POPULAR WIRELESS, February 25th, 1933. REGISTERED AT THE G.P.O. AS A NEWSPAPER.

SPECIAL SUPPLEMENT—RADIO SIMPLIFIED

Popular Wireless

Every Wednesday
PRICE
3d.

No. 560. Vol. XXII. February 25th, 1933.

EVERYTHING RADIO

IMMEDIATE DELIVERY—CASH, C.O.D. OR H.P.

CARRIAGE PAID TO YOUR DOOR

LISSEN "SKYSCRAPER 3." Chassis model with (Lissen) S.G., Detector and Pentode valves. Cash Price £4/9/6. Carriage Paid. Balance in 11 monthly payments of 8 3 — Send **8/3** only

LISSEN "SKYSCRAPER 3." Cabinet model. Complete with Lissen speaker and Lissen S.G., Detector and Pentode valves. Cash Price £6/5/0. Carriage Paid. Balance in 11 monthly payments of 11/6. — Send **11/6** only

QUIESCENT PUSH-PULL ACCESSORIES

CASH or C.O.D. CARRIAGE PAID.

CELESTION Q.P.P. 19a MOVING-COIL SPEAKER, with input transformer. Cash or C.O.D. Carriage Paid £2/10/0. Balance in 11 monthly payments of 4/7. — Send **4/7** only

W.B. P.M.4 Q.P.P. MOVING-COIL SPEAKER, with input transformer. Cash or C.O.D. Carriage Paid £2/2/0. Balance in 7 monthly payments of 5/9. — Send **5/9** only

ROLA Q.P.P. MOVING-COIL SPEAKER, with input transformer. Cash or C.O.D. Carriage Paid £2/9/6. Balance in 11 monthly payments of 4/6. — Send **4/6** only

SONOCHORDE SN. Q.P.P. MOVING-COIL SPEAKER, with input transformer. Cash or C.O.D. Carriage Paid £3/7/6. Balance in 11 montly payments of 6/3. — Send **6/3** only

FERRANTI

Type A.F. 11/c. Input Transformer 1:10	34/-
Type A.F. 12/c. Input Transformer 1:9	15/-
Type O.P.M. 11/c. Output Transformer Multi-Ratio	26/6
Type O.P.M. 12/c. Output Transformer 1·7 : 1 and 40 : 1	15/-
Type O.P.M. 13/c. Output Transformer Multi-Ratio	26/6

SOUND SALES

Q.P.P. Intervalve Transformer : 9 : 1	16/6
Sound Sales Q.P.P. Output Choke 1 : 1; 2 : 1; 3 : 1	10/6

R.I.

"Q" Type Q.P.P. Multi-Ratio Choke D.Y. 35	12/6
"Q" Type Q.P.P. Transformer D.Y. 34—8 : 1	16/6

VARLEY

D.P. 36 Q.P.P. Input Transformer 9 : 1	17/6
D.P. 37 Q.P.P. Output Transchoke 3 : 1 and 42 : 1	18/6
D.P. 38 Q.P.P. Output Transchoke 3 : 1 and 50 : 1	18/6
D.P. 39 Q.P.P. Output Transchoke 3 : 1 and 75 : 1	16/6

Above Q.P.P. Transformer prices include Royalty 1/6.

Guardian Q.P.P. Milliammeter .. 10/-

BLUE SPOT UNIT AND CHASSIS. Type 99 P.M. Including matched transformer. Cash Price, £2/19/6. Balance in 11 monthly payments of 5/6. — Send **5/6** only

ROLA PERMANENT MAGNET MOVING-COIL SPEAKER F.6. With Universal tapped input transformer. Cash Price £2/9/6. Carriage Paid. Balance in 11 monthly payments of 4/6. — Send **4/6** only

ATLAS ELIMINATOR. Type A.C.244. Three tappings, S.G., Detector and Power. Output: 120 volts at 20 m/A. Cash Price £2/19/6. Carriage Paid. Balance in 11 monthly payments of 5/6. — Send **5/6** only

EPOCH "20 C" PERMANENT MAGNET MOVING-COIL SPEAKER. (New Edition.) With 5-ratio input transformer. Cash Price £1/15/0. Carriage Paid. Balance in 5 monthly payments of 6/6. — Send **6/6** only

EPOCH PERMANENT MAGNET MOVING-COIL SPEAKER. Type "A.2." Complete with 5-ratio input Transformer. Cash or C.O.D. Carriage Paid, £3/3/0. Balance in 11 monthly payments of 5/9. — Send **5/9** only

PILOT AUTHOR KIT
Exact to specification

AIRSPRITE

KIT "A" FIRST PAYMENT OF **8/0**

Author's Kit of specified parts, including FREE BLUE PRINT, ready drilled Panel, but less Valves and Cabinet.

Balance in 11 monthly payments of 8/-

KIT "B"
As Kit "A" but with valves less cabinet. Cash or C.O.D.
£5 : 19 : 9
12 monthly payments of 11/-.
Carriage Paid.

KIT "C"
As Kit "A" but with valves and Peto-Scott Airsprite cabinet Cash or C.O.D.
£6 : 14 : 9
12 monthly payments of 12/6.
Carriage Paid.

3 valves £1 : 12 : 3. Peto-Scott Cabinet 15/-.

DELIVERED Carriage Paid CASH or C.O.D.
KIT "A"
8 7/6
with FREE Full size Blueprint and Copy Popular Wireless

PILOT STRUCTAKIT AIRSPRITE (Battery Model)

Comprises Peto-Scott Red Triangle Ebonite Panel, 16" × 7", ready drilled, 1 Peto-Scott Baseboard, 16" × 10", 1 Peto-Scott Red Triangle ready drilled Terminal Strip, 16" × 1½", and connecting Wire, Screws, Flex, etc., for Panel and Baseboard assembly of Battery Model. In sealed carton. Cash or C.O.D. Carriage Paid. **10/6**

KIT-BITS *Selected C.O.D. Items—You pay the postman, we pay post charges orders over 10/-.*

	s.	d.
1 PETO-SCOTT Red Triangle ready-drilled Panel, 16" × 7", 1 Baseboard, 16" × 10" and Terminal Strip 16" × 1½"	7	9
1 Pair TELSEN Coils (W.227) with Switch and Coupling Link	17	6
2 POLAR S.M. Condensers	13	0
1 VARLEY L.F. Transformer, D.P.35	11	6

SEND DIRECT to AVOID DELAY

AIRSPRITE A.C. MODEL

KIT "A"
Author's Kit of Specified Parts including **FREE BLUE PRINT**, ready-drilled panel and terminal strips, but less valves and cabinet
Cash or C.O.D. Carriage Paid.
£9 : 15 : 0
or 12 monthly payments of 18/-

KIT "B." As Kit "A" but with valves less cabinet. Cash or C.O.D. £12 : 15 : 0 or 12 monthly payments of 23/4.

KIT "C." As Kit "A" but with valves and PETO-SCOTT A.C. Airsprite Cabinet Cash or C.O.D £13 : 14 : 6 or 12 monthly payments of 25/3.

AIRSPRITE TWO

KIT "A"
Author's Kit of Specified Components including *ready-drilled panel*, but less valves and cabinet.
Cash or C.O.D. Carriage Paid.
55/-
or 12 monthly payments of 5/-

KIT "B." As Kit "A" with valves but less cabinet. Cash or C.O.D. £3 : 19 : 9 or 12 monthly payments of 6/6.

KIT "C." As Kit "A" but with valves and cabinet. Cash or C.O.D. Carriage Paid, £4 : 2 : 9 or 12 monthly payments of 7/7.

CASH, C.O.D. or EASIWAY

PETO-SCOTT CO. Ltd. 77, City Road, London, E.C.1.
Telephone: Clerkenwell 9406/7.
West End Showrooms: 62, High Holborn, London, W.C.2. Telephone: Holborn 3248

Dear Sirs, Please send me CASH/C.O.D./H.P. .....
for which I enclose £ ..... s. ..... d. CASH/H.P. Deposit.
NAME .....
ADDRESS .....
..... P.W. 25/2/33

ANY ITEM SUPPLIED SEPARATELY—ORDERS OVER 10/- SENT C.O.D. CARRIAGE AND POST CHARGES PAID

R.M.A. OFFICIALS
RADIO FIND
LAWYERS' OPINION
ODD ENGLISH

RADIO NOTES & NEWS

"LIGHT" PROGRAMMES
DESERTED CITY
WONDERFUL SELECTIVITY!
ETHEREAL RECIPES

New Appointments.

MR. W. W. BURNHAM, Manager of the Radio Division of the Edison Swan Electric Co., has been elected Chairman of the Radio Manufacturers' Association. He is already Chairman of the British Radio Valve Manufacturers' Association. The new Vice-Chairman of the R.M.A. is Mr. S. Wilding Cole, Deputy Chairman and Managing Director of Kolster-Brandes, Ltd. Mr. J. Joseph, Managing Director of Radio Instruments Ltd. is Treasurer of the R.M.A.

Wireless Beacons.

A CHAIN of twenty-three wireless beacons is now in operation round the coasts of the British Isles for the greater safety of shipping. The latest to be installed is in the Irish Lightship "Comet." This beacon, with 100-watts aerial power, will be operated in conjunction with a submarine sound signalling device to enable navigators to ascertain their position in relation to the lightship and their distance from it. Thus does Marconi come to redress the "curse of Cromwell"!

The Young Whistler.

REGINALD BRIGGS, the B.B.C.'s latest "find," who made his debut as a siffleur at the end of last month, was really discovered by Colonel Jones, a director of the Piccadilly Hotel, where Reggie is employed as a page-boy. The first step was to let him whistle with the hotel orchestras, and during one of his performances a B.B.C. official heard him. Whilst he thereby won our sympathetic hearing for Reggie, I don't think that Henry Hall helped the boy very much by telling us twice that he was rather nervous.

Wireless Society Note.

MR. E. FISHER, Hon. Sec. of the Smethwick Wireless Society (33, Freeth Street, Oldbury, Nr. Birmingham), asks me to mention that all applications for membership should be addressed to him at the address given above. He describes the Society's meeting of January 20th, at which Mr. Inchley of the G.E.C. gave an interesting lecture on "Photoelectric Cells and Gas-filled Relays," demonstrated by means of working models. The headquarters of the Society are at the Crown Hotel, High Street, Smethwick.

German Legal Decision.

I UNDERSTAND that by a judgment of the Kammergericht of Berlin, it has been held that the contents of programmes giving the musical or spoken items to be broadcast on each day of the coming week, the exact hour and the names of the singers and speakers, etc., do not possess any of the characteristics of a literary work within the meaning of German copyright law. Hence, weekly programmes published by the broadcasting companies are not regarded as being entitled to copyright protection.

"AIRSPRITE" ENTHUSIASM.

18, Upper Plymouth Grove,
Longsight, Manchester.

Dear Sir,—No doubt you like to hear from your regular readers now and then? Well, here goes! Having fancied the "Airsprite" circuit, I set about to build it. I had it going same day as blue-print arrived, as I had nearly finished from the small black-print from previous week. In my time I have put a few together, but I must say I had the biggest surprise of my life on tuning in. There is a QUALITY of TONE unkown before, and stations fly in. Could you only hear my set working I think you would be agreeably surprised.—Yours Ever, *W. WILSON.*

Famous Works Band.

THAT very popular Callender's Cable Works Band began in a small way about thirty-five years ago at Belvedere, in Kent. They have been broadcasting since 1924, giving their first performance at 2 L O. Callender's is one of the few combinations which actually toured the old B.B.C. stations, instead of being relayed to them from the London studio. During one tour the Band covered some 1,700 miles and visited seven provincial stations.

B.B.C. and English Speech.

MISS HILDA MATHESON, formerly in charge of B.B.C. "talks," states in the "Week-end Review" that she suspects those who oppose all efforts to spread the use of educated English may be the descendants of those who opposed popular education. (Who *did?*) Apart from the basic objection that people are not convinced that the B.B.C. is the ultimate authority on the subject, there is this—that the B.B.C. have failed even to make its announcers toe the line. During the last two weeks I have heard "piecis" (pieces); Margrit Ballfer (Margaret Balfour); and "wahliss awkisstrah."

Imperial Airways Wireless.

SOME extraordinary results have been obtained by the radio sets which have been fitted to the "Atalanta" aircraft on the Cairo-Cape Town air route. For example, consider that while one of these aircraft was over the White Nile it established two-way communication with Portishead, near Bristol, 5,000 miles distant. Contact was also maintained with Norddeich, Germany (5,000 miles), Coltano, northern Italy (3,900–4,000 miles) and news messages were received from Miami Beach, Florida, U.S.A.

A Fine Short-Wave Set.

AMONGST other striking features of the February "Modern Wireless" is a complete working description of a new short-wave receiver, written by its designer, "W. L. S." This set, a five-valver, called the "Empire Super," is credited with getting all stations working on wave-lengths of 16 to 80 metres, and is intended as much for home users as for those abroad. Please see this issue of "M.W." for articles on the "Mu-Gram" and "Handi-Box."

Broadcasting By Light.

APROPOS my recent note on the use of a light beam as a carrier for telephony, it is of interest to note that this method has been put to practical purposes in the U.S.A. In January, a lady's voice was carried by a beam of light half a mile across New York. It was then changed from light to sound and re-broadcast to about fifty stations. As a test the transmission across New York was done by

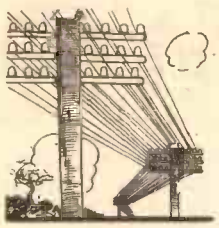
(Continued on next page.)

ARIEL CONTINUES HIS RUNNING COMMENTARY ON RADIO

wire as well, and the listeners were unable to detect any difference.

How Current Escapes.

C. M. S. (Bognor) sends me a press clipping which reads, "The little white cups on telephone poles are for attaching the wires to the poles. They are made of porcelain, which is a non-conductor. The electric current thus escapes down the pole to the earth."



And so—"number engaged."

C. M. S. asks whether motor cycles are outside the sphere of these Notes. Sir, they are beyond the pale!

An Uninviting Prospect.

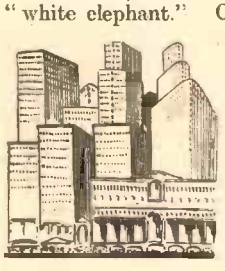
I UNDERSTAND that according to Schönberg, the well-known composer, composers will in future have to produce a special sort of music which is wholly suitable for being broadcast. The theory is that ordinary music, such as Beethoven wrote, I suppose, involves frequencies which the microphone cannot handle. Personally, I don't think that any of the frequencies I may have lost from either the great masters or from Jack Payne are worth worrying about; certainly one would rather lose them than lose the old music. And why not improve the microphone?

America Begins to Rebel.

LEADING American newspaper men are convinced that a remedy must be found to combat the competition of radio in the dissemination of news and advertisements. The president of a Louisiana newspaper company has formed a plan to freeze out of his papers all reference to radio; programmes and radio articles and gossip are to be dropped out completely. This plan has actually been adopted in Louisiana with some success, and it is estimated that if it were adopted on a national scale millions of dollars which are now spent on radio advertising would return to the newspapers.

Radio City, New York.

I HAVE already indicated that the great Radio City, built by the Rockefeller interests, has so far proved to be a "white elephant." Conceived on a scale which was designed to astonish the world, this collection of huge theatres and offices has been dumped into one of the congested parts of Manhattan Island, which is already crowded with half-empty, half-bankrupt buildings.



The great Music Hall is so great that from the back rows the performers look like dwarfs, and from the nearer seats the eye cannot take in the whole stage.

Is Your Set Selective?

WE all aim at selectivity. All our skill in construction and manipulation tends to that end, nowadays—and, goodness knows, one needs it. But I should like to know what circuit the radio dealer had in mind when he replied to the lady who asked if it was selective, "Selective! Why, madam, this set would make a duet sound like *two solos*." Probably he was the same young hopeful who told the highbrow that a certain receiver eliminated all sharps and flats!

Beam Radio Problem.

A POONA (India) reader, whom I have to thank for a nice letter and graph of the strength of the Empire station signals, says that the Canadian and the two African beams are received in Poona better than the Indian beam. A poser! Perhaps he is getting those beams on their return path to the East. However, on the basis of data such as he supplies, the B.B.C. will no doubt alter its transmitting arrangements. The first phase of the Empire scheme is necessarily experimental.

SHORT WAVES

"There are musical notes which are inaudible to the human ear," says a scientist.
We wish he could extend his statement to include some of the UN-musical notes we get on our loudspeaker.

* * *

A Chicago gangster has taken to writing popular songs for broadcasting, we read.
We hope he has taken the precaution of doubling his personal bodyguard.

* * *

RECEPTION PERFECT.

A woman appeared at Clerkenwell police court recently, her head covered with bandages. She wanted a summons for assault.
"What is the nature of your injuries?" asked the magistrate.
"A three-valve wireless set," was the mournful reply.

* * *

Wireless ought to be a great success in China, as it is almost impossible to distinguish atmospherics from the Chinese language.

* * *

An eminent scientist is billed to broadcast a talk on "Why do we fall asleep?"
Sometimes because we are listening-in to a broadcast talk by an eminent scientist.

* * *

AN APPRECIATION OF THE B.B.C.

"The Fareham Sub-Committee had received with great regret the decision of the Public Assistance Committee not to comply with the recommendation for the restoration of the wireless set at the Fareham Institution, having regard to the great amount of pleasure that the wireless gave to the inmates generally, and more particularly to the mental defectives."—Hampshire Paper.

"Punch."

The New Jazz Star.

THE music of "Ring o' Roses" was composed by Guy Daeblitz, son of the leader of the Scottish Orchestra. Some critics aver that in him there has arisen a new star in the jazz world, and they have gone so far as to dub him the British Gershwin. Another item of interest is that Ashley Sterne, the humorist of journalism and lyric writer for broadcasting, is also the organist of a South London church. And, if I remember aright, Gillie Potter is a heavyweight on the austere subject of Church history.

A Licence Muddle.

URBAN Councillor R. Roach, of Crediton, summoned for working a set without a licence, stated that when, in December, 1928, or early in January, 1929, his licence expired, he applied to the Post Office for a new one. Clerk asked him to produce card notifying him licence had expired. He hadn't a card.

In December, 1930, he applied again for a new licence. Nothing doing—because he hadn't that card. This occurred yet again, and he was then told that if he would pay £2 all would be forgiven.

But he elected to be summoned—and the Bench dismissed the case. Vive le Bench!

Transmitting Note.

MR. F. L. POSTLETHWAITE, 41, Kinfauns Road, Goodmayes, Ilford, Essex (G 5 K A British Experimental Short-wave Station), asks me to say that the Radio Society of Great Britain is now handling its own members' Q S L cards. All applications for such cards by non-members should be sent to Mr. Postlethwaite, with stamped and addressed envelopes. This Q S L service is being organised by G 2 V Z, 2 A R Z and G 5 K A.

The B.B.C. on Cooking.

I AM not sure whether I do a public service or the reverse by drawing attention to a cookery pamphlet which the B.B.C. has issued; twopence, post free. It illustrates a series of talks and emphasises that sound nourishment from meat is procurable at minimum cost. With an eye to our straitened domestic budgets the pamphlet shows what marvels may be accomplished with bones, cods' heads, etc., and has a special word for the humble gas-ring cook and the heroic housewife who is trying to produce invalid's food without the proper amount of money required in order to follow the usual cook-book.

The Woman Pays.

THAT caption, so dear to the producers of melodrama, is not true of radio sets, according to the publicist of the Radio Manufacturers' Association. He maintains that "where a radio purchase is concerned, it's the man who pays but the woman who buys. Ninety per cent of the sales made in 1933 will be really made to women.

I concur. It's the piano business all over again, and manufacturers must have a care to catch the ladies' fancies when designing cabinets.

ARIEL.

The P.W. "AIRSPRITE" TWO

By G. V. DOWDING, Associate I.E.E.

A new set with automatic tone balance, capable of giving unprecedented results. It brings first-class distant-station reception within reach of the leanest purse, and can be built and operated by anyone.

MILLIONS of listeners are completely ignorant of the potentialities of a modern properly designed two-valve set. Not because two-valvers are particularly scarce, but because only scanty respect is often paid to their production.

They are more often than not the products of a kind of designer's holiday; mere vehicles for the presentation of second-class ideas. Pot boilers, in fact. But as regular readers will know, POPULAR WIRELESS, at least, treats this economical class of receiver with all the respect it deserves.

Worth Consideration.

After all, tens of thousands of listeners are quite unable to afford to buy and run screened-grid valves. Are their only alternatives to be cheap (and, sometimes quite nasty) "det. two L.F.'s"? Even these they may find somewhat expensive in upkeep for their limited incomes. But what horribly wasted expense!

A first-class two-valver would be an infinitely better proposition from every point of view. And I am advancing the "Airsprite" Two as a set which deserves that description and more.

Many of our trade friends who have heard it in action have described it as a revelation, and in their very surprise at its performance they tacitly admitted their partial subscription to the fallacy that a "two" is not worth serious consideration.

But, of course, they had never before heard a "two" with A.T.B. in it! Automatic Tone Balance was sufficiently striking in its effects in the "Airsprite" Three to cause, as you have seen, dozens of the great companies of the Radio Industry to volunteer extremely enthusiastic reports. Yet A.T.B. is even more effective in a two-valver, impossible though that may sound.

The vital point is that A.T.B. is not merely a tone compensation, pure and simple, it definitely adds to the station-collecting powers of a set.

Full Entertainment Value

Transmissions which are heard on an ordinary receiver as nothing but low, muffled mumblings become clear and undistorted programmes of full entertainment value when the A.T.B. system is applied.

I can hear some of you saying, "But if the amplification is not there, if there is no power, no volume—" Actually, the power is there all right, but is swallowed up because reaction has killed practically the whole of the audio-frequency spectrum; all the notes above about 400 cycles have been wiped out. A.T.B. puts them back again.

That is why A.T.B. is so spectacular in demonstration. Everyone can hear the result at once. A simple change-over test reveals an almost miraculous revival of lost volume and tone. You haven't got to take only my word for that. Read some of the many

(*Continued on next page.*)

WHAT A MANUFACTURER SAYS:

"The problem of maintaining fidelity of reproduction without a separate tone control has hitherto defied solution. It is therefore to your credit that you should have overcome this without additional cost. Your scheme does all that is claimed for it and is a definite advance towards simpler and more efficient home radio."—Colvern.

A READER'S OPINION:

"I have now incorporated your most marvellous A.T.B., so simple but so terribly effective.

"I really think that Mr. G. V. Dowding should receive all the medals manufactured in the next twenty years, when A.T.B. will still be marvelled at by wireless enthusiasts."

N. F. Brown, London, W.8.

THE FIRST "TWO" WITH A.T.B.

Note the extreme simplicity of construction.

THE FEW PARTS

1 PANEL, 12 in. × 7 in. (Peto-Scott, Permcol, Becol, Goltone, Wearite, Direct Radio).
1 CABINET TO FIT, with baseboard 12 in. × 10 in. (Camco, Peto-Scott, Direct Radio, Osborne, Gilbert).
1 DUAL RANGE COIL (Telsen H.F. Transformer No. 154).
1 L.F. COMPENSATING TRANSFORMER (R.I. Varitone, Telsen Audioformer, Varley D.P. 35, Lewcos L.F.T. 6A).
1 ·0005-mfd. VARIABLE CONDENSER (Polar 'Ideal' or No. 2 S.M., Ormond, Telsen, J.B., Utility).
1 ·0003-mfd. SOLID DIELECTRIC VARIABLE CONDENSER (Ready Radio Micalog, Telsen Series Aerial, Polar, Graham Farish, Ormond, Lotus, Igranic).
1 ·0003-mfd. DIFFERENTIAL REACTION CONDENSER (Ready Radio special "Airsprite" type, or Ormond Slow-motion, Telsen, Lotus, J.B.).
1 H.F. CHOKE (Graham Farish L.M.S., or Telsen Binocular).
2 VALVE HOLDERS (Benjamin, Telsen, W.B., Clix, Ready Radio, Wearite, Lotus, Igranic).
1 ·0003-mfd. FIXED CONDENSER (T.C.C. type S. Dubilier, Graham Farish, Telsen, Ready Radio, Igranic, Goltone, Sovereign).
1 ·01-mfd. FIXED CONDENSER (Dubilier 610, Telsen, T.C.C., or as above).
1 3-POINT SWITCH (Goltone, Telsen, Ready Radio, Bulgin, W.B., Lotus, Benjamin, Tunewell, Keystone, Wearite, Sovereign).
1 ON-OFF SWITCH (Goltone, or as above).
1 GRID LEAK, 2-meg., with wire ends or terminals (Goltone, Telsen, Tunewell, Dubilier, Graham Farish "Ohmite").
1 FUSEHOLDER AND 150-MILLIAMP. FUSE (Belling-Lee small size, Bulgin, Telsen, Goltone).
1 TERMINAL STRIP, 10 in. × 1½ in., with 9 Indicating terminals (Belling-Lee, Bulgin, Eelex, Igranic, Clix, Goltone).
5 BATTERY PLUGS (Clix, Belling & Lee, Bulgin, Igranic, Goltone).
2 SPADE TERMINALS (Clix, Belling & Lee, Goltone).
1 BIAS BATTERY CLIP (Bulgin).
4 yds. 18 Gauge Wire, 3 yds. Sleeving (Goltone).

YOU NEED

THE "P.W." "AIRSPRITE" TWO

(Continued from previous page.)

reports we have published; reports written by impartial experts whose names are very highly respected in all technical circles.

A.T.B. allows you to use reaction to full advantage; you get about twice as much from it as has hitherto been the case. That is why constructors are going to obtain results with the "Airsprite" Two which will make almost fantastic reading.

To look at this set with uninformed eyes will tell you nothing. It has the appearance of one of the simplest radio sets which has ever been designed. Just a half-dozen or so ordinary-looking components screwed to a wooden baseboard, a panel carrying a singularly small number of controls, a handful of wires.

Better Home Radio.

A set a child could build and operate fashioned from components the leanest purse can afford. In short, "P.W.'s" second great contribution to simpler and better home radio.

There are only two special items in it and neither is expensive. The compensating L.F. transformer can now be reckoned as a standard component and, anyway, it costs less than many ordinary L.F. transformers.

The reaction condenser is special only in that it requires a slight modification to make it suitable for use in an A.T.B. circuit. Every differential reaction condenser of the right value could be altered, although some are very much easier to alter than others. It is these which we list, and you will find full details for altering them in our February 11th issue.

The differential reaction condenser used in our original model, and therefore mentioned first in our component list, needs no modifying. It is, at least at the time of writing, the only differential designed especially for "Airsprite" sets.

Not Critical.

It is also one of the least expensive of all the makes!

All that I have said regarding the components for the "Airsprite" Three applies with equal force to this set. "Airsprites" are far from being critical, and departures from the makes listed are not likely to cause the severe instability and other such crippling troubles that are only too often encountered.

But we have chosen with extreme care makes of components we can guarantee as being of "Airsprite" standard. And inasmuch as they are by no means "top price" parts (on the contrary in the majority of instances), it will obviously be in the constructor's interests to make sure he does not depart from that list.

Those who desire to use a wooden panel can do so, though they won't save much. I strongly recommend the purchase of a complete kit because not only will every part be supplied down to the last screw and piece of wire, but also the panel will be drilled.

Not that panel drilling is a particularly difficult task, but you should use metal-working drills. However, a large number of radio shops arrange to drill panels for customers and frequently there is no charge at all for the service when several purchases are made at the same time.

You can, of course, make up your own terminal strip from a piece of ebonite 10 in. by 1½ in., and holes for the terminals being spaced 1 in. apart, and positioned 1 in. from the bottom.

Particularly Important.

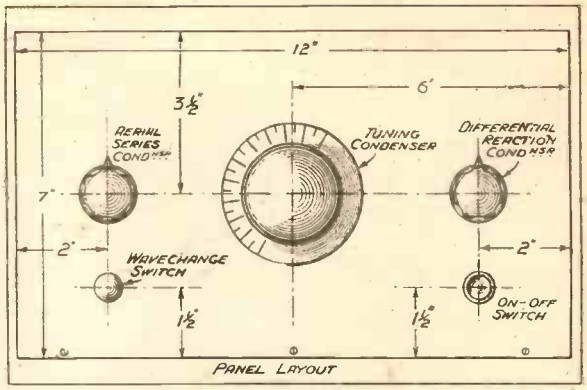
Mount the panel components before you fix the panel to the baseboard.

Use either eighteen gauge tinned copper wire and systoflex tubing for the wiring, or a good material such as Glazite. Soldering is quite unnecessary.

It is particularly important that the connections to the reaction condenser should be made correctly. The F_2 terminal *must* join to the ·01-mfd. fixed condenser.

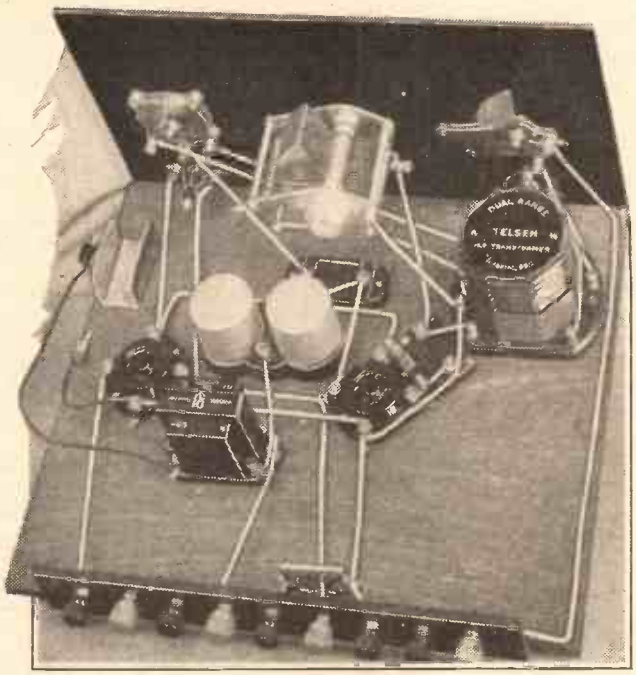
(Continued on next page.)

VARIABLE SELECTIVITY



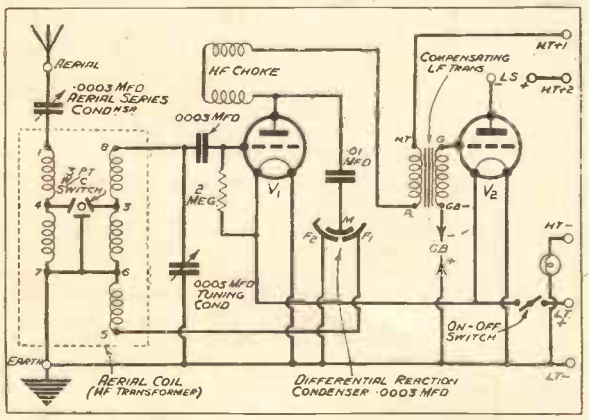
The few panel controls include a handy selectivity adjustment for dealing with congested groups of stations. A.T.B. is, of course, absolutely automatic.

NO INTRICACIES IN ASSEMBLY



There are no sub-baseboard parts or wires—every component and wire is "above board."

FLEXIBILITY WITHOUT COMPLEXITY



Although the "Airsprite" Two is capable of providing such an outstanding performance, and despite its ingenuity and novelty, its circuit is quite devoid of complications.

"AIRSPRITE" TWO ACCESSORIES

LOUDSPEAKERS.—(R. & A., Celestion, Marconiphone, H.M.V., G.E.C., B.T.-H., Epoch, Baker Selhurst, Igranic, Lanchester, Blue Spot, Ormond, Atlas).

H.T. BATTERY.—120 volts (Ediswan, Drydex, Pertrix, Magnet, Marconiphone, Ever Ready, Siemens).

G.B. BATTERY.—To suit output valve (Ever Ready, Siemens, or as above).

L.T. BATTERY.—(Exide, Ediswan, Pertrix, Oldham, Block, G.E.C.).

MAINS UNIT.—To give two output tappings and maximum current to suit requirements of output valve chosen (Ekco, Atlas, Regentone, Heayberd, Ferranti).

AERIAL AND EARTH EQUIPMENT.—Electron, "Superial," Goltone, "Akrite," Graham Farish "Filt" earthing device.

THE "AIRSPRITE" TWO IS A TRIUMPH OF VALUE-FOR-MONEY RADIO

THE "P.W." "AIRSPRITE" TWO

(Continued from previous page.)

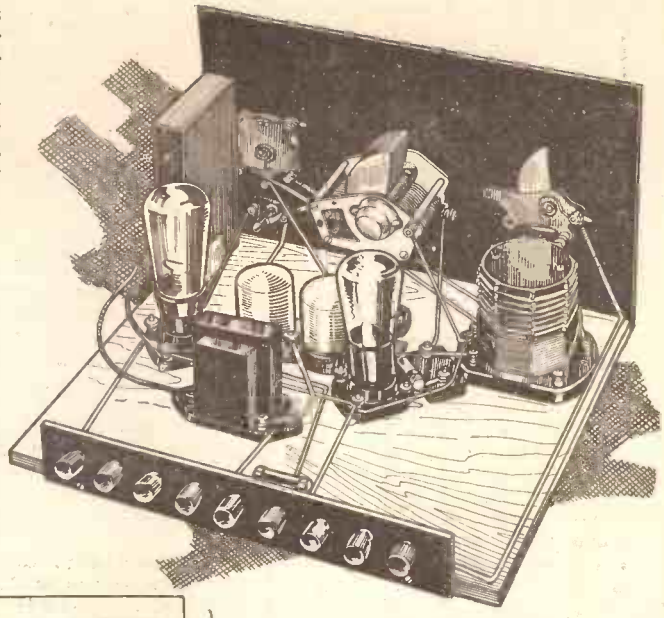
There will be room for the small grid-bias battery on the baseboard and the two grid-bias leads can be cut to the required length, leaving just enough "play" to avoid strain on them, but not enough slack to result in the leads coiling all over the interior of the set.

No Installation Difficulties.

The "Airsprite" Two is exceptionally straightforward to install. Use the maximum H.T. on the H.T. plus Two terminal, and about seventy-five volts on the H.T. plus One. The grid bias will depend upon the particular L.F. valve you employ, and a glance at the maker's leaflet will at once inform you of a suitable value.

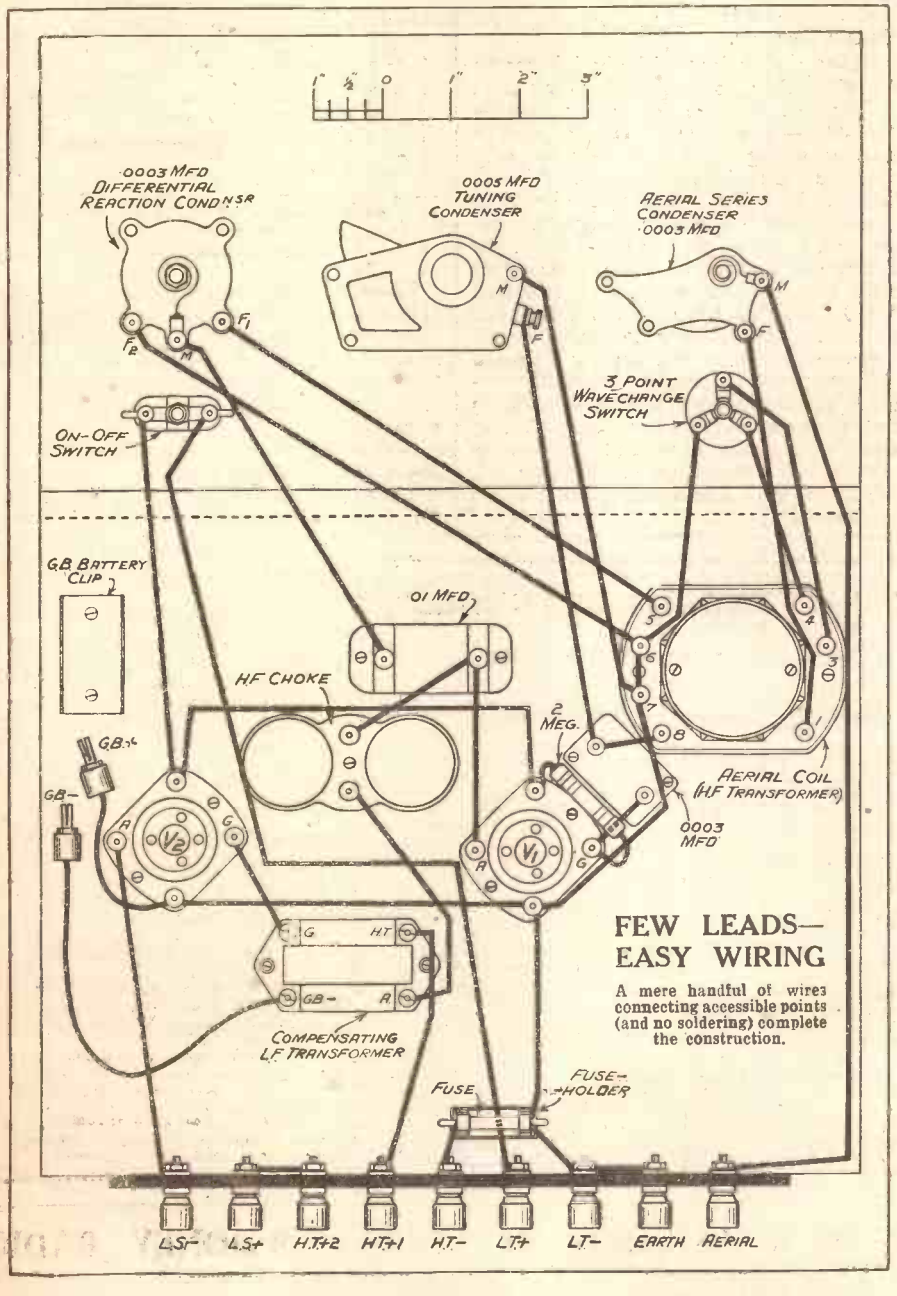
For only two valves a twenty ampere-hour two-volt accumulator will suffice, although I, personally, would favour a thirty ampere-hour capacity as allowing a little more margin for a four weeks' run per charge. (An accumulator should never be allowed to run its theorctical period of activity.)

Before you switch on it will be as well carefully to check all the battery and other connections, and even to have a quick "once-over" of the internal wiring. Also, the fuse should be examined to make certain that it fits properly in its holder.



AMPLE SPACE

There has been no attempt to crowd the components. They are grouped for best and easiest wiring.



FEW LEADS—EASY WIRING

A mere handful of wires connecting accessible points (and no soldering) complete the construction.

You will be able to work a moving-coil loudspeaker with the "Airsprite" Two and work it very well, too.

An adjustment for variable selectivity is provided by the ·0003-mfd. condenser on the panel. And this condenser also acts as a volume control. You will find it an extremely useful adjustment, although it is not necessarily one that has to be wangled every time the set is adjusted for a new station.

Completely Automatic.

A.T.B. calls for no operation at all. As I have said before, it is completely automatic. When you tune in powerful transmissions you will naturally have the reaction right over to minimum. If reaction is needed to boost up the strength of a station you use it in the ordinary way. But automatically A.T.B. steps in to reinstate the missing frequencies, and remember it is maintenance of tone balance which makes all the difference between just logging stations and receiving programmes. With A.T.B., distant listening for the first time, becomes *really* worth while.

And now I will leave you to roam around the European ether and await reports of results from those who will be good enough to send them. I wonder what the record is going to be for the "Airsprite" Two?

I believe that all the surprises of the past are going to be completely overshadowed!

VALVES WE RECOMMEND

	Det.	Output (Battery)	Output (Mains Unit)
Mullard ..	P.M.1H.L.	P.M. 2A.	P.M.202
Cossor ..	210 H.L.	220 P.A.	230 X.P.
Marconi ..	H.L.2	L.P.2	P.2
Osram ..	H.L.2	L.P.2	P.2
Mazda ..	H.L.2	P.220	P.220A
Tungsram ..	H.210	P.220	S.P.230
Eta	B.Y.1815	B.W.604	B.W.602
Micromesh	H.L.B.1	P.B.1	P.B.1
Clarion ..	H.2	P.2	P.2

SHORT-WAVE NOTES

By W. L. S.

Our popular contributor keeps you au fait with the latest news about this fascinating band.

THIS year of grace 1933 is certainly getting along! Already it is possible to have tea in daylight, and then to listen to distant stations *below* 25 *metres* for another two hours or more. "Summer is icumen in," etc. I might add, also, that it's about time something *did* happen to liven up our short waves a little.

Winter is the short-wave man's dull time with a vengeance, if conditions are as poor as they were at the latter end of 1932. But the tide really seems to have turned now.

Good Work "Down Under."

I have been listening during the week-ends to the progress of the B.E.R.U. Tests between R.S.G.B. or B.E.R.U. members all over the world. On the first Saturday of the tests I heard stations from nine of the eleven zones into which they are divided (although these zones have no significance in the scoring this year).

The marvellous thing to me was the splendid way in which the Australians and New Zealanders come over on the 40-metre amateur band. From 6 a.m. till 9 a.m. the dial is full of them, and if there are any other signals they are also DX. West Coast Americans, Japs, Philippine Islanders, and the rest of them all combine to make things merry.

It Can't Be Done.

Already I have had three or four letters asking why the readers of "P.W." who are only interested in broadcast reception should "get away" with such a fine institution as the "Slider-Log" while the poor short-wave man gets nothing of the kind to help *him*. Could I please design one for short waves?

Don't think I am in the habit of making difficulties, or even of going out to meet them, but, really, it can't be done. The number of kilocycles covered in the sweep of the tuning dial on most short-wave sets is tremendous. If you cover 30 to 60 metres on one coil you have a range of 5,000 kcs.

The Next Best Thing.

How could you possibly design a "Slider-Log" covering 5,000 kcs. and still accurate enough to distinguish between two stations 10 kcs. apart? And, on top of this, consider the odd shape of the average curve obtained on a short-waver. So much depends upon the type of coil, the wiring of the set, and even the aerial coupling.

As I have often said before, the most useful thing a short-wave man can possibly make himself is a good heterodyne wavemeter. The next best thing is to take great pains and to calibrate his receiver as accurately as possible.

Random Thoughts.

I nearly fell asleep with the 'phones on this afternoon: so much so that my train of thought became distinctly hazy—"H A T"—who's he? Sounds like a laundry-whistle. "W E E"—good call-sign, but his signals belie it. "Hello, London, Noo York technical ahpraytor (American for 'operator')"—started arguing with a girl on the exchange about her Hollywood favourite. Hullo, who's this with a note like a horse breathing? "W 6 E L K" (so it wasn't a horse after all!). Another of these machine-gun racketeers? No, W I K sending his usual high-speed dots. Ouch! What the—— Wish the neighbours wouldn't start up their vacuum cleaners when a chap's taking a rest after a 48-hour watch!

That last one nearly finished me off. In future I shall remove the 'phones before thinking of repose.

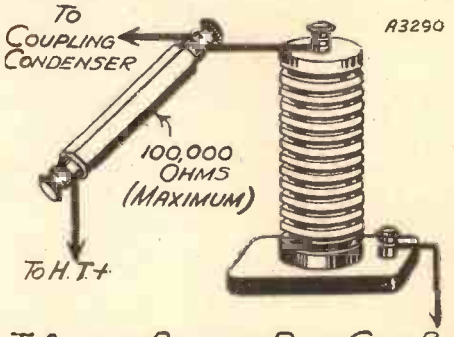
R.C.C. AND REACTION

Users of resistance-capacity coupling will find this tip helpful in ensuring satisfactory reaction.

AS a result of the constant quest for better reproduction listeners often equip their sets with a resistance-capacity-coupled L.F. stage immediately following the detector.

Although the desired improvement in quality may be effected, cases are not infrequent where the alteration to the set is characterised by a lack of reaction over a portion of the waveband.

FOLLOWING THE CHOKE



Don't exceed 100,000 ohms for the resistance, and try increasing H.T.

When using resistance-capacity coupling it is inadvisable for the anode resistance to have a value higher than 100,000 ohms, and in order to nullify loss of H.T. volts across the resistance the voltage at the detector H.T. terminal should be increased to 80 or even 100 volts.

If these points are borne in mind it will be found that reaction is "as before," but there are, of course, extreme cases where a slightly larger reaction condenser has to be used.

THE LISTENER'S NOTEBOOK

A rapid review of some recent radio programmes from home and abroad.

DO you enjoy long plays, like "Hassan"? It was just the sort of play the B.B.C. loves to give us—poetic drama, claiming, as such drama does, an abundance of lines of real beauty. Hence, another opportunity for education by wireless!

It was in two parts (a bad arrangement, I think, this), with a record cast for length, a number of whom spoke alike or with no appreciable difference.

The difficulty in distinguishing characters was more noticeable in Part II than in Part I. Henry Ainley was never difficult; his voice and speech are too distinctive for that to be possible. But I could never be certain whether it was Ishak or Jafar speaking. It was only their occasional references to themselves that cleared things up a bit. The minor characters were particularly confusing.

Importance of Voice.

If the B.B.C. is going to persevere with big cast plays, it will have to attach more importance to this voice question. The stage play and the radio play have many points of difference, but nowhere is there a greater disparity than in the respective attributes required of their actors.

In the former case physique, or what is generally known as stage presence, is of first-rate importance. In the latter this presence is of little account. It is *voice* that matters, and it should be seen that sharp contrasts exist between the several voices put over.

This shouldn't be a difficult matter. Musical comedy and grand opera have always done this to the extent that tenors invariably play one type of character, while basses are always associated with another. The same with sopranos and contraltos.

A Dreadful Memory.

A further disadvantage of the big cast is that one individual often plays two small parts. This adds to the general confusion, and listeners are impatient of anything that needs a lot of unravelling.

One noticed again the absence of effects in "Hassan," although a faint trickle of water was discernible in the fountain scenes. Good dialogue doesn't need the help of effects. One of "Hassan's" outstanding features was the ease with which we got the atmosphere. This was entirely due to the dialogue.

Symphony Concert No. XII will stay long in our memory, not because it included Beethoven's beautiful Eroica Symphony, but because of Schönberg's "Variations for Orchestra." And the memory is a dreadful one for me.

It might have been worse if I hadn't switched off early on in the proceedings. "The man that hath no music in himself, nor is not moved with concord of sweet sound, is fit for treasons, stratagems, and spoils." So wrote the immortal bard. I, too, like to think of music as concord of sweet sound. Schönberg's dissonance is not music, to my way of thinking. But then, I am not a musician!

I think the B.B.C. showed us splendid consideration when they gave the Wireless Singers as an alternative to Schönberg. Listeners who, like myself, sustained shattered nerves by listening to a fragment of Schönberg obtained instant relief by switching over to the London Regional.

Beautiful Combination.

What a beautifully balanced combination the Wireless Singers are! I should say they are second to none now in their particular sphere of music. Incidentally, they are becoming one of the most popular features of broadcast music. Their fame is one of the most outstanding musical achievements of the past few months. We have heard quite a lot of them lately, and I hope we are to hear more.

The "Should They Be Scrapped?" series of talks is well in its stride now, thanks to the Hamilton Fyfe-Tom Clarke discussion on the abolition of the Press. The last debate in this series to which I had listened was that very one-sided talk on blood sports, in which Lady Oxford so surprisingly failed. But those two journalists went at it hammer and tongs, and at a speed that outstripped even thought itself.

There was meat in plenty in both arguments, though I believe that if a vote were taken, the Noes would have it by a comfortable majority. Mr. Hamilton Fyfe's outlook seemed a trifle soured, and offered a striking contrast to his opponent's obvious *joie de vivre*.

Beloved of Children.

On the whole, an excellent debate, and one that was probably continued before many a fireside after the fade-out. It was a pity about that fade-out, by the way!

A broadcaster very popular with adults (and, of course, children) is Commander King-Hall when he talks to children in the Children's Hour. I think his attraction lies in his thorough understanding of children and the child-mind.

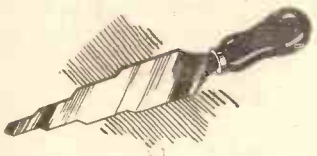
Not only does he always give those bits of information that children like, but he dishes them up in a way so beloved of children.

That little story about the small child who refused to listen-in because "it was only the Children's Hour" does show that many of the accepted ways of talking to children aren't always accepted by the children themselves. Like their elders, some children hate to be talked down to, and I don't blame them! Commander King-Hall doesn't appear to, either!

RECOMMENDED WRINKLES

A REAMER DRILL.

A SIMPLE, useful tool is shown in the sketch which can be employed for making holes in wood or vulcanite or even metal, if not too thick, and it can also be used for reamering holes to larger sizes.



Note the slight taper between each increase in size.

It is made from a piece of good ¼-in. steel, ½ in. wide and about 3½ in. long. The end is ground or filed to a diamond point, and the length is reduced in width by steps in a graduated fashion.

Thus, the first step is the correct size for 4 B.A. holes, the second is 2 B.A., and the remainder represent a gradual increase in size, such as may be required for making holes for components of "one-hole" attachment.

The increase from size to size should not be by a sudden jump, but should be made by means of a slight taper. To improve the cutting powers, it is an advantage to "back off" the cutting edge as is done with flat drills.

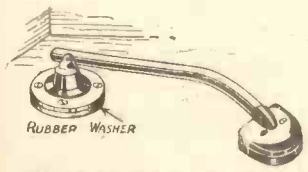
The tool is finished by fitting a small wooden handle such as is used for a screw-driver.

RADIOGRAM RATTLE.

WHEN playing records on a radiogram there is sometimes noticed a rattle on certain passages.

The cabinet is often blamed, but sometimes it is a vibration which reacts on the pick-up.

This can be cured by mounting the pick-up on soft rubber. I have found this make a wonderful difference in



The volume can be increased to maximum without rattle if this idea is adopted.

the reproduction of records. Whereas before the volume had to be kept low because of the rattle, it can now be increased to maximum.

TESTING ACCUMULATORS ON LOAD.

WHEN testing the voltage of an accumulator, it should be on load; otherwise you will possibly get a false idea of its condition.

It may read full voltage when delivering only the small current taken by the voltmeter, but when supplying current to the receiver, a very much lower reading may be obtained, showing that the accumulator requires recharging.

When testing the voltage of a high-tension battery with the ordinary moving-iron voltmeter, the receiver should be switched off; as the current taken by the meter, together with that taken by the receiver, imposes too big a load on the battery.

Incidentally, the reading would be rather lower than the actual working voltage.

MAKING A NEUTRALISING CONDENSER.

THE wire should be made as straight as possible. If the insulation already on the wire is not too good, "sleeving" should be put on.

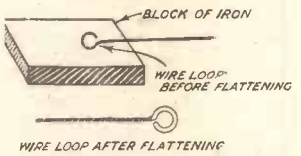
The two wires should be tied together, as shown. If the wires are

Make sure that the wire is firm and straight.

moved up and down so that the surface area of opposite wires changes, the required capacity may be obtained.

FLAT LOOPS.

THIS consists simply of flattening the loops made in the wires when wiring up a set, and does away with the necessity for washers, and



A flat loop in wiring leads will not open out.

also prevents the loops from opening out when tightening down the nuts or terminals.

It is also very useful where two or more wires have to be secured to the same terminal, such as valve holders, etc., as there is hardly enough length of screw to accommodate two wires and two washers.

First of all, turn the loops just a little larger than required to fit the sixpence and put this in, and you will find that it cures the trouble immediately and without any harm to your batteries.

Actually, of course, frothing is rarely encountered with modern accumulators. Cells in glass containers do not froth, and only the older types of celluloid cases give rise to the trouble.

SCALE FOR SMALL KNOBS.

MANY manufacturers, aiming for neatness, fit ridiculously small knobs for reaction or volume control. Not only are these difficult to grip, but if it is a black knob against a dark background, it is very awkward to see where the pointer is pointing, as the wireless set is, as a rule, none too well lighted.

The main dial may be illuminated, but it is too much to expect that the other knobs will be similarly treated.

A white background shows up the pointer of a small control knob.

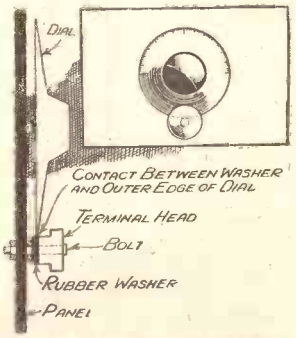
In such cases, I find it a distinct advantage to fit behind each knob a semi-circular scale, cut out of white paper and attached to the panel by a little rubber solution.

It is then possible to see the pointer of the knob travelling across the white background without any effort.

SLOW-MOTION DIAL.

IN some sets, where ordinary dials are used, it is an advantage to have a slow-motion dial.

A simple, but effective one, can be made without any expense. All that is needed is an old terminal head, a rubber washer, and a long bolt with two nuts.



See that the rubber washer and not the terminal head makes contact with the dial.

The rubber washer is fixed to the terminal head and this is pivoted on the panel so that the washer eugages with the outer edge of the dial.

It can be fixed, in the same way with a small compression spring between the panel and the terminal head, so that contact is made between the washer and the dial only when the terminal head is depressed.

This enables slow-motion to be used at will.

(*Continued on next page.*)

THERE'S A GUINEA WAITING FOR YOU!

Readers are invited to send in a short description, with sketch, of any original and practical radio idea of their own.

Each week £1 1s. will be paid for the best "Wrinkle" from a reader, and others published will be paid for at our usual rates.

Each hint must be on a separate sheet of paper, written on one side of the page only. Send your idea to-day, marking the envelope "Recommended Wrinkles," to the Technical Editor, "Popular Wireless," Tallis House, Tallis Street, E.C.4.

"Wrinkles" not accepted for publication can only be returned if a stamped and addressed envelope is enclosed.

Our guinea last week was sent to Mr. P. Taylor, of R.M.S. "Scillonian." c/o Isles of Scilly Steamship Co., Quay Street, Penzance, for the wrinkle entitled "Protecting the Output Valve."

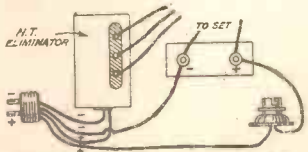
PERMANENT CHARGING.

"P.W." readers with a 2-volt accumulator and D.C. eliminator to work their set would do well to consider the following method of keeping the accumulator up to scratch.

The accumulator is connected to the set as usual, but a lamp-holder is connected in series with it, and the eliminator mains plug (as shown). The polarity should, of course, be carefully tested.

A 60-watt lamp inserted in the holder will supply current to the accumulator, counteracting that taken by the valves.

If the voltage of the accumulator is increased above 2 when on full load, then a smaller lamp may be used, or the 60-watter removed from the holder for a time. If the arrangement does not keep pace with filament consumption it is only necessary to



You should take great care to test polarity carefully.

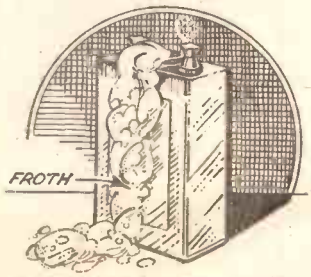
leave the mains plug in when the set is not running and the arrangement will act as a simple charging board.

It should be noted that it is unwise to use this scheme in the rare cases of sets where L.T. — is *not* joined to H.T. —.

screw, then, laying it on a block of iron, vice, etc., flatten it with a hammer, taking care not to cut the wire either with the edge of the block or with the sharp face of the hammer.

ACCUMULATOR FROTHING

BATTERY chargers at home experience innumerable difficulties with their batteries, especially when they are deteriorating with *dopes*.



Impurities in the cell cause frothing. The cure is perfectly simple.

Due to impurities in the cell and in the celluloid, the acid begins to froth in the form of a lather, and pours over the side of the cell, and maybe eating away a carpet!

The level of the electrolyte is also reduced, but when this starts take as much "A 1 Soap Powder" as covers a

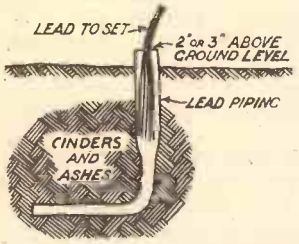
RECOMMENDED WRINKLES

(Continued from previous page.)

AN EFFICIENT EARTH.

THE following description of my earth might be of some use to readers.

A piece of lead water piping about 4 ft. long is used. The earth lead consists of 6 ft. or 7 ft. of insulated aerial wire and is connected to the pipe as follows:



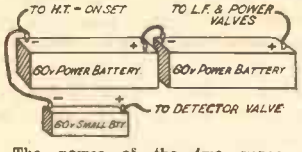
Note how the pipe is flattened over the insulation to keep water from rotting the wire.

The insulation is stripped off for about a foot; the bare wire is then inserted into the pipe, which is now hammered flat so that a good contact is formed, care being taken that the insulation is gripped for an inch or so, and a good fit made round it to keep water from rotting through the wire.

PRESERVING H.T. BATTERIES.

I ENCLOSE a rough diagram which shows the idea, also a sketch of the manner in which I connect my H.T. batteries.

By using the small-capacity battery for the detector valve it keeps the voltage of the two power batteries even, so that the one is not useless



The power of the two super batteries is kept even.

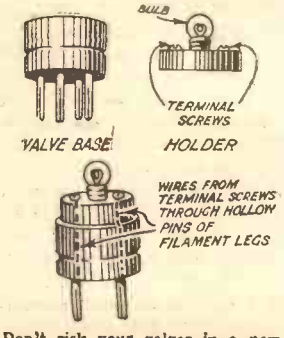
while the other still has enough power to be of use, but too high an internal resistance to connect in series with a new battery.

I find that this extra battery more than pays its initial cost by the saving of the larger batteries.

A VALVE SAVER.

THIS is a useful gadget for use after wiring a set or after extensive repairs before fitting the valves in place, but after all batteries, aerial, earth, etc., have been connected.

Requirements are: An old valve



Don't risk your valves in a new receiver when this simple filament tester is so easy to make.

base and one of the round porcelain flash-lamp bulb holders, usually sold as fuse holders.

These will fit neatly into nearly all the valve bases at present on the market, and may be secured with a little seccotine, though I have found that the connecting wires are quite sufficient to hold it firmly in place.

The sketch shows how the holder and base is assembled; if the valve pins are solid, holes should be drilled close to pin, and the wires passed through and a turn taken round the pin and secured with a spot of solder.

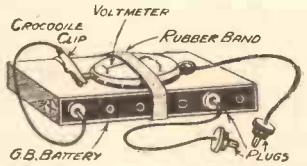
A SIMPLE CIRCUIT TESTER.

MANY amateurs use a watch-pattern voltmeter for checking their accumulator and dry batteries, and such a meter can be made into a handy tester for tracing faults, and checking over the wiring of a new set.

The voltmeter is simply laid on the side of a G.B. battery and a stout rubber band is used to hold them together, as shown in the accompanying sketch.

The positive terminal of the meter is connected by means of a crocodile clip and a piece of flex to the positive socket of the battery. The negative lead should be plugged into the other end of the battery.

This simple tester is handy for checking a suspected "short" in the H.T. wiring. It is much better to disconnect the H.T. and test with the meter in



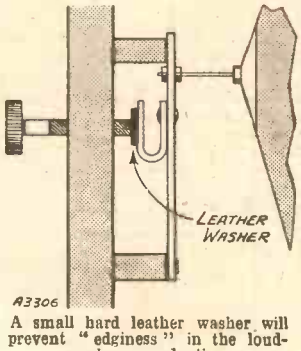
Continuity tests can be carried out quickly with this "gadget."

series with the small battery than to try and locate the leakage of the H.T. supply by using the meter alone.

Ordinary tests for continuity can be carried out with this simple combination quickly and effectively.

IMPROVING SPEAKER TONE.

ON many of the simpler types of cone speakers the metal adjusting pin bears directly on to a piece of spring-steel attached to the vibrating arm.



A small hard leather washer will prevent "edginess" in the loud-speaker reproduction.

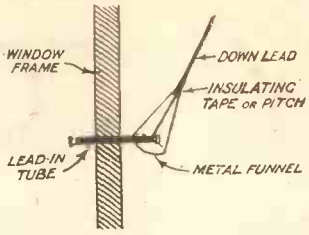
This metal-to-metal contact is very often the cause of a metallic "edginess" on heavy notes, and can be easily remedied by slacking off the adjusting pin and placing a small hard leather washer between it and the piece of spring steel, as in enclosed sketch.

Incidentally, this will improve the tone of the speaker.

DRY LEAD-IN.

A METAL funnel and a piece of insulating tape (or pitch) form an excellent device for preventing oxidisation at the lead-in tube.

Slip the funnel over the lead-in tube and down-lead, as in sketch, then apply some insulating tape at the top of funnel, thereby preventing water running along down lead, so ensuring a good contact at terminal.



The insulating tape at the top of the funnel keeps out the rain.

WINDING A SPEAKER.

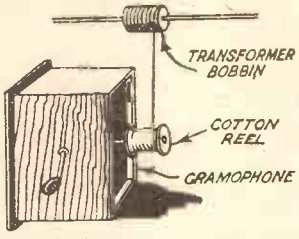
THIS is very handy for anyone who possesses an old gramophone and prefers to carry out his own repairs when the loudspeaker gives out.

It is much easier if the gramophone is of the old cabinet pattern, as by standing it on its side, the handle for winding and the starter are both easily accessible.

The secondary winding of an old L.F. transformer will provide the wire, if care is taken in the process of unwinding. This is best done by first stripping the transformer, removing the core, and plugging the bobbin at either end with a piece of wood, and then boring a hole through the centre of such a size that it will run freely on a stiff wire or spindle.

Then, turning the gramophone on its side, remove the turntable and fit a cotton reel to the spindle, as in sketch, and the machine is complete.

To wind the L.S. bobbin it is advisable first to unwind the wire on to a reel in the same manner, as tearing it



The winding speed can, of course, be controlled by the governor.

or cutting it off is a longer process in the long run, and generally ends in damage to the bobbin itself.

To rewind the L.S. bobbin, plug it at each end as previously described and bore holes to fit spindle of gramophone, the reel of wire taking the place of the transformer bobbin.

A really good job with very little trouble can be done by this method, the speed being enough to keep the wire under control and the process of winding closely watched, if a little greater speed is required the governor can be moved up a little on its spindle by the screw which secures it.

A sheet of white paper placed on the bench directly behind the wire is a great help in keeping the wire under observation.

GETTING TERMINALS TO GRIP.

IT is often found by the constructor that terminals on being tightened up will not grip the panel but still remain in a very loose condition, even on the most careful working.

In this case the terminal should be removed from the panel and placed in a vice. The terminal face should then be nicked in a series of places with the file and altogether "roughed up."

On replacing the terminal it will generally be found that the roughening will have imparted to the terminal just that "bite" which will ensure permanent rigidity.

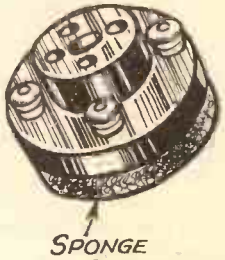
A CUSHION FOR VALVE HOLDERS.

THERE are, no doubt, many amateurs who possess the rigid type valve holder; here is a hint that may give these holders a new lease of life.

By placing a cushion of sponge rubber underneath the holder, it will reduce or entirely eliminate any tendency to set up howling or other microphonic noises due to vibration.

The sketch below should make it a little clearer.

Lightly smear some seccotine on both flat sides of sponge rubber and place in position on the baseboard of set.



Seccotine will hold the sponge quite firmly for all ordinary uses.

Stick the valve holder on the sponge rubber and allow to dry, and the result should be both neat and efficient.

There is only one more thing to be said, and that is that the holder should be held while changing valves, otherwise it may come unstuck. This only applies of course, while taking the valve out.

FUSE CONTACTS.

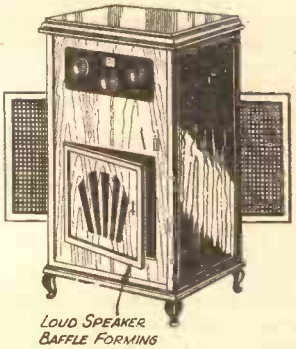
I HAVE recently fitted two fuse holders, and on each occasion found there was no contact through the fuse bulb.

On taking a small piece of tinfoil from a cigarette packet, folding it up very small, and dropping it inside the holder, I was able to screw the bulb down tight and make a good contact, without the aid of solder.

MAKING ACCESSORIES ACCESSIBLE.

THE popular type of self-contained pedestal radio cabinet is usually specified as having a removable back giving easy access to the batteries and speaker.

These accessories, however, are not readily accessible, as it is usually necessary to draw the cabinet out into the room and turn it round before the back can be removed, especially if it stands in a corner or recess.



A hinged baffle makes it an easy job to get at the innards of the set.

Those who make or order a cabinet may well arrange the front of the speaker compartment to be a hinged door. The speaker can be fixed to the door, if not too heavy, or it may be fixed in the cabinet so that the door just closes over the cone when closed.

The batteries and speaker are made instantly accessible in this simple way.

Capt. ECKERSLEY'S QUERY CORNER

Under the above title, week by week, our Chief Radio Consultant comments upon radio queries submitted by "P.W." readers. Don't address your letters direct to Capt. Eckersley; a selection of those received by the Query Department in the ordinary way will be answered by him.

PREVENTS FADING?

H. S. (Sydenham).—"Why is it that, with a tone control transformer which enables the high notes to be very greatly reduced, it is possible to reduce apparently hopeless fading to a more or less constant and intelligible level of strong reception, simply by adjusting the tone control to cut the high notes?

"Fécamp comes in at my home with good strength, but badly interfered with by fading accompanied by monkey chatter and mush. This interference apparently causes the bad fading experienced, because when the tone control is arranged to cut the high notes the mush and the fading disappear."

This is very interesting, and it is a point I had not recognised or observed. I expect that when the whole spectrum is present more of it seems to disappear because part of the spectrum fades too. Then, in fading, the neighbouring station comes up and masks the wanted station.

Or dare I suggest that you have better reaction conditions in one case and that, therefore, you tend to keep a good wanted station-carrier relative strength which only disappears on very infrequent occasions and gives you long periods of true demodulation? I should have to experiment a lot to answer the question categorically.

HOW THE MAINS TRANSFORMER WORKS.

M. B. (Chelmsford).—"I notice that in A.C. mains receivers and H.T. supply units, a component known as a mains transformer is used to increase or decrease the voltage. Can a mains transformer be used with D.C. mains to enable similar voltages lower or higher than the mains voltage to be obtained?"

No! A transformer such as you describe is essentially a component for use with alternating current. If a current flows through a wire, then a magnetic field is set up around that wire.

If the current through that wire changes, obviously the intensity of the magnetic field changes. It is found that if a conductor forming a closed circuit is surrounded by a changing magnetic field, currents are set up in that closed circuit which are proportional to the rate of change of the magnetic field.

Thus, if you put an alternating current through one winding of a transformer, then that winding creates around it a changing magnetic field. If you have another circuit (the secondary of the transformer) not connected to the first, but closely coupled to it, and if the circuit is "closed" externally, the changing magnetic field caused by the primary affects the secondary and sets up currents in that secondary.

This is the principle of the transformer and the point to get hold of is that essentially it depends upon a changing current. If you put different numbers of turns on primary and secondary, you step up or step-down the current in the primary, or vice versa, step-down or step-up the voltage in the primary.

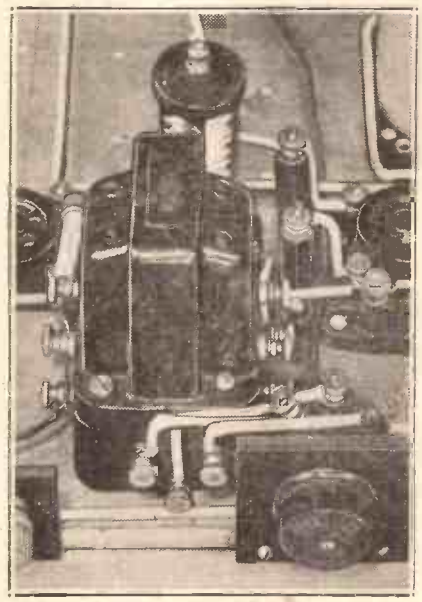
If the efficiency of the transformer is 100 per cent and the power factor is unity, the product primary volts × primary amps = secondary volts × secondary amps.

But with D.C. you have no change of current, and so a transformer does not work for D.C. The only way to change a D.C. voltage is to drive a motor from the D.C. which drives a dynamo, which can be wound to give more or less voltage. This type of device is sometimes called a rotary transformer.

BETTER WITH NO EARTH.

R. G. W. (Balham).—"Can you please tell me why my set should work better without the earth wire connected than with it joined to the normal earth terminal?

DOUBLY WORTH WHILE



The adoption of tone control is tending to become standard practice in modern set designs. If the prevention of fading attributed to it by H. S. becomes generally experienced, a further impetus will be given towards establishing tone control among the essential features of a receiver.

"The set is an S.G., Det. and 2 L.F. arrangement with ganged tuning, and I use a D.C. eliminator for the H.T. supply. Is it detrimental to the set to remove the wire as regards the mains eliminator?"

The removal of the earth wire probably allows reaction—intentional or spurious—to be applied more strongly than when it is joined.

If the quality, selectivity, etc., of the set is acceptable with no earth connection, there is no reason to use one—in a sense the connection of the set to the mains negative constitutes a kind of earth even if a condenser has to be used so as not directly to earth the mains.

CAUSING HEADACHES.

C. B. (Winchester).—"I have just built an A.C. mains unit, and it is giving me every satisfaction, but there is just one point that I should like you to explain.

"The rectified output is 200 volts at 30 milliamps, yet the manufacturers of the rectifier state that the drain on the secondary of the transformer is 90 milliamps. Why is this? The mains unit works on the voltage doubling system."

If you start to work out what happens in a rectifier system you will get a headache! I've had several.

But I can see that there must be a loss in the rectifier itself, that owing to the peculiar wave form, the apparent current from the transformer is greater than if there were a pure sine wave input.

In any case it *is* so, and I recommend you a pencil and paper, a wet towel, to work out the quantities, when you will see, if not quantitatively at any rate qualitatively, why the apparent discrepancy should arise.

RECTIFIER BREAKDOWNS.

J. P. D. (Watford).—"I have recently installed a moving-coil loudspeaker which has a mains energised field coil. My mains are A.C. and I employ a valve rectifier.

"During the first two weeks, I had to replace the above valve several times, and since this is situated quite close to the loudspeaker, is it possible that sound waves from the loudspeaker are responsible for breaking the filament of the rectifying valve?"

Not impossible, but I should hope improbable. After all, it's only a rectifier and therefore easier to construct than a valve with three or four or more electrodes.

Moreover the filaments of modern valves stand jerking about in aeroplanes, motor-cars, trains, etc. Are you sure you are using the correct voltages on the filament of the rectifier valve?

THE MIRROR OF THE B.B.C. By O. H. M.

"ATMOSPHERE" AT BROADCASTING HOUSE

Paying for O.B.—Expanding Broadcasting House—Poems for Broadcasting—etc. etc.

I AM increasingly impressed by the change in the "atmosphere" of the B.B.C. since the transfer from Savoy Hill to Langham Place. Gone is the old friendly informal feeling. Gone also is the spontaneous zest.

Now there is smooth, unruffled elegant uniformity; definitely impersonal. Departmentalism holds sway. Heads of departments seem aloof. Sir John Reith is as remote as Tibet. The consequential tempo is slow. All of which will be bad for broadcasting unless it is remedied.

Let's get back to full-blooded enthusiasm, friendliness, and informality. And there is just one person who would effect the necessary reforms, and that is Captain P. P. Eckersley, of whose contribution to broadcasting the B.B.C. has not the right to deprive listeners.

The Grand National.

SO the Grand National, on March 24th, is going to be broadcast, after all.

There was a serious hitch in the negotiations which at one time nearly collapsed. For the first time the authorities of the racecourse demanded payment.

Already the film interests pay substantial fees for the talkie rights, and there seemed no reason for letting in the B.B.C. free. But the B.B.C. would not pay; and then Gerald Cock, the outside broadcast director, had a "brain-wave." He said the B.B.C. would pay rent for the accommodation occupied by its gear and commentators. And this was the way the thing was settled.

PAGE-BOY WHISTLER

Reginald Briggs, the Piccadilly Hotel page boy, who has recently been broadcasting with the B.B.C. Dance Orchestra.

G.T.C. versus B.B.C.

UNTIL now the B.B.C. has disregarded the hostile attitude of the G.T.C., (General Theatres' Corporation) but now violent counteraction is contemplated. I do not wish to reveal the plans, but they are of such a nature as to make the G.T.C. "sit up."

More Room Wanted.

PLANS for the enlargement of Broadcasting House are to be prepared during the next few months in readiness for the time when some adjoining houses can be demolished. The houses were purchased by the Corporation before the building of Broadcasting House was finished, and the lease of one has already fallen in.

Even before the move was made from Savoy Hill, it was clear that the new building would be inadequate to the needs of broadcasting, particularly in office accommodation, but I doubt very much if the problem will be solved by the forthcoming extension, because of the requirements of the Empire Service, Television and Blattnerphone recording.

The existing twenty studios at Broadcasting House were designed before any of these important aspects of the B.B.C.'s activities were contemplated, and the difficulties are becoming more acute every day. And to make things worse they all require more office space for the staffs concerned, as well as their own special studios.

NEXT WEEK
Another fine number, including
RADIO SIMPLIFIED
"P.W.'s" Practical Outline for Beginners.

Kabasta Coming.

KABASTA, the distinguished music director of Radio Wien, is coming over soon to return the visit to Vienna of Dr. Adrian Boult, who achieved a great triumph there.

Coming Operas.

TWO miniature operas by Mozart are to be produced by Gordon McConnel in the National and Regional programmes on Friday and Saturday, March 17th and 18th, respectively.

They are the lyric pastorale, "Bastien and Bastienne," and the comedy opera, "The Impressario," the English adaptation being by Eric Blom. Dr. Adrian Boult will conduct the B.B.C. Orchestra, Section C, which numbers thirty-eight players.

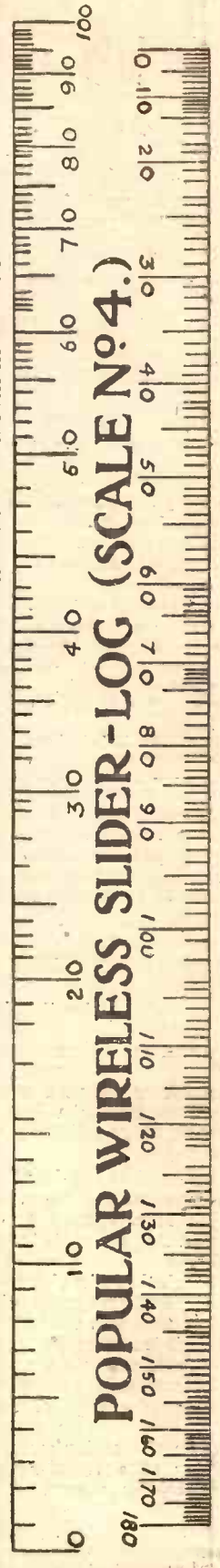
A Pleasure-Cruise Play.

WHEN I read about the scores of thousands of people who have spent their holidays on the pleasure cruises which have become so popular since the low value of the pound abroad made it impossible for all except the very rich to stay at expensive Continental resorts, I realise how great will be the interest in a new musical play which Henrik Ege and Norman Hackforth are now completing for inclusion in the broadcast programmes on Monday and Tuesday, March 20th and 21st, respectively.

"Fourteen Days Sunshine" is a glorious title for jaded nerves, and coming as it will in a month renowned for chilly winds, the play should do the cruising business a bit of good between now and the end of the summer. But perhaps one should not call attention to that fact, when there is so much criticism of the indirect advertising that gets into the B.B.C. programmes.

(*Continued on page* 1316.)

A FOURTH SCALE FOR YOUR "SLIDER-LOG."



One of the most attractive features of the "Slider-Log" is that, given three or four key stations, a number of scales can be tried in a matter of a few seconds.

But it should be noted that there are controls on some sets which badly affect the tuning. And unless these controls (earlier forms of reaction, some selectivity devices, capacity-coupling adjustments, etc.) are left "set" in predetermined positions, no system of calibration of any kind could possibly be effective.

Further, the "tuning curves" of a few sets are exceptionally queer. But, even so, the "Slider-Log" can still give close readings if the most suitable scale is chosen, and readings are taken in "belts" between such key stations as the Midland and North Regional, the Midland and London Regional, the North and London National, and so on. This is instead of using the whole scale at once, and naturally in this case the scale is not stuck down.

PICK-UP PROGRAMMES *on* The P.W. "AIRSPRITE"

By K. D. ROGERS.

The famous "Airsprite" can be used with a pick-up without any modification whatever, for pick-up terminals are provided on it. But as a refinement you can also fit a switch at little expense. Details of this easy addition are given below, together with some useful general hints on record playing. Incidentally, it is shown that A.T.B. actively contributes to the pick-up results, as well as revolutionising the purely radio side of the set.

ONE of the greatest advantages of modern radio receivers is the fact that most of them can be used equally well as gramophone amplifiers or radio programme providers. There is no need for the set to be housed in a special radiogram cabinet, making it a fine piece of furniture, perhaps, but nevertheless a rather cumbersome piece.

It can be housed in an ordinary cabinet like any other set, and yet by the connection of a pick-up or the movement of a switch it is ready at a moment's notice to provide excellent home-chosen programmes from gramophone records.

The "Airsprite" is no exception to the rule, and provides excellent loudspeaker reproduction of record music. In its original version two terminals were provided for attachment of the pick-up, but many may prefer to switch this latter on and off without having to connect and disconnect it each time.

SUITABLE PICK-UPS, MOTORS AND VOLUME CONTROLS

PICK-UPS.—Marconiphone, Celestion, Bowyer Lowe, Bulgin, Radiophone, Ready Radio, B.T.-H.

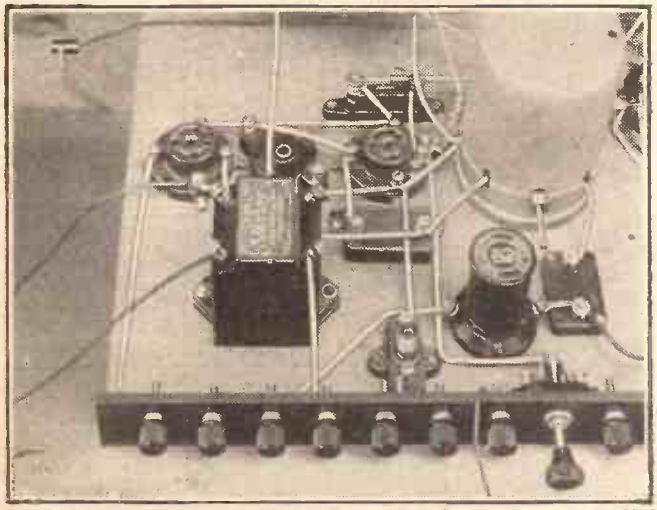
MOTORS.—Garrard, Collaro, or H.M.V. Record Player which is provided complete with pick-up and electric motor.

VOLUME CONTROL.—Bewcos, Watmel, Telsen, Ready Radio, Tunewell, Varley, Sovereign, Wearite, Radiophone, Colvern.

SWITCH.—Telsen, Ready Radio, Wearite, Bulgin, Keystone, etc.

The switch can easily be added, and at a cost of less than a shilling, for room has been left on the terminal strip next to the pick-up terminals, and only the ordinary "on-off" switch is required.

ADDING THE SWITCH



This photograph of part of the baseboard, and the sketch to the right, show how the pick-up switch and wiring are arranged. In the sketch, the dotted line represents the original connection, and the black lines indicate the new leads.

The accompanying sketch shows how the addition is carried out, and it will be seen that all that has to be done after mounting the switch is to break the lead from one of the pick-up terminals to the grid of the detector valve, and take it over to the switch.

Then, when the switch is open (pushed in) the connection from the pick-up to the grid of the valve is broken and the set is "all clear" for radio reception. When the switch is closed (pulled out) the connection is made and the set is ready for record.

Saving Current.

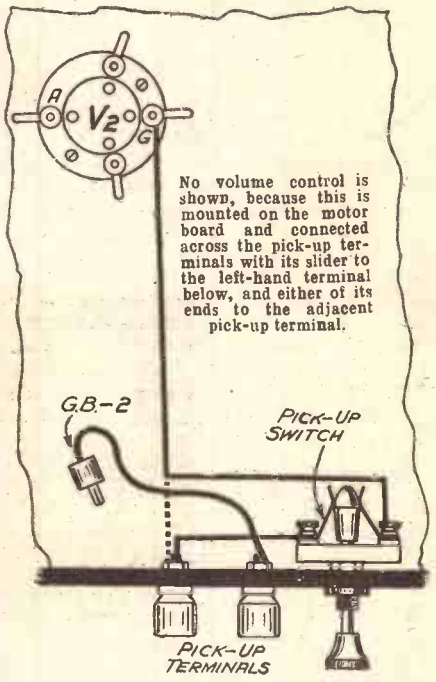
Apart from the mere operation of the set as a gramophone amplifier, which is particularly easy, we have one or two things to say about pick-ups and records that may be of interest. First, however, let us remind readers that in using the "Airsprite" as a "record-reproducer," whether or not the pick-up switch is used, the set should be detuned and the variable-mu volume control should be set right "back" (anti-clock-wise).

The reason for this latter advice is that the need for a switch to control the variable-mu valve to save H.T. when the set is used on record, is obviated, for at zero setting on the volume, the consumption of the valve is negligible. If the volume control were turned fully to the right there would be a waste of current that could very well be avoided.

Screened Leads.

In using a pick-up with the "Airsprite," as with every other set, care must be taken over one or two points if satisfactory results are to be obtained. The first is to ensure that the leads from the pick-up do not run close to, or parallel to, the loudspeaker leads for any distance, otherwise trouble from feed-back may be experienced, making itself known as howling or in the form of bad distortion.

If the pick-up leads must be long, due perhaps to the fact that the gramophone motor and turntable have to be some distance away, they should be of the metal-screened variety, the metal screening being earthed. This flexible cord can be obtained from several sources, and is a very useful precaution against any form of instability due to interference between the pick-up leads and other parts of the set. It is a good plan to connect the frame of the pick-up to the screening as well.



The choice of pick-up can well be left to the individual, but it is best that it should be tested "on appro." if possible first, so that he can judge if it will satisfy his requirements—if it will suit his loudspeaker.

Failing the possibility to "borrow" the pick-up from the dealer for a day or so, perhaps he may be persuaded to give a demonstration with it on a battery set and a speaker like the purchaser's.

Some pick-ups produce better bass than others, and some are more brilliant in the high note register, so that you want to be sure that if you have a particularly brilliant loudspeaker you do not get too much brilliance by using a pick-up that predominates in high notes.

If the pick-up can tackle the bass properly as well as the high notes, then you can easily cut down the high note

(*Continued on next page.*)

ON THE WORKBENCH

A Coil Hint—For Soldering—Inspection Made Easy—Valve Holders.

FIXING COILS.

WHEN screwing transformers and valve holders to a baseboard a certain amount of care is usually exercised to prevent breaking the mouldings, although the tuning coils are invariably mounted with the same screwdriver, irrespective of its size or shape.

It should be remembered, when fixing components, that a thin screwdriver should be used for the coils in preference to a wide one, otherwise there is a great risk of catching the windings with the sharp edge, as shown in the diagram, and damaging an expensive coil.

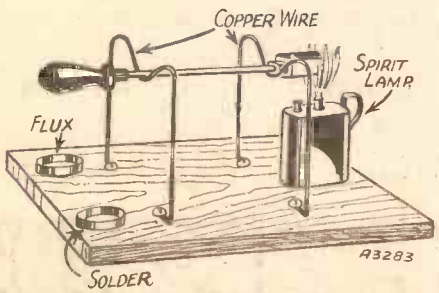
IRON STAND.

A STAND for one's soldering iron is extremely useful and can easily be made from two lengths of stout copper wire mounted on a wooden board.

Such a support is handy when a soldering job is being done, since the iron can be quickly set aside on the stand and picked up quickly when needed. If a spirit lamp is used for heating, this can be placed in such a position that the flame is directly beneath the bit when the iron is in position.

The tops of two tins can be screwed to the board if required, for solder and flux respectively.

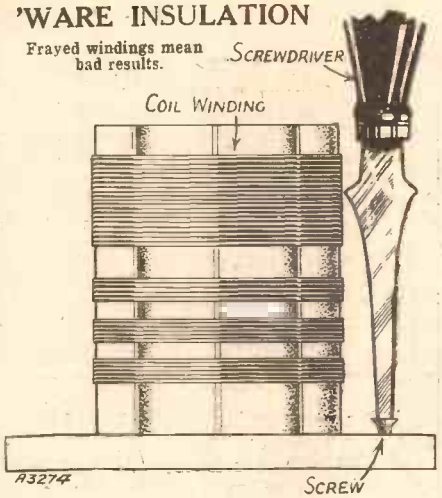
MADE FROM WIRE



Easy to make, and a great time- and trouble-saver.

'WARE INSULATION

Frayed windings mean bad results.

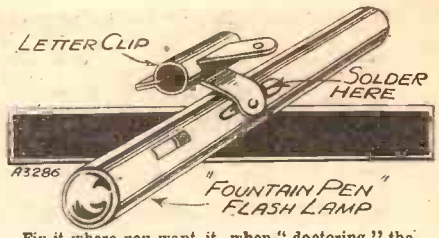


DOCTORING YOUR SET.

IF you have been stricken with the influenza epidemic, you may have envied your doctor his little inspection lamp which enabled him to examine your throat, ears and eyes.

An inspection lamp is always a necessity when you are looking for trouble or altering the wiring in your set without taking it out of the cabinet.

One of those "fountain pen" flash lamps is the best thing to use, but it has to be held on to. By soldering the pocket clip on to one of those little springy letter clips,



Fix it where you want it, when "doctoring" the set's internals.

however, the lamp can be clipped conveniently on to almost any part of the receiver, leaving both hands free for work.

VALVE HOLDER CONVERSION.

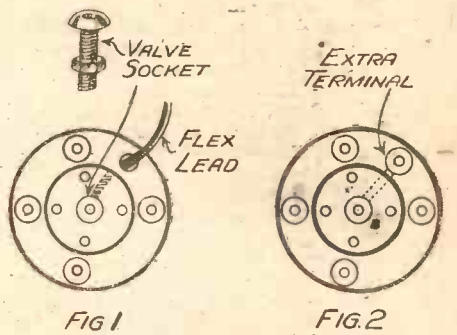
WHEN a five-pin valve holder is required, and only a four-pin one is available, it is quite a simple matter to convert the latter into the former.

A hole is drilled in the centre to take an ordinary valve socket. A flexible connection is taken from this, and passed through a hole drilled in the terminal base.

The resulting valve holder is quite as satisfactory as the commercial five-pin holder.

Of course to make a real job of it, an extra terminal can be fitted, as shown in the sketch.

FOUR INTO FIVE.



An easily-effected component alteration.

PICK-UP PROGRAMMES ON THE "P.W." "AIRSPRITE"

(Continued from previous page.)

reproduction by a resistance and condenser in series across the pick-up terminals, the resistance being of about 10,000 ohms and the condenser of ·001 mfd. The value of this or the resistance can be varied till the requisite cut-off is obtained. Decreasing the resistance or increasing the value of the condenser results in further cutting of the high notes.

The main thing to avoid in choosing a pick-up is the purchasing of one with peaks in its response curve that will coincide with peaks in the loudspeaker. This can only be avoided (unless you have the curves of the pick-up and the speaker) by hearing the two operating together, but any bad peaks will soon make themselves heard.

Volume Control Connections.

Price is not always an indication of excellence where pick-ups are concerned, for we have known low-priced types that have given definitely superior results to others for which more money is asked, but if you follow the list we give you will not go far wrong both as regards price and sensitivity.

This latter point is one that must come into the matter, for where there are only two stages of amplification, as in the "Airsprite," the pick-up must be fairly sensitive if it is to give good volume on the quietest of recordings. Most instruments are pretty sensitive nowadays, though there are a few on the market that are only moderately so.

Hearing the pick-up will cover all these features, however, and that is why we are so insistent in proffering the advice to hear before purchase.

One thing is essential if satisfactory results are to be obtained when the set is operating on records, and that is the use of a volume-control potentiometer across the pick-up. This control is necessary to prevent the pick-up overloading the valves of the set when playing loud musical passages, and the control can conveniently be placed on the motor board alongside the pick-up.

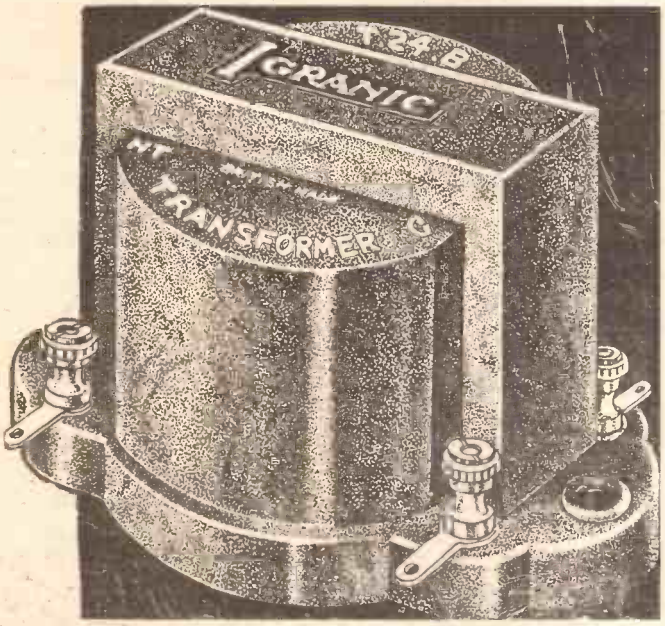
The connections are well known to most of our readers, but for the benefit of those who may not be quite clear on the matter here they are in words. The volume control will be found to have three terminals (it should have a resistance of about 50,000 ohms, by the way), and these terminals are connected like this.

The two leads from the pick-up go to the volume control outside terminals, one to each, and the centre terminal of the volume control goes to the pick-up terminal on the set that is connected to the switch on the terminal strip. In addition, one of the outside terminals of the volume control also goes to the remaining pick-up terminal on the set.

Value of A.T.B.

Regarding the operation of the set on record, you will find that the A.T.B. control can be used by altering the position of the reaction control, though reaction must not be pushed up to its limit as in the case of radio. As a matter of fact, you should not turn the control more than a fraction, but this will give you a useful adjustment of brilliance on your pick-up reproduction, and it will be specially valuable when you are listening to violin or vocal records where the surface noise may be excessive, or when the shrill type of soprano like Gracie Fields is "on the air." You will soon find that the A.T.B. control is an extra gadget that makes all the difference; it is the little something extra that others have not got and you will be very glad you possess it.

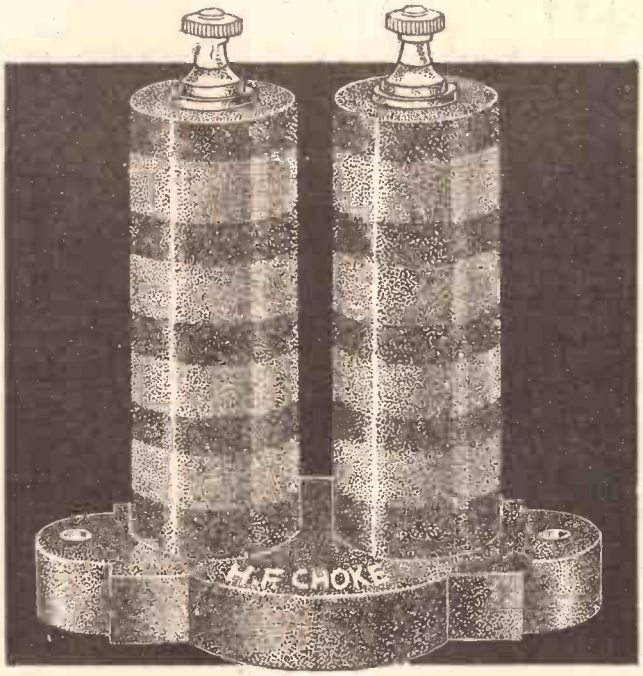
IGRANIC COMPONENTS WILL BE THE MAKING OF YOUR SET



"I do not know what the life of a transformer is supposed to be, but this one has been in constant use for 7 years and has given about 10,000 hours actual performance and is still going strong."
J. A. L., Liverpool. Extract from letter.

Igranic, with their long experience of wireless construction, have perfected a general purpose transformer at a reasonable price — you can be certain that it is the best of its kind. The Igranic T 24B Transformer reproduces over the whole scale of musical frequencies. Ratios 3 — 1 and 5 — 1. Price 5/6.

The Igranic Binocular Choke, with its extremely small external field, can be placed in close proximity to other coils with negligible interaction. Exceptionally efficient over the entire wave length range of 150 to 2,500 metres; D.C. resistance of 830 ohms and an inductance value of 158 millihenries. Price 3/9.



Igranic Binocular type of H.F. choke . . . . a good choke and suffers from no peaks over its rated range of 150 to 2,500 metres . . . . in view of its indisputable technical attractions, it is good value for money.
"Popular Wireless," 24/12/'32

RADIO IGRANIC DEVICES

Write to-day for fully Illustrated Catalogue No. R.200 of complete new range of Igranic Quality Components:—
The Igranic Electric Co. Ltd., 149, Queen Victoria St.,

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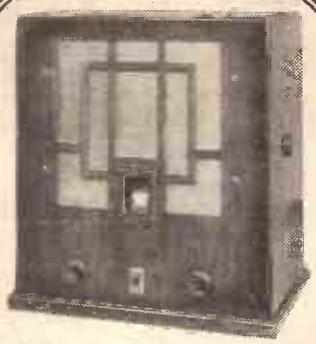
RECEIVERS of RENOWN



THE COSSOR "533A"

A two S.G. four-valve receiver for A.C. mains operation.

"P. W.'s" Automatic Tone Balance scheme is, and probably will be for some time to come, the prerogative of the home constructor. It is not at present available in any commercial receiver, but its advantages are such as to warrant the assumption that it will one day be adopted as standard practice in all receivers.

Meanwhile, it seems pointless to deny that there *is* a high note cut-off consequent upon the use of reaction in many of the existing commercial receivers. We know, for instance, from our own experiences, that there are few sets of the one H.F. type which are sufficiently sensitive to bring in the majority of the European stations *without* the use of reaction, and as soon as reaction is applied then the quality is no longer comparable with that of the local stations.

On theoretical considerations, there are only two obvious ways of retaining local-station quality on distant transmissions. The one for which "P.W." is responsible is intended primarily for simpler types of sets, since it permits of quality reception *with* the use of reaction.

A Superb Instrument.

The other way is to make the set sufficiently sensitive to receive the bulk of the distant programmes without the use of reaction, under which circumstances with a well-designed set the question of high note cut-off does not arise.

That is the way in which Messrs. Cossor have tackled the problem in their model "533A" Receiver, and for that reason alone the success of the set is assured. But the "533A" is something very much more than just a quality receiver on distant stations. It is as fine an example of modern radio design as it would be possible to get at any price.

The reader may well have cause to wonder why it is possible for such an unconditional claim to be made of a set costing only 16 guineas complete. The reason is twofold.

It is due in part to a complete avoidance of unnecessary elaboration, but over and above that it is the product of Messrs. A. C. Cossor, and to the technician that is good enough. Without a doubt, the "533A" is a superb instrument.

Almost subconsciously we are led up to the question of performance simply because an experience with the "533A" is not easily forgotten even by us to whom the reception of distant stations at "local" quality is an everyday occurrence.

There is something about the "533A" that is both fascinating and decisive. You turn a knob, you go through station after station, you hear any one of fifty, sixty, possibly even seventy alternative programmes.

There is a something that makes you want to linger at every port of call—a crispness, a liveliness—yes, that's it, high notes! Quality! Realism!

The ability to capture the *real* atmosphere of distant broadcasters in the comforts of your own home! France—Spain—Italy,

TECHNICAL SPECIFICATION

GENERAL DESCRIPTION.—Self-contained receiver for A.C. mains operation (200-250 volts, and 40/100 cycles).

CIRCUIT DETAILS.—Four valves (excluding rectifier) in following sequence: Two variable-mu S.G. H.F., power-grid detector and super-power output.

CONTROL ARRANGEMENTS.—The three tuned circuits, which are ganged, are brought out to a control on the right of the cabinet, where is also to be found the wave-change switch. Reaction is controlled by the left-hand knob at the front, while the knob balancing it on the right regulates the variable-mu bias.

Mains switch is located centrally at the front, and alternative tone-control switch is mounted at back of instrument.

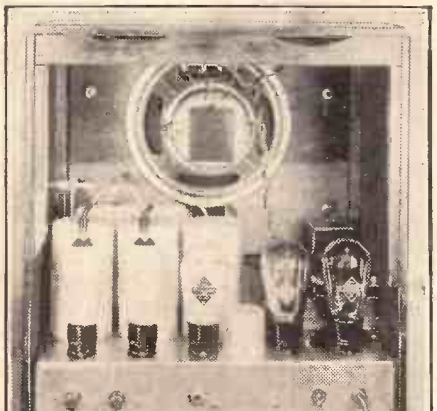
SPECIAL FEATURES.—(1) Great sensitivity. (2) Simplicity of operation. (3) Jack and plug provision for pick-up. (4) Mains-energised moving-coil speaker. (5) Power grid detection.

PRICE.—£16 16s. complete; or £17 17s. with special stand.

MAKERS.—Messrs. A. C. Cossor, Ltd., Cossor House, Highbury Grove, London, N.5.

not just "canned-music" representations, but the real thing. Music *as* music, the spoken voice reflecting every intonation of the speaker, a living being without a lisp!

ENERGISED SPEAKER



The magnetic system of the efficient loudspeaker is energised by mains current.

And with reaction at zero. Who would want to listen without high notes after this?

The reader might well have cause to wonder how it is done. The answer is simple enough. It is done by the use of two high-efficiency variable-mu S.G. stages in front of a power-grid detector—a combination which results in sensitivity and selectivity sufficient for the reception of all but the weakest of Europe's broadcasters without the use of reaction.

What an argument in favour of the retention of high notes!

The Cossor "533A" is, excluding the rectifier, a four-valver. Our regret that it is not available for battery operation does not lessen the good fortune of those whose environment will enable them to consider it; in other words, all those who are on A.C. mains of from 200 to 250 volts, 40 to 100 cycles.

The moving-coil speaker incorporated is of the mains energised variety; and the output stage, which employs a Cossor 41M.X.P. super-power valve, has been specially arranged to match the characteristics of the speaker. The resultant reproduction leaves absolutely nothing to be desired.

Unconventional Control Positions.

The arrangement of controls is, if anything, rather unconventional, yet the amazing ease with which distant stations can be tuned in is proof enough, if proof is wanted, of the domestic virtues of the instrument.

Unlike most sets, the main tuning control of the "533A" is mounted on the side of the cabinet in a position which is unobtrusive yet accessible. The wave-change switch is also mounted on the right-hand side of the cabinet.

At the front of the instrument below the illuminated dial which, incidentally, is calibrated in wavelengths, there are three simple controls. The one on the right is a reaction control, the reason for the provision of which is not perhaps entirely obvious, although no doubt there are circumstances in which it might be useful.

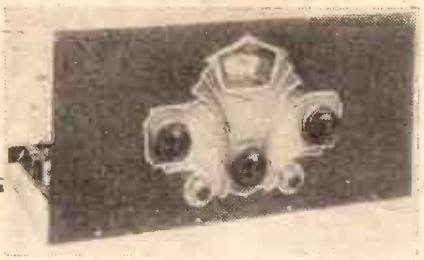
Balancing this on the right is the main volume control, which regulates the bias to the variable-mu valves. The mains switch is mounted in the centre.

At the back of the instrument there is the usual provision for the connection of aerial and earth, an alternative tone-control switch, and a gramophone pick-up plug and jack.

Summed up, the Cossor "533A" receiver is an instrument that anyone might be proud to possess. It represents the embodiment of all that is best in modern receiver design, and it is an achievement of which the makers can justly be proud. To Messrs. Cossor goes the credit for having produced an instrument not only in keeping with, but actually abreast of the times, and we congratulate them.

THE TELSEN "ASTRALA" 3

Kit Kriticisms



A new Det. and 2 L.F. receiver with pick-up connections.

By Mr. Peter Simple

A SHORT while ago, when discussing another kit receiver, I commended the fact that the makers had included everything in the kit—except the tools for building it.

I do not know whether a member of the Telsen technical staff noticed this paragraph, but the first thing I noticed when I opened my kit of the new "Astrala" Three was a little nest of spanners attached to a screwdriver with which I was able to assemble every part of this new receiver.

It is such thoroughness in attention to detail which makes one certain that the firm concerned really has the interests of the inexperienced home-constructor at heart.

Less Than Two Pounds.

Quite frankly, I cannot imagine how the Telsen Electric Company has managed to produce the "Astrala" for less than two pounds. Everything in this three-valver is of the high quality that we have come to expect from the Telsen firm, but the designers have not been content to rest there.

In addition to all the usual refinements of an efficient detector and 2 L.F. receiver, the "Astrala" incorporates several other features which combine to make it, quite apart from its price, a most outstanding production.

Most interesting of all, perhaps, is the alternative aerial input arrangement which provides for a very widely varying degree of selectivity from that already given by the aerial series condenser. An important point, this, and one which is even more successful in practice than it sounds in theory.

Interesting, too, is the incorporation into the "Astrala" of the Telsen slow-motion disc drive and escutcheon. This latter not only simplifies the construction, but gives the finished receiver a modern and workmanlike appearance which I have never yet seen surpassed in a constructors' kit.

And not the least important refinement is the panel dial lamp with its own switch for economy in L.T. current.

Difficult To Go Wrong.

In each of these particulars the designers have rightly gauged the requirements of the majority of constructors—selectivity, handsome appearance and attention to necessary detail.

The constructor will not find the "Astrala" the kind of receiver he can build in half an hour or so after work. Although the full-size blue print and very comprehensive instructions make it a matter of the greatest difficulty for anyone to go wrong, the carefully designed circuit and the wide range of components make the "Astrala" a job in which the constructor will take a real pride.

However, there is not really much satisfaction in owning a Rolls-Royce if the engine won't work, and with any receiver it is results that count. And because there was not the least doubt that the Telsen Company had put a great deal of thought into the "Astrala" I approached its aerial tests with more than usual interest.

Clear-Cut Reception.

Superlatives are rather unsatisfactory things nowadays, when almost every product is indiscriminately described as "the best of its class," or even "the finest in the world." But it would be difficult without to describe the results which the "Astrala" gave me.

Stations which my standard "S.G." Three receiver finds it difficult to receive without interference stood out in relief, and although on the night of my tests the new Athlone station was doing its best to swamp all other broadcasters round 400 metres, I had not the slightest difficulty in receiving all the British Regional transmitters and the principal foreigners, both on the long and the medium waves.

And this with a clear-cut reception which made the foreign programmes of real entertainment value instead of being just a test of the receiver's distance-getting powers.

From meter tests, I find that the "Astrala" is a most economical receiver to run, and I would emphasise that the quality and strength of output is all that could be desired.

"I Can Find No Fault."

If a critic's business is to find faults, then I am afraid that the Telsen "Astrala" has caused this critic, at least, to fail in his duty! Frankly, as a receiver for home construction I can find no fault at all with this kit, either in design, ease of construction or ultimate performance, and such is the reputation of the house of Telsen for consistently good components, that I should have no qualms about recommending the "Astrala" to any constructor, beginner or expert, who wanted the best results at the minimum trouble.

And the price of 39s. 6d. makes an excellent proposition seem almost a marvel!

TECHNICAL DETAILS

NAME. The "Astrala" Three.

CIRCUIT. Detector R.C. coupled to 1st L.F. with transformer coupling to output valve.

FEATURES. Pick-up connections and terminals included; alternative aerial input for additional degrees of selectivity; independently switched dial lamp; safety fuse. (All tools necessary for building are included in the kit.)

MAKERS. The Telsen Electric Co. Ltd., Aston, Birmingham.

PRICE. £1 19s. 6d.

A RECEIVER OF DISTINCTION

A back-of-panel view of the "Astrala" which shows there has been no cutting down of components for the sake of economy. Interesting features are the alternative aerial input arrangements, and the panel dial lamp with its own switch at the back of the baseboard.

When a receiver such as the "Astrala" has so many special features which are unique in kit set construction, one is apt to overlook details of general construction which, in almost any other receiver, would call forth no little amount of praise.

The metal panel, the incorporation of a fuse, the neat clip for the battery cord—all these refinements would take a first place in any criticism of a less thoughtfully designed receiver. In the "Astrala" they must be mentioned as an afterthought, or we should find this report spreading over several pages!

Standard Pick-Up Connections.

But I must not forget to make special mention of the pick-up connections which are part of the standard design and which are given special terminals next to the loudspeaker.

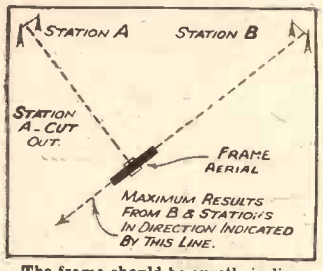
Just before I was handed the "Astrala" for test I was reading some remarks made by our Technical Editor in last week's POPULAR WIRELESS.

"I don't imagine," he said, "anyone is going to quarrel with me if I say that I consider Telsen are doing more for the cause of home construction these days than any other single unit in the industry."

After testing Telsen's latest offering to the home constructor, I am inclined to think that these remarks were almost mild!

RADIO SIMPLIFIED

A PRACTICAL OUTLINE FOR BEGINNERS

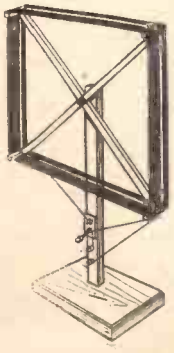


The frame should be exactly in line with the station for best results.

ALTHOUGH the appearance of the frame aerial is familiar to the majority of listeners a great deal of misunderstanding exists about the uses of this class of aerial. Its advantages are often mentioned in print, but sufficient emphasis is seldom laid on its great and fundamental **disadvantage. The frame aerial is very insensitive compared with an outdoor, or even with an indoor, "roof" aerial.**

With the average set of to-day, an indoor aerial—of the kind discussed in this supplement two weeks ago—will give good reception of quite a number of stations; but the use of a frame aerial instead would most likely reduce the set almost to the level of a local-station-only receiver. And this great loss of power is inevitable when a frame aerial is used.

Once that fundamental disadvantage is realised it may be admitted that frame aerials also possess some advantages. And, moreover, a very sensitive and powerful set can restore the power lost through the use of a frame aerial, so it is then possible to enjoy the advantages without feeling the disadvantage. **But only when a very powerful set—such as a super-heterodyne—is used, or in very unusual circumstances, is the use of a frame aerial worth while.**



A square frame with sides vertical and horizontal.

The frame aerial's disadvantages and advantages are all due to its small size.

The first effect of this is greatly to limit the amount of energy picked up and passed to the set which, as we have seen, is a big disadvantage. But being quite small the frame aerial can be turned round in different directions, and this often enables it to be used as an aid to selectivity.

One of the diagrams shows this effect clearly. Because the windings of the frame are "in line with" or are "pointing to" the station marked B the frame receives this station, and gets virtually nothing at all from station A, even though this is just as near and just as powerful as station B.

If the frame windings were swung round at right angles, station B would fade out and station A would be received instead, the direction in which the frame is pointing thus enabling its owner to select the one station in favour of the other.

In practice this great advantage of directional effect is often completely lost.

It will generally be found that if a frame aerial is earthed (as is often necessary for good reception) its directional properties may be destroyed.

It will also be discovered that **if a frame aerial is used near to an outdoor aerial it may "pick up" from that, instead of from the distant station! So again its directional properties are lost.**

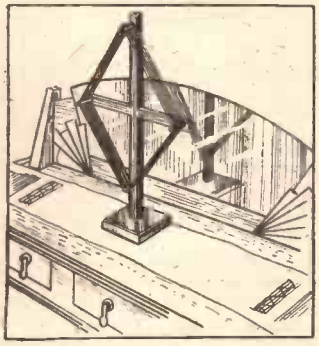
Finally, when a frame is used indoors, especially in modern buildings with steel frames, the directional effects are again sometimes absent, because the metal work "screens" the frame aerial, with the result that it tends to receive almost regardless of its hoped-for directional effect.

So marked is the screening effect of metal, at times, that we have known of cases where the set was "blanketed" by being placed too near to a large mirror. One of the pictures illustrates this, and it is a good reminder of the "touchiness" of frame aerials, and of their liability to give unsatisfactory results due to their surroundings.

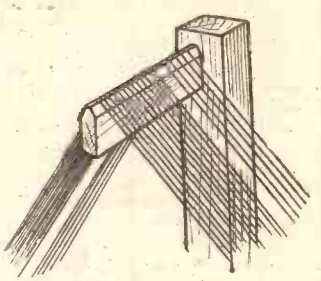
For those who wish to make their own frame aerials a number of shapes are available, the usual ones, methods of supports, etc., being shown on this page. The chief difficulty is to arrange for long-wave windings as well, without these acting as unwanted screens when not in use.

Because of this difficulty the home-made frame aerial is usually limited to medium-waves only. **The tuning is generally carried out with a .0005-mfd. variable condenser, and, as the frame aerial takes the place of the aerial coil in the set, the latter must be removed if a frame aerial is to be tried on an ordinary receiver, intended for outdoor aerial use.**

AVOID MIRRORS



For a frame having sides one yard in length, six or seven turns will be needed to cover the usual broadcasting wave-band between 200 and 600 metres. Bare or covered wire may be used, and 22 D.C.C. wire, as recommended for indoor aerials, will do admirably for the purpose. If the sides are shorter—say 2 ft. only—either 10 or 11 turns will be needed. While a frame with 4-ft. sides, tuned as above mentioned, would need only five turns to cover an approximately equal wave range.



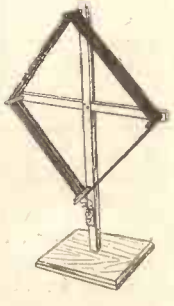
Slots cut in the corner piece provide simple spacing of wires.

In all cases the windings should preferably be evenly spaced apart, an eighth or a quarter of an inch spacing being commonly employed. Once the spacing is fixed do not shift the wires, or the dial readings may be thrown out.

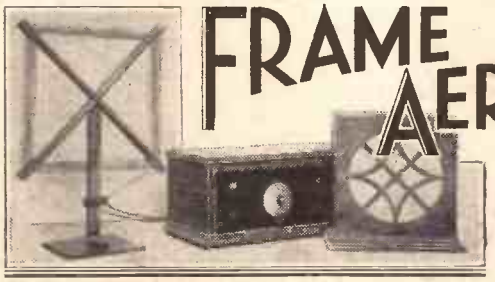
It is important to use the frame near to the set itself, if directional properties are desired. Otherwise the leads between frame and set will act as an indoor aerial, and render the frame largely inoperative.

The following point about the selective results obtainable with a frame aerial is often overlooked. It is better to use the frame to cut out an undesired station than to try and strengthen the one which is wanted.

Generally the wanted station will come in without much weakening even when the frame is pointing well away from the direction of the station in question. But the unwanted station will generally "fade out" sharply, when the windings are exactly at right angles to it. **So always try to weaken the interference with the frame rather than to strengthen the wanted programme when endeavouring to separate two stations.**



The diamond-shaped frame, an alternative to the square type.



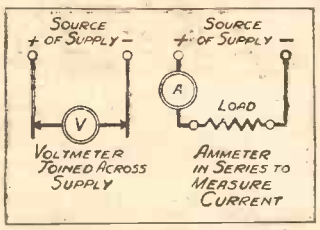
FRAME AERIALS

An explanation of how they work and a description of their application in practice.

Voltage & Current

THE two terms, voltage and current, are very widely used in radio. Every listener meets them sooner or later, perhaps more especially in connection with his H.T. and L.T. supplies.

In actual fact, the proper functioning of the set is dependent upon the existence of voltage



Voltmeter and ammeter readings are taken with quite different connections for the meters.

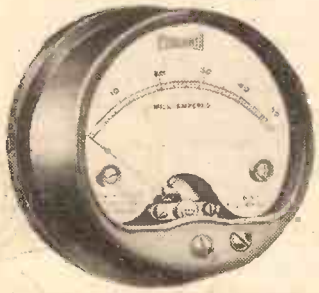
and current, and it will therefore be realised that both are factors of primary importance.

What is this word voltage that we hear so much about, and how is it linked up with current?

If for a moment we consider a hosepipe with water flowing through it, we find that the amount of water passing through the nozzle in a given time depends upon the pressure or force behind it.

The electro-motive force which drives the electrons around an electrical circuit is analogous to the pressure of water in the hose-pipe. This electro-motive force (abbreviated E.M.F.) is the voltage or potential difference across the two ends of the circuit, and the electron flow is the current.

So we see that voltage is the same as the pressure in our hosepipe analogy, and that current can be likened to the



A panel-type instrument, in which the connections are taken to the back.

water flowing along the pipe as the result of the force behind it.

Now, the unit of voltage is the **volt**, which is the electrical difference of potential required to cause a current of one ampere to flow in a circuit having one ohm resistance.

The ampere is the amount of current that passes a given point in the circuit per second, and is analogous to the number of gallons of water which pass through the nozzle of the hose-pipe in a second.

The number of amperes which flow round the circuit when a given electro-motive force is applied is controlled by the resistance of that circuit. That is to say, if the circuit has a low resistance a smaller voltage will be needed to force a given current along the wire than if the circuit had a high resistance.

Hence, voltage, resistance and current are closely interrelated, and any one of them can be calculated, provided the other two are known.

There is a law—known as **Ohm's Law**—which connects voltage, current and resistance together. **Briefly, the law says that the current which flows round a circuit is equal to the electro-motive force, divided by the total resistance of the circuit.**

Ohm's Law is particularly useful in working out values of resistances, such as those used for automatic biasing, or for determining the number of amperes flowing through a resistance when a certain voltage is applied to it.

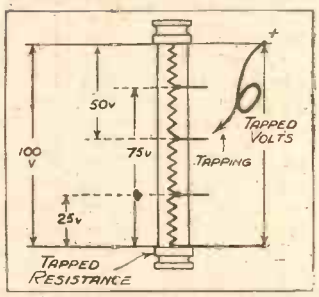
One very interesting fact in connection with voltage is its application to potential dividers, such as are used in mains units.

In the figure on this page we have shown a resistance divided into four equal parts. The voltage is applied across the two ends, and the source of supply could readily be the output from an H.T. unit.

If the flexible tapping clip is connected one-quarter of the way down from the top of the resistance, the voltage between that tapping and the negative side of the supply will be three-quarters of the total voltage.

In the case of a 100-volt supply it is easy to see that the tapping one-quarter of the way down would give a voltage of 75. Similarly, a tapping half-way down would give a voltage of 50, and another tap three-quarters of the way down from the top, a voltage of 25, or one-quarter of the total.

PROPORTIONAL VOLTS



The voltage is proportional to the resistance tapped off.

The resistance connected across the source of voltage supply in this way is called a Potential Divider, because the voltage can be divided according to the position of the flexible tapping along the resistance, and its practical utility lies in the ability to choose any proportion of the total voltage at will.

The principle is, therefore, of considerable value where different voltages are required for the anodes of valves.

MULTI-RANGE METER

Different scale ranges in volts, amps., and milliamps are obtainable on this Sifam instrument.

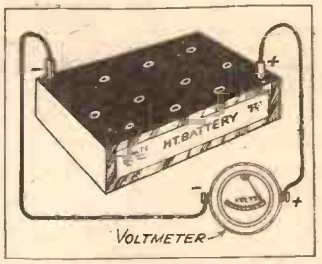
Since the total voltage of any source of supply is always between the positive and negative terminals, a voltmeter is connected to these terminals, as distinct from a current measurer or ammeter, which is joined in series with the supply.

As a practical example we can take an ordinary H.T. battery whose voltage we wish to measure.

The voltmeter should have its positive terminal connected to the positive socket of the battery, and its negative terminal joined to the negative socket of the battery.

In this way the total voltage between the two sockets will be shown on the meter scale. **H.T. batteries, however, should always be tested when they are connected up to the set, and while the set is working.**

The reason for this is that the voltage of the battery drops to its normal working figure when it is delivering current, as it would be if the set were switched on. Directly the set is switched

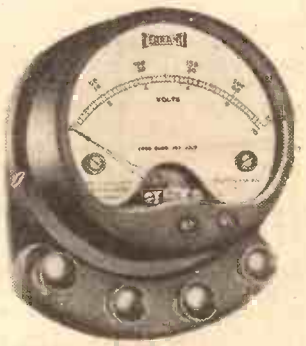


The positive terminal of a voltmeter should be connected to the positive terminal of the battery.

off, and the battery stops delivering current, the voltage of the cells tends to rise slightly, because the "load" has been removed. Thus a voltmeter reading taken with the battery inactive is not necessarily accurate, and, in fact, would be definitely inaccurate in the case of an old battery.

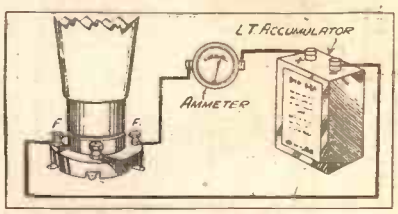
In connection with voltage measurements, we would advise constructors always to buy good meters of the high-resistance moving-coil type if possible.

For the measurement of mains unit output voltages, the meter resistance has to be exceedingly high, otherwise the readings will be misleading. It is impossible to do more than to briefly touch on these points in this article, but we have commented upon the question of voltmeter resistance, since many constructors rely upon cheap moving-iron instruments with their inevitable inaccuracies when used for this particular class of work.



A typical triple-scale meter, the range being chosen according to the terminals used.

FILAMENT CURRENT



The resistance of an ammeter is very low, and so does not upset the current flowing in a circuit.

The ammeter, employed for measuring current, is joined as shown in the diagram: **since the current which flows round the circuit is the same in every part of that circuit, it follows that it doesn't matter where the ammeter is connected so long as it is in series with the source of supply.**

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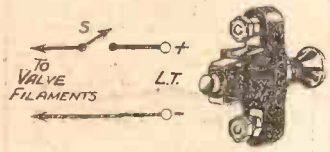
SIMPLE SWITCHING

ALTHOUGH in this short article we are dealing only with switching in its simplest form, the constructor should bear in mind the fact that complicated switching is

"ON" OR "OFF"



undesirable in any home constructed receiver. The chances of noisy and unreliable reception due to bad contacts are intensified, and to this must be added the risk of possible instability due to the necessarily more complicated wiring.

The number of switches should be kept down to a minimum, and no attempt made to cut out the valves stage by stage, or to carry out any operations other than those that are necessary for the proper working of the receiver.

One essential is the on-off switch that disconnects the filaments from the L.T. battery. This switch is sometimes of the push-pull type, and sometimes of the toggle variety.

Both types of switches are quite reliable and good firm contact is an important and necessary feature.

The contacts of such switches have to be capable of carrying the current for the valve filaments **without heating and without adding resistance to the circuit, and so causing a loss of voltage.**

There is another form of push-pull "on-off" switch in which a third contact is provided; with this type of switch, the H.T. negative circuit can be disconnected simultaneously with the L.T. circuit; or, alternatively, the additional contact can be employed for cutting the grid-bias battery out of circuit in a variable-mu receiver, so as to obviate any wastage of current when the set is not working.

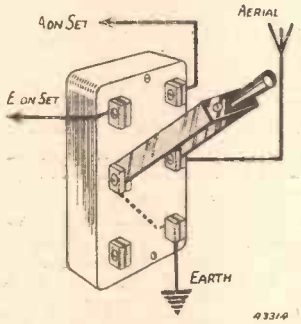
For radiogram work the simplest form of switch is the single-pole change-over type. It is usual to join the moving portion or arm to the grid of the valve, and the remaining terminals to the grid condenser and leak, or coupling condenser and grid resistance in the case of an R.C. stage, and to one pick-up terminal.

Such switches should have a reasonably low self-capacity, otherwise there is a likelihood of radio still coming through on the loudspeaker when the switch is in the gramophone position.

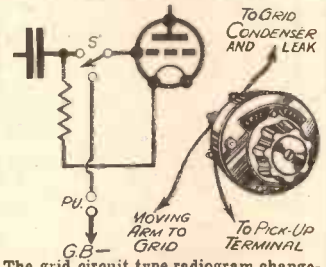
Although not a switch in the generally accepted meaning of the word, a crocodile clip attached to the end of a flexible lead is a convenient means of cutting a series-aerial condenser out of circuit.

The clip is attached to the aerial terminal of the set, and the fixed selectivity condenser can be included or excluded at will, simply by changing the crocodile clip from one terminal of the condenser to the other.

TWO COMMON SWITCH SCHEMES

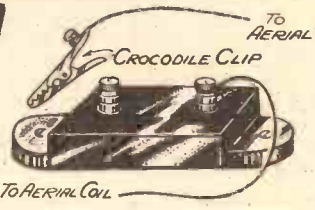


An excellent way to wire up an aerial earthing switch.



The grid circuit type radiogram change-over switch with its theoretical connections.

"IN" OR "OUT"



CONNECTING TO EARTH

THE earth may truthfully be called the radio set's "sheet anchor," and the removal of the earth connection will in many cases make an otherwise stable receiver exhibit all the symptoms of instability. For this reason, apart from any other, it definitely pays to see that the earth is a good one.

For radio purposes the earth is considered to be at zero potential in relation to other parts of the circuit, and in order to achieve stable and uniform working the negative side of the receiver is invariably maintained at "earth" potential in so far as high and low-frequency impulses are concerned.

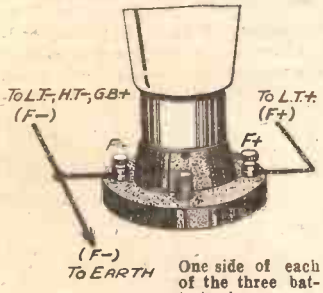
In practice, this means that L.T.−, H.T.−, G.B.+, all-metal screening, the electrical centre-points of heater windings, etc., are joined to a point of common potential—or, in other words, the "earth line" of the set.

Now this does not necessarily entail the use of an external earth connection, although, as we have pointed out, the conventional water-pipe earth, or its equivalent, has in many instances stabilising properties.

FOR BY-PASSING

One side of the condensers used with decoupling resistances usually goes to earth.

BATTERY JUNCTION



One side of each of the three batteries is common.

Nevertheless, it must not be forgotten that a well-designed receiver with adequate screening and decoupling should be perfectly stable whether or not the earth lead is joined to its appropriate terminal on the set.

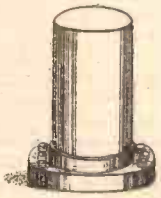
The main fact to bear in mind is that of keeping certain points in the receiving circuit at the same potential; an essential feature in confining the high-frequency and low-frequency impulses to their proper paths in the amplifying chain.

Take, for example, the decoupling condensers. These are connected, on the one side, to their decoupling resistances, and on the other to "earth."

In other words, the decoupling condensers are joined to the negative filaments of the valves with which they are associated, and, in consequence, to the "earth line."

Similarly we join the metal "cans" on screened coils, the moving vanes of the tuning condensers and all vertical screening and baseboard foil to the same point.

Care should be taken to see that all "earthed" connections are electrically and mechanically sound.

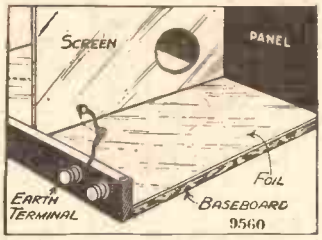


For instance, a faulty joint between a decoupling condenser and the terminal to which it is connected will prevent satisfactory by-passing, and so render the condenser ineffective.

Similarly every endeavour should be made to ensure good contact between coil screens and their "earthing" points; usually the base of the coil.

On the low-frequency side it is usual to connect the metal shrouding of L.F. transformers and chokes, and also the cores to the "earth line," in those cases where terminals are provided for this purpose.

SCREEN AND FOIL



Joining screens by a special lead ensures their proper bonding.

Here is a practical point worth remembering. Always see that the insulation of all wiring passing through slots in "earthed" screening is above suspicion. This is particularly important where H.T. or L.T. leads are concerned, because faulty insulation in this case may short-circuit the battery.

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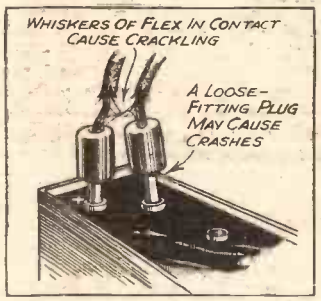
GOOD CONTACT

THE words "good contact" are used so frequently in wireless literature that they often fail to strike home. But an actual bad contact never fails to strike a blow at the efficiency of the set. Bad contact is probably the commonest fault in radio to-day.

Remembering that there may be well over a hundred joints for even a small set (and that a partial failure at one of them may badly hamper it, whilst



See that flex connections are neatly carried out—without whiskers.

two or three will almost certainly do so), is it any wonder that one often finds a half hour is well spent in cleaning and tightening up? The man who goes over the whole installation regularly, every six weeks or so, will generally find something well worth his attention.

Aerials and earths have already been mentioned several times, but at the risk of vain repetition the importance of a good earth must be mentioned again. And also the aerial switch contacts, out of doors.

A dull and rusty looking switch will prevent many a weak station from providing you with programmes, so switches should be covered (as shown in one of the sketches), and a small sloping "roof" should be arranged over the cover to prevent the entry of

INCREASING TENSION

rain, etc. at the point where leads pass through.

A curious form of fault is worth mentioning here—spiders! They sometimes weave their webs across switches, and if the web gets wet the effect is to partially short programmes to earth. The cure is obvious.

Only good sound leads (especially flex leads) should be selected for use in the first place, and they should be renewed when they show signs of wear and tear. The ends should terminate in a proper connector of some kind—a plug, or a spade tag, or something that lends itself to a large firm contact of bright metal surfaces. To twist a lead carelessly round a terminal and to leave this half tight is to ask for trouble through faulty connection.

Here is a point worth stressing, but which is often overlooked. **It is generally at the high-frequency, or before-the-detector end of the set that one bad contact can work manifold mischief. So look after the aerial, earth, tuning and first valve leads with special care.**

Those handy "crocodile clips" are often the cause of weak reception, because they "bite" on only a small surface, and if that happens to be dirty or greasy an impaired contact results at once. Moreover, the temptation to twist a length of flex round the screw-head and leave it at that, often inserts a second bad joint in series with the first and thus accumulates the possibility of weakened programmes.

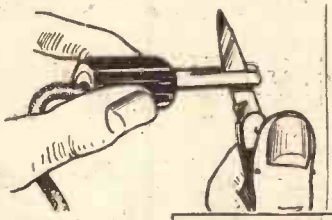
A more serious and often quite unsuspected source of loss is that depicted in the sketch of a piece of flex with a break inside the insulation. Hidden in this way an imperfect contact will "hold the set down" to a fraction of its real power, and that is why a regular overhaul of leads—especially of the short leads to tappings, etc.—is so strongly recommended.

The fact that one end of such a flex lead has been soldered into a good thick single strand often assists this fault to escape notice. As a matter of fact, it is generally the soldering that is responsible for the trouble, for not only is the heated wire likelier to break, but the transition point from solid to flex lead is almost certain to lend itself to the quick breakage of the joint with constant use.

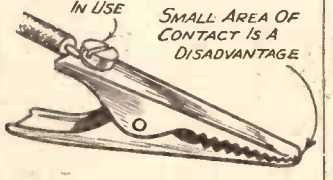
Another hint well worth close observance, is when overhauling a set to pay special attention to movable contacts.

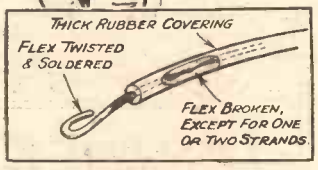
H.T., grid-bias and other plugs, valve legs, and all switches need careful watching for signs of weakened contact. The pressure is a matter of importance, for it is not merely a question of the two surfaces to be touching each other—they should be held firmly together if contact is to be satisfactory and permanent.

YOU WANT TO WATCH THESE POINTS



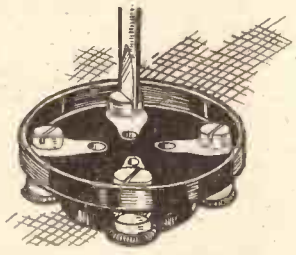
Open up the prongs of wander plugs occasionally and see that crocodile clips are firm.





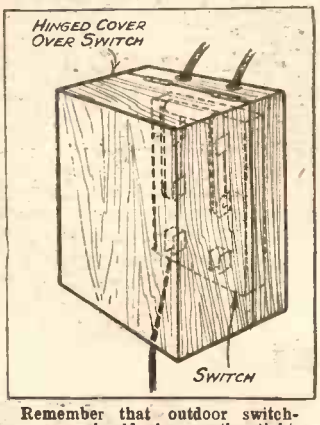
Careful search is needed to find a fault in a flex lead because of the rubber casing.

DO THIS FIRST



You will save yourself a lot of bother if you check the tightness of screws before fixing components to the baseboard.

Switch-springs are generally quite easy to tighten, and an example in one of the sketches shows how this is best done when the switch is dismantled. So be careful when mounting an old (or even new!) switch, that its spring is not weak, as it is far easier to put right in the first place than when wired in position.



Remember that outdoor switch-covers should be weather-tight. Sometimes a roof above it is advisable.

The same applies to the hidden or inaccessible contacts under valve-holders, coil units, etc. A run round them with a small screwdriver before they are mounted may save no end of disappointment and delay later on.

Usually a pair of long-nosed pliers lends itself to quick overhaul of loose terminals, etc., but do not forget that terminals on valve caps, such as an S.G. anode, are exceptions to the rule, and should never be more than finger-tight, owing to the risk of stripping the thread or loosening the valve cap.

Soldering, where it can be done easily, is certainly a good way of getting firm contact, but inexpert soldering is often a snare and a delusion, the shiny blob of solder hiding a dry joint being one of the best-known causes of crackles and bad reception.

QUITE FIRM

NEXT WEEK:

Special Beginners' Supplement will deal with A.C. and D.C. In Series and In Parallel. The L.F. Transformer. Using your Mains. Stage by Stage. Locating Faults.

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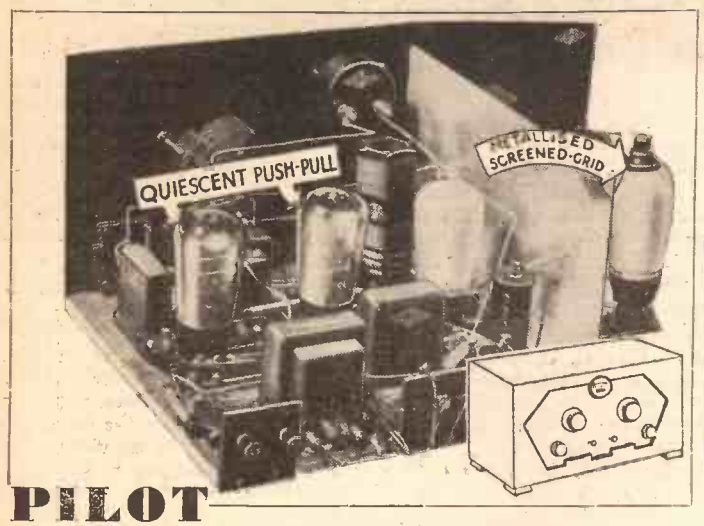

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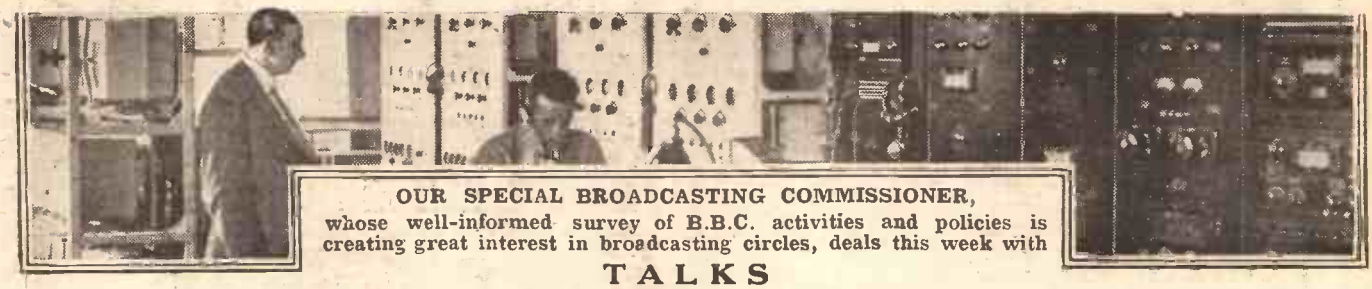
BROADCASTING—THE NEXT TEN YEARS



OUR SPECIAL BROADCASTING COMMISSIONER,
whose well-informed survey of B.B.C. activities and policies is creating great interest in broadcasting circles, deals this week with

TALKS

THE first big discovery the B.B.C. should make in Talks during the next ten years is the fallacy of what can best be described as "separatism," which has discredited so much otherwise excellent effort in the past ten years. The watertight compartment view of programme building has been a serious handicap to progress.

The tidy mind got too much "head" early on. The result was that talks became an entity to themselves, embodying most of the uplift policy for which the B.B.C. rightly stands.

Something Wrong?

If it were only the repetition of crises about talks, this should have been enough to induce the B.B.C. to consider whether there was not something fundamentally wrong in organisation and conception. But instead of going to the root of the matter, the B.B.C. has tried to solve the problem in terms of personalities.

First of all Mr. J. C. Stobart was in charge of the whole of the spoken word. Then, as its importance grew, Mr. Stobart concentrated on the schools educational and religious sides, leaving Miss Hilda Matheson to look after other talks.

Subsequently there were other rearrangements, beginning with a three-cornered "Polish partition" as between Miss Matheson (General Talks), Mr. Stobart (Schools and Religion), and Mr. Charles Siepmann (Adult Education). There was equality of status and responsibility.

Talks Should Entertain.

Then followed the resignation of Miss Matheson, and the promotion of the Talks Department to the status of a Branch, on an equality with the Programme Branch, and with its new chief, Mr. Charles Siepmann, enjoying "Control Board Status." Throughout this process personalities bulked generously, with the result that the situation is still unstable and unreal.

In my view the only legitimate separation should apply to schools and religion, the department for which Mr. Stobart retained responsibility. For the rest, not excluding adult education, I believe it should become part of the Programme Branch, definitely submitting to tests of entertainment value.

Moreover I cannot avoid the thought that it is an anachronism that the News Services should be a sort of "poor relation" to the intellectual giants of the Talks Branch. Then, as to topical talks, so naturally allied to News, these certainly should be given a new composite status, but under the general administration of those whose chief concern it is to provide adequate entertainment values.

Take the pyschological point in this matter of separatism. I have heard responsible and able members of the Talks Branch discussing plans and proposals. The first consideration uniformly was the intellectual contribution factor, in which a tendency to the left was sought, whatever the policy or the interests of the B.B.C. at the moment might require.

It is no concern of mine whether the B.B.C. disregards the application of its policy through talks, but what worried me was the disregard of the entertainment factor. All this should be changed in the next decade. There must be much more tolerance and catholicity of outlook in the B.B.C. Talks policy.

The rather small exclusive circle which now contributes most of the talks must be enlarged. After all, the exercise of a monopoly should debar snobbery or exclusivity even when it is unconscious.

And next as to microphone criticism of books, the theatre, the film, and music. Here again there should be a broader policy or an abandonment of the present policy.

The B.B.C. now delegates the enormous power of the microphone to the views of an individual critic who is given years at the job. I am not suggesting that the critics chosen are not only excellent in themselves but also most conscientious, but I am saying that the responsibility of this kind of delegated monopoly is excessive.

Microphone Criticism.

Who knows but that the state of the general public may be influenced and deflected by the criticisms and praises of books, films and plays that are carried periodically into millions of homes? My solution of this problem would not be as advocated in some quarters, "to wash-out the lot." What I would do would be to "ring the changes" among the critics more frequently, in order that the listening public would have the chance of gaining a conspectus.

There is no reason why an alleged highbrow should not be followed by an alleged lowbrow, or why the sexes should not be mixed. It is in this direction alone that I see a satisfactory development of microphone criticism during the next ten years.

International Exchange.

Exchange of talks internationally is forecast by the experiments which Mr. Vernon Bartlett is now carrying out in Europe. The wandering microphone has long been a familiarity, especially in America, but the peripatetic descriptive microphone reporter is a new conception, and in this line Mr. Bartlett is definitely a pioneer.

I believe that if the journalistic instinct is given full play in competent hands there is an enormous future for this part of broadcasting, and that we shall see its happy fruition before 1942. Of course, it follows

(*Continued on page* 1304.)

FILMS—PARLIAMENT—INTERNATIONAL POLITICS

Mr. FRANCIS BIRRELL. Mrs. MARY HAMILTON. Mr. VERNON BARTLETT.

The film criticisms up till last autumn were in the capable hands of Mr. Birrell, while Mrs. Mary Hamilton, now a B.B.C. Governor, has given us some interesting talks on Parliament.

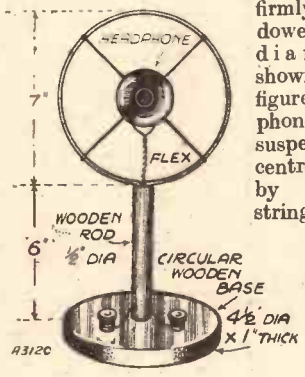
Mr. Vernon Bartlett's task is to illuminate European politics by interviewing leading personalities of various countries.

HANDYMAN HINTS.

A Home-made Mike—For Curing Clicks—Outdoor Safety.

HOME-MADE MICROPHONE.

A MICROPHONE suitable for making announcements from the loudspeaker is very easily constructed from a high resistance earphone. In its simplest form the two leads from the 'phone are taken to the pick-up terminals of the set which should be switched for record reproduction. Words spoken into the 'phone will then be reproduced on the loudspeaker. A much more attractive method, however, is to arrange the headphone to resemble a Continental type of microphone as follows. A piece of very thick brass or copper wire is bent round to form a loop about seven ins. in diameter, the ends being pushed firmly into a dowel rod ½ in. diameter, as shown in the figure. The headphone is then suspended in the centre of the loop by means of strings passed through holes drilled in the case of the headphone, the leads from which are brought down to terminals on the base of the microphone stand. The whole should be given a coat of some dark stain.

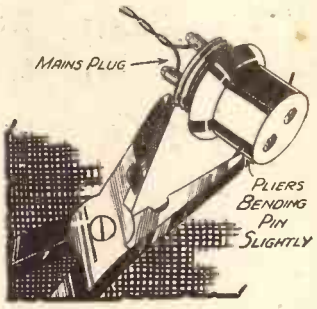


IMPROVING MAINS CONNECTIONS.

CLICKS and other noises which sometimes occur in sets worked from the mains entirely or using a mains unit for H.T., can often be traced to the bayonet adapter which fits into the lamp socket. Especially when this is touched are clicks prominent.

The trouble may be due to the contacts

A CURE FOR NOISY PLUGS



on the plug not being firmly held against the spring-loaded plugs in the holder. This is often due to the bayonets being too near the end of the plug.

Bending these bayonets slightly and carefully with a pair of pliers will cause the plug to fit farther into the holder and stop the clicks.

Be careful with bakelite plugs how you use the pliers, so as to avoid splitting pieces off the plug.

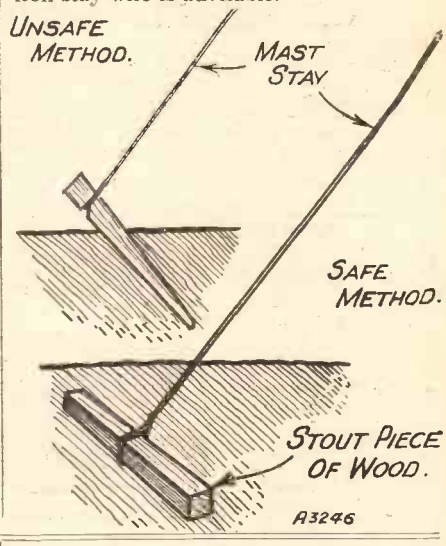
HOLDING THE MAST.

WHEN a tall mast is employed the easiest method of anchoring it to the ground safely is not always apparent. Wire stays should be used, of course, but how can they best be fixed?

Generally speaking even a long stake is unsafe. Moisture of the ground attacks its principal holding point, on the surface, and once this loosens there is no safety for long.

Much better (and quite as easy as laborious pile-driving) is the buried holdfast, consisting of a stout piece of old oak or metal, round which the stay has been made fast.

No anxiety need be felt about such an anchorage, but of course, good galvanised iron stay-wire is advisable.



BROADCASTING—THE NEXT TEN YEARS.

(*Continued from page* 1302.)

that "Outside Broadcasts" will go from strength to strength, chiefly developing. I believe, in carrying important international utterances across the continents and oceans.

As to the politics of Talks, I would say that in the next ten years there will be more definite identification with the fundamental views of the State than in the past decade.

The reason of this is not hard to find. Those who know about such matters, whatever their party allegiances may be, are unanimous in the view that the difficulties of the world have so increased recently as steadily to diminish the factor of safety against general disaster.

If the Wrong Side Won.

Therefore there must be progressively less opportunity for what normally would be called "free thought" at the microphone. On the whole, the B.B.C., in its talks, must reflect the views and policies of the British State as interpreted by the Government of the day.

This is far from meaning partisan broadcasting; but it does mean definitely linking up with Imperial policy. If this truth is not soon recognised at Broadcasting House, the B.B.C. will find itself in much graver difficulties than it has so far experienced.

It is generally agreed that, except in times of national emergency such as war, it would be fatal for broadcasting to be handled as a department of Government, but if the B.B.C. does not move warily with its talks it may find itself suddenly deprived of all real independence. Parliament is increasingly tender to the suggestion that already the B.B.C. has too much power, and it would need not more than a short succession of incidents such as a debate on

A DEBATABLE POINT!

Futuristic furniture is supposed to strike an ultra-modern note in the Debates Studio at Broadcasting House.

Communism in which the wrong side appeared to win before the constitution of the B.B.C. would be suspended, as it is within the authority of the P.M.G. to do at any minute.

I do not expect any such catastrophe, but I think it worth while publicly warning the B.B.C. to take more account of its own interests and less of the ventilation of views some of which cause the deepest resentment amongst most patriotic British people.

In general, if talks go forward as they should, they will gain in vitality, variety and actuality. There will be a greater alertness to real as distinct from academic personality. In ten years' time one should expect to hear on the microphone nightly an adequate reflection of what is happening in a world of events. The news will be brighter and more comprehensive.

Logical Reform.

Above all, the topical talks will be better, and will contain a much larger proportion of O.B.'s than they do at present. And in this connection I am not sure that a logical reform would not be to link News, Topicality and O.B.'s together in a new unit under Mr. Gerald Cock, who has done more to make the B.B.C. a living thing to the masses than any other single member of the staff.

Mr. Cock has carried the considerable burden of "Outside Broadcasts" through the difficult period when they were frowned upon by the highbrows to their present triumphant place in the estimation of all castes, high and low. And it is with this thought and hope that I shall conclude these reflections on Talks in the next ten years.

DIRECT RADIO AIRSPRITE KITS ARE OFFICIALLY APPROVED BY THE MANAGING EDITOR OF "POPULAR WIRELESS"

Read what he says:

"With regard to the DIRECT RADIO P.W. 'Airsprite' kit which you are offering to the public. I am pleased to inform you that it meets with the requirements of my Technical Staff, and I therefore have pleasure in giving the kit the official approval of this journal.

Yours faithfully, NORMAN EDWARDS, Managing Editor, 'Popular Wireless'."

OFFICIAL DEMONSTRATION

The "Airsprite" de Luxe will be demonstrated daily by DIRECT RADIO at 159, Borough High Street, London Bridge, S.E.1. Come and hear the amazing results for yourself.

The AIRSPRITE DE LUXE A.C. MAINS VERSION

	£ s. d.
1 Set Twin Matched Screened Coils. Telsen W.287	0 17 0
1 Coil Switch Coupling Assembly. Telsen W.217	0 0 6
2 Polar type S.M.2 ·0005-mfd. Variable condensers	0 13 0
1 Polar ·0003-mfd. Slow-motion Differential Reaction condenser	0 6 6
1 Sovereign ·0003-mfd. Pre-set condenser	0 1 3
1 Dubilier type B.S.4-mfd. Fixed condenser	0 5 0
1 T.C.C. type 80 4-mfd. Fixed condenser	0 8 6
2 T.C.C. type 50 2-mfd. Fixed condenser	0 7 8
2 Dubilier type 9200 2-mfd. Fixed condensers	0 7 6
3 T.C.C. type 50 1-mfd. Fixed consensers	0 8 6
1 T.C.C. type 34 ·01-mfd. Fixed condenser	0 3 0
1 T.C.C. type "S" ·0001-mfd. Fixed condenser	0 1 3
1 Lewcos 10,000-ohm wire-wound Potentiometer	0 3 0
1 Colvern 50,000-ohm Strip resistor	0 2 3
1 Colvern 25,000-ohm Strip resistor	0 1 9
1 Colvern 20,000-ohm Strip resistor	0 1 9
1 Erie 10,000-ohm wire end resistance	0 1 0
1 Erie 1,000-ohm wire end resistance	0 1 0
1 Erie 350-ohm wire end resistance	0 1 0
1 Erie 200-ohm wire end resistance	0 1 0
1 Erie 1-meg. wire end Grid Leak	0 1 0
1 R.I. E. Y. 30 Mains transformer	1 10 0
1 Smoothing Choke R.I. 28/14 henry	1 1 0
1 Igranic Output Choke type C.H.2	0 9 6
1 Varley Tone Compensating Transformer D.P.35	0 11 6
1 Ready Radio S.G. H.F. Choke	0 5 6
3 5-pin valveholders	0 2 0
1 S.G. valve holder 5-pin	0 1 0
1 Ready Radio Radiogram Switch	0 2 9
1 Ready Radio Push-Pull Switch	0 0 10
1 Bulgin Mains Switch S.85	0 1 6
1 Permcol Panel 16" x 7" drilled to specification	0 4 6
2 Baseboards 16" x 12" and 16" x 5½"	0 2 0
2 Terminal Strips 5¾" x 1½" and 3" x 1½"	0 1 0
1 Bulgin F.15 Mains fuse and plug	0 3 6
1 Goltone combined plug adaptor, flex, mains lead and plugs	0 3 0
1 Bulgin Thermal delay switch S100	0 7 6
6 Belling Lee type "R" Indicating terminals	0 1 3
2 Panel Brackets	0 0 6
1 Belling - Lee Anode Connector No. 1030	0 0 4
1 Set switch Bracket coupling link and spindle and bush	0 1 6
6 Yards Systoflex, connecting wire, flex, screws, etc.	0 1 5
4 Valves, Mullard MM4V, 354V. DW2, Cossor, 41MP.	3 0 0
1 Cabinet "159" type in walnut	1 5 0
	£14 7 0

KIT No. 1

As detailed specification. (less valves and cabinet)

£10 : 2 : 0

or 12 monthly payments - 19/3

KIT No. 2

(with valves, less cabinet)

£13 : 2 : 0

or 12 monthly payments - 24/-

KIT No. 3

(with valves and cabinet)

£14 : 7 : 0

or 12 monthly payments 26/9

The AIRSPRITE DE LUXE BATTERY MODEL

	£ s. d.
1 Pair Telsen matched twin screened coil-type W. 287	0 17 0
1 Telsen coil switch assembly type W.217	0 0 6
2 Polar ·0005-mfd. Variable Condensers No. 2 Slow motion	0 13 0
1 Ormond R.190 ·0003-mfd. Differential Condenser Slow Motion	0 3 0
1 Ready Radio 50,000-ohm Potentiometer	0 3 9
1 Ready Radio 3-pt. on-off Switch	0 1 6
1 Sovereign ·0003-mfd. max. pre-set Condenser	0 1 3
2 4-pin Valve holders	0 1 0
1 S.G. Valve holder	0 1 0
1 T.C.C. ·1-mfd. Condenser	0 1 10
1 Ready Radio S.G. H.F. Choke	0 5 6
1 Ready Radio Reaction Choke	0 1 6
1 Varley Rectatone L.F. Transformer type D.P. 35	0 11 6
1 T.C.C. ·01-mfd. Condenser	0 2 6
1 Graham Farish 1,000-ohm resistance and Holder	0 2 0
1 Dubilier 100,000-ohm Resistance, with wire ends	0 1 0
1 T.C.C. ·0005-mfd. Condenser	0 1 3
1 T.C.C. ·0003-mfd. Condenser type M	0 1 0
1 Fuse and Holder	0 1 0
12 Belling-Lee Indicating Terminals	0 2 6
1 Panel 16" x 7" drilled to specification	0 4 0
1 Baseboard 16" x 10"	0 1 6
1 Dubilier ·1-mfd. Condenser type 9200	0 2 0
1 Ready Radio 2-meg. Grid Leak and Holder	0 1 4
8 Belling - Lee Battery Plugs	0 1 4
2 Spade Terminals	0 0 4
1 Terminal Strip, 16" x 1½" drilled to specification	0 1 6
1 Belling-Lee Anode Connector	0 0 4
Flex, screws, etc.	0 1 10
3 Mullard Valves, PM12 V., PM1HL PM2A	1 12 3
1 Cabinet "159" type in Walnut	1 1 0
	£7 1 6

KIT No. 1

As detailed specification (less valves and cabinet)

£4 : 8 : 3

or 12 monthly payments of - 8/3

KIT No. 2

(with valves, less cabinet)

£6 : 0 : 6

or 12 monthly payments of - 11/3

KIT No. 3

(with valves and cabinet)

£7 : 1 : 6

or 12 monthly payments of - 13/3

AIRSPRITE TWO BATTERY MODEL

	s. d.
1 Direct Radio panel, 12" x 7", drilled to specification	3 9
1 Direct Radio baseboard, 12" x 10"	1 6
1 Telsen H.F. transformer No. 154, dual range coil	5 6
1 Varley D.P.35 L.F. compensating transformer	11 6
1 Polar No. 2 S.M. ·0005-mfd. variable condenser	6 6
1 Ready Radio Micalog ·0003-mfd. solid dielectric variable condenser	3 6
1 Ready Radio special "Airsprite" ·0003-mfd. solid dielectric variable condenser	3 0
1 Ready Radio binocular H.F. choke	5 0
2 Valve holders	1 0
1 T.C.C. ·0003-mfd. fixed condenser, type S	1 3
1 T.C.C. ·01-mfd. fixed condenser	2 6
1 Ready Radio 3-pt. switch	1 6
1 On-off switch	10
1 2-meg. grid leak with wire ends	10
1 Fuse holder and 150 milliamp fuse	1 0
1 Terminal strip, 10" x 1½"	1 0
1 Bulgin bias battery clip	6
Connecting wire, screws, etc.	1 4
	£2 12 0

2 Valves: PM1HL and PM2A	15 9
1 "159" "Airsprite 2" cabinet in walnut	15 0

Kit Model No. 1 (as per detailed specification), £2.12.0, or 8 monthly payments of 7/6.
Kit Model No. 2 (as above, but including valves), £3.7.9, or 10 monthly payments of 7/6.
Kit Model No. 3 (as above, but including valves and "159" table type cabinet in walnut, £4.2.9, or 12 monthly payments of 7/6.
Kit Model No. 4 (as above with valves, "159" type "Airsprite 2" consolette cabinet in walnut, and Celestion PPM. Soundex moving coil speaker, £6.0.0, or 12 monthly payments of 11/6.

AIRSPRITE DE LUXE BATTERY ACCESSORIES

	£ s. d.
Siemens 120-volt H.T. Battery	0 13 6
Siemens 9-volt G.B. Battery	0 1 0
Block Type L.T. Accumulator, 2-volt, 80 amp/hrs.	0 11 6
Oldham 120-volt Wet H.T. Accumulator, 5,500 m.a./hr. Capacity (or 12 monthly payments of 7/6)	4 1 0
Atlas A.C. 244 H.T. Mains Unit	2 19 6
Atlas A.K. 260 H.T. Mains Unit with L.T. Trickle Charger (or 12 monthly payments of 8/6)	4 10 0
Atlas D.C./15/25 H.T. Mains Unit for D.C. Mains	1 19 6
Celestion Soundex Permanent Magnet Moving Coil Speaker with Input Transformer	1 7 6
WB. PM.4 Speaker	2 2 0
Bowyer-Lowe AED Pick-up	1 10 0
Collaro Double Spring Gramo. Motor with Automatic Stop	1 13 0
Cop. Aerial Lead-in & Lightning Arrestor	0 2 6
1 Igranic D.9 permanent magnet moving coil speaker, £1.12.6.	
1 Bluespot 66R unit and major chassis, £2.10.0.	
1 Bluespot 44R or 45R oak cabinet speaker (incorporates 66R unit), £2.12.6	

AIRSPRITE DE LUXE MAINS ACCESSORIES

	£ s. d.
WB. PM.2 Speaker (or 12 monthly payments of 7/9)	4 5 0
Epoch A.2	3 3 0
Celestion Reetone, Dual Matched PM. M.C. Speaker (or 12 monthly payments of 12/-)	6 10 0
Collaro A.C. Induction Gramo Motor	2 10 0
Henley "Solon" Electric Soldering Iron	0 7 6
"159" Radiogram Cabinet	3 10 0

CASH C.O.D., AND EASY PAYMENT ORDER FORM

To: DIRECT RADIO LTD., 159, Borough High St., London Bridge, S.E.1

'Phone: Hop 3000. 'Grams: Dirrad Sedist London.

Please dispatch to me/us once the following goods.....

.....

for which (*a*) I enclose (*b*) I will pay on delivery (*c*) I enclose first payment of {Cross out line not applicable} £.....

NAME .....

ADDRESS ..... Pop. Wireless 25/2/33

WISE SPENDING—DISCRIMINATING SET BUILDERS INSIST ON DIRECT RADIO SPECIFICATION

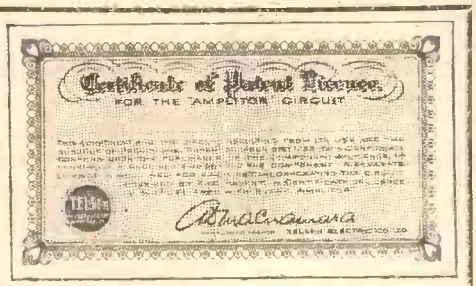
Sensational new component!

Telsen 'AMPLITOR'

PROV. PAT. NO. 2877/33

gives enormous increase in VOLUME!

secures tremendous improvement in TONE!


Certificate of Patent Licence
FOR THE 'AMPLITOR' CIRCUIT

SUPPLIED COMPLETE WITH SPECIAL PATENT LICENCE!

The Telsen 'AMPLITOR' is the only component of its kind in the world being covered by a special Telsen Patent Licence, a reproduction of which is enclosed in the carton. Look for it when you buy.

THE new Telsen 'AMPLITOR' heralds a revolutionary advance in radio technique, for this brilliant new component effects two distinct and outstanding improvements in any type of set, firstly, giving amplification equal to an extra L.F. stage at no extra cost, and secondly, a tremendous improvement in quality of reproduction.

5/6

TELSEN

RADIO COMPONENTS FOR LASTING EFFICIENCY

ANNOUNCEMENT OF THE TELSEN ELECTRIC COMPANY, LIMITED, ASTON, BIRMINGHAM

EFFICIENCY AND REFINEMENT

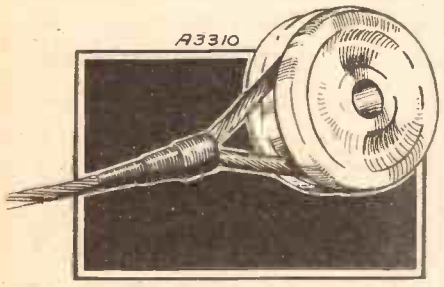
The difference in appearance between a mediocre radio installation and the best may be in details only—but the difference in results is more than a detail. These tips will help you to enjoy your radio to the full.

THE AERIAL

YOU will find that 7/22 copper wire, after it has been threaded through or round an insulator, is not easy stuff to fasten off neatly. This is the best way to tackle the job.

Separate the wires after they come through the insulator and lay them along the main part of the wire; then starting with one wire, twist it round and round the separated wires and the main wire, close up to the insulator.

STRONG AND ALSO NEAT



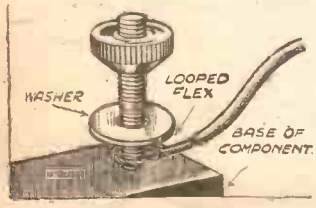
A tapering effect is obtained by employing the fastening-off method illustrated here.

When you come to the end of that wire start on another at the point where the first one ended. You will then get a neat tapering effect. Pinch in the ends as closely as possible with pliers.

BATTERY CORDS.

IN the interests of economy very many constructors make use of ordinary flex wire as an alternative to battery cords, and it sometimes happens that, when fixing, one of the strands becomes twisted round the thread of the terminal in such a manner that difficulty is experienced in screwing down.

If a metal washer is first placed over the looped flex, as shown in the diagram, very little trouble in this respect will be encountered.



A washer on top of a looped flex end will simplify tightening.

LOADING YOUR MAINS UNIT.

THE regulation of mains units is not usually particularly good, due to various factors associated with the apparatus itself, also to the D.C. resistance of the smoothing circuits. For example, a metal rectifier suitable for supplying current to a three-valve receiver with a small-power valve in the output stage would give, say, 15 milliamps, smoothed output at about 150 volts. At 30 milliamps, however, only about 80 volts would be obtained at the terminals.

Thus an overloaded eliminator is bound to operate the receiver unsatisfactorily since the output voltages are inadequate.

Too large an eliminator, on the other hand, is almost as bad, and the voltages at the output terminals will be in excess of the normal figure if the eliminator is run below its rated output. A metal rectifier intended to supply a current of, say, 40 milliamps at 150 volts, when run at only 15 milliamps, as in the first case, would have an output of over 200 at its terminals. With a larger eliminator the figure would be greater, of course.

An overloaded eliminator unfortunately can only be remedied by employing a larger unit, or if a larger power valve is used in the last stage, by substituting this for one that takes less anode current.

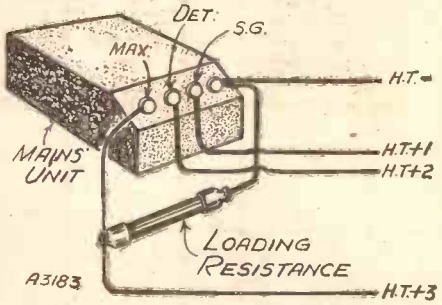
A Simple Remedy.

With two stages of L.F. amplification this latter procedure is not usually satisfactory, however.

In the case of an eliminator which is too large, the remedy is more or less simple, since a loading resistance can be connected across the max. output terminals of the eliminator. The size of the resistance is more or less simple of calculation, and is actually equal to the figure obtained by dividing the voltage at the output terminals by the excess current which must be taken from the eliminator, in addition to the normal current required by the receiver. This figure is the size of the resistance in thousands of ohms.

Thus, assuming the max. voltage to be 150 and the eliminator will give 50 milliamps at this figure, we calculate from the makers' instructions the approximate current the valves in the receiver will take, and subtract this from the above. Assume the valves to take 20 milliamp, then we have to pass 30 milliamps, and the resistance will be equal to 150 divided by 30, which is 5. The value of the resistance, therefore, being 5,000 ohms.

KEEPING VOLTAGE DOWN



The loading resistance draws a certain amount of current.

The resistance will have to dissipate a certain amount of energy—measured in watts. To find the wattage, multiply the current (in amps.) through the resistance by the voltage across the resistance.

Thus the wattage of our present resistance equals 150 multiplied by 30, the product being divided by a thousand since the 30 is in milliamps. Thus a 5-watt resistance would be needed.

The LINK BETWEEN

BY G. T. KELSEY

Weekly Jottings of Interest to Buyers,

THE new Empire Station at Daventry was inaugurated primarily for the linking together of all those far-flung outposts over which the British Flag is flying. That its world-wide success is assured is abundantly obvious from the warmly enthusiastic reports that have already been received in this country.

One interesting aspect of the new station is that it has created extensive overseas markets for the sale of short-wave receivers, and it is gratifying in the extreme to learn that at least one of our own manufacturers has had the enterprise to anticipate the demand by the production of a really super short-wave outfit.

Designed for Overseas.

I am handing the laurels to Messrs. E. K. Cole, Ltd., who have tackled the job in a manner which does them credit. The new Ekco All-Wave Model 37—designed specially for overseas use—is an all-electric seven-valve super-heterodyne.

It is marketed in chassis form only, partly to overcome the difficulties of transit, but mainly to enable would-be users to choose cabinets to suit their own requirements. All chassis components are constructed, and all insulation treated to withstand extreme variations of temperature and other conditions to which the set is likely to be subjected.

In passing, I may mention that the set is being exhibited for the first time on Stand No. 44 at the Olympia section of the British Industries Fair.

* * *

The fact that among the very large circulation that is enjoyed by "P.W." there must be many thousands of readers who use Exide accumulators, prompts me to pass on a little something that came to my knowledge the other day concerning guarantees.

Concerning Accumulator Guarantees.

When you buy an Exide accumulator, you buy the product of one of the most famous accumulator manufacturers in the country, and, as you probably know, it carries with it their guarantee. But it is as well to remember that the guarantee is conditional—as is the case with all other reputable makes—upon the accumulator being used in the recommended manner.

The guarantee becomes null and void if anything other than the recommended water is added to the electrolyte.

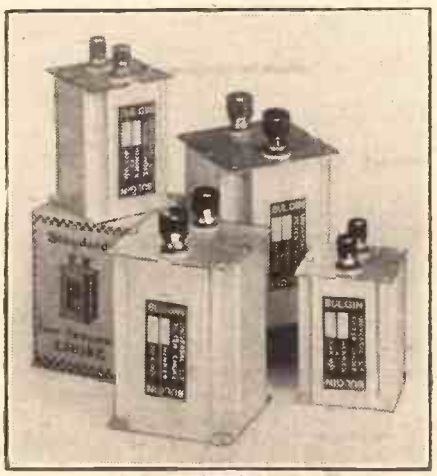
In glancing through a copy of the Goltone catalogue of Radio Requisites for 1933, I was surprised to find that the index contains rather more than two hundred

(*Continued on page* 1315.)

NEW BULGIN CHOKES

WHEN you see "50 Henries, 35 Milliamperes" (or some other such figures) engraved upon a choke, you can be forgiven for jumping to the conclusion that that choke will maintain an inductance of 50 henries even when 35 milliamperes of current is passing through it.

But in all probability you would be quite wrong, the figures being two maximums



The four Bulgin L. F. Chokes.

bearing no relation to each other. At 35 milliamperes that choke might have an inductance of only ten or so henries. The inscription ought to run "Will handle up to 35 milliamperes; inductance up to 50 henries."

Messrs. Bulgin are determined that there shall be no misunderstanding about their new chokes, for they are rating all these with given inductances *at* certain currents. Therefore, as Messrs. Bulgin state, a constructor buying a Bulgin choke can be assured that he will obtain a definite inductance at a definite current.

Distinctive Metal Cases.

These new Bulgin chokes are built into distinctive metal cases and can be either baseboard or chassis mounted. Also insulated terminals are fitted.

There are four of these new Bulgin chokes. L.F. 14 has an inductance of 20 henries at 50 milliamperes and L.F. 15, 32 at 30 milliamperes, and these two sell at 10s. 6d. each.

L.F. 16 and L.F. 20 retail at 7s. 6d. each, and are of 20 henries at 20 milliamperes and 32 henries at 15 milliamperes, respectively.

All four, as with all Bulgin apparatus, are skillfully designed and made. Air gaps are introduced to provide a constancy of inductance at varying currents.

For the characteristics they achieve all the chokes in the range are triumphs of compactness, and their small sizes and good shielding are qualities which will doubtless contribute largely to their success.

We have no hesitation in recommending the attention of all constructors to these attractive new components.

TWO R & A REPRODUCERS

Reproducers & Amplifiers, Ltd., are specialists in the production of moving-coil loudspeakers. It is therefore not surprising that they include some particularly attractive units in their range.

Indeed, I would go further and say that I consider their "Challenger," for example, is a very fine unit quite irrespective of its price (which is only 35s. complete with input transformer).

It is a permanent-magnet model and has a very effective magnetic system giving it a sensitivity well above the average.

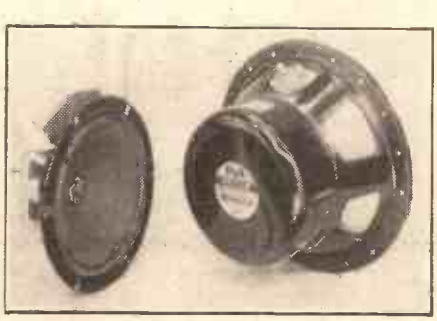
The built-in transformer provides a choice of three useful ratios, 19, 33 and 44 to 1, and these enable good matching to be obtained with ordinary power valves and with a pentode.

Unusually Even Response.

The response of the "Challenger" is unusually even, and there is a commendable absence of those marked peaks which only too often mar the performances of the smaller moving coils.

From approximately 200 to 1,200 cycles it has an almost straight line, and above that to 6,000 there is a useful rise. The bass is free from appreciable resonance and is exceptionally full.

So, as must be obvious, its performance leaves no room for criticism. With clean bass, a "straight" middle register and clear-cut and retentive treble it handles small and large inputs with gratifying evenness, speech, of course, being particularly good.



The R & A "Challenger" and (right) "Victor" Reproducers.

Yes, the R & A "Challenger" is certainly a fine proposition, and one I would recommend all readers to make a point of considering.

The R & A "Victor" is a larger unit and retails at 70s. complete with a transformer having no less than six ratios for close matching in all conditions.

The "Victor" also has a metal grille to protect its diaphragm, a practical advantage which all constructors will at once appreciate.

It is able to deal with considerable power, but at the same time it is perfectly satisfactory on outputs such as are given by small two-volt valves.

Messrs. Reproducers & Amplifiers have every right to be proud of their products, for they reach high standards. I urge "P.W." readers to endeavour to hear R & A's demonstrated so that they can at least know what is being accomplished in the development of better and cheaper moving-coil speakers these days.

WATMEL POTENTIOMETERS

We have received a number of potentiometers from the Watmel Wireless Co., Ltd., who specialise in the manufacture of this type of component. There is first the Wire Contact type, a well-made and reliable device of the non-inductive variety.

It has an efficient, self-cleaning contact, and is perfectly quiet in operation.

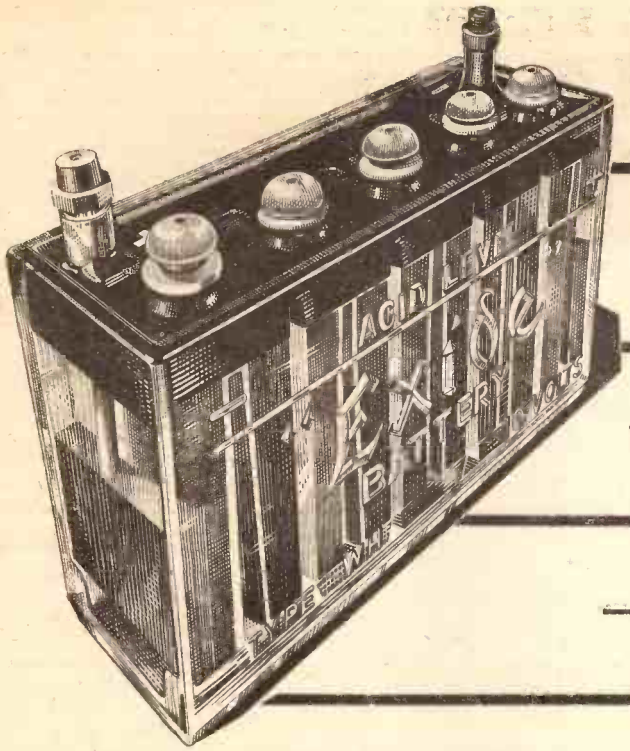
The Watmel Wire-Wound Potentiometer has one of the smoothest actions we have encountered; indeed, it is smoother than many of the plain graphite types. And yet

Large, easy-to-handle knobs are features of these Watmel components.

the contact is firm and remains at its full effectiveness throughout the range of movement.

There is a Watmel Resistance with a Square-Law Winding which is, on that account, specially suitable for variable-mu work. The average variable-mu range of adjustment is not usually particularly liberal, so that it is important that as much is made of it as possible. With an ordinary resistance this is obviously not done.

All the above-mentioned Watmel components have been tested in "P.W." sets, and have given excellent service. We can recommend them to our readers.



Thousands are saying

"Oh, for wireless with tone that's really clear —without buzzing and crackling." **Here's the one sure way to get it**

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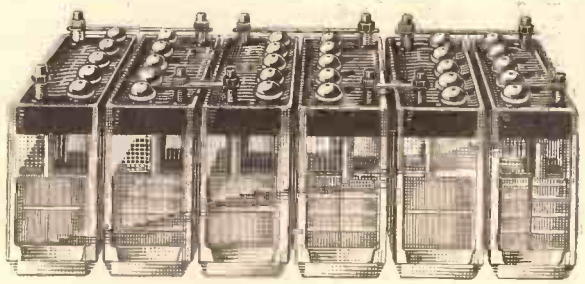

Exide

P.42

WIRELESS

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‡ Prices for 10-volt unit ● Type WJ 2,500 milliampere hours, 5/- Type WH 5,000 milliampere hours, 6/3. Type WT 10,000 milliampere hours, 12/- Also complete batteries in crates. *(These prices do not apply in the Irish Free State.) From Exide Service Stations or any reputable dealer. Exide Service Stations give service on every make of battery*

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RADIOTORIAL

All Editorial communications should be addressed to the Editor, POPULAR WIRELESS, Tallis House, Tallis 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 or 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 reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialties described may be the subjects of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

Technical Queries Editor: A. JOHNSON-RANDALL

QUESTIONS AND ANSWERS

WHO WAS IT?

J. W. X. (Beswick).—"As a regular reader of 'P.W.,' I am asking for help in a little difficulty that I am having to identify two transmissions that I picked up in the early hours of Thursday morning, January 19th, on my 'Skyscraper' Three Valve. The first one I came across was around 300 metres. Of course they are both medium-wave stations; I heard programmes as follows: 12.30 a.m. Dance music. Item being played was 'Please.' And then a man spoke about Japan, and this was followed by more dance music, item being played, 'Eleven Pounds of Heaven.'

"The next I heard was around 280 metres. Programme as follows: 1.45 a.m. Dance music playing 'I See You in My Dreams,' followed by announcement 'Hollywood Newsboy speaking' about a two-hundred dollar contest and asking folk to 'buy Phillips's tooth paste now.' This was followed by a song, 'Take Me in Your Arms.' Both these transmissions were on headphones, but were fully up to programme value. (I have only a short indoor aerial and my earth is travelling up to a pipe, being the most convenient.)"

It would certainly appear that you were picking up America direct, as it has recently been quite easy to do on a good night at the hours you mention. Moreover, the Hollywood announcement indicates you were receiving a west-coast (Pacific) station, in which case the distance would probably be something like 5,000 or 6,000 miles! Good going!

As even the low-powered U.S.. Canadian and South American stations have been receivable this season, it has been impossible for us to identify the various programmes, but we suggest you write to the station director of Radio Station K N X, Hollywood, California, repeating the details you have given us, and asking him if he can confirm your reception.

(K N X works on about 285 metres.)

FITTING A PICK-UP.

A. C. V. (Midhurst, Sussex).—"I am the owner of a 1931 'P.W.' set, namely the 'P.V. Star.' Could you inform me as to the most satisfactory way of fixing a pick-up to my set?"

From the electrical point of view the alterations are few and simple.

What you have to do is first to disconnect the G terminal of V2 (detector) from the 2-meg. leak and ·0003-mfd. condenser to which it is connected. Then join these two latter points instead to one of the "outer" contacts of a simple 3-point radiogram switch.

(Such a switch has two "outer" and one "inner" contact, the latter making connection with either of the outer contacts.)

The centre or "inner" contact of this switch (which, as stated, is the one that joins up with either one or the other outer contacts, in turn, according to its manipulation) is then connected to the G terminal of the V2 valve holder.

The final connections are (*a*) a lead to the remaining switch contact, and going to one pick-up terminal; and (*b*) a flex from the second pick-up terminal, ending in a black plug that goes to 1½-volts negative on the grid-bias battery.

That is all in theory, but in practice you have got to decide how the grid-bias battery, switch, and pick-up terminal leads can all be kept short. If they are long and straggly you may get feed-back or instability troubles, but with due regard to short,

(*Continued on page* 1312.)

DO YOU KNOW—

the Answers to the following Questions?

There is no "catch" in them, they are just interesting points that crop up in discussions on radio topics. If you like to try to answer them you can compare your own solutions with those that appear on a following page of this number of "P.W."

(1) If an A.C. valve is rated to pass 10 milliamps of plate current at 5-volts grid bias, what should be the value of its automatic bias resistance?

* * *

(2) If valves of different kinds were accidentally knocked, which kind would be likeliest to suffer most—ordinary 3-electrodes, such as detectors, or S.G.'s, or Pentodes?

* * *

(3) What new B.B.C. station may we expect to hear testing in the next few weeks?

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SCREENED DUAL-RANGE COILS ON METAL CHASSIS

For modern receiver designs, these "Goltone" matched Dual-Range units will meet all requirements.
Type GGR—Tuned grid with separate reaction and aerial tap.
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Type GBS—Band-pass secondary coil with separate coupling winding.
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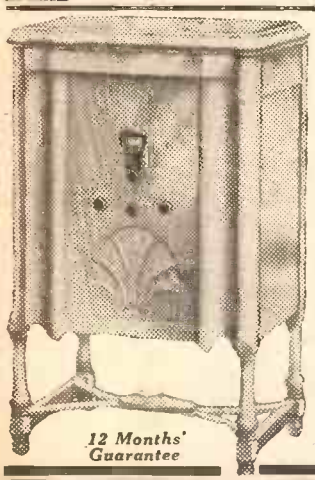

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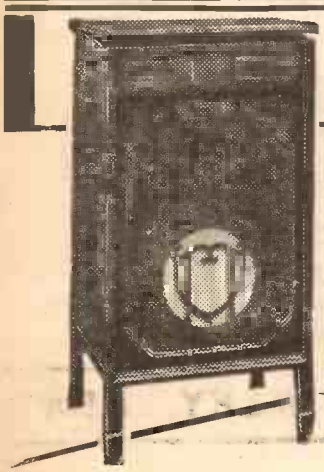

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PONDERS END, MIDDLESEX

EDISWAN -the Better Service Batteries

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RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 1310.)

well-spaced leads you will find that in one position you get "Radio" as before, while in the other switch position (marked "Gramophone" or "Pick-up") you are connected for the electrical reproduction of gramophone records via the pick-up.

THE A.C. "AIRSPRITE"

As several points about the construction, etc., of the A.C. "Airsprite" have been raised by readers not very familiar with set building, the following information may assist those who are still in the early stages of constructing it.

In mounting the Telsen coils, care should be taken to follow the directions given by the makers, for the operation of the wave-change switch gear will depend for its smoothness on the careful assembly of the coil mechanism.

The output choke has four terminals, and they should be joined as shown in the diagram, the two O terminals being connected together. It is a double choke, being available for either series or parallel connection of the windings, and in this set we require the series method.

If an alternative make is employed, there will probably be only the two terminals to consider, one going to the anode terminal of the third valve holder, and the other to the H.T. flex connection from the 4-mfd. condenser on the mains section.

The reaction condenser used in the set as shown is a J.B. and the "backmost" vane of the fixed plates on the F2 side must be bent outwards, the insulation being removed at this point so that the fixed vane can protude to make contact with the moving vanes when they complete their travel towards the F2 side of the condenser.

This short-circuiting is essential to the operation of the automatic tone compensating scheme on which the set is based.

When the wiring has been completed the set can, if care be taken, be tested out with the mains unit lying at the back, and before the unit is fixed in position on the main baseboard. But if this is done, every care must be taken that no part of the set other than the panel controls is touched while the mains are switched on. (As a matter of fact, this precaution must be taken even when the set has been finally assembled.)

The valves required were given in a special list, and only those specified should be used, or the constants of the circuit will be upset. In certain cases it will be seen that the bias resistance values for the various valves have been given, and these values must be used instead of those given in the blue print if valves other than the following are employed.

The actual valves used in the original set were Mullard M.M.4V., 354V., Cossor 41M.P. and the U.10 as rectifier (Marconi or Osram).

"P.W." PANELS. No. 112.—GRENOBLE, FRANCE.

The announcer (man) at this station calls "'Allo. Ici la poste radiotelephonique de la Region des Alpes à Grenoble." Grenoble usually relays Paris programmes.

* * *

The wavelength is 566 metres. Distance from London 515 miles.

* * *

Usually closes down with "La Marseillaise" and "Bon soir, Mesdames, etc."

THE ANSWERS

TO THE QUESTIONS GIVEN ON PAGE 1310 ARE GIVEN BELOW.

(1) 500 ohms. (The current passing through the resistance must provide the voltage, and Ohm's Law says :

$$\frac{V}{I\ (\text{current in amps.})} = R$$

Therefore $R = \frac{5}{\cdot 01} = 500$ **ohms.**

* * *

(2) The damage done by shock is usually in the form of misplacement of electrodes, so pentodes with their five electrodes are the likeliest sufferers. S.G.'s, having four electrodes are more likely to suffer from damage by shock than 3-electrode valves.

* * *

(3) The Western Regional, now being completed at Watchet, Somerset. The date of the first tests will probably be announced shortly

DID YOU KNOW THEM ALL?

BETWEEN THE WAVEBANDS.

G. H. W. (Stanford-le-Hope).—"The recent articles in POPULAR WIRELESS about stations which are excluded from most listeners because their sets will not tune below 1,000 metres on long waves nor up above Budapest on the medium waves interested me keenly. I have been experimenting a bit, first with extra tuning condensers, of which I had several available, including a pair of ·0003's.

"With these wired across the set's aerial and H.F. tuning condensers I got quite a number of programmes at different times, the one from Wilno being a capture of which I was specially proud, as it had enormous strength behind it. There were several others with that arrangement, but the languages used were very unfamiliar—in fact, it was like exploring

(*Continued on page* 1314.)

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page* 1312.)

unknown country, and I got a great thrill out of it.

"Then it occurred to me to save fiddling about with two aerial and two H.F. condensers, and use instead more turns on the coils, which is what I am now experimenting with.

"I find, however, that although the difficulty of double dial-settings is now overcome by doing away with the ·0003's, I still do not get positive identification, because of the absence of known language, etc., and the long waiting for announcements.

IS YOUR SET BEHAVING ITSELF?

Perhaps your switching doesn't work properly? Or some mysterious noise has appeared and is spoiling your radio reception? Or one of the batteries seems to run down much faster than formerly?

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

Full details, including scales of charges, can be obtained direct from the Technical Query Dept., POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

A postcard will do. On receipt of this an Application Form will be sent to you 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.

LONDON READERS, PLEASE NOTE: Inquiries should NOT be made by 'phone or in person at Fleetway House or Tallis House.

"Could you give me a list and wavelengths of the stations which are placed between the two ordinary wavebands? That is, stations between 1,000 metres and Budapest on 550 metres?

"Also any information about languages used, etc., to help in knowing which is which?"

The following are the stations within the limits named, with their allotted wavelengths.

Wavelength in Metres.	Station.	Nationality.
1000	Moscow	Russia
937·5	Kharkov	Russia
867·1	Leningrad	Russia
848·7	Rostov-Don	Russia
779·2	Petrozavodsk	Russia
770	Ostersund	Sweden
760	Geneva	Switzerland
742·6	Novosibirsk	Russia
720	Moscow	Russia
690	Oulu, Uleaborg	Finland
680	Lausanne	Switzerland
631·6	Smolensk	Russia
574·7	Ljubljana	Yugoslavia
574·7	Hamar	Norway
570	Freiburg-im-Breisgau	Germany
566	Grenoble (PTT)	France
566	Hanover	Germany
563	Wilno	Poland
560	Augsburg	Germany
	Kaiserslautern	Germany
	Tampere	Finland
550	Budapest No. 1	Hungary

The Russian stations are liable to shift wavelengths, and change over with each other during tests, etc., in connection with the rearrangement of Soviet broadcasting which is now being undertaken.

Ostersund on 770 metres relays the Sundsvall programmes.

Geneva, 760 metres, and Lausanne, 680 metres, share the "Radio Suisse Romande" programmes (from Sottens, who is on 403 metres).

Oulu, Finland and Tampere, Finland both relay the Helsinki programme, announcements being made in the Swedish and in the Finnish languages.

Hamar, on 574 metres, relays Oslo and Freiburg-im-Bresgau relays Stuttgart.

Grenoble is a "P.T.T." station, linked with Ecole Supérieure, etc.

The Hanover station usually relays Hamburg, and the Augsburg and Kaiserslautern transmitters are associated with Munich.

IN THE NORTHERN AND SCOTTISH REGIONS

From A SPECIAL CORRESPONDENT

WHEN Captain Eckersley framed the Regional Scheme, providing for dual-programme transmitters in each region, a fundamental feature was that one of those transmitters should broadcast an essentially Regional programme with very strong local characteristics, to contrast with the alternative National programme from London. The Regional headquarters at Manchester, Edinburgh, and elsewhere were to have a large measure of autonomy

Then the centralisers got to work; the scheme was modified. And still from time to time the question breaks out of how much "home rule" the provincial programmes should have.

Quite a Sensation

It caused a sensation in provincial B.B.C. offices recently when the Midland Regional Director, Mr. Percy Edgar, boldly announced his ambition of a 100 per cent Midland programme (as already reported in POPULAR WIRELESS).

No doubt Mr. Edgar meant to indicate that this full-blooded regionalism could only come about if there were available material of the requisite standard; that is a point which must be considered. The North Regional Director, Mr. Edward Liveing, more cautious, refused to be drawn when I asked him whether he has a similar ambition.

"Mr. Edgar," he said, "expressed a desire, which is naturally shared by his fellow Regional Directors in regard to their own wavelengths, to make his Regional programme as distinctively Regional as possible."

I asked what was the present proportion of genuine northern material in the North Regional programme. Mr. Liveing said it was difficult to give an exact answer, but it would be something like 60 to 70 per cent.

I should say that the proportion in the case of the Scottish Region is somewhat less, and the Midland Region less still.

Relying On Outside Broadcasts

So far, in expressing its Regional individuality, the North Region has relied very much on outside broadcasts, but I have reason to believe that 1933 will see an increased amount of studio activity at Manchester and in the fine new studios at Leeds. In my opinion, the B.B.C. in the North has only touched the fringe of possibilities of interesting studio programmes based on Northern talent, history, and life.

In Scotland the feature programme has found great favour with the authorities.

Feature for the Empire

It is interesting to learn that among the special programmes recorded on gramophone discs for circulation to Empire stations there is a Scottish feature, lasting about 30 minutes, and a programme called "World's Away," produced by John Watt, which is a sort of Yorkshire "Cavalcade." I hope that later on these records will be broadcast from English stations.

THE LINK BETWEEN

(*Continued from page* 1307.)

entries! I knew that the range of apparatus produced by this famous Lancashire firm was very comprehensive, but I must confess that I had no idea that it covered such a wide field.

The Goltone catalogue, which is very well produced, is one of those publications that ought to be in the hands of every home constructor, and for this reason it is eminently suitable for inclusion in "P.W.'s" postcard literature scheme. Will readers desirous of obtaining a copy kindly let me have their postcards promptly, please? **(No. 23)**

An Invitation.

The Carrington Manufacturing Co., Ltd., who, of course, are the makers of the famous "Camco" range of cabinets, extend a cordial invitation to all "P.W." readers to visit their showrooms at 24, Hatton Garden, E.C.1. The showrooms are open daily from 9.15 a.m. to 5.45 p.m., and from 9.15 a.m. to 12.30 p.m. on Saturdays.

In addition to the stock line cabinets which are permanently on view, I am given to understand that there are always a few cabinets ex contracts and samples to be had at extraordinarily attractive prices. A visit would certainly appear to be well worth while.

Radio Veterans.

I wonder how many readers of these notes possess a museum of radio relics of the "good old days"? I have one of which I am very proud, and one of these days when I am a little less busy I am going to build up a set from my pre-1923 apparatus just to see how much real progress we *have* made during the last decade.

"P.W.'s" postcard literature scheme saves you time and money! Week by week in these columns reviews are given of all the latest catalogues and leaflets appertaining to every aspect of radio, and if you want any or all of the literature to which reference is made you need only send a postcard giving the numbers of those in which you are interested, and the required literature will be sent off to you free of charge except where otherwise stated. The reference numbers in each case are given at the end of the appropriate paragraph, and applications need not be limited to any one particular issue of "P.W." Postcards, on which your name and address should be printed in block capitals, should be sent to G. T. Kelsey, at Tallis House, Tallis Street, London, E.C.4.

I have already earmarked the transformer for the job. It is one of those old R.I. transformers of the type that was used in one of the early "S.T." sets—the old but amazingly successful "S.T.100." I refer to the transformer as old, but, as a matter of fact, I have the very greatest respect for it which is not lessened by a letter that has just come into my hands.

The writer of this letter is proud of the fact that two of these transformers which he bought in 1922 are still working perfectly in his set to-day! Ten—nearly eleven years' service, and *still working perfectly.*

The letter speaks volumes for the extreme reliability of R.I. products, and it certainly justifies me in my choice of this particular transformer for the L.F. side of my "relic" set.

Another Quiescent Scheme.

I was interested to read the other day that in the Philips 830-B receiver, which is a two S.G. four-valver for battery operation, a special valve is employed that automatically controls H.T. consumption in proportion to the volume of output.

So far I believe that this is the only set with single-valve output arrangement to include a quiescent scheme, but I must confess that it appeals to me very much.

I am afraid that I have only brief details at the moment, but if there are any readers who would care for further details I shall be happy to arrange for literature to be forwarded on receipt of the usual postcard. **(No. 24)**

"Cold" Valve at Last?

I am able this week to reveal the first news of an entirely new "cold" valve that will shortly be placed on the market by Westinghouse.

The technical details are at the moment being kept very hush-hush, but special arrangements have been made whereby "P.W." readers will receive a full description in an early issue.

I have it on good authority that the new valve will take the form of an H.F. rectifier, but beyond that I am afraid I must not go at present.

THE "AIRSPRITE"—MORE PRAISE!

A further selection of reports from the Radio Industry.

From THE TELSEN ELECTRIC CO., LTD.

Dear Sir,—I have very much appreciated the privilege of carrying out a test on the recently developed "P.W." "Airsprite" Three, and, much as I loathe the use of superlatives in connection with a radio receiver, **I can only describe this set as magnificent.**

The most outstanding characteristic that impressed me was the excellent quality of reproduction. With a set designed to standard practice, it is well-known that as reaction is gradually increased there is a correspondingly progressive loss in the top notes of the receiver, and that good selectivity is obtained only by undue sacrifice of quality. In the case of the "Airsprite" Three, with its entirely new and novel circuit arrangement, it was immediately noticeable that with the set working at its maximum sensitivity, and with the reaction control well in, the top-note response was surprisingly realistic, and the quality of reproduction as wonderful as that obtained on the local station.

You are to be congratulated on this important result, especially in view of the fact that it has been made possible by a negligible increase in the cost of the receiver.

I found that this excellent quality was not in any way obtained at the expense of either sensitivity or selectivity, the set responding to all my standard tests in a way that was most impressive.

The two tuning controls allowed of very accurate tuning, the volume control was smooth and easy in action, and, in fact, **the whole "feel" of the set immediately imbued me with a sense of power that for bringing in distant stations was beyond description.**

I am sure that your innumerable constructors who are keen on good quality (and, therefore, plenty of top-note response), whether they are listening to British or Continental stations, will welcome this set as one from which they will derive the greatest pleasure and enjoyment.

Yours faithfully,
G. S. Brayshaw,
B.Sc. (Eng.), Grad.I.E.E.,
Chief Radio Engineer,
For and on behalf of THE TELSEN ELECTRIC CO., LTD.

From GRAHAM FARISH LTD.

Dear Sir,—It was with considerable interest that I witnessed the scientific demonstration of the effectiveness of your new automatic balanced tone control.

In addition to those on this page, we have already published appreciative reports on the "Airsprite" from Mullard Wireless Service Co., Ltd., Peto-Scott Co., Ltd., Varley (Oliver Pell Control) Ltd., Ready Radio Ltd., General Electric Co., Ltd., Wingrove & Rogers Ltd., Whiteley Electrical Radio Co., Ltd., Cossor Ltd., Ferranti Ltd., Celestion Ltd., Belling & Lee, Ltd., A. F. Bulgin & Co., Ltd., Direct Radio Ltd., The Marconiphone Co., Ltd., Ward & Goldstone Ltd., Radio Instruments Ltd., Wright & Weaire Ltd., Colvern Ltd., Benjamin Electric Ltd., Dubilier Condenser Co., Ltd., and Reproducers & Amplifiers Ltd.

Extremely poor quality, resulting from the over-use of reaction, has for the ordinary receiver made it hardly worth while to listen to distant stations, but I can foresee that with the use of this excellent scheme, the entertainment value of these will be greatly enhanced due to the considerable improvement in the quality.

I feel that this ingenious and simple scheme marks a distinct advance and will get the popularity it undoubtedly deserves.

Yours faithfully,
W. H. Mills,
Director, GRAHAM FARISH LTD.
Bromley, Kent.

From STANDARD TELEPHONES AND CABLES, LTD.

Dear Sir,—We must thank you very much for giving us the opportunity of hearing the "Airsprite" set under working conditions. It certainly justifies all your claims, and we are confident that any member of the public who builds one of these sets will have an instrument which will give him every satisfaction.

Yours faithfully,
F. A. Cobb,
General Manager,
STANDARD TELEPHONES AND CABLES, LTD.
Radio Research Department.

MIRROR OF THE B.B.C.

(*Continued from page* 1288.)

The play should please the shipping companies. If it doesn't, they have their remedy in the example of Poland's protest

New Series of Talks.

DRAMA becomes a very serious thing when one gets into the intricacies of what goes to the making of a play from the point of view of everybody concerned with its performance—producer, actor, scenic designer, and the rest. Whether listeners generally will find such a subject a bit too deep one cannot say until after the series of talks arranged by Mr. Geoffrey Whitworth of the Drama League, in which various experts will discuss "Macbeth" as it concerns their own jobs.

Harcourt Williams will have his say as a producer, John Gielgud (brother of Val, head of the Productions Department of the B.B.C.) as an actor, and Albert Rutherston as scenic designer. The play itself will be broadcast on Sunday, March 12th, for those who are not listening to sponsored programmes from Continental stations.

That Poetry Competition.

THE B.B.C.'s request for original poems has brought what may quite easily turn out to be an avalanche. The competition does not close until the end of February and there is no telling how many more poems will be sent in to swell the two thousand five hundred which had arrived up to the first few days of the month.

(*Continued on next page.*)

MIRROR OF THE B.B.C.

(Continued from previous page.)

My readers will remember that when I first mentioned the B.B.C.'s invitation, some weeks ago, I said that the poems were to be judged by Mr. Marsh and Mr. de la Mare, and that the best would be broadcast. Poems must not be longer than will take five minutes to read, and no single author will be allowed to submit more than three attempts.

How absurd these simple conditions appeared to some people is shown by the fact that two men sent in terrific "works," and several other people bundles of more than twenty short pieces. Girls of between twelve and twenty years of age, mostly living in suburban homes, proved to be the most poetical class, with miners coming second and bricklayers third—an interesting bit of information gleaned from letters attached to some of the poems.

Nearly two hundred of the poems are addressed to the Prince of Wales, but the most popular subjects are love, nature, patriotism and God, respectively. Of the great majority we shall, of course, hear no more, but quite a high percentage represents ability—and, as I have said, several more sackfuls are expected to arrive at Broadcasting House before the closing date.

LOW-FREQUENCY COUPLING DEVELOPMENTS

THE auto-transformer method of coupling low-frequency amplifiers is a scheme that is becoming increasingly popular. One of the main advantages is that it affords a method of adding to or subtracting from the normal voltage step-up of the transformer concerned. Thus the overall stage gain can be regulated within certain limits to suit the requirements of a particular design.

But this theoretical knowledge is based upon the assumption of a correct impedance in the anode circuit of the valve and since in most existing schemes this impedance takes the form of a resistance, the anode load cannot be taken up to the theoretical ideal on account of the loss of voltage entailed.

A Difficulty Overcome.

The difficulty of obtaining the optimum valve load without the consequent voltage drop has now been overcome in an ingenious manner by a new Telsen invention known as the "Amplitor."

Briefly, the Telsen "Amplitor" is a compact unit which enables all the advantages of auto-transformer coupling to be obtained with the transformer primary winding connected directly in the anode circuit of the valve.

In addition to giving an increased step-up in certain circumstances this new scheme makes it possible to obtain a rising characteristic to compensate for the attenuation of high notes incurred in selective receivers. Moreover the high-note improvement is achieved by an actual increase in the upper register and not a decrease in the lower, which is one of the shortcomings of many existing tone—correction schemes.

TECHNICAL NOTES

Some diverse and informative jottings about interesting aspects of radio technique.

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

Interesting Experiments on Earths.

READERS are familiar with the important part which the earth connection plays in radio reception. Except for receivers of the portable type, it is essential that an earth connection should be provided, with as low an electrical resistance as possible.

This is the reason why we connect if possible to a cold water pipe, which runs in the earth for a long distance, and so gives us a chance of getting contact to "ground" at some point or other. In the same way, it accounts for the fact that the set sometimes does not work so well in the summer months, when the soil is dry, as at other times when the soil surrounding the earth connection is wet.

In Transmission.

It is not so commonly known, however, that the earth plays another and perhaps more important part in wireless communication, particularly in the distribution of broadcast programmes at moderate distances, up to 50 or 100 miles. The waves from the transmitting station travel along the earth's surface and some of their energy is lost in setting up electric currents which are, of course, impeded according to the resistance of the earth.

If the earth is a good conductor, this energy loss is relatively small and thus the strength of the waves is maintained to considerable distances, with good reception results. If the ground is poorly conducting the waves lose their energy rapidly and poor or indifferent reception is obtained. It is because the sea is a good conductor that signals received over an all-sea path are much stronger than those received in similar conditions over land.

Dry Ground.

Some very interesting investigations into the whole question of the conductivity of soil have been made recently by Dr. R. L. Smith-Rose, of the National Physical Laboratory, on behalf of the Radio Research Board of the Department of Scientific and Industrial Research; these experiments were described in a paper read before the Royal Society a few days ago.

The experiments consisted essentially in measuring the electrical resistance of soil from different parts of the country, under conditions corresponding to those met with in radio communication. Results of the experiments showed that while dry soil is a very poor conductor, the conducting power is increased more than a *thousand times* when water is added to bring the moisture-content up to the value commonly met with in garden soil.

Soils taken from different places were studied and compared, and it was found that, altogether apart from the question of moisture, their properties varied to a considerable extent.

(*Continued on next page.*)

TECHNICAL NOTES

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A knowledge of these properties is important in connection with the location of wireless transmitting stations and also in connection with radio transmitters generally.

For Receiving Sets.

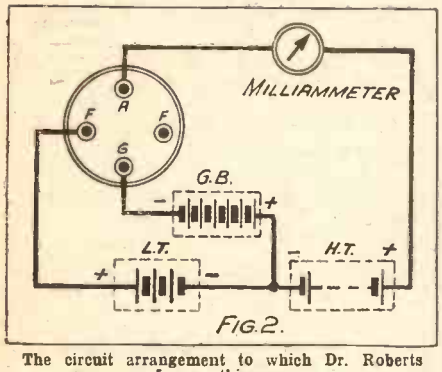
So far as the ordinary listener is concerned, the results only emphasise once more the extreme importance of having a good earth connection and, if this is a buried earth plate or similar device, the importance of keeping it surrounded by moist earth.

For practical purposes an earth connection buried in really dry soil is no earth at all, and for the usual type of aerial-earth receiver this means that you can scarcely expect any signals to be received—at any rate, any signals worth talking about. The different "chemical" earths which have recently been put on the market help greatly in keeping the soil around the earth in a reasonably moist condition.

Checking the Characteristics.

Readers often ask whether it is a simple matter to find out the characteristics of a valve or to check up the characteristics against the specification sheet supplied by the makers. This is very easily done by the arrangement shown in the figure which indicates a valve-holder connected

CHECKING VALVE CHARACTERISTICS



The circuit arrangement to which Dr. Roberts refers on this page.

up to the necessary grid-bias, high-tension, and low-tension batteries with a milliammeter in the anode circuit.

All you have to do is to take some particular anode voltage (it is assumed that you use the proper filament current and that this is kept steady throughout the whole of the tests) and then determine the way in which the anode current varies with the grid-bias.

In this way you will get a grid-bias anode-current curve for one particular anode voltage. You then take a different anode voltage and do the same thing again and so obtain a series of characteristic curves.

It isn't a bad plan to keep a little outfit of this sort on hand and to check up the characteristics, because they do not always correspond very accurately with the specification sheet supplied.

Amplification Factors.

Readers frequently ask questions about the amplification factor of different valves, and especially whether it is not always an advantage to use a valve with a high amplification factor; this latter question is very similar to the question as to why we do not always want a high-ratio step-up transformer.

It is only natural to assume, I suppose, that a high-ratio transformer will give better results than a low-ratio. Inasmuch as the function of the transformer is to step up the voltage, it would appear that the greater the step-up the greater the advantage.

To consider for a moment the question of the amplification of a valve, this really depends upon the way in which the valve is made, especially the construction of the grid and also the positions of the three electrodes in relation to one another.

The spacing of the wires in the grid has a very important effect on the amplification. You know that the grid stands as a "sentinel," as it were, or a traffic policeman, between the filament and the anode, and variations in the potential of the grid produce corresponding variations in the anode current.

Influence of the Grid.

Now the influence that the electrified grid has upon the stream of electrons passing from filament to anode depends, as already mentioned, on the spacing of the grid wires. If you take an extreme case, in which the grid consists of a single straight wire parallel to the filament, you will hardly expect this to have anything like so much controlling effect as a grid consisting of a mesh of close wires parallel to the filament.

The opportunity which the grid has for exerting its electrical influence on the electron stream is evidently much greater with the close mesh grid than with the single wire. In actual practice we use sometimes close mesh grids and sometimes open mesh grids.

Well, the influence of the grid being greater the closer the mesh (within limits), the closer mesh valve gives in general a higher amplification. With a valve having open mesh grid, other things being equal, the amplification will be relatively low.

Grid Mesh and "Slope."

But there is a corresponding disadvantage in using a close mesh grid because, although it has a greater control over the electron stream, a much larger percentage of the stream gets lost to the grid, and so a smaller percentage gets through. Therefore, although the close mesh grid is a better control, the anode current is reduced.

You see then that the increase in the amplification factor by using a close grid is to some extent offset by the increase in the internal resistance of the valve, and what we really want is to keep up the *former* without increasing the *latter*.

In fact, the ratio of the amplification factor to the internal resistance gives us (or, to be more exact, is proportional to) the "slope" or mutual conductance of the valve. This slope has been very greatly increased—that is to say, the efficiency of valves has been much improved—during the past three or four years, as a result of investigations into valve design.

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TECHNICAL NOTES

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Interference.

The various clicks and other interference which you get in a receiver due to electric light switches, the Post Office telephone, illuminated signs and so on, are generally picked up, at any rate mainly, on the aerial. If you have a mains set, this outside interference may be brought in partly by the mains, but I think you will find that the aerial is responsible for most of the trouble.

There are various things you can do to mitigate this trouble and one of them is to screen the aerial, or at any rate the lower part. Of course, if you screen the aerial completely you will cut down the signal energy to a very low value, which is hardly the right way of doing things.

If you are using a frame aerial you will not generally be so subject to this type of interference, but if you do suffer from it you can often cut it down quite a lot, without sacrificing too much of the signal energy, by the judicious use of screening.

NEXT WEEK

A NEW SHORT-WAVE ADAPTOR

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Push-Pull.

I have more than once recently mentioned the question of push-pull amplification in these Notes, and the importance of having the valves and output transformer sections properly matched. From time to time I have heard from readers that, although they have been to a good deal of trouble to get everything properly matched up, they have found after a time—usually a fairly long time, say a year or so—that the scheme does not seem to work so well, and in some cases they even get a slight whistle when the set is working.

It goes without saying that if the results change in this way the conditions must have changed, and we have to look for what sort of changes are most likely. Assuming that the most variable factors, such as anode voltages, grid bias, etc., are all properly attended to, and that the trouble does not lie there, it seems likely that it is due to an actual change in the components themselves, and most likely of all in the push-pull valves.

Matching and Grid Bias.

It is possible in some cases that trouble may have arisen in the transformer, but this is not particularly likely. The valves are the most likely seat of the trouble. What you want to do is to get a milliammeter and try the anode current of each of the valves, to make sure that they are still reasonably well matched and the emission is up to scratch. If not, you may quite likely get high-frequency oscillation.

If you find that one of the valves is not up to normal, you might try replacing it with a new one, but the only trouble there is that the new one may not match the remaining one of the two originals. In such a case there is nothing for it but to get a new pair of matched valves. An exact match between modern output valves is difficult to obtain, so it is always better nowadays to employ a "split secondary" input transformer so that grid bias may be individually adjusted.

Bandpass Tuning.

When you are troubled with stations interfering with one another, there are various methods which can be applied to separate them, one of the simplest being the use of bandpass tuning. This is really a filter arrangement by which the selectivity of the set is increased so that it accepts only a narrow band of frequencies at the same time keeping up the sensitivity to a reasonable amount.

Of course the band which is received, although it must be narrow enough to exclude the unwanted stations, must at the same time be wide enough to give proper reproduction. Excessive selectivity, as we all know, is very liable to produce distortion. With the bandpass arrangement however a useful compromise is made between these two effects and the loss of sensitivity should not be serious.

When selectivity is greatly increased in the ordinary way one of the first results is to cut off the higher frequencies; bandpass tuning avoids this. Bandpass coils are widely used in up-to-date receiving sets.

Loudspeaker Extension.

Often enough when wishing to have the "wireless" in different rooms people are a bit uncertain whether they should leave the set in its original position and run loudspeaker wires from one place to another or whether they should shift the whole set complete with loudspeaker and run an extension of the aerial and earth to the set.

The latter arrangement of course would have the advantage that the set would be available at the place where it was wanted so that it could be easily adjusted or tuned to different stations.

If you leave the set in a fixed position and run extension leads for the loudspeaker it means that whenever you want to make any alteration to the set—except perhaps volume control—you have to go back to where the set is to make them unless you use remote control arrangements.

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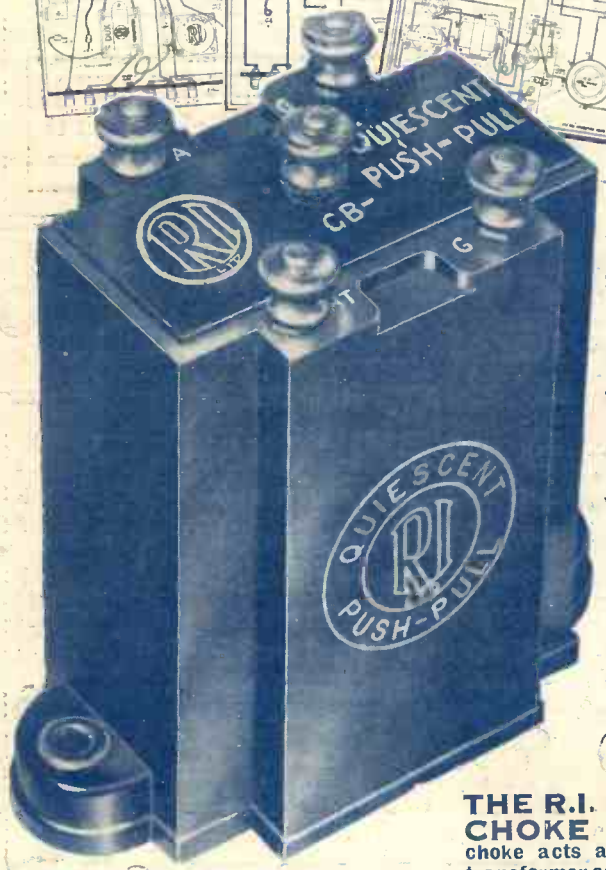

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