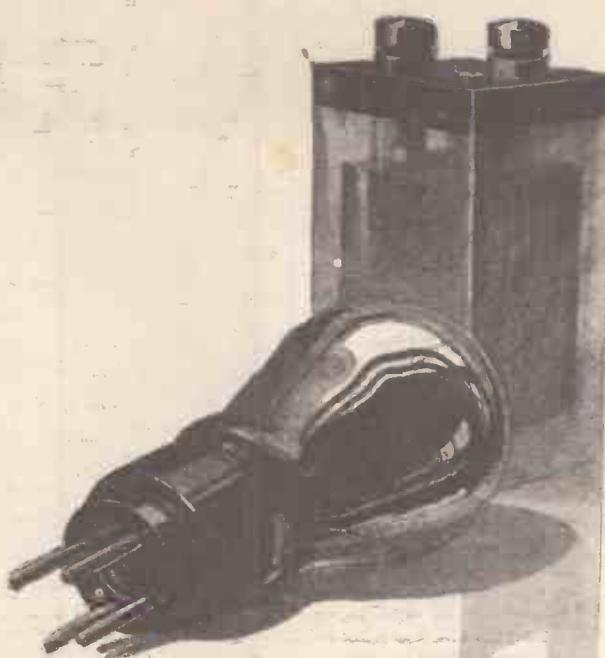
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The L. & P. Variohm  
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included in above  
estimate.



Zero to 10  
ohms, Scaled,  
with off position .. 4/-

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## Getting better results from 2 volts

When we say that B.T.H. Nickel Filament Valves are superior to other 2-volt valves, we are not referring merely to subtle improvements in construction or characteristics. We mean that the new valves give results, which, to the average listener, as well as to the critical expert, are quite obviously better in volume, tone and length of service, than those given by any other 2-volt valves. To get the very best from your 2-volt accumulator you must use Nickel Filament Valves. But don't take our word for it. Try them in your set. You will be delighted and astonished at the wonderful improvement in reception—a result that will more than justify the cost of the change.

### B 210 H R.C. and H.F.

Fil. Volts .... 2  
Fil. Amps. .... 0.10  
Max H.T. Volts 150

10s. 6d.

### B 210 L General Purpose.

Fil. Volts .... 2  
Fil. Amps. .... 0.10  
Max H.T. Volts 120

10s. 6d.

### B 215 P Power Amplifying

Fil. Volts .... 2  
Fil. Amps. .... 0.15  
Max H.T. Volts 120

12s. 6d.

*The above prices are applicable in Great Britain and Northern Ireland only.*

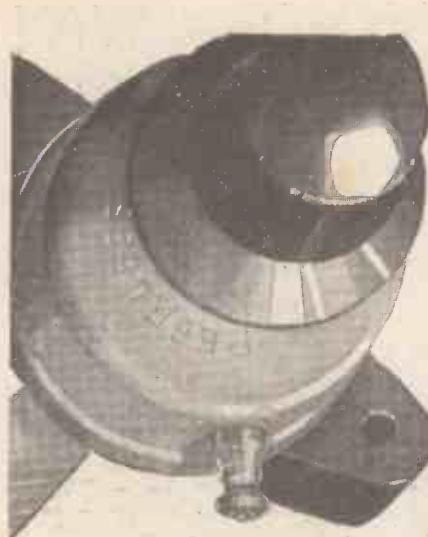


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### THE PEERLESS NEUTRODYNE CONDENSER

This component is neat in design and robust in construction. Rotation of an ebonite knob causes a circular brass plate to move towards or away from a fixed circular brass plate attached to a disc of insulating material. Contact between the two plates is prevented by means of a thin insulated disc placed between them. The fixed plate is attached to the centre of an insulated washer, the latter being held in position by a neat metal case which encloses the plates. A metal sleeve is attached to the case, and in conjunction with a nut provides a means of fixing the component to the panel after drilling a single hole.

On test the minimum capacity was found to be 3 micro-microfarads, while the maximum capacity was 22 micro-microfarads. This is a satisfactory range of capacities for neutralising all types of receiving valves.

Panel Mounting - - 2/6  
Baseboard Mounting - - 3/-

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C.2.

## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 858.)

to cut out in one movement both batteries? I can do it with an elaborate switching arrangement, but probably there is a much simpler arrangement.

"I think this is something that is wanted badly, because I often hear people saying H.T. accumulators don't give half their rated capacity, and it is generally through not disconnecting H.T. every night. It wants a switch because the average man will not trouble to disconnect the leads themselves."

To cut out both batteries there are two distinct operations to be performed by the switch, namely, disconnect H.T. negative from the L.T. battery plus, and also disconnect the L.T. battery plus from the filaments.

This means that a double-pole single-throw switch (or its equivalent) can be used. It should be connected near to the battery terminals, and we will call its centre terminals 1 and 2, and the corresponding outer contacts A and B.

To wire up, join 1 and 2 together and to L.T. plus only. Join A to H.T. negative. Finally, connect B to the filament lead. When the switch is off, L.T.

### "P.W." TECHNICAL QUERY DEPARTMENT

#### *Is Your Set "Going Good"?*

Perhaps some mysterious noise has appeared and is spoiling your radio reception?—Or one of the batteries seems to run down much faster than formerly?—Or you want a Blue Print?

Whatever your radio problem may be, remember that the Technical Query Department is thoroughly equipped to assist our readers, and offer an unrivalled service.

Full details, including a revised scale of charges, can be obtained direct from the Technical Query Dept., "Popular Wireless," Fleetway House, Farringdon Street, London, E.C.4.

A postcard will do: On receipt of this an Application Form will be sent to you free and post free, immediately. This application will place you under no obligation whatever, but having the form you will know exactly what information we require to have before us in order to solve your problems.

plus is joined to the centre contacts of the switch only. H.T. negative is joined to one of its "outer" terminals, and the filaments to the other "outer" contact. When the switch is "on," all connections are as formerly.

#### CONDENSERS "IN PARALLEL."

S.R.L. (Warrington).—"I have two spare fixed condensers on hand, one '0002 and one '0003. If I connect one across the other, is that "in parallel," and, if so, what is the capacity of the pair?"

When one wire is connected to one side of both condensers, and another wire to the other sides of both, they are "in parallel." And their total capacity is the sum of the separate capacities. In the case named this will be '0002 mfd. + '0003 mfd. = '0005 mfd.

#### THE MORSE CODE.

"Nautical" (Epsom, Surrey).—"I want to become a wireless operator, and I understand that to do this I shall have to learn telegraphy. How long would it take to learn the Morse code?"

It only takes a day or two to memorise the Morse code, but it takes a year or so to make a good telegraphist. For the expert operator not only knows the Morse code, but he can rattle it out on a transmitting

(Continued on page 862.)

Our New  
Popular Sets



are  
Extraordinary  
Value

Such handsome well-made receivers have never previously been offered the wireless public at such extraordinarily low prices. Quality has not been sacrificed and the component parts are of the highest grade ensuring extremely satisfactory reception, indeed the range and volume of the 3-valver has surprised many H.F. adherents. The slow motion control and S.L.T. Condenser ensure fine Tuning, there are no loose coils, the change from average to long wavelength being effected instantaneously by a switch. The oak cabinet contains not only the valves, but all batteries so that neatness of appearance is a pronounced feature. These sets are guaranteed twelve months and can be confidently recommended.

#### PRICES (Set only)

2-valves	£5: 0:0
3-valves	£6: 14:0

(Excluding Marconi Royalty).

LAMPLUGH  
BRITAIN'S  
BEST  
RADIO  
"LAMP-LOO"

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Representative for London and Southern Counties:  
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# The CHEAPEST VALVE IN THE WORLD

Better results — lower filament current used — longer and more satisfactory service—  
NON-MICROPHONIC, ALL BRITISH—greater clarity and better reproduction.

## 3 DAYS FREE TRIAL

Money refunded in full if valves purchased are returned to us within three days.

TYPE H.F., L.F. & R.C.  
2, 4 and 6 volt. All 0.1  
amps. [Post Free.]  
TYPE POWER 2, 4 and 6 volt.  
0.25, 0.15 and 0.1 amps.  
respectively.

(Post Free.)

Fill in the name of the Company on all Postal Orders and cross "Co."



**6/-**

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Callers served at 28, Bartlett's Buildings (Basement).  
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## Heaps of Jolly Music for Xmas

Think of the many jolly hours this Brownie 2-valver would bring. Imagine the different programmes you could listen to, seated at your own fireside! Amazing loudspeaker clarity on all wavelengths. Get it ready for Xmas. Write for Booklet "Wireless without Worry."



**50/-**

Very well finished, handsome appearance, complete with two coils—but without valves. Marconi royalties extra.

## The BROWNIE 2-VALVER.®

BROWNIE WIRELESS COMPANY (G.B.) LTD.  
NELSON ST. WORKS, MORNINGTON CRESCENT, LONDON, N.W.1

## MAKE YOUR OWN CONE SPEAKER

TWO WONDERFUL UNITS AT ONLY **15/- EACH**

YOU'LL BE SURPRISED!

The New Wonder  
"Nightingale"  
**CONE UNIT**



AS FITTED TO OUR CABINET CONE

**GRAMOPHONE ATTACHMENT**



with  
4-inch  
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AS FITTED  
TO OUR  
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Reduced from 32/- to 15/- solely as an advertisement for the famous Bullphone Nightingale Loud Speakers. Cobalt Magnet guaranteed for all time.

Astonishing Results, equal to the most expensive Loud Speakers yet made, are guaranteed with either of these Units.

**BULLPHONE DOUBLE 2/- PAPER CONE**

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Exactly as fitted to our own Speakers.

## BUY ON DEPOSIT EASY TERMS 5/- DEPOSIT



CABINET CONE

Size 17 ins. high by 15 ins., in Mahogany, Walnut or Rosewood finish.

**77/6** cash, or EASY TERMS  
10/- deposit and 12 monthly payments of 6/-

SEND DEPOSIT NOW—NO REFERENCES—SPEAKER BY RETURN.

SATISFACTION GUARANTEED  
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Obtainable from your local dealer or direct from:

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NIGHTINGALE LTD.  
SPEAKERS



## Plantations and Panels.

### 4. The long, thin rubber sheets are now dried

WHEN the powerful roller machines have expressed all impurity from the rubber, the long thin sheets are hung up to dry, where they are left for some time preparatory to shipment.

If a sheet of this rubber contains the slightest flaw or impediment it is never shipped for the manufacture of Resiston Panels. That is why, if you examine the Resiston Panel which your Wireless Dealer will show you, you will find no blemish to mar its beautiful surface. That is why you will marvel at its great strength. Why you will appraise its rich colouring—as fresh after months of use as when you buy it. That, too, is why Resiston's insulation is so perfect, and why its dielectric constant is so low. That, in short, is why Resiston is the perfect panel. Ask your Dealer—he knows.

Resiston Panels come in 13 stock sizes in Black and Mahogany-grained. From 6 in. x 9 in. in Black, 3/5, to 8 in. x 30 in. Mahogany-grained 19/-.

**RESISTON**  
PANELS

"24 hours Cut Panel Service"

Advt. American Hard Rubber Co., Ltd., 13a, Fore St. E.C.

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## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 860.)

key at the rate of thirty words per minute; and if he is receiving he can not only read thirty words a minute coming in the 'phones, but he can write it down legibly.

Before such speed can be attained plenty of practice is essential, so that the time it takes to learn is really dependent upon how much practice one is going to put in day by day. Unless you know an expert telegraphist who will undertake to teach you it will be necessary to undergo a course of training at some telegraphic school or college. (As well as being an expert telegraphist, the wireless operator has to pass an examination in the working of a ship's wireless apparatus, and this instruction, also, is generally best received at a wireless training college.)

### CHOOSING THE LOUD SPEAKER.

D. S. (Leamington).—“Before I buy a loud speaker I would like you to tell me which you consider is the very best one on the market at the moment for tone and value for money?”

We should like to be able to help you, but, unfortunately, the choosing of a loud speaker is very much like the choosing of a wife! It can only be done for one's self. The “value” to you will depend upon how much money you can afford to spend, and upon how keen is your musical appreciation, neither of which we know anything about. Similarly, the “tone” of the instrument is essentially a matter to be decided personally, for the tone that one person likes may not please somebody else. (The nearest approach to loud-speaker perfection is generally admitted to be the Rice-Kellogg type of speaker, but as this is expensive, and may cost up to fifty pounds, most listeners have to be content with one of the cheaper loud speakers which, although not perfection, are capable of giving amazingly faithful reproduction.)

### THE WORK OF A DETECTOR.

CHARLIE (Rochdale, Lancs).—“Why can't I hear by joining a pair of 'phones between the aerial and earth? It's the 'phones that turn the waves to sound, and it's the aerial that picks up the waves, isn't it?”

We are afraid, “Charlie,” that you didn't read the “Series for the New Amateur” which appeared recently in “P.W.” In that series it was explained that there are high-frequency currents and low-frequency currents. It is quite true that the aerial picks up waves, but as these waves are caused by currents that are hopping up and down the aerial about a million times every second, it would have to be an uncommonly good pair of 'phones to keep in step, wouldn't it?

And even suppose you managed to get hold of a specially invented super pair of 'phones, and they could and did respond to high-frequency aerial currents, you wouldn't enjoy listening with them because the human ear can't hear or “receive” such a frequency. It “cuts off” at anything above about 30,000, and therefore your cardrum wouldn't be able to pick up what those impossible telephones were sending out.

(Continued on page 864.)

## STARTLING REDUCTION IN WIRELESS VALVES

BEST BRITISH FOR 3'6 OLD PRICE  
MADE VALVES

L.F., H.F., R.C., AND DETECTOR IN 2 and 4 VOLTS.

P.R. SUPER VALVES are the latest products of one of the finest equipped Wireless Research Factories in Great Britain. They must not be confused with Bankrupt or Foreign stocks of old and rubbishy valves. The P.R. SUPER VALVE FILLS EVERY WIRELESS NEED, and has enormous TONAL STRENGTH, PURITY, and SELECTIVITY.

Type	Fil. Vts.	Fil. Amp.	Imp. Ohms.	Amp. Fac.	M/C	
206h	2	.06	35,000	15	.4	H.F.
206d	2	.06	25,000	12	.43	Det.
206l	2	.06	18,000	8	.44	L.F.
206rc	2	.0	120,000	40	.33	R.C.
215h	2	.15	40,000	20	.5	H.F.
215l	2	.15	30,000	15	.5	Det.
215l	2	.15	12,000	6	.5	L.F.
406h	4	.06	23,000	15	.65	H.F.
406d	4	.06	19,000	9.5	.5	Det.
406l	4	.06	11,000	6	.55	L.F.
406rc	4	.06	120,000	40	.33	R.C.

NO BETTER  
CAN BE  
BOUGHT  
ANYWHERE.

THEY  
WILL  
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any require-  
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NOW ONLY  
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2 Valves for 6.9  
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of Money Back in Full if  
not satisfied. All valves  
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at low cost

Daimon batteries provide voltage at low cost—a generous unceasing effort of power, a clean noiseless H.T. current to your grid—improving your loud-speaker reproduction, eliminating crackle and ensuring volume.

**Prices:**

<b>DAIMON STANDARD</b>
H.T. Batteries, 60 volts .. . . . . 9s. 6d.
100 volts .. . . . . 15s. 6d.
L.T. Type K. 1s. 10d. 18 amp. hrs. G. 4s. 60 " 9 volt grid bias .. . . . . 1s. 10d.
<b>DAIMON JUNIOR</b>
60 volts .. . . . . 7s. 11d.
100 volts .. . . . . 12s. 11d.

Ask your dealer or write direct  
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OUR COMPREHENSIVE AND COMPETITIVE WHOLESALE WIRELESS CATALOGUE FREE TO WIRELESS DEALERS ONLY.

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PERSEUS RADIO (Dept. P.W.), Burton-on-Trent.

PLEASE MENTION "POPULAR WIRELESS" WHEN REPLYING TO ADVERTISEMENTS

**EBOHITE**  
**BUSHES**

FOR MOUNTING ON METAL OR WOOD  
PERFECT INSULATION

Orders under 1/- send 1d. postage.

NUMBER	0	1	2	3	4	5	6
Hole in Bush	6BA.	4BA.	2BA.	1 1/2"	5/16"	8"	7/16"
Price each:	1d.	1d.	1d.	1d.	1d.	2d.	2d.

(Complete List of sizes free on application)

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TRADE SUPPLIED.





## A Perfect Combination!

— the Ericsson Family Two Loud Speaker Set and the Ericsson Super Tone. They combine to give the finest possible rendering of the "local" and 5 X X or 5 G.B.

The set is beautifully made in a sturdy Oak cabinet. All parts enclosed. Price £6 - 15 - 0. Royalties 25/- . The Ericsson Super Tone costs 45/-.

On sale at all good dealers, or direct from:

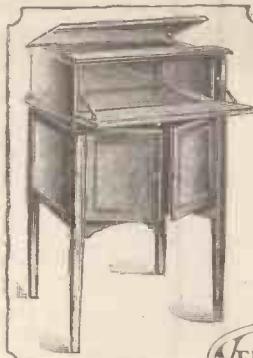
ERICSSON TELEPHONES, LTD.,  
67/73, Kingsway, London, W.C.2.

**Ericsson**  
APPARATUS

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## PROUD OF YOUR SET?



VEE CEE BEE

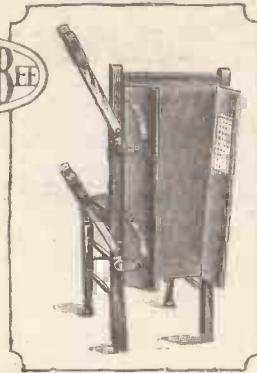
Pride of Person is important, too, and here there is another V. C. Bond production at your service. This combined bedroom chair and trouser-press is a distinctive piece of furniture, besides being the servant of your appearance.

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Telephone: Clissold 0883. Est. 1899  
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## Announcement!

The famous

LOEWE High Vacuum Resistances

and

LOEWE High Vacuum Block Condensers

**LOEWE RADIO**



are now available in Great Britain. They have been a full success on the Continent, and will, no doubt, be equally favoured by the British public.

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Telephone: — Tottenham 2076

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TO THE LOEWE RADIO COMPANY, LTD.,  
4, Fountayne Road, Tottenham, LONDON, N.15.

Please send me your literature concerning LOEWE High Vacuum Resistances and LOEWE High Vacuum Block Condensers.

Name \_\_\_\_\_  
Address \_\_\_\_\_



No other Condenser in Europe has such low leakage as Hydra. "Spark" of the "Manchester Evening Chronicle" loaded two of our 4-mfd. condensers and after 10 hours got a spark out of one and rather a severe shock out of another—an unrivalled record. And in Hydra unquestionable quality is bought at the lowest price.

Prices, Tested on 500 volts D.C.:  
1 mfd. 2/6 2 mfd. 3/6 4 mfd. 5/3

Prices, Tested on 750 volts D.C., equal to

500 volts A.C.:

1 mfd. 3/- 2 mfd. 4/- 4 mfd. 6/9

Inquire for prices of Condensers tested at 1,000, 2,000

4,000 and 6,000 volts D.C.

**LOUIS HOLZMAN,**  
34, Kingsway, London, W.C.2.  
Telephone—HOLBORN 6209.



## This is the Battery for You

It costs a little more—  
But it lasts a lot longer.  
It is much, much cheaper  
In the end... Remember its name—

**Columbia**

No. 4780, 60 volts type : 22 G.

## High Capacity Radio Batteries

Columbias are high capacity batteries of exceptional efficiency. They are built to meet the demand for something better. They will give you longer service; they will positively save you money.

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## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 862.)

If you refer to the articles named (they ran from "P.W." No. 280 to No. 285) you will find that a detector—to change high-frequency into direct current—is really quite an indispensable part of a wireless set.

### THE "PROGRESSIVE" ONE.

N. A. W. (Manchester).—"I am thinking of making the 'Progressive' One, and carrying on to the four-valve stage; but it seems to me that by using the tapped coil described, the aerial will have to be clipped to a fresh tapping for each change of wave-length.

"This is going to be very inconvenient, and when I have the four-valve set in a nice cabinet I shall not want to open this and dive into the interior every time I want a fresh station. Is there an alternative method of working the tapped coil?"

You misunderstood the instructions given. Once you have made the aerial connection to the coil which gives you the degree of sensitivity and selectivity to suit your local and aerial conditions, you need never vary the tapping again. It is a case of "once set, always ready." The variable condenser will then give you the tuning over the whole range of wave-lengths that the coil will cover.

### EFFECT OF GRID LEAK ON GRID BIAS.

"STUMPY" (Sale, Manchester).—"There is one thing that stumps me about grid bias, and that is how the 3 volts, or whatever the adjustment is, ever gets on the grid through the grid leak. My last amplifying valve has a leak marked 3 mgs! Surely the presence of this leak in series cuts down the voltage of the grid battery?"

The presence of the grid leak makes no difference to the voltage applied to the grid (provided that the valve is properly biased).

For it is not until current flows that a resistance in series will cause an apparent voltage drop. And as no current should be allowed to flow between the filament and grid of your last valve there is no loss of voltage in the circuit, and consequently you can assume that 3 volts applied to the grid will "get there" even through a 3-meg. leak.

### WET BATTERY HIGH TENSION.

H. C. (Blackpool).—"Is it really necessary to put insulation between every row of cells in a home-made wet high-tension battery?"

Yes, we should certainly insulate the different rows carefully or you will get trouble instead of voltage.

### HOW MUCH H.T.?

R. B. A. (Conway, North Wales).—"For the resistance stage I shall use a D.E.H. 210 2-volter. Will 120 volts be too much?"

No; the maximum for this valve is 150 volts.

### A CORRECTION.

The photograph which appeared in last week's "P.W." on page 757 was not of the Brandeset IIIA, as stated, but showed the IIIB model, which is priced at £8 5s. exclusive of royalties and accessories.

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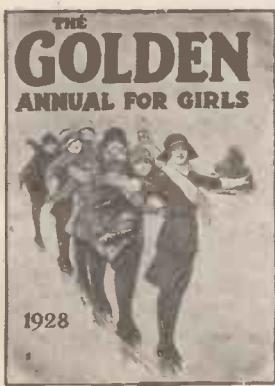


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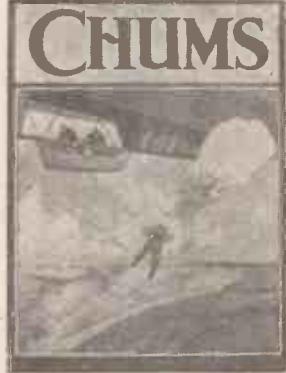


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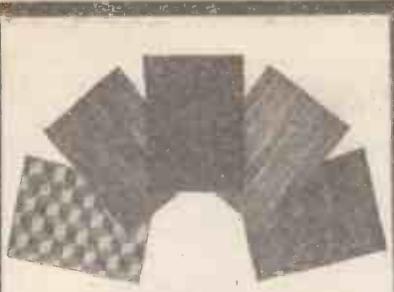
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## SHORT-WAVE NOTES.

By W. L. S.

THE first man to find a reliable method of forecasting reception conditions, particularly with regard to the shorter waves, will be doing what is probably the greatest service to radio since De Forest added the grid to the thermionic valve. It is, at the present time—and these remarks apply particularly to the last few weeks—utterly impossible even to gain the slightest inkling of whether conditions are to be good or bad in, say, two hours' time.

The lot of the amateur transmitter with low power who is anxious for some reason to get into touch with a station in, say, the United States, is a most unhappy one, for on some evenings the "NU" stations will be extremely strong as early as 8.30 p.m. and will all have disappeared by 11 p.m.; while on other occasions there will not be a sound audible at 10.30, and by the time the enthusiast is making tracks for his bed there will be distant stations in their hundreds mocking him!

It is not easy even to ascertain whether the variations in conditions are caused by variations in the weather, for while atmospheric conditions may affect only a comparatively small locality, the mysterious radio "conditions," as we have to call them for want of a better name, make their presence felt for 3,000 miles or more!

### 3 LO's Success.

The 20-metre band is by far the worst offender in this respect, while the broadcast band of 300-550 metres, although it seemed freakish enough in the old days, now apparently suffers few variations.

This is probably quite logical, for it is a generally accepted fact that the shorter waves penetrate further and further into the Heaviside layer before they are refracted sufficiently to emerge again, and certainly the longer the wave-length the greater the reliability seems to be.

Numerous readers have been kind enough to write to me and report reception of 3 LO, Melbourne, on about 33 metres. Several heard him on November 27th at about 19.20 G.M.T., when the transmission appears to have been very good, and others report reception of tests from 3 LO at various times. Congrats, 3 LO! May your power increase, or, in "ham language," may you QRO.

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## TECHNICAL NOTES

(Continued from page 840.)

## Thumb-Control.

Thumb-control, which originated with the American designers of radio components, is now becoming more and more popular in this country. With this arrangement the dial of a condenser, for example, is placed in a plane perpendicular to the panel and protrudes slightly through a slot in the panel. It therefore serves not only as an indicator, but also as a means of adjusting the instrument. As this is obviously done most conveniently by moving the projecting part of the dial by means of the thumb, it is easy to see how the popular description of "thumb-control" has arisen.

One obvious advantage of this arrangement is that there is a considerable saving in the panel-space occupied by the dial, and also the appearance of the panel is much neater.

## Ganged Condensers.

Another quite important advantage where two instruments are to be operated simultaneously (say, ganged condensers) is that the dials or control discs may be placed side by side in close proximity; it is then only necessary to place the thumb upon the control discs, which may then be moved simultaneously. Of course, if it is desired to move them separately, this also can readily be done.

## Simultaneous Operation.

Talking about ganged condensers and simultaneous operation, which subject I also touched upon recently, there are, of course, other ways in which the simultaneous control may be obtained. Where several tuning condensers are to be operated together, they may be driven from the same shaft by a belt drive, and this renders it easy also to gear them in any desired ratio.

(Continued on next page.)

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A "how-to-make" book of never-ending interest is the HOBBY ANNUAL (6/-), which deals in a new way with all hobbies. The BRITISH BOYS' ANNUAL (5/-) contains tales of school-life, mystery, sport and adventure.

Anyone seeking a gift at a higher price than these should select CHUMS ANNUAL (12/-); in which there are 832 pages of splendid reading matter and 12 magnificent coloured plates. There are 12 book-length stories dealing with school-life, football, cricket and adventure, in addition to a variety of other stories and articles.

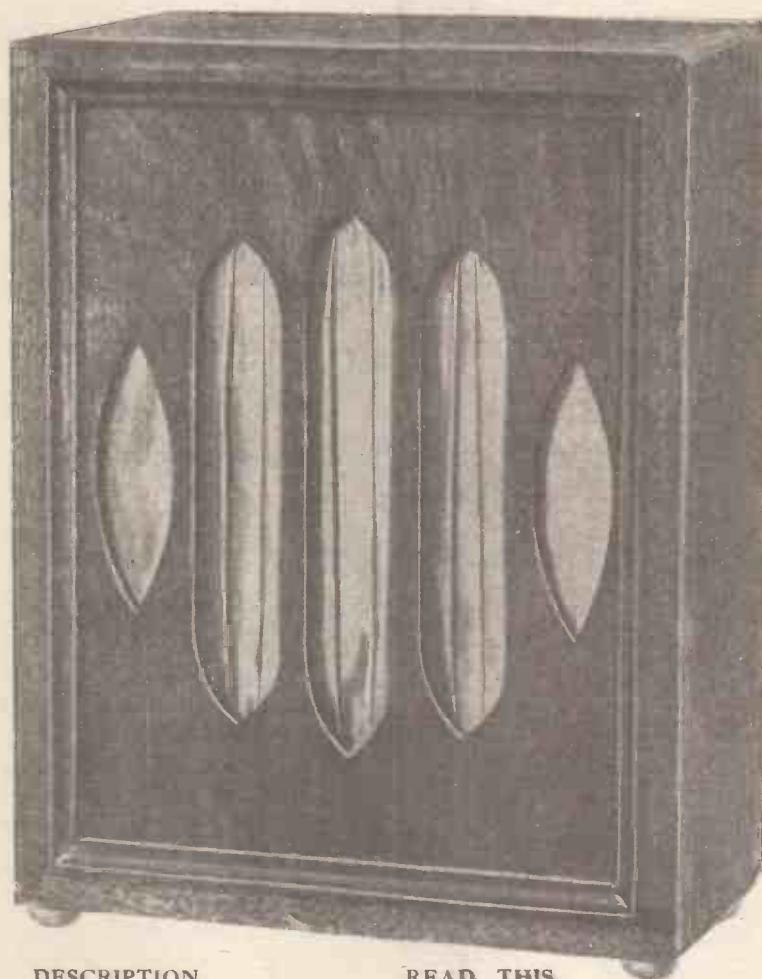
For schoolgirls there are SCHOOL FRIEND ANNUAL (6/-) and SCHOOLGIRLS' OWN ANNUAL (6/-), packed from cover to cover with entertaining stories and articles; the GOLDEN ANNUAL (4/-), a story-book which will appeal to schoolgirls of any age; and BRITISH GIRLS' ANNUAL (5/-), with a delightful assortment of tales of school life, sport and adventure, together with entertaining articles.

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## TECHNICAL NOTES. (Continued from previous page.)

### Filters.

A little time ago I spoke about the function of the condensers in an eliminator. As I have had several letters from readers on this point, it may be useful to refer to the matter again, as an eliminator power-supply device is not necessarily fool-proof and, like all other pieces of radio apparatus, it requires reasonable treatment.

The filter condensers used in H.T. eliminators should have proper di-electric to withstand the full voltage of the device throughout many years of service, and also to resist the occasional peaks or surges which may sometimes run to two or three times the maximum output voltage. It is a good plan, in fact, to employ filter condensers rated at twice the output voltage; that is, for a 200-volt maximum output H.T. eliminator the filter condensers should be of at least 400-volt working voltage rating, and so on.

The condenser nearest to the rectifier is subjected to the greatest electrical stress, since the current at this point is not entirely smoothed out, and therefore may have decided peaks in voltage. It is obvious that the first condenser in the H.T. power supply unit should have ample di-electric strength. If you are making up your own supply device and you have condensers of different di-electric strength or voltage rating, it is best to employ the highest rated condenser as the first filter condenser.

### Two-Section System.

In the usual two-section filter system there are generally three filter condensers. The first one, that is the one nearest to the rectifier, is intended rather to maintain the output at a fairly steady voltage notwithstanding the changes in the load upon the instrument. It serves, in fact, for the regulation of the rectifier and does not have very much influence on the smoothing of the output of the device.

The second condenser acts as a smoother and, within reasonable limits, the larger the capacity of this condenser, in conjunction with the proper choke coils, the better.

The third condenser influences the tone quality at full volume.

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