

# A SLASHING ARTICLE BY CAPT. ECKERSLEY

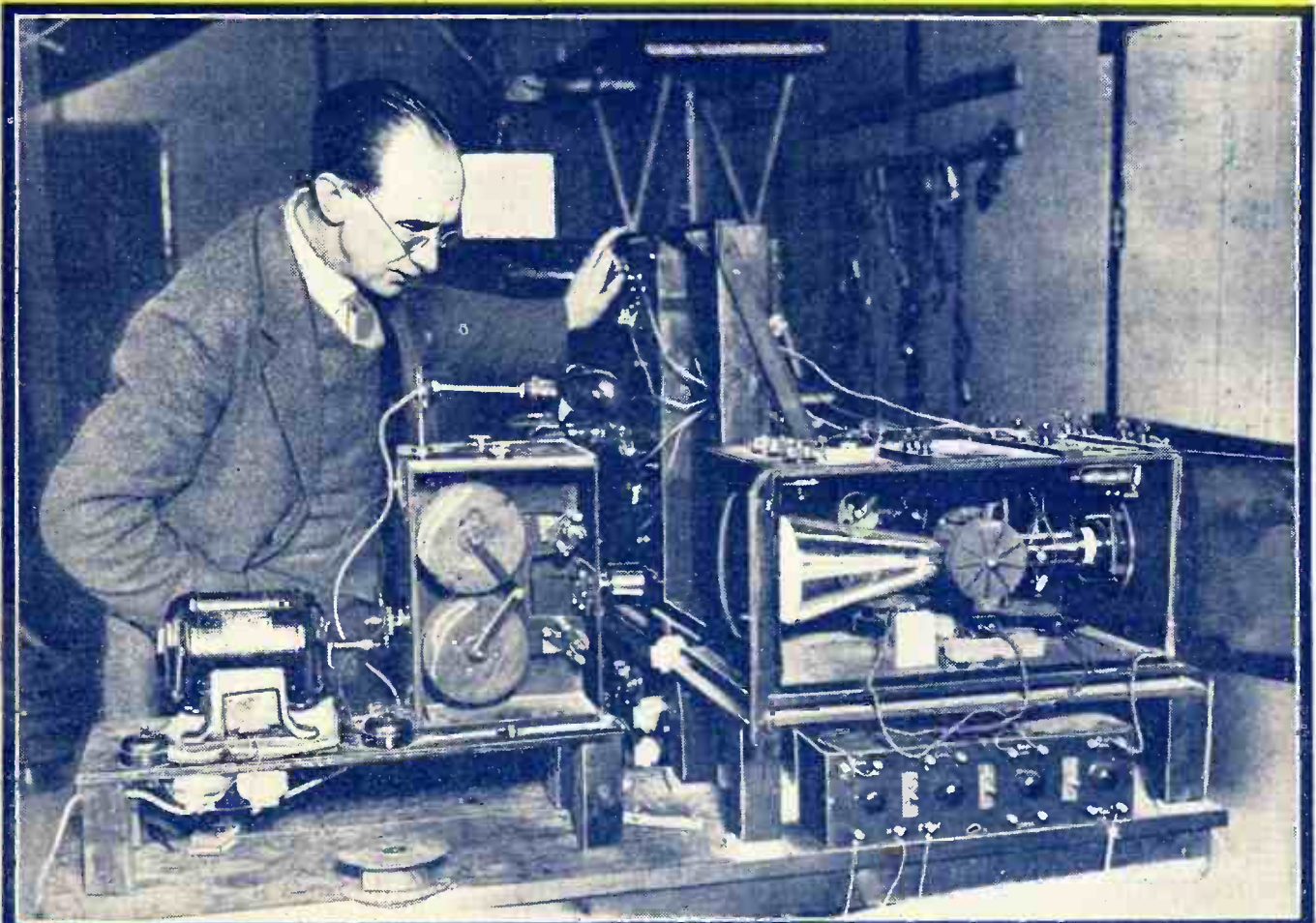
# Popular Wireless

Every Thursday  
PRICE  
3d.

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INCORPORATING "WIRELESS"

August 1st, 1931.



*Among the Special Articles This Week are—*

COLLECTING RADIO ANTIQUES

THE LATEST FROM LAUSANNE

WHAT THOSE CURVES MEAN—By VICTOR KING

MORE ABOUT THE "S.P.V." THREE

RADIO SURGERY

DESIGNING A SHORT-WAVER

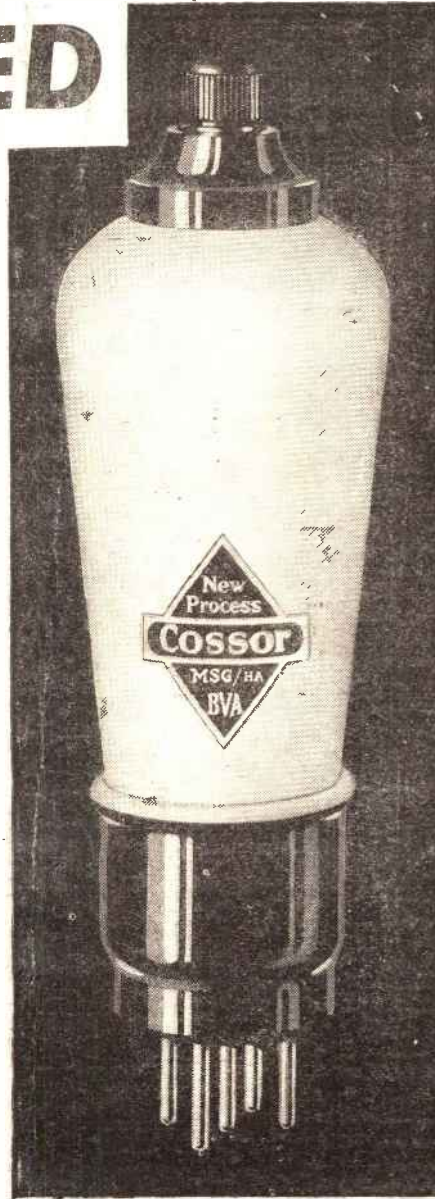
WITH THE B.B.C. IN THE NORTH (GLASGOW)

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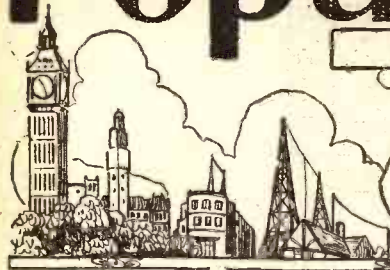
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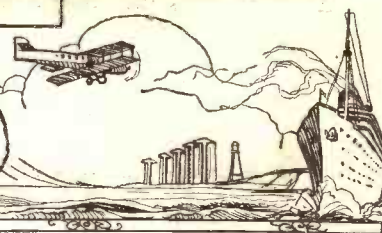


# Popular Wireless

LARGEST NET SALES



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 K. D. ROGERS, P. R. BIRD,  
 A. JOHNSON RANDALL.



SONG "PLUGGING"  
 THE "GECOBIRDS"  
 I AM CORRECTED  
 "YOUR TONE VARIES"

## RADIO NOTES & NEWS

CORRESPONDENTS  
 WANTED  
 THIS DANCE MUSIC  
 IGNORANCE IS BLISS  
 THIS MEANS YOU!

### Portables in Camp.

A HIKER who hiked before hiking became a craze complains that at some of the camping places he has been greatly annoyed by the thoughtlessness of motoring campers who allow portables to blare till the last possible minute in spite of the fact that around them are tents containing people who are trying to sleep after putting the miles behind their packs all day. I advise him to carry a saxophone. That would drive the motorists to bed.

### Radio, the Essential.

SO it has come at last. Radio is no longer a novelty, a luxury, something like a self-recording grammy or a cine-camera; it is essential, one of the commoner of the household gods, harmless and necessary—like father. If legal decisions in foreign courts tend to create precedents here, then special interest will attach to the decree of the Danish courts, which lays it down that a bailiff may not seize a radio set under a distraint warrant, it being considered that such apparatus is "essential to the maintenance of a household." Evidently it now ranks with the meat safe, the mangle, and the dust-bin.

### A Challenge!

THERE must be some fascinating jobs, crammed with variety for certain officials of broadcasting organisations. For instance, John R. Carey, Service Supervisor of the National Broadcasting Co. (U.S.A.), has to keep the telephone in order, keep the lifts from lifting the roof off, charter tug boats, persuade railway trains to wait for radio "stars" who are late, and produce any noise from a "horse and buggy" to an elephant's sneeze. Some of his noise-making devices are clever and amusing, but I challenge him to imitate mechanically the sounds of a good, all-out cat fight.

### Song "Plugging" by Radio.

IF, as has been rumoured, song "plugging" by radio is to be stopped by the formation of B.B.C. dance bands and the exclusion of outside dance bands, then I for one would prefer the "plugging" to continue on the old terms. I look at it in this way. I do not pay my licence fee and listen to the programmes in support of any trade or profession, and if British

family radio set alive, nearly driving the said somebody to distraction with the boom and blare of the loud speaker morning, noon and night. One version of this tale states that the wireless was derived from one of the much-in-the-news relay services and a kick is registered against the relay system. Had I been the victim I should have shot round to the Post Office with a complaint and then, while they were seeking Parliamentary authority to act, I should have gone away for my own little trip to the seaside trusting and hoping to find that the "tap" had been turned off by the time I got back!

### FAMOUS INVENTOR'S DAUGHTER



Mrs. Morse Rummel, daughter of Samuel Morse, the inventor of the telegraph, reading messages of congratulation on her eightieth birthday. Morse sent the very first telegraphic message to his daughter in 1844.

composers feel that they don't get a fair show because American "dough" subsidises bands, that is not my affair—though I am sorry—but the B.B.C.'s. What's wrong with "plugging" so long as the listeners are pleased, anyway? And why not plug some of the talkers?

### Wireless for Ever!

THERE is a story going round to the effect that somebody's neighbours went off to the seaside leaving the

"Miking."  
 YEA, even "Ariel" knows the joy, the value and the risk of a "mike." Lest this sound an unmoral note in the ears of my brother workers I hasten to add that the "mike" which I have in mind took place at home. No chance of "miking" in the office: my typist's eye alone—. When I ought to have been reading trade journals, Chamber of Commerce reports, and other soul-killing bungo I smoked my pipe over, "The Loud Speaker," the "house organ" of the G.E.C. at Coventry. A week or so back I was dreaming of being an Exide guy, now I am not sure that I don't want to be a "Gecobloke." Not much "ated kepalist grindin' dahn the fices ev the pore derloodid perdoocers," about the G.E.C. A happy family, rather.

### The "Gecobirds."

MY favourable leanings towards the G.E.C. considered as an employer of labour and a specimen of a modern manufacturing concern are warmly supported by Mr. G. V. Dowding, who spent a happy day at the Coventry Works last

(Continued on next page.)

NEXT WEEK—AN ENTIRELY NEW SET DEVELOPMENT

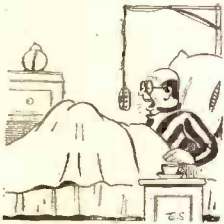


# "ARIEL" CONTINUES HIS POPULAR NEWS FEATURE

month. Mr. Dowding tells me that he was highly interested and entertained by the various items on the programme, not the least attractive amongst these being a spot of lunch garnished with a cabaret show in which very pretty girls were used to introduce the new G.E.C. sets. Geco-birds?

"Yours truly" from Regina.

AND Saskatchewan at that! T. S. from that place sends me an amusing picture of a radio speaker before the "mike," giving instructions for P. J.



(early morning brand). "Smartly now! One, two—up on the toes!" But the speaker is snug in bed with the "mike" beside him. T.S. has written on the picture, "Hop to it, Ariel!" No buddy! Hopping

won't cure my trouble. I have to lie on my back and draw patterns in the ether with my feet; much more difficult than tiptoeing, believe me!

### I Am Corrected.

FIRST of all, T. S. points out that I stated that the "C.P.R." owns radio stations. I should have written "C.N.R."; an obvious slip. Then he denies that Amos 'n' Andy are losing their popularity. Glad to hear it, and hope that you can prove it. Lastly, he says that radio advertising must pay Americans or they wouldn't do it. Well, my son, you'd be surprised at what has to be done in big business without any direct return on the investment, sometimes with no return whatever.

### "Your Tone Varies."

T. R. S., a six years' friend of "P.W." doesn't understand the code which he hears amateurs using and asks questions. I will give a few examples.



QSA (Strength of your signals is good). QRN-r (but I am interfered with by atmospherics). QSB-r (Strength of your signals varies). QRK-r (Receive you well, your signal good). QRM-r (I am being interfered with). OSX (Your wave-length varies). Tone-t (Your tone varies). QRG (Tell me my wave-length). QRB (How far are you from me?) QSO (Can you communicate with . . . direct?)

Have You Picked This Up?

### Have You Picked This Up?

PRIZE names in my memory. Pio Fi, the man with the shortest name; who was a Spanish radio man and longed to be a torador. He once killed a small bull after about twelve jabs. Caradoc Pants, a haberdasher of Boston, U.S.A.; and Noah Younghusband—just exactly what Noah

was not. But have you picked up signals from the good ship Parapatha Paykialetcherry, built by Canthucuddyveloopulle, owned by Sapapathy Punneamooty, and commanded by Nagappiar Chokalingan? All that for a mere 133 tons burthen. It's true, too!

### Correspondents Wanted.

MR. THOS. A. WEBB, 47, Belmont Avenue, Hamilton, Ontario, Canada, wants some of you chaps to write to him about radio, as he is an English-born dweller in Canada and the recent

### SHORT WAVES.

A farmer, writing to the press, says he thoroughly enjoys the Children's Hour on the wireless. It would be a graceful response if some toddler were to write expressing the interest he (or she) takes in the Fat Stock Prices.—"Punch."

"When my loud speaker is entirely disconnected from the set," writes a correspondent, "I can hear the signals quite distinctly. Can you explain the reason for this phenomenon?"

Well, we think you should put more water in—your batteries.

A wireless set has been placed in the Gravesend Police Station for telling the time. Will a few portables for the cells be considered, for the gents about to do time?—"Gravesend Reporter."

### TROUBLE AT OHM.

"I am going to attempt a survey of pocket wireless as it might be commercially developed for every day (and night) use. Will the loose-couplings of Brown and Robinson not be damped by heterodyne interference from the Dull Emitters awaiting them at ohm? Will their passionate assurances in remorse code mend a rift in the lute, a leak in the grid? Will, oh, will Brown and Robinson be happier if and when the still, small voice resounds from their hip-pockets and there is constant high-tension on their respective wive-lengths? I wonder."—"Daily Mail."

Perhaps the B.E.C. Pronunciation Committee can assist:

Should we to our domestic speak About her falling short: "You haven't dusted for a week The grand pianofort!" But being quite high-browed and haughty, She would reply in manner snorty. "Do you mean the pianoforty?" "Surrey Comet."

Adam: "I oft sinner on the radio." Eve: "Coward!"

discovery of "P.W." has created in his soul a nostalgia which only English correspondents can assuage. Werry pretty wrote, though I says it myself. He inquires about "Modern Wireless," which he thinks is "dedicated to short waves." Well, not wholly to short waves, but it is the best English radio monthly of its kind, and the Canadian subscription rate is 15s. 6d. per year. Thank you for being a new reader, Mr. Webb. Spread the good news about "P.W." throughout Canada.

### Kind Words from Quetta.

SIMPLY amazing how "P.W." gets about. You ought to be proud of us, gentlemen of England, Caledonia, Wales, Northern Ireland, and the Isle of Man, not forgetting Dogs and Channel ditto. In far-off Quetta, Baluchistan, sits

one, H. G. F. inditing goodly matters about us. He likes our circuits, the "Magic" Four is the best ever for his part of the world; he gets the National programmes on it. W. L. S. is dear unto him, and "Modern Wireless" is highly commended. He swears by the "Globe-Trotter," and so do other dwellers in Quetta. Perhaps he could bring some of these more important concerns to the notice of those pessimists who foretell another world-war. Nothing like "raddio," H. G. F., to foster the jolly old fraternal!

### About This Dance Music.

I HAVE a plastic mind; too plastic when I listen to rival politicians, for I become half Free Trader and half Protectionist—an awful state! But this plasticity is

the mental property which has allowed me to be transformed into a dance music Laodicean; I cannot say that I am enthusiastically warn, but I certainly am luke-warm, whereas I once was frosty. I don't dance—all along of my cork leg!—but the Chief Arielette was so insistent that I attended one of her "hops," my first for twenty years, and there can be no doubt that modern dance noises invest these affairs with a jollity and zip impossible to the mooning string bands of my youth. N.B.—Cork leg metaphorical! Vive le Zhack Payne!



### Ignorance is Bliss.

A FRIEND of mine who has just returned from a cruise in a small private motor yacht tells me that his three days of mal de mer were heaven compared to the twenty-four hours of fog, when they crept

timorously through a blanket of wringing mist, their siren bawling raucously across the water. (See illustration.) He says that he derived untold comfort in watching the D.F. aerial, believing that the ship was miraculously immune from disaster while that was in action. When the yacht emerged into sunshine the skipper told my friend that the "D.F. aerial" was connected only to the saloon broadcasting receiver!



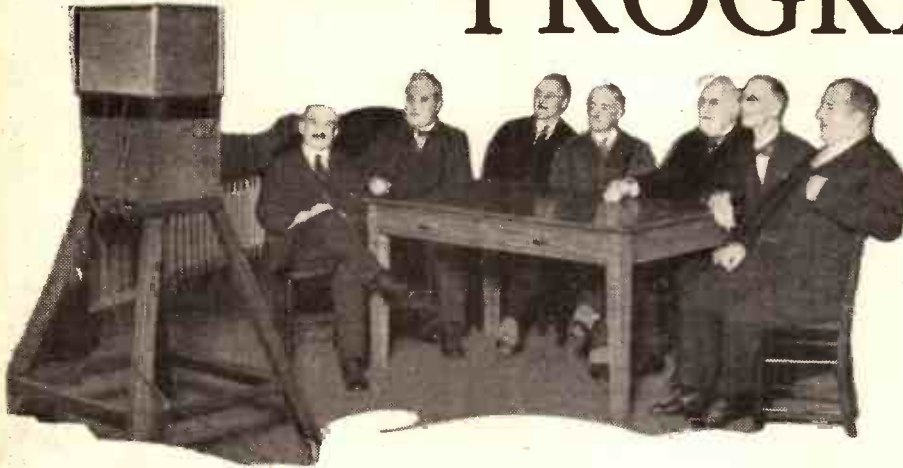
### This Means You!

THE chief of the B.E.C. is reported to have said to the Summer School of Broadcast Adult Education, "We must see that by the operation of broadcasting the intellectual and ethical standard of the community, low enough, in all conscience, as you will agree, is not brought lower still." The italics are mine, to direct your attention to what some of 'em believe and preach about your standards and mine!

ARIEL.



# THOSE ALTERNATIVE PROGRAMMES



By  
**Capt. P. P. ECKERSLEY, M.I.E.E.**  
 Our Radio Consultant-in-Chief  
 lashes out at the present B.B.C.  
 programmes, and pleads the cause  
 of an independent broadcasting  
 competitor to liven things up.

**B**UT quite honestly the programmes are boring. But they *are*, my dear friend, they *are*! Can you really conscientiously say that, except for live things like Jack Payne's band, some of the more robust variety and a talker or two, you feel anything is going on up there in Savoy Hill?

Do you feel that there are *people* at the other end? It seems to me as if the B.B.C. and their mouthpieces the announcers are primarily and conscientiously performing a duty in providing the programmes.

It is tritely said that it's impossible to please everybody all the time; my complaint is that the B.B.C. succeeds so well in doing just that. But they don't succeed with you, do they? No? No! No!!

It's all *dull* I repeat; a sawn off performance, lifeless, so same, so girl schoolish, so priggish and so self-righteous!

The other day one of Reith's head boys was reading a news bulletin, and an item mentioned that Mr. Lansbury had said that announcers worked on Sundays. And the dear boy blushed in his speech and made a faint discreet aside, and we allowed our Sunday faces to relax in a prim little approving smile.

It was reported that a wireless critics' circle had been formed, that a lunch was held and a master of B.B.C. polemic declared it to be "a new force destined—most important rôle in journalism," while Eric, alias this and alias that, and rising, little by little, from the lunch table in "a typically witty speech" likened his guests to the animals at Whipsnade.

## We "Grin and Bear It!"

And the way the new man announces French! He pronounces French just like an Englishman who knows how Englishmen usually pronounce French. "Oh, my dear! What a talented boy." It's all "so mawkish, so unmanly." "Where are the guts of yester year?"

A baritone singing in the lunch hour neither balanced or controlled, hymns and brass bands (well) after Sunday lunch, appeals by actresses for charity immediately following the last dot seconds, the informal tocking of a hammer during the dreary waits between emasculated opera, and a

running commentary on a chess match, the vulgar, cheap print of the advertisements of the "Radio Times" next to the programme Bradshaw, and the special gothic print to show the respect due to the fact that we cannot "pick up" on Sundays.

And behind it all the right people going to the Sports Club (for 10s.) and sitting in careful caste groupings in immoderate blazers. Enthusiasm derided, holidays extended!

## Time Will Tell.

Five more years shall roll and then? Who knows? But really might not the B.B.C. meanwhile, for its own sake, and having dismissed all the above as jealousy and pique on my part, think of some innovation.

Sixty per cent of the population to-day can get an alternative programme. I repeat, but more accurately, that sixty per cent *could* get an alternative programme.

Assuming that the B.B.C. were on fire with purpose how, even then, could the

## WILL ROGERS CALLING!



America's greatest manufacturer of "wise cracks" broadcasting for the wide-flung Columbia chain of stations.

same set of persons, the same body with necessarily the same ideology, ever produce truly alternative expressions from the same medium?

Does a writer of detective stories produce a great romantic novel; does a scene painter ever take good photographs? (I don't know, do you?) So why not, with a due measure of control, of course, hand over that second wave-length to someone else just as an experiment?

It seems to me as if advertisement programmes could be ideally given as an alternative to the present B.B.C. programmes. I know all the objections; vulgar, would seduce those who had come to look upon the B.B.C. as ———, would be very difficult to select one advertiser from another, etc., etc.

But the aim and object of an advertiser is to please those who listen. If this is the object of the B.B.C. also, there is no fundamental departure here. If it is not the B.B.C.'s intention to please its listeners, it's time something was done about it.

Then this vulgarity touch, seducing people to listen to what is not really good for them. Who on earth dares openly suggest that people are not fit to hear anything that is not vicious? Incidentally, anything vicious is therefore banal and therefore useless as advertisement.

This type of autocratic treatment of the public which denies and does not give, which has grown up since I was a child, is, to me, the most menacing feature of modern England. Broadcasting should exist to break it down, not to build it up.

## "Tickle Them Up."

The advertiser would bring a contrary spirit which would have the merit of reality in any case. As to the difficulty of selecting one advertiser from another, this is imaginary. Provided any advertiser can produce a programme worthy of the public it addresses, then any advertiser should be welcome to the microphone.

There are sixteen hours in a broadcasting day, there are seven days in the week and fifty-two weeks in the year. There is room for all better programmes. Think what might come of it all, think of the enterprise that such people, used to attracting the public, might bring.

Either this, or the B.B.C. should do *something* new. Poor dears, though, it's a jaded life to sit in an office and think out new schemes when you are caught in the machinery of so vast, so ponderous and so "efficient" an organisation.



# STATIONS WORTH HEARING

Some practical distant programme notes compiled by a special contributor who nightly searches the ether in order to obtain really up-to-the-minute information for "P.W." readers.

THE temporary setback in reception conditions which I mentioned last week as a possibility has duly occurred, and at the moment of writing we are suffering somewhat from its effects. There was a marked improvement at the beginning of July in all-round strength, and in the number of stations obtainable.

This continued for quite a while; then came what a dyed-in-the-wool Irishman might call progress backwards. This kind of thing is by no means abnormal as I pointed out in my last notes.

## In the "Doldrums."

The depression will in all probability pass away as suddenly as it came, and we shall find one night in the near future that there is an enormous change for the better in every way.

Meantime, do not be downhearted, fellow-thirsters for foreign programmes, for even on the worst of nights in the present era of high-powered transmitters and efficient receiving sets the number of alternatives that your receiving set will bring in is pretty considerable.

No one with three or more valves at his command can complain that he is tied to the local station nowadays, or anything like it. He should have, no matter how poor all-round strength is, at least half a dozen alternatives waiting for him which have genuine entertainment value.

That is on the worst of nights. On anything like a decent evening the number is trebled or quadrupled.

So if you find that quarter-kilowatt stations a thousand miles away are still on the weak side don't jump to the conclusion that long-distance wireless is an over-rated hobby. It most certainly is not, for quite apart from the pleasure of pulling in stations at long range the owner of an efficient set never needs to switch off if he doesn't like the fare provided by the home studios.

## Summer Conditions.

All through the summer he has had plenty to choose from, though it has been on the whole a poorish long-distance time, and every day that passes sees us nearer and nearer to the welcome period when the

good set is capable of giving a choice of literally dozens of different programmes.

The long-wave stations have mostly maintained their strength despite adverse conditions. Almost the only foe, in fact, which really defeats reception of them is the unmentionable atmospheric.

At any time when these are not about you can feel perfectly certain that Huizen, Kalundborg, Zeesen, Warsaw, Radio-Paris and probably Motala are waiting for you.

## Select the Bigger Stations.

On the medium band during rather poor periods a sound rule is always to go for the stations which you know to be the most strongly received. Brussels Nos. 1 and 2 hardly ever let you down, and you can rely upon Beromunster, Sottens, Strasbourg, Turin, Gothenburg and Frankfurt on the great majority of evenings.

All of these would be there on every evening were it not for two adverse factors which have been rather noticeable of late. The first of these is fading, which has affected an unusually large number of stations, and the second is heterodyning, which is a matter that cannot be rectified by anything that is done by you or your set.

Toulouse unfortunately still continues to wander over the wave-lengths and has succeeded on many occasions in jamming himself and others as well. Another instance is Turin, who has also been a rather bad sufferer.

A great deal of the heterodyning that we experience is caused by the foolish behaviour of many of the French stations, which either cannot or will not adhere to their allotted wave-lengths.

AS I write these notes I can hear the distant roll of thunder, and, if I were to switch on the short-wave set, I am sure I could hear also the distant "crunch" of atmospherics. They were so strong when I last listened that I thought my Brown's "A" 'phones would jib at the unfair work being given them.

Yet a short spell of listening on the broadcast wave-lengths makes me thankful that I am a short-wave man. On the 40-50-metre band, admittedly, atmospherics at this time of the year are often very bad. But below 30 metres I can definitely say that I have never yet had to give up listening because of them, however close the storm happened to be.

## Heard This One?

One of my favourite "tall tales" (although perfectly true) concerns a certain morning when I arose at about 6 a.m. and went straight to the receiver. Having got the transmitter in action and "raised" an American, I was nearly knocked off my chair by a terrific crash in the 'phones, coinciding with a flash of lightning apparently just outside the window.

It appears I had slept soundly through the first half of quite a severe storm, and had actually "got on the air" during a lull without noticing any atmospherics until the specimen I have mentioned nearly laid me out.

Having got properly into my stride again after my short "break" I am of the opinion that conditions above 30 metres are not all that they might be. The 40-50-metre band of broadcast stations are distinctly

## SHORT-WAVE NOTES

A few interesting observations concerning happenings down on the short waves by W. L. S., a very well-known amateur transmitter and a leading expert on the subject.

weaker than usual until very late, when they appear to come up to something not far short of their normal strength.

Can anyone tell me definitely the name of the German station on about 32 metres, very close to Lyngby and Zeesen, that transmits gramophone records fairly regularly?

I have heard him three times on Sunday evenings—in fact on each Sunday that I have listened recently. There is a limit to patience, and, in spite of such diversions as printing photographs while waiting for an announcement, I have had to admit myself beaten every time.

## My New "Baby."

Incidentally, I am treating myself to a new receiver for short-wave broadcast, quite separate from the "amateur band" receiver. So as not to have an unfair advantage, I am making it of the very simplest type imaginable, and I intend to burn the midnight wats and enter into direct competition with some of those "P.W." readers who seem to hear everything that has ever been on the ether.

Just for curiosity, when I have finished it, I am going to pack a thermos flask and some sandwiches and make a 24-hour sitting of it. If any of my readers like to accompany me on this trip and send in their logs for the same 24 hours I shall be interested to compare notes.

In "design," if the throwing together of components can be called that, the set will go back some years. It will be a perfectly straight two-valver of the type that has given successful results on short waves since 1927. Incidentally, I still know of nothing to beat an old set I had at that time, although for amateur-band work I now use a screened-grid stage.

## "Nightmare" Dials.

Is anyone ever bothered with noisy dials and condensers? I remember some of the nightmare times I used to have, entailing hurried journeys to the local shop to borrow either a new dial or a new condenser, or possibly both, still to find the most atrocious scratchy noises on rotating the controls.

New components did not cure the trouble then, for the simple reason that it was simply downright bad design, and not dirt or age, that caused the trouble. Luckily we have progressed since then, and do not seem to be worried any longer.

"W. M. F.," of Aberdeen, wants to join the H.A.C., but does not know where we get our six continents from! In case others are in a similar position, they are: Europe, Asia, Australasia, Africa, North America and South America. To become a member one has to hear them all on telephony.



# The LATEST FROM LAUSANNE



THE International Broadcasting Union held its usual June meeting at Ouchy-Lausanne, from June 22nd to July 1st. The first half of the time was devoted to committee work, the second half to the general assembly and to council meetings. The meetings were, as hitherto, strictly confidential, but being on the spot I was able to gather more or less what was in the air.

### Talking Things Over.

The beneficial effect felt by all concerned in regular meetings and thus getting to know each other applies on the whole only to the technical people and to the general directors of the European companies.

For instance, at the June meeting at Ouchy only two programme directors were present. Therefore, the U.I.R., according to my information, intend bringing the European programme directors together for a bi-annual conference.

This seems all the more necessary as international programme exchange is now technically possible and, therefore, it would be helpful for the actual programme directors to get into touch with one another and discuss problems which affect them all, and at the same time arrange for interesting international exchanges.

The reason for a proposed interval of two years between each meeting is a very practical one. A programme director is usually too busy with his work, and it is impossible for him to leave his subordinates too frequently. But once in two years it should be possible for all concerned to get away at the same time for a few days at least.

### International Concerts.

A programme of five international concerts, to be relayed by as great a number of stations as will take them, has been decided upon, but there still remains to be heard the opinions of the programme people, who will know if the dates fixed fit in with other arrangements, and if artistes can be engaged, etc. The five concerts will probably take place before the end of the year.

Perhaps the most important work done at Ouchy was performed by the technical people. This is important to the long-distance

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**Our special correspondent gathers, on the spot, some vital information concerning the recent meeting held by the broadcasters of Europe.**

\*-----\*

listeners, and to the local listener as well, for that matter. The question dealt with was that of allocation of wave-length.

I did my best to interview Mr. Braillard, the President of the Technical Committee, on the subject, but he gently and firmly spoke continuously of the weather, of his car, and when I asked him what was still on the agenda he took out a notebook and told me that he was booked for a dinner-party at Bruxelles on July 7th, and that he intended going by road to Bruxelles.

### Relying on Rumours.

So I gave up all hope of getting anything official, and the following are just my own opinions based on information I picked up when at the Hotel Beau-Rivage at Ouchy. Rumours are curious things, but I think in this case they are reliable!

With the arrival of high-power stations practical experience has shown that a wave-

length separation of only 9 kc. is not sufficient for quality reception of two neighbouring powerful transmitters without interference.

### The Muhlacker "Muck up."

On the other hand, tests carried out between Muhlacker and London have shown that at least 12 kc. are necessary to properly separate big stations. But we already know that Europe's ether is overcrowded, and that there is no room for any more stations or for a greater separation between wave-lengths, as this would mean the suppression of existing transmitters.

One way out has already been proposed: This is to ask the various governments at the Madrid conference in 1932 to give more wave space for broadcasting. But even if this proposal were favourably accepted, at least a year would pass between the end of the Madrid conference in 1932 and the putting into force of any new regulations.

Then the chances are small for existing services, such as those for aircraft and navigation, to give up part of their wave space. The Broadcasting Union, however, always have the welfare of the listener at heart, and for that reason I understand that tests and research have been decided upon to permit a revision of the so-called Prague Plan.

The revision, if any, cannot be expected before the meeting of the U.I.R. in Rome next October, 1932, and then it can only be a part revision, that is to say, a rearrangement of certain wave-lengths giving adjacent high-power stations at least 12 kc. separation between them.

### Too Big a Job.

For a complete revision, a new Prague conference would have to be called, and with the governments just back from the one at Copenhagen, and with preparations for the great Madrid conference going ahead, where not only broadcasting but every phase of wireless will have to be discussed, it is doubtful if they would assent to this.

Therefore, if listeners are not to continue with the present state of affairs, which are getting worse as each new high-power station

(Continued on next page.)

## ABOUT LONDON AND MÜHLACKER?



Admiral Carpendale of the B.B.C. (standing) discusses some weighty problems with a few of the other delegates at Ouchy.



## DESIGNING A SHORT-WAVE SET.

Some practical hints.  
By H. D. PRICE.

I WONDER how many short-wave enthusiasts have been asked the following question by some ardent B.C.L.: "How many valves do you need to get Australia?" Personally, I always reply "one." I do this for two reasons. Firstly, because it is correct and, secondly, to see the look of incredulity come over the questioner's face.

The more normal receiver to use, however, is the conventional detector and one low-frequency stage or possibly two, but it must be borne in mind that by adding low-frequency stages it is impossible to amplify signals which are not already in the anode circuit of the detector. That is a point which seems to be forgotten by so many listeners.

### Making a Start.

Therefore, as "W. L. S." has so often pointed out, it is a good plan to experiment with the plain detector in order to bring this stage to its very highest point of sensitivity. Then if an amplifier or two is added you can rest assured that you are getting maximum results from your set. It is advisable always to use as small a reaction coil as possible, and this should be coupled right up to the grid coil as close as it can be. Use a short aerial of about thirty feet, joined as near to the grid end of the tuning coil as possible.

Now there are a few points about the tuning circuit which are well worth remembering. The tuning condenser, for instance, must go straight across the grid coil. By this I mean that the moving plates must not be joined to any convenient point on the earthed filament circuit, but they must be joined actually to the earth end of the coil itself, otherwise the length of wire from where the condenser is joined, to the filament end of the coil, becomes part of the tuned circuit and naturally increases its size.

With reference to the coil it should be wound on some kind of "low-loss" former, preferably of the plug-in variety, as this facilitates wave-changing. It should be wound with not less than No. 20 S.W.G., and it is a good plan to space the turns a little, as this makes the most efficient coil for short-wave work.

### Cutting Out "Threshold Howl."

It will be found that a .0001-mfd. or even a smaller condenser is more suitable than the conventional .0003-mfd. grid condenser on the higher frequencies, as a lower value helps to make the set oscillate. In the same way reaction control is improved by the use of a higher value of grid leak up to about 10 megohms, taken to the slider of a potentiometer which can be varied to find the point which gives smoothest control.

That finishes the grid circuit of the detector and we now come to the plate circuit. It is here that the well-known trouble of "threshold howl" occurs. From experience I find that a resistance instead of a choke in this part of the circuit is inclined to lessen the tendency to howl and also improves the smoothness of reaction control which, of course, is essential if telephony is

to be received, but not so necessary if it is only desired to receive C.W. signals. The most suitable type of resistance to use is a "spaghetti" of between 10,000 and 20,000 ohms, as this takes up so little room and at the same time is inexpensive.

The low-frequency transformer is often another cause of "threshold howl," but this can nearly always be stopped by putting a resistance of .5 meg. or less across the secondary, but, unfortunately, this cuts down the amplification of the L.F. stage.

### The L.F. Stages.

The quality of Morse signals does not matter, so the characteristics of the transformer can be altered till "threshold howl" stops. A high-ratio transformer is useful, as it is inclined to peak the C.W. signals, which greatly adds to the ease with which they can be copied through the interference that is only too prominent on the amateur short-wave bands.

There is nothing more to be said until one comes to the output from the plate of the final L.F. valve. In all short-wave receivers an output filter is a great help. It not only tends to eliminate hand-capacity effects, but also for some reason is inclined to decrease threshold howl.

An H.F.C. in the 'phone leads is more or less essential if absolute freedom from hand-capacity is desired, but in which lead it should be put must be found by experiment. Another help is a small condenser of .0001-mfd. up to .001-mfd. straight across the 'phones, this will by-pass any H.F. that happens to pass through the choke. A volume control is also a great help; this should also be connected across the 'phones.

While on the subject of hand capacity, here are a few useful tips which may help some short-wave enthusiast whose receiver is suffering from this disease. It is always a good plan to have the receiver in a metal cabinet, or at least to have a metal panel, as this shields the set from the effects of the body in the same way as a screen in an H.F. stage shields the coil of one stage from that of another.

Another point is to stand all the batteries on an earthed metal plate. This also is a fairly certain cure for mains hum, which is so pronounced in many short-wave sets. This hum appears in most cases to come from the house wiring under the floor and the batteries, if they are standing on the floor, appear to pick it up.

My own receiver includes all the above points and during the seven years I have been receiving on short waves I have logged over 150 countries and have been in communication with 97. I mention this to prove that with a properly designed receiver it is possible to copy even the weakest signal though interference is bad, as all these countries have been received on the amateur bands, which are noted for "jamming."

## THE LATEST FROM LAUSANNE.

(Continued from previous page.)

is opened, the Union ought to and, I hope, will take independent action. This, again, is only possible if all members are unanimous.

From what I could gather, they were unanimous as regards the present inadequacy of wave-length separation between stations, and it is only to be hoped that there will be the same unanimous vote when the new measures are proposed.

### A Suggestion.

As far as these are concerned, I think I can suggest one: All relay stations could be transferred to national or international common waves as they already are in Britain and a few in Germany, thus releasing wave-lengths or giving more space between existing ones.

After all, the number of high-power stations is only about twenty, and one can

## FOOD FOR THOUGHT!



Mr. Noel Ashbridge, Chief Engineer of the B.B.C. (right), in ruminative mood.

so place them that the extra 3 kc. separation will only be needed on one side, meaning that about three or four new 9 kc. wave-lengths will have to be provided, and this should mean that only about three or four stations, at present working on exclusive waves, would be put on to a common wave.

### Improvement Next Year.

This, however, is for the Union to decide. Anyway, I think that listeners can look forward to an improvement in the present wave-length situation, if not for this year, at least from January or so onwards.

Nearly everyone will agree that it is impossible for the present state of affairs to continue for long. It is not too bad at the moment, but when the winter comes along, with the accompanying "good conditions," things will be hopeless.

## NEXT WEEK.

### THE P.W. "SUPER-QUAD."

AN AMAZING SET DEVELOPMENT.





# RADIO SURGERY

**T**O-DAY, among the miracles that radio has wrought, is one of the finest surgical instruments ever invented, according to many of those who have used it—and it is nothing more than high-frequency current.

By "surgical instrument" I mean just that—an instrument for the cutting of human tissue, the removal of malignant growths by actual surgery, or the resection (not the destruction by burning) of a bad thyroid gland, unhealthy tonsils, or a diseased appendix. A finger could be even more neatly amputated by the use of the "radio knife" ("endotherm" is its proper name), and a small bone-cutting saw or knife, than it can, now, by the use of the scalpel.

### Shock Depends on Frequency.

In the latter part of the last century the great Polish engineer and scientist, Nicola Tesla, and Professor d'Arsenal, one of France's outstanding workers in electricity, both noted the effect of high-frequency current on living tissue. They worked out at that time some facts about it which have since been proven not only accurate, but extremely useful.

They found that a current up to 10,000 cycles created the well-known muscular spasms, even resulting in death if administered in high enough amperage doses. The spasmodic muscle contraction, however, gradually decreased as the current frequency increased. Somewhere around 300 cycles seemed to be the most violent and painful effect, and also gave the most serious burn.

Above 10,000 cycles the human nerves seem unable to register or transmit to the muscles the electrical shock. This high-frequency current can, however, in spite of the absence of muscular contraction due to the current proper, inflict a very deep burn of a special type.

### Spark as Knife-Blade.

For surgery it is the high-frequency spark that does the work. It is rather difficult to say who really started forward the study of high-frequency surgery; but shortly after the war Dr. George A. Wyeth, of New York, began a careful investigation of endothermy, using a cold needle to create the same effects (desiccation and coagulation of tissue) as was being done with a hot needle.

By F. M. DELANE.

Radio principles are finding wider and more varied uses as time goes on; for example, the latest application of high-frequency currents is in the surgical field, where a new type of electrical knife has made its appearance. In this article our contributor tells you all about it.

He soon found that he could break open tissue by a high-frequency spark, and eventually worked out the principles which two American companies have now commercialised—one in the "endotherm" (taking the original name of the treatment, and the other in a high-frequency surgical unit, the former instrument being a regular spark transmitter, the latter a three-tube transmitter.

### THE YOUNGEST YET?



This is Miss Dorothy Maddick, who announces regularly from station 3EF, Melbourne, Australia. She is claimed to be the world's youngest announcer, being only 12 years of age.

The patient is laid upon the operating table with a carefully grounded metal plate laid beneath him. The anæsthetic having been administered, the operating surgeon turns on his "radio set," and draws the cutting electrode across the part to be cut.

There is a sharp little hissing sound, a small plume of steam rises, following the "knife," and an incision of a depth equal to or greater than that made by a scalpel with a similar movement is thus cleanly done. No effort to the surgeon, no danger of slipping due to a hard pull of the knife, and practically no blood to hinder the vision of the surgeon and later to weaken the patient in recuperating.

### Very Little Blood Lost.

What occurs, according to Dr. Wyeth's idea, is that there is apparently an actual molecular disintegration of the cells coming in contact with the spark (which can be seen occasionally as the electrode moves through the flesh). There is, apparently, very little heat, but just enough to cause the breaking down of a single small unit such as a tissue cell, these structures being entirely consumed by the arc, thus leaving no residue.

The slight burning effect which the radio knife has is one of its most important attributes. It is this which stops the blood flow from the tiny blood vessels running so close to the skin and throughout the fatty and muscular tissue. In motion pictures of operations by this method, one of the first things one noticed was the remarkable and almost entire absence of the sponge, as compared with regular knife surgery.

### Quick Healing Results.

This small heat effect also is important for antiseptic reasons; as to a large extent it cauterises wounds which might otherwise become infected through otherwise unavoidable circumstances. The fact that it is a very shallow burn allows for a proper healing after the operation, as the flesh is not scared deeply, leaving much dead tissue to slough off before healing may begin.

The advantages of the radio knife, then, are primarily those of speed due to bloodless cutting, which enables the surgeon to see always what he is doing; accuracy for the same reason, and because the surgeon does not have to strain his muscles in cutting; no serious loss of blood for the patient; and sterilisation of wounds,



THE MIRROR OF THE B.B.C.

**MORE B.B.C. SELF-  
INVESTIGATION**

FOREIGN CONDUCTORS—  
EMPIRE BROADCASTING—  
DRAMA AT BELFAST.

SO there is to be a general overhauling of B.B.C. staff before the move is made to Broadcasting House! This is due partly to space restriction for offices in the new building, but also, and perhaps even more, to the desire of the administration to get the staff reduced to an absolute permanent minimum, with perhaps the simultaneous infusion of new blood into the creative sections.

There is a feeling that the B.B.C. has allowed sentiment to play too great a part in retaining old and loyal servants after the work has out-grown their capacity. All this is now to be changed, with a general clearing up.

**Foreign Conductors.**

The number of foreign conductors applying for work to the B.B.C. has suddenly increased enormously. Ignaz Neumark is one of the most recent of these applicants. Special investigations are being made before encouragement is given.

There is really not much room nowadays in B.B.C. arrangements for any but a few of the biggest outsiders who have "arrived." Savoy Hill rightly feels that if experiments are to be made with new or young conductors the home product should get a marked and continuous preference.

There is another point, too, that is, the experience of the past season proving how important it is to have one personality developing an orchestra which is built on a big scale. This, of course, refers to Dr. Boulton, who will take more than 50 per cent of next season's concerts.

**Empire Broadcasting.**

I understand from the Post Office that since Sir John Reith returned from America, progress has been made in the attempt to get the Chancellor of the Exchequer to release from the Treasury balance of licence revenue, not only enough to run Empire Broadcasting but also a substantial sum for the ordinary purposes of the B.B.C. A favourable decision is anticipated before long.

**Drama at Belfast.**

It was feared that when London poached Mr. Jack Watt from Belfast there would be a falling-off in the excellent local dramatic work which he had been doing with Mr. Beadle. The latter, however, has contrived to carry out the tradition, but by using more outside material than formerly.

For instance, through the B.B.C. in Belfast, the Abbey Players of Dublin have become as well known and nearly as affectionately regarded in Northern Ireland as in the Free State.

In this connection, I am looking forward to being in the vicinity of Belfast on Monday, August 10th, when the Abbey Players will broadcast a Mystery Play entitled, "Let the Credit Go," the scenes of which are laid in a little Irish country bank.

The B.B.C. is more anxious nowadays to meet the wishes of listeners—or at any rate that section of listeners who take the trouble to complain—with the result that an experiment, first tried in connection with the broadcasting of excerpts from the Aldershot Tattoo a few weeks ago, is not to be repeated when items from the Southern Command Tattoo are relayed from Tidworth on Tuesday, August 4th.

It seems that some listeners were offended when dance music was faded-in between the Tattoo items. The idea was to preserve a continuity of the programme, but some people, hearing jazz tunes gradually pushing out the military music, got the impression that the B.B.C. was robbing them of part

of the Tattoo. This will not happen on August 4th, when each item from the Tattoo will be allowed to end, and be followed by a short silence before the dance music comes in.

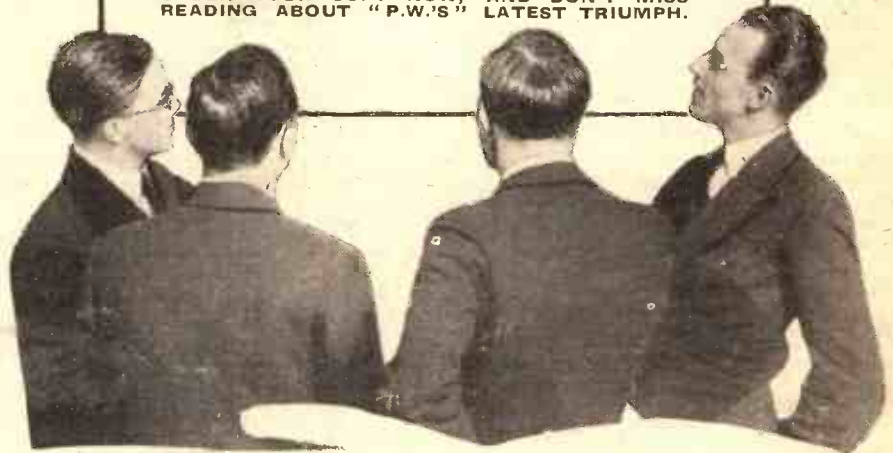
Perhaps, after all, it is artistically wrong to mix dance music with pageantry, and the saxophone and banjo with the strains of massed band and drum and fife music when listeners are trying to visualise the scene at Tidworth representing the siege of Carlisle and the Battle of Culloden. "The Evening Hymn" and "The Last Post" which are included in the Grand Finale, will undoubtedly sound more effective if completely severed from such titles as "My Canary Has Rings Round Its Eyes."

**NEXT WEEK**

The first details of something entirely new in radio receiver design.

**A SET WHICH WILL ASTOUND  
THE RADIO WORLD**

ORDER YOUR COPY NOW, AND DON'T MISS  
READING ABOUT "P.W.'S" LATEST TRIUMPH.



**FOR THE LISTENER**

By "PHILEMON."

Other people's views are not always very interesting, but our popular contributor certainly knocks the nail on the head more often than most critics of the broadcast programmes.

SUMMER-TIME in broadcasting is a sort of doldrums. I think that the Programme Directorate, working a month or two ahead of time, must cater for listeners whom they have imagined as away from home and office, scattered about the British Isles in punts, on sea beaches, and under canvas. The note is, "Come, let's be airy, let's be merry!" Away with all heavy stuff, serious music, serious talks, serious drama. "List to the light guitar!" Quite right, too!

**Holiday Programmes.**

The critic must have a heart of stone who will not yield to this holiday mood. He is a fool to take himself and his trade too seriously when Mr. Roger Eckersley and his colleagues take themselves lightly heartedly, and when listeners have taken their sets out of doors and placed them under a tree on a river bank.

The less significant and exacting the programmes the better. A "Programme of

Waltzes"—that's the stuff! Something dreamy, lazy, suitable to the drowsing of bees in the lime-trees or the splash of a rising fish in a "twilit" pool.

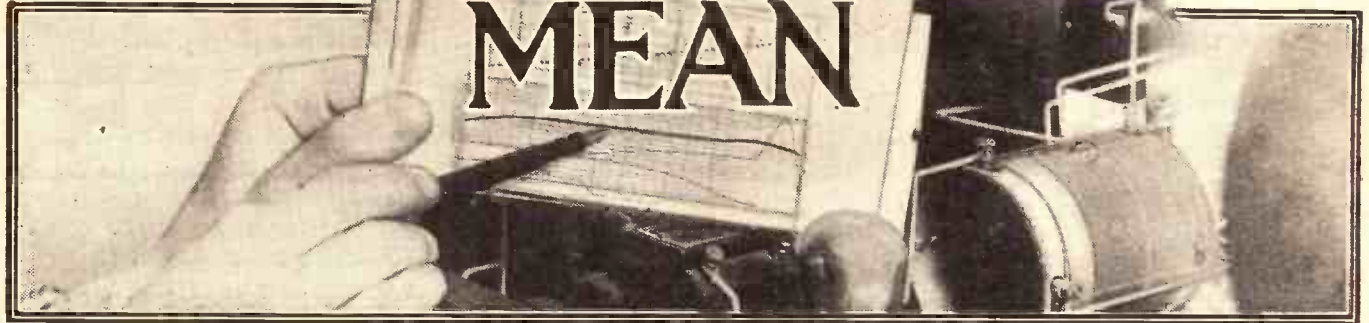
The schools are shut. The lecture-rooms are empty. The professors are in mufti up in Scotland, fishing perhaps or lying among the heather. Chamber music yields to open-air music; the band in the park. Tragedy to comedy. There are no problems any more. Savoy Hill strolls through the universe with a carnation in its buttonhole, whistling a merry tune. The critics "cease from troubling." And thank heaven for that!

Here and there serious items crop up in the programmes, but against this light and loitering background they loom up like distant thunderstorms which gloom and grumble and—pass away. The Demonstration on Disarmament, for instance; with Mr. MacDonald, Mr. Baldwin, and Mr. Lloyd George, an entertaining conjunction

(Continued on page 676.)



# WHAT THOSE CURVES MEAN



A PROPERLY taken curve shows you exactly what an L.F. transformer is capable of doing. There are some L.F. transformers on the market, though not many, thank goodness! whose makers would never dare to publish curves. But other manufacturers are wary of so doing merely because they feel that only a few people, comparatively speaking, would be able to interpret them correctly.

You see, it is a great mistake to pay too much attention to mere straightness of curve. Straightness, however commendable in itself, must be backed up by something else if the product is to assume useful all-round qualities.

For instance; the little drawing on this page shows three curves each taken from a different transformer working in more or less similar conditions. Many of you would immediately say transformer "A" was the better. But I would not use it in preference to at least one of the others—you'll see why in a minute.

### Their Combined Efforts.

But first of all I want to explain what a transformer curve is. It illustrates the overall amplification given by a certain valve and a certain L.F. transformer working in conjunction. Don't forget that.

Valves have amplification factors, that of a detector might be 20, which means that it should amplify the voltage fed into it twenty times; half a volt on its grid being stepped up to 10 volts in its anode circuit.

L.F. transformers used for ordinary radio sets have step-up ratios. An average ratio is 1 to 3½—the voltage in its secondary winding will be 3½ times that which exists in its primary winding.

The maximum amplification possible with a valve having an amplification factor of 20 connected to an L.F. transformer with a ratio of 1-3½ is 20 multiplied by 3½, which is 70. The valve steps up the voltage 20 times and the transformer steps it up a further 3½ times.

Now look at those curves in the illustration. The figures running upwards are, as stated, "Voltage amplification," and those along the bottom represent frequencies—the object of the curves being to indicate the voltage amplification at the various

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By VICTOR KING.

A famous set designer has some very outspoken things to say about L.F. transformers, and you may learn quite a few really useful things from this exclusive contribution.

\*-----\*

audio-frequencies. Why do the figures close up as they increase instead of being equally spaced? The answer to this is that they are arranged on a logarithmic basis, equal spaces upwards showing double the amplification.

The idea behind this is to represent a truer picture of what actually happens in practice. Doubling the voltage amplification does not necessarily double the loudness, as a matter of fact you have to quadruple it to do that. And your curve, therefore, is arranged at least approximately to give you a fair comparison in terms of actual performance.

Much the same sort of thing applies to frequencies, so that these are also plotted logarithmically.

up to 17½ volts. Obviously, the voltage amplification that has occurred is 17½ divided by ½, i.e. 70.

A good L.F. transformer can occasion almost negligible losses on frequencies ranging from 200 to 2,000—2 per cent is the sort of tolerance permissible.

And here we come to the vital, the crucial point in this article. Curve "A" is very straight, the transformer concerned deals equally with all the frequencies between 25 and 10,000 cycles. But if it has a ratio of 1-3½ and the practical amplification factor of the valve is 20, terrible losses have occurred somewhere.

An overall voltage amplification of only 25 has been attained instead of the 70 that represents the maximum possible.

Transformer B's curve indicates that this specimen gives about 43 on all frequencies from about 100 up to 3,000 cycles. Below 100 there is a falling off in amplification, and above 3,000 the amplification rises

### Not the Only Consideration.

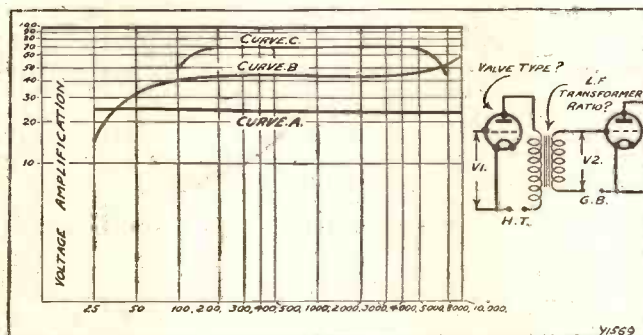
Transformer C gives an approach to the maximum possible amplification between 200 and 5,000 cycles, with a falling off at each end.

Supposing the other parts of your set prevent you from obtaining any effective reproduction below 200 or above 5,000 cycles then, clearly, transformer C is the one you should choose, for it will enable you to get greater volume than with the others. So you see, despite the fact that its curve is not nearly so pretty as the others, it can quite possibly be the better component for a certain set!

Loud speakers are our greatest limiting factors, and you can take it from me that there aren't many on the market able to handle frequencies that don't easily come within the most effective scope of the "C" transformer. But even the best moving-coil would be quite happy with transformer B. And the falling off at the bass end is not half as serious as it looks.

Of course, if you can get a curve as straight as A in the drawing, plus a full or nearly full amplification, then you are approaching the ideal. And it can be done these days, though the straight line is apt to develop a few kinks by the time the loud speaker and other things have had their say!

## WHICH WOULD YOU CHOOSE?



Curves given by three imaginary L.F. transformers. With nothing else to guide you, which transformer, A, B or C, would you choose for your set?

There is a little theoretical diagram in the illustration. This is to indicate how the curve is taken. A certain voltage at a certain frequency is applied across the points marked V1. Let us, for illustrative purposes, say it is .25 volts, 400 cycles. The voltage developed across the points V2 is then carefully measured. Supposing it is 17½. A quarter of a volt has been stepped





# CAPT. ECKERSLEY'S QUERY CORNER

THE "TREE TRAP"—SELF-CAPACITY OF COILS—ARE OUT-DOOR AERIALS DIRECTIONAL?

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

**The "Tree Trap."**

J. H. H. (Clapham).—"I have been told that in certain circumstances a tree can be used as an aerial, provided satisfactory electrical connection can be made through the bark to the 'sap-carrying' part of the tree.

"Since the roots are buried in the ground, it seems curious to me that it is possible to use it as an aerial. Will you please enlighten me on this point?"

The tree is a very high resistance aerial. Physically we have conditions as at (a), which is electrically as in (b).

If there is a source of e.m.f. caused by the arriving waves at P there are two paths to earth; through the tuned circuits or through the resistance R.

If the resistance R is large the set is not short-circuited and some current goes through the set. But the ordinary aerial connected in the ordinary way is better!

\* \* \*

**Self-Capacity of Coils.**

N. P. (Slough).—"I understand that the most efficient type of tuning coil consists of a single layer of D.C.C. or D.S.C. wire wound on a cylindrical former. Unfortunately this type of coil becomes somewhat

bulky if wound in this manner for the long waves.

"Suppose, instead of winding the coil in one layer, a number of layers were placed one upon the other in order to keep down the size. would this have a very detrimental effect upon the efficiency of the winding, say, for instance, on a wave-length of 1,500 metres?"

You can make multi-layer windings, but you have to be very careful what you are doing.

Let's consider the winding shown at A, which goes along 1 to 18, the 19th turn being wound over the first. Then there's a considerable capacity effect between 1 and 19 and a considerable difference of potential between turns compared to the difference of potential in the size larger type.

You can overcome this to some extent by doing as at B., but bulk for bulk for given inductance you don't gain much. "Pile winding," so called, is best. It is shown in my sketch at C.

It's best to groove your former to make the piles stay in position.

\* \* \*

**Are Outdoor Aerials Directional?**

W. H. C. (London).—"My house faces south, and therefore my garden in length, as usual, is north to south. In view of the fact that the function of an aerial, as I understand it, is to intercept the ether waves, would you consider any advantage would accrue, for receiving foreign stations, from erecting an aerial to run two or three times the width of the garden (from east to west), instead of the common practice of stretching it the length of the garden irrespective of the position of the latter?"

"I ask the question because of the surprising difference in signal strength caused with the slightest directional alteration of frame aerials.

"I have heard it argued that the impulses actually enter the aerial through the end, and not broadside on, but this is, of course, not so."

No! Frame reception is very different from aerial reception. You must appreciate that if the horizontal and vertical portions of an aerial are of comparable dimensions (say, 3 or 4 to 1 in favour of the horizontal) it is the vertical part which does the reception, the horizontal part helps it to do so.

Thus the effect of the waves is to make a current pulse up and down in the vertical

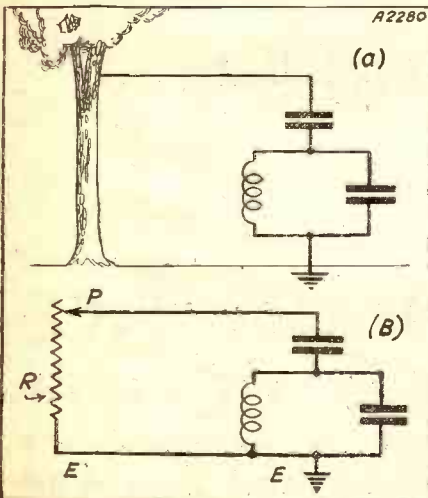
part of the aerial. If you use a simple vertical wire the currents cannot in their upward thrust push out through the end of the wire! So the travel of the current is, so to speak, limited.

If you put up a nice big empty copper room for them to range into, then the vertical up and down movement will be greater. Adding the top hamper increases what we call the effective height of the aerial. It does nothing whatsoever to the directional properties, other things being equal.

Sometimes swinging round the horizontal part may make a difference, because of other phenomena which make the horizontal part more or less effective in helping the vertical part, but apart from this, the ordinary aerial is not directional.

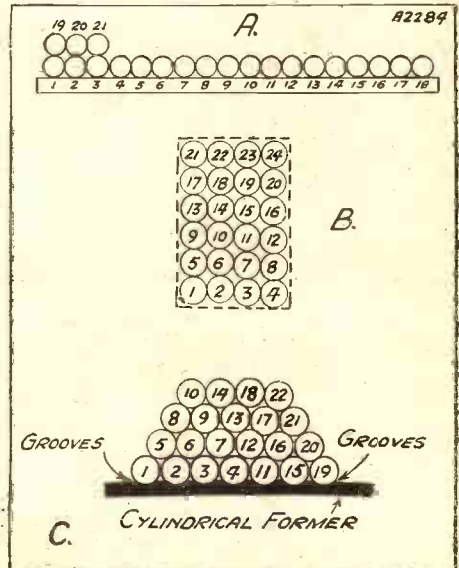
With a frame aerial, however, the waves come along and hit first one side of the frame and then the other—provided the frame is turned with its plane along the line joining the point of observation and the station. This carrier hitting of one side sets up circulating currents in the frame, and we get a signal.

**TREE AS AN AERIAL**



The bottom diagram shows the theoretical conditions when a tree is used as an aerial.

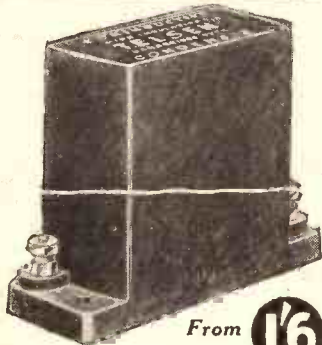
**WAYS OF WINDING COILS**



The efficiency of a coil largely depends on the way it is wound, the pile type of winding (c) being the better of three methods shown above.



# BUILD BETTER WITH TELSEN



From **1/6**

### MANSBRIDGE TYPE PAPER CONDENSERS

are of the Mansbridge non-inductive type, and will not deteriorate in use, owing to an exclusive vacuum process employed during manufacture. 500-volt test. 1,000-volt test

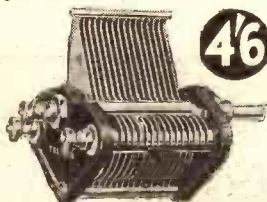
0.01 mfd.	1/6	2/6
0.04 "	1/9	2/9
0.1 "	1/9	2/9
0.25 "	2/-	3/-
0.5 "	2/3	3/3
1.0 "	2/3	3/6
2.0 "	3/-	6/-



**6<sup>d</sup>**

### FIXED MICA CONDENSERS

Prov. Pat. No. 20287/30. Made in capacities up to .002 mfd. .0003 supplied complete with patent Grid Leak Clips to facilitate series or parallel connections, can be mounted upright or flat; tested at 500 volts. Price 6d.



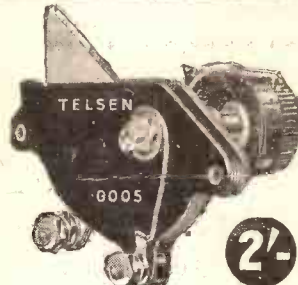
**4/6**

### LOGARITHMIC VARIABLE CONDENSERS

Substantially constructed and of high insulation and low minimum capacity. The Vanes are clamped by a new process and frame is triple braced against distortion.

Substantial terminals are provided with alternative connection to the stator.

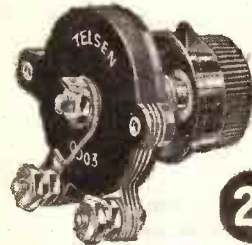
Made in capacities of .0005, .00025 and .00035. Price 4/6



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### BAKELITE DIELECTRIC TUNING CONDENSERS

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**2/-**

### BAKELITE DIELECTRIC REACTION CONDENSER

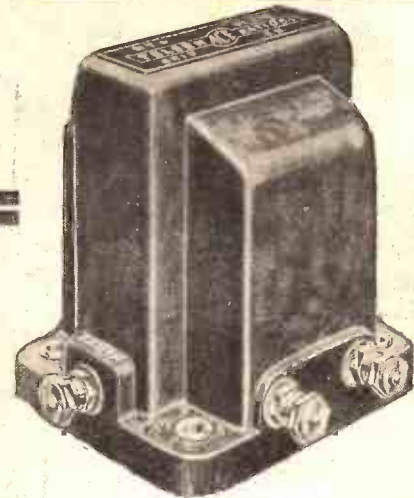
Made in capacities of .0001, .00015, and .0003. Capacities of .0005 and .00075. Price 2/6



**2/-**

### BAKELITE DIELECTRIC DIFFERENTIAL CONDENSER

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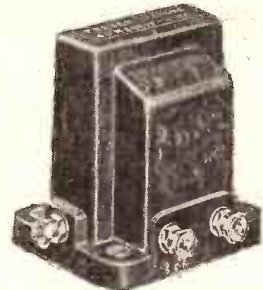


ACE  
**5/6**  
RADIOGRAND  
**8/6**

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Ace, ratios 3-1 and 5-1	5/6
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40 henrys; 100 henrys; 125 henrys. Price 5/-

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20 henrys. Price 8/-

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**1/6**

### PRE-SET CONDENSER

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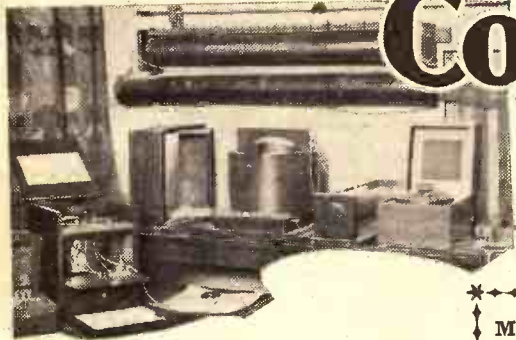
# TELSEN

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## COLOSSAL PRICE REDUCTIONS

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# COLLECTING RADIO ANTIQUES

By R. E. BLAKEY

I DO not think I am very far wrong in saying that nearly everyone has at some time been a collector of something. As schoolboys, we used to collect stamps, coins, cigarette cards, and so forth. Some people retain the desire to collect even when they grow out of their boyhood.

### Better Than Bucket-Handles.

For instance, some pursue the collecting of used stamps right through their lives. There are collectors of almost everything—from paintings by the great masters to picture cards, precious metals to "plated goods," precious old books to modern novels, and I read of one queer old gentleman who collected bucket handles! And so you will see that the collecting of products of art and science is very popular.

There seems to be one science in which the collector has not taken a great deal of interest, and that is the great science of radio. Perhaps the collector thinks radio too "new fashioned" to justify his collecting radio material.

Perhaps some of you, on the other hand, have been grumbled at by the good lady of the home for hoarding heaps of wireless "junk." But even if this be the case, I do not think my suggestion of collecting radio antiques is altogether prohibitive.

### Not So New, Either!

What I really desire to see is a good number of keen wireless men who have sufficient interest in their hobby to take upon themselves the honourable task of procuring early examples of the different types of apparatus used in wireless installations. I am sure that some of you have not the least idea of the age of some of the most primitive apparatus.

Think for a moment of batteries, which are very old friends indeed. Here are some of the earliest types of batteries: 1799, Voltaic Pile; 1801, Cruikshank's battery; 1802, Wollaston's battery; 1838, the Grove cell; 1840, the Smee cell. And the following are old examples also: Trouve Bichromate, Fuller's Bichromate, Agglomerate, Daniell cell, Minotto cell, Clark's standard cell,

### An Interesting Hobby.

Now what about condensers? We say "so many microfarads" capacity, seldom remembering who "farad" is connected with.

The word "farad" is derived from Michael Faraday (1791-1867), a brilliant scientist who will ever be thought of with reverence by the electrical world.

A "so many ohms resistance" brings to our mind George Simon Ohm (1787-1854). Ohm's Law is known to nearly all of us. I do not suggest that condensers and

Most people have at some time or another started collecting things. It may have been stamps, engravings or perhaps matchboxes—in fact, almost anything! Why not a collection of out-of-date wireless apparatus? Valves would be a good line to start with. Some of the very old examples are quite rare, and might fetch good prices in years to come.

resistances used by these men can be picked up, but what of their followers?

Do you not consider that early examples of batteries, condensers, and resistances would be exceedingly interesting to collect?

### Some Suggestions.

Coming nearer our own life-time, what of those iron-filing coherers? These were used years before the crystal detector or the valve, and it is not difficult to obtain them at the present time.

Here is a list of detectors: A coherer; old type open crystal detector; old closed type crystal detector; carborundum type with resistance and cell; dual crystal detectors; permanent types. And now for something very valuable—one of Fleming's two-electrode valves; Round's valve, V.24 "C" and "R" types. Then, to show the change from the bright valve to the dull-emitter type, a "D.E.R." valve, -06 valves, W.E.C.O. peanut valves, and an example of each subsequent development during the past few years.

Inductances are interesting. Solenoids: Slab, pancake, peg wound, basket, straight wound plug-in, and so forth up to the modern high-efficiency coils.

### Great Scientific Interest.

I think it would be very interesting to procure old papers which have been read to audiences of early scientists.

The age of a relic has a great bearing upon its value. Very early examples of batteries, for instance, would be valuable. There are two ways of considering my suggestion: Firstly, scientific interest; and, secondly, as a commercial proposition. I contend that to have a collection of the crude wireless apparatus used years ago enables you thoroughly to appreciate new developments as they take place. I believe that to possess such a collection makes it much easier to understand the underlying principles of the science.

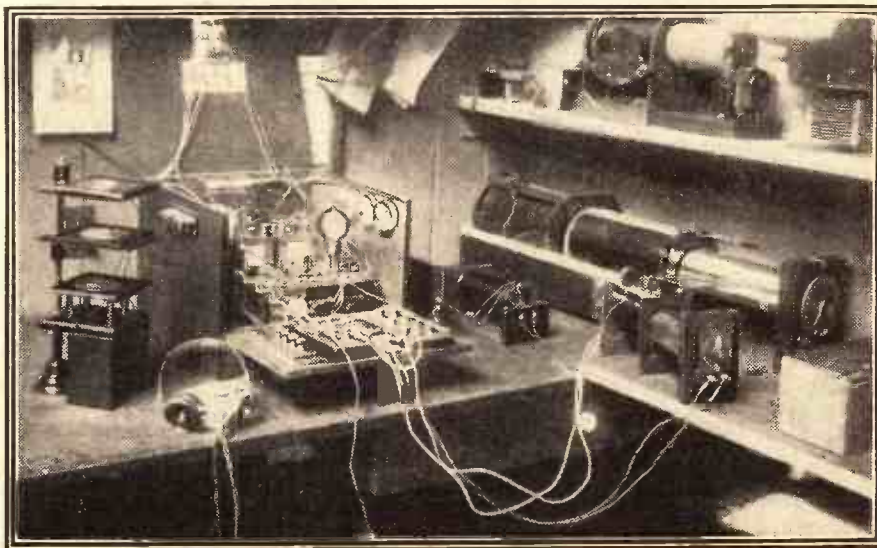
### Money In It?

Here is another point of view. We should say, if we were speaking in business terms, the small demand for such material causes low prices. This is quite correct, for early examples can be purchased for very small figures.

I presume, however, that if there came to be a large demand for wireless relics, prices would rise, thus showing a profit to those who bought whilst prices were low.

Radio collecting would obviously have good effects in a variety of ways, and I hope to see it become a new interest amongst wireless men, who at present may be missing real bargains.

## A PEEP INTO THE PAST!



This station dates back to soon after the War, and in those days was considered quite "posh." On the right some old-fashioned Loose Couplers can be seen, and in the top right-hand corner there is a colossal variable condenser which weighed several pounds.



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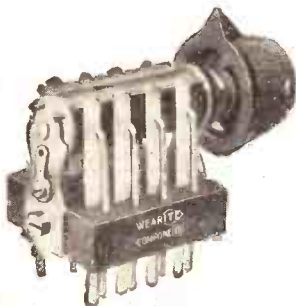
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4- or 5-pin split sockets. Fitted with terminals and soldering tags. Price 1/3

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2" x 3", for medium-wave coils. Price 9½d.

Any special length can be supplied other than above. Special diameters to order.



If you use an Extenser with the "S.P.V." you will not need the wave-change switch and no hole need be drilled for it on the panel. In order to make the panel layout neat and tidy, the Selector should be dropped to a point exactly half-way down the panel instead of being fixed as indicated in the wiring diagram last week.

#### Enter the "Extenser."

The new panel layout is shown in the heading photograph, and it should be noted that all the photographs, with the exception of that one at the bottom right-hand corner of this page, were taken with the Extenser fitted.

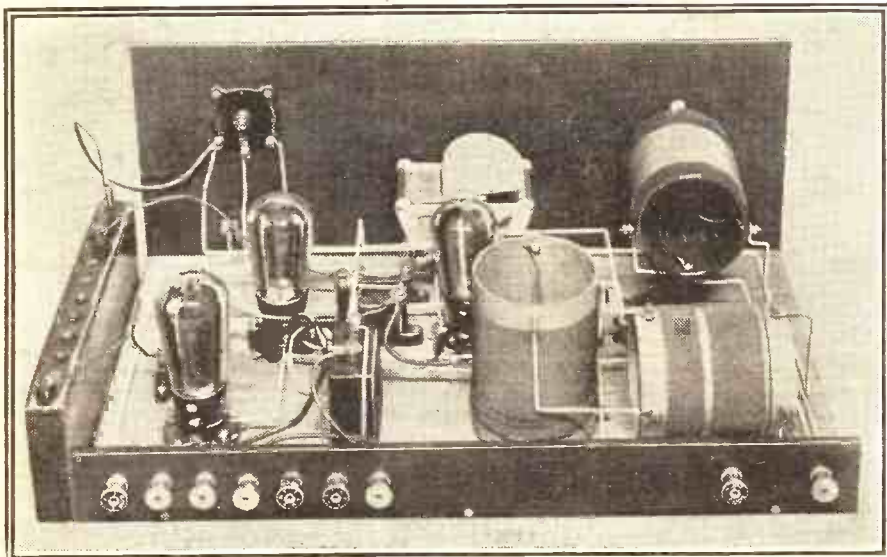
There is little else affected in the set with the exception of a few of the leads. None of the other components have to be moved. On the full wiring diagram, which appeared in our last issue, six of the wires are shown lettered A to F. All these leads are concerned with the variable condenser and the wave-change switch and, obviously, these do not stand in the original formation when the Extenser is employed.

#### Exit "One Lead."

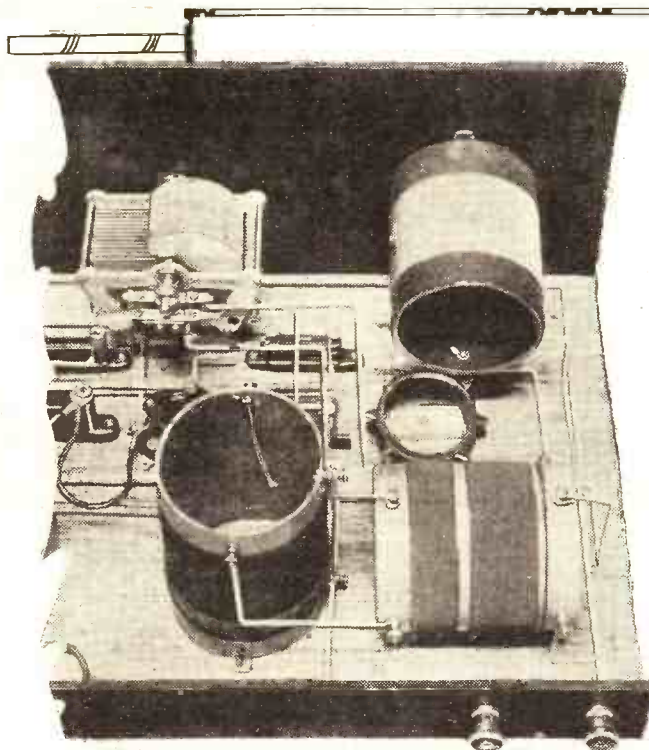
Lead "A," which runs from E on the wave-change coil to the wave-change switch, comes right out, and no other wire takes its place. You see this is the lead that the Extenser saves.

This leaves five Extenser leads, and on the third page of this article you will find a small diagram which tells you exactly how these leads have to be joined up. At least, it shows how they are connected at the Extenser end. At their other ends they go to exactly the same places as marked on the wiring diagram.

**ONLY ONE SHILLING OR SO PER STATION!**



A novel but telling way of judging a set's all-round efficiency is to calculate its value on a basis of the cost per programme. The "S.P.V." Three scores heavily in this respect.



There are four special "P.W." coils, and an "Extenser" can be used (as above) still further to simplify the set's construction and controls.

If you had had an ordinary variable condenser and wave-change switch in use, you would have to disconnect all wires from these components and take them instead to the Extenser. One wire, remember, becomes unnecessary and can be dispensed with entirely.

#### Logical Dial Readings.

You will note that the Extenser is drawn as having three "self-changer" terminals. There is at least one make which has four (The Wavemaster). But in this present instance only two are needed, and it doesn't matter a scrap which two you use. The self-changer, by the way, is, in effect, the wave-change switch and is operated automatically

by the Extenser. I add this for the benefit of those new readers who might not yet have met an Extenser, though I cannot help thinking they must now be few in number!

It should be noted that it is decidedly advantageous to have the Extenser's dial correctly set on the panel, that is, with its "O" dial marking at the top when the vanes are all out and the capacity is minimum. You then turn the dial to the right (clockwise) for the ordinary wave stations, and to the left for the long-wave stations, the numbers running 0-99 ordinary waves and 101-200 long waves.

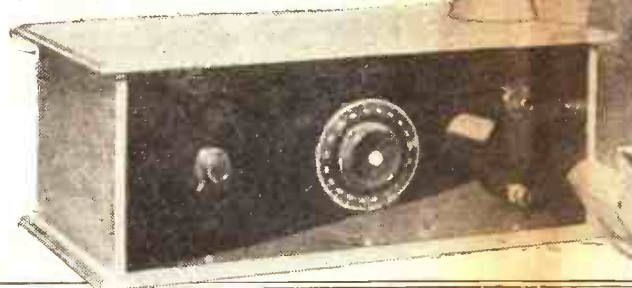
#### No Substitute.

In passing, I hope you made sure that you got a proper differential reaction condenser and not an ordinary type having three terminals, for such is no substitute. And this further reminds me that there is a point in connection with differentials that seems to have caused a little confusion.

#### Simplifying the Wiring.

It arises with a make of differential that has four terminals. But two of these terminals carry exactly the same marking and are, in effect, exactly the same electrical points. It does not matter a scrap which of them is used. And both can be used, each taking one of, say, two leads which in the case of a three-terminal make

# MORE ABOUT "S.P.V."



Concluding constructional comments and some helpful pointers

By G. V. DOWDING, Associate

THE "S.P.V." EMPLOYS THE NEW "P.V." COILS, A "P.W." SELECTOR, A "P.W." CONTRADYNE, "P.W." DIFFERENTIAL REACTION, AND "P.W." TWO-BAND TUNING FOR HIGH-EFFICIENCY ON ALL PROGRAMMES.

#### RECOMMENDED ACCESSORIES

**LOUD SPEAKER.**—(Blue Sp B.T.-H., W.B., Undy, O Dario, Rolls-Caydon, M Celestion, Amplion, etc.).

**VALVES.**—1 H.L. type, 1 L.F. 1 power or super-power (2-, 6-volt valves may be used) and Six-Sixty, or Cossor, Mullard, Eta, Lissen, Marconi.

**BATTERIES.**—H.T. 100-150 volt Ready, G.E.C., Grosvenor, S National, Oldham, Fuller, Partrix, Lissen, etc.).

**G.B.**—9 to 18 volt according of power valve (see Ready, Grosvenor, Siemens, National, Fuller, Drydex) Partrix, Lissen.

**ACCUMULATORS.**—2-3 4- according to valves used Ediswan, Exide, Lissen, Oldham, etc.).

**MAINS UNITS.**—State type of voltage, and details of setting ordering (Heyberd, R.I., Tekeco, Atlas, Junit, Regenton

## A REAL VALUE-FOR



# UT THE - HREE



Operating notes concerning this fine set.  
Date I.E.E.

would have gone to the one terminal.  
When we include one of these particular components in a set we sometimes use all four points in order to simplify the wiring. Perhaps it would have been better had we ignored that fourth terminal altogether! The manufacturers probably include it more to make the article symmetrical in design than anything else. Anyway, the duplicated terminal happens to be one to which it often happens two or more wires can go so that it is definitely useful.

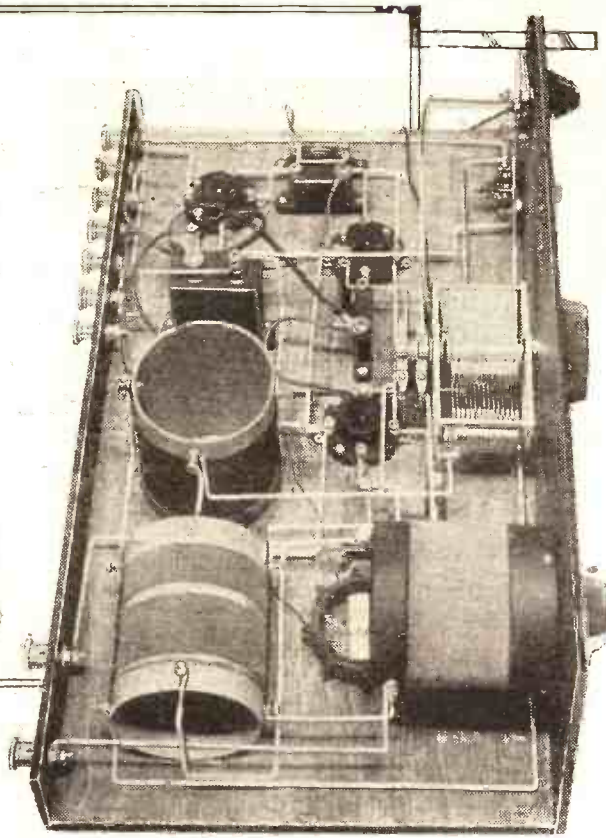
### You Can't Go Wrong.

And now for some operating details concerning the "S.P.V." I have not said a great deal regarding its assembly, I know, but it is an unusually easy set to build and you can hardly go wrong, however little may have been your previous experience of set construction.

A detailed accessory list is given this week, or I should say repeated, for it also appeared in our last issue. But it can usefully stand quite a bit of further amplification.

### Smooth, Easy Reaction.

For instance, there may be many of you who are unable to interpret "I.H.L. Type" in the valve paragraph. Well, the valves are given in their order as detector, first L.F., and output or second L.F. This corresponds with the  $V_1$ ,  $V_2$ , and  $V_3$  markings on the valve holders in the wiring diagram.



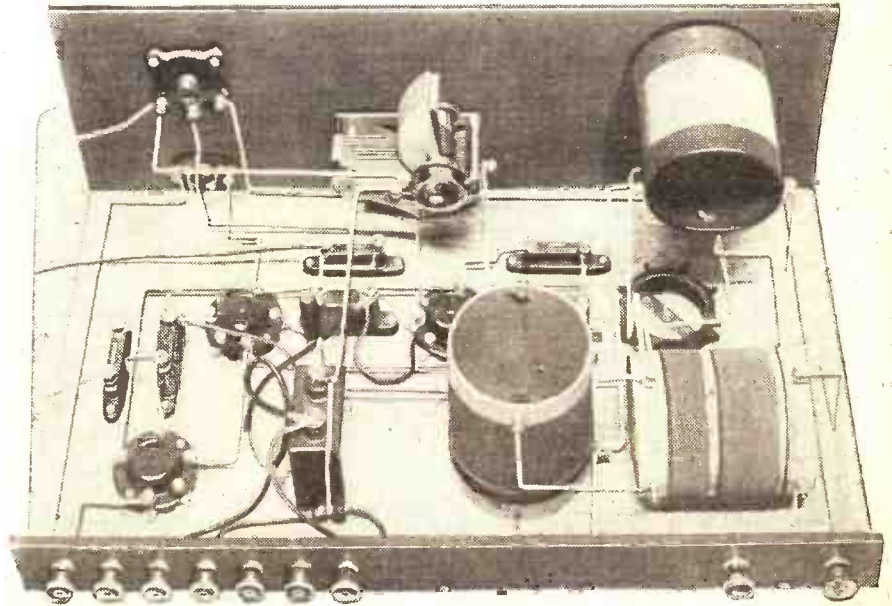
All the photos this week, with the exception of the one below, illustrate the inclusion of an "Extenser."

The detector ( $V_1$ ) should, as it says in the list, be of the H.L. type. That means a detector and H.F. type of valve of moderately low impedance. The one particular make is actually called the H.L.—it is its own private marking, as it were! An impedance of somewhere around about 18,000 or 20,000 ohms is what I like for such a stage as the detector of the "S.P.V.," always providing its other

had the mains on and could afford the initial outlay for a mains unit—if, I say, you are forced to use H.T. batteries, I would advise you to make a most careful study of this question of valve selection with a view to cutting down the consumption of H.T. current to its very lowest limits:

But don't be led into trying to use one of those ordinary L.F. valves or very small  
*(Continued on next page.)*

## THEY ALMOST EQUAL ANOTHER VALVE



The "P.V." coils plus a Selector make the fullest possible use of the received energy—a change over to these from a conventional coil arrangement gives one the impression that additional valve amplification has been introduced.

# R-MONEY SET



## MORE ABOUT THE "S.P.V." THREE

(Continued from previous page.)

power valves in the third valve holder. It might prove a satisfactory expedient in a two-valve set to have one, such as an output valve, but the over-all magnification of the "S.P.V." demands something fairly robust.

A fairly close approximation of the energy a valve will handle before it begins to overload is provided by the grid-bias voltage officially recommended for it. I would advise you to turn up an article which appeared in "P.W." a week or two ago (the issue dated July 18th to be exact) entitled "Notes on High Tension."

### The "Vital Link."

This deals most admirably with the economising of H.T., and may help you to save quite a few valuable millamps.

You will want a good loud speaker for this set. Of course, there is absolutely nothing to prevent you from employing any old thing, but the loud speaker is a vital link in the chain if quality results are desired. Go for the open cone type in preference to a cheap cabinet design. And here I want you to appreciate that there can be a subtle difference between "cheap" and "inexpensive."

### Using the "Mains."

You will find the "S.P.V." perfectly stable with a mains unit. It is really the best possible kind of set for quiet mains working, and it will take any good make providing that such is capable of passing enough current for the particular valves used without a serious voltage drop resulting.

Should you have read that little article mentioned above, you will not dream of attempting any economies in regard to the grid-bias battery, for it is clearly shown that any such would indeed be false economies.

### Easy to Tune.

The tuning of the "S.P.V." is simplicity itself. There is only the one main tuning control. The Selector knob does not have to be moved every time you change stations. On the long waves it goes right out of circuit and does not have to be touched

needs touching, but when you move on twenty or thirty degrees one way or the other, then a re-adjustment of the Selector is highly desirable.

When its knob is turned right round to B. the Selector is shorted altogether out of action. It is a good plan to set this control in this way and proceed to tune in the desired station. After having done this the Selector can be adjusted until the greatest volume eventuates.

### A Useful Control.

You will soon learn whereabouts the Selector knob can be left for the best reception over particular parts of the tuning dial.

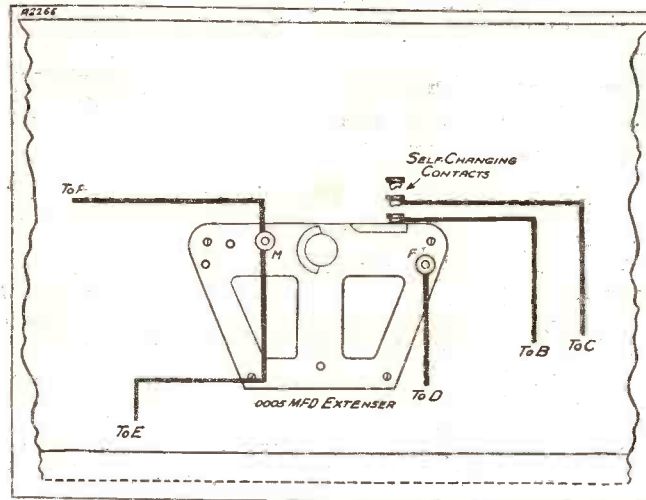
With an Extenser you so quickly and so "unconsciously" go over to the long waves or back to the medium waves that you may be surprised by an over-virile reaction. That is to say, the following may happen: You set the reaction control for, say, the reception of a certain medium-wave station. Then you go over to a long-wave station. Using an Extenser all you do is to sweep the dial round to an appropriate reading. But if you momentarily forget that the reaction needs re-setting for different stations you might get a squeak due to oscillation.

### It Isn't Done!

This is a point to be remembered for the benefit of your neighbours! The simple remedy is not to let the fascinating Extenser make you forget that it cannot automatically control reaction settings as well as wave-changing, and in this respect, at least, it can claim no superiority over the ordinary variable!

So when you are trying for distant stations keep one hand on the reaction, and endeavour to hold the receiver just off the oscillation point. It is then in its most sensitive condition.

## WIRING UP THE "EXTENSER"



This little diagram should be used in conjunction with the full wiring diagram published last week.

at all. It is here that the Contradyne steps in to do a job of work not unconcerned with selectivity plus greater volume.

However, it is advisable to refer to the Selector knob when fairly drastic variations of the tuning dial are made. When you are tuning up and down over a band of ten or twenty degrees, the Selector hardly

reaction settings as well as wave-changing, and in this respect, at least, it can claim no superiority over the ordinary variable!

So when you are trying for distant stations keep one hand on the reaction, and endeavour to hold the receiver just off the oscillation point. It is then in its most sensitive condition.

## A REMINDER REGARDING THE PARTS THAT YOU WILL REQUIRE

- 1 Panel, 18 in. × 7 in. (Red Seal, or Permeol, Goltone, Lissen, Becol, Wearite, Parex, etc.).
- 1 Cabinet to take 10-in. baseboard (Cameo, or Pickett, Osborn, Lock, Kay, Langmore, Gilbert, etc.).
- 1 0005-mfd. variable condenser and vernier dial (J.B., or Ready Radio, Telsen, Cyldon, Astra, Polar, Lotus, Lissen, Ormond, Igranie, Dubilier, Formo, Burton, Wave-master, Crossley, etc.).
- 1 0001-00015-mfd. differential reaction condenser (Ready Radio, or Telsen, Formo, Burton, Parex, Magnum, Lissen, J.B., Dubilier, Lotus, Igranie, Ormond, Polar, Cyldon, etc.).
- 1 3-point wave-change switch (Wearite, or Ready Radio, W.B., Peto-Scott, Magnum, Red Diamond, Ormond, Bulgin, etc.).
- 1 L.T. on-off switch (Lotus, or Igranie, Benjamin, Ready Radio, Bulgin, W.B., Peto-Scott, Ormond, Junit, Wearite, Red Diamond, Goltone, etc.).
- 1 Selector coil (Wearite, or Ready Radio, Goltone, Peto-Scott, Parex, R.I., Magnum, etc.).
- 1 P.V.1 coil (Ready Radio, or Goltone, Wearite, Parex, R.I., Melbourne Radio,

- A.E.D., Tunewell, Watmel, Formo, Magnum, Peto-Scott, Ferranti, etc.).
- 1 P.V.2 coil (Ready Radio, etc.).
- 1 Hank coil or coil quoit (Peto-Scott, or Ready Radio, Wearite, A.E.D., Melbourne Radio, etc.).
- 2 oz. 30-gauge D.S.C. for above coil. (If you make the P.V. coils, also get 4 oz. of 30 D.S.C. and 2 oz. of 24 D.S.C.)
- 3 Valve holders (Junit, or Telsen, W.B., Clix, Igranie, Formo, Bulgin, Lotus, Benjamin, Wearite, Magnum, Lissen, Dario, etc.).
- 2 01-mfd. fixed condensers (T.C.C., or Dubilier, Ready Radio, Telsen, Ediswan, Lissen, Ferranti, Mullard, Igranie, Watmel, Formo, Graham-Farish, etc.).
- 1 0003-mfd. fixed condenser (Telsen, or Ediswan, etc.).
- 1 2-mfd. fixed condenser (T.C.C., or Formo, Igranie, Telsen, Ferranti, Helsby, Franklin, Mullard, Hydra, Lissen, Dubilier, Peto-Scott, etc.).
- 1 2-meg. leak and holder (Ferranti, or Ediswan, Ready Radio, Dubilier, Mullard, Igranie, Graham-Farish, Watmel, Lissen, Telsen, etc.).

- 1 1-meg. leak and holder (Ferranti, or Telsen, etc.).
- 1 25-meg. leak (and holder if necessary) (Graham-Farish, or Igranie, etc.).
- 1 500,000-ohm resistance and holder (Ferranti, or Dubilier, etc.) (Ready Radio, or Peto-Scott, Sovereign, Graham-Farish, Lissen, Varley, Tunewell, Telsen, Lewcos, Bulgin, Magnum, etc.).
- 1 100,000-ohm Spaghetti resistance (below).
- 1 50,000-ohm Spaghetti resistance (Ready Radio, or Sovereign, etc.).
- 1 25,000-ohm Spaghetti resistance (Lewcos, or Telsen, etc.).
- 1 10,000-ohm Spaghetti resistance (Bulgin, or Tunewell, etc.).
- 1 Terminal strip, 18 in × 2 in,
- 9 Indicating terminals (Eelex, or Belling & Lee, Igranie, Clix, etc.).
- 3 G.B. plugs (Clix, or Belling & Lee, Eelex, Igranie, etc.).
- 3 H.T. plugs (Igranie, or Belling & Lee, Eelex, Clix, etc.).
- 2 L.T. spade terminals (Belling & Lee, or Igranie, Clix, Eelex, etc.).
- Glazite or Lacoline for wiring.
- Flex, screws, etc.



# READY RADIO KITS FOR REALLY GOOD RECEPTION

## THE "S.P.V. 3"

£ s. d.		£ s. d.		£ s. d.	
1 Polished ebonite panel, 18" X 7" x 3/16", drilled to specification	5 3	2 T.C.C. -01-mfd. fixed condensers	5 0	1 ReadRad 10,000-ohm spaghetti resistance	1 0
1 Oak cabinet to take 10" base-board	1 5 0	1 ReadRad -0003-mfd. fixed condenser	10	1 Ebonite terminal strip, 18" X 2" X 3/16"	1 6
1 ReadRad -0005-mfd. variable condenser	4 6	1 T.C.C. 2-mfd. fixed condenser	3 10	9 Belling-Lee terminals, type "R"	2 3
1 ReadRad Duograph S.M. dial	6 6	1 ReadRad 2-meg. grid leak and holder	1 4	3 Belling-Lee G.B. wander-plugs	6
1 ReadRad -00015-mfd. diff. reaction condenser	5 0	1 ReadRad 1-meg. grid leak and holder	1 4	3 Belling-Lee H.T. wander-plugs	6
1 ReadRad 3-point wave-change switch	1 6	1 ReadRad .25-meg. grid leak and holder	1 4	2 Spade terminals	3
1 ReadRad L.T. on-off switch	10	1 Peranti 500,000-ohm resistance and holder (synthetic type)	2 0	1 Packet Jiflinx for wiring	2 6
1 ReadRad Star Turn selector coil	12 6	1 ReadRad 100,000-ohm spaghetti resistance	2 9	3 Mullard valves to spec.: PM1HF, PM1LF, PM2	1 7 6
1 ReadRad P.V.1 coil	4 3	1 ReadRad 50,000-ohm spaghetti resistance	1 9	Flex, screws, etc.	9
1 ReadRad P.V.2 coil	4 3	1 ReadRad 25,000-ohm spaghetti resistance	1 6		
1 ReadRad quoit coil	2 6			<b>TOTAL (including valves and cabinet)</b>	<b>£6:12:0</b>
3 Telsen 4-pin valve holders	1 6				

## THE "POP-PORTABLE"

£ s. d.		£ s. d.		£ s. d.	
1 ReadRad portable cabinet to specification	2 5 0	1 Lewcos 100,000-ohm flexible resistance	1 6	1 Screen and foil to specification	3 6
2 J.B. -0005-mfd. condensers, slow-motion log type, 40-1 ratio	1 1 0	1 ReadRad 5-megohm grid leak and holder	1 4	1 Mullard portable loud-speaker unit	1 18 6
1 ReadRad -00015-mfd. differential reaction condenser	5 0	1 ReadRad 1-megohm grid leak and holder	1 4	1 ReadRad wound medium wave coil as specified	5 0
2 T.C.C. -01-mfd. fixed condensers	5 0	1 ReadRad 2-megohm grid leak and holder	1 4	2 ReadRad wound coil quots for long waves	7 6
3 Telsen fixed condensers, -001-mfd., -0003-mfd. and -0001-mfd.	1 6	1 Telsen H.F. choke	2 0	4 Oz. reel 24 g D.S.C. wire for short-wave frame aerial	2 2
2 T.C.C. 1-mfd. fixed condensers	5 8	3 Telsen 4-pin valve holders	1 6	4 Oz. reel 30 g D.S.C. wire for long-wave frame aerial	3 0
1 T.C.C. 2-mfd. fixed condenser	3 10	1 W.B. horizontal type valve holder	1 3	1 Packet ReadRad "Jiflinx" for wiring	2 6
2 Lewcos 60-ohm flexible resistances	1 6	1 Wearite 2-way rotary switch with terminals and indicating knob	4 0	4 Valves to specification (S.O., Det., I.F. and power)	2 7 6
1 ReadRad 10,000-ohm flexible resistance	1 0	1 Wearite 4-way rotary switch with terminals and indicating knob	5 6	Flex, wander plugs, spades, crocodile clips, etc.	1 10
1 ReadRad 25,000-ohm flexible resistance	1 6	1 Telsen "Acc" L.F. transformer	5 6	<b>TOTAL (including valves and cabinet)</b>	<b>£11:9:0</b>
		1 Set Bulgin frame aerial spacer	1 3		

### "S.P.V." THREE

**KIT "A"**  
(less valves and cabinet) **£3:19:6**  
or 12 monthly payments of **7:3**

**KIT "B"**  
(with valves less cabinet) **£5:7:0**  
or 12 monthly payments of **9:9**

**KIT "C"**  
(with valves and cabinet) **£6:12:0**  
or 12 monthly payments of **12:0**

**TO OVERSEAS CUSTOMERS**  
All your goods are very carefully packed for export and insured, all charges forward.

You can now buy your Ready Radio Kit from your local dealer, but be sure it is a genuine Ready Radio Kit.

### "POP-PORTABLE" ACCESSORIES

1 C.A.V. 2 N.S. 17 unspillable accumulator	16 0
1 Fuller 9-volt G.B. Battery	1 6
1 Fuller W.O.P. 100 portable battery	15 0

### THE "POP-PORTABLE"

Completely assembled, with valves and cabinet, ready for use and aerial tested. Royalties included - **£13:9:0**  
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### "POP-PORTABLE" CABINET WITH WOUND FRAME AERIAL

The Cabinet supplied with Kit "C" can be obtained separately with ready-wound frame aerial **£2:15:0** Cabinet without aerial **£2:5:0**

### "POP-PORTABLE"

**KIT "A"**  
(less valves and cabinet) **£6:16:6**  
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**KIT "B"**  
(with valves less cabinet) **£9:4:0**  
or 12 equal monthly instalments of **17:0**

**KIT "C"**  
(with valves and cabinet) **£11:9:0**  
or 12 equal monthly instalments of **21:0**

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Your goods are despatched post free or carriage paid.

# Ready Radio

159, BOROUGH HIGH STREET, LONDON BRIDGE, S.E.1.

Telephone: Hop 5555 (Private Exchange) Telegrams: READIRAD, SEDIST.

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159, Borough High Street, London, Bridge, S.E.1.

**CASH ORDER.** Please despatch to me at once the goods specified for which I enclose payment in full of £ .....  
**C.O.D. ORDER.** Please despatch to me at once goods specified for which I will pay in full the sum of £ .....  
**EASY PAYMENT ORDER.** Please despatch my Easy Payment order for the goods specified for which I enclose first deposit of £ .....

Name.....

Address.....

Kit required.....



## FROM THE TECHNICAL EDITOR'S NOTE BOOK.

# Tested and Found—?



## CONCERNING CELESTION ACCESSORIES.

IT is stated that the Celestion D50 loud-speaker embodies an entirely new principle. After closely examining one of these instruments I can hazard a guess that it is a development of the inductor. Anyway, it is a fine speaker, and the results it gives can only be described as high-class in every respect.

It gives clean bass with a good power



This is the Celestion D50 Loud Speaker.

percentage at 50 cycles, whilst it is capable of handling higher frequencies at "parity."

A new technical feature of interest and value is also to be found in the Celestion W5 pick-up. This time it is a unique method of damping which eliminates groove-jumping even at 25 cycles.

But in this accessory there is a further novelty that specially appeals to me. This is a quick needle release device which enables a needle to be fitted or removed without the necessity of fiddling with a tiny screw.

The Celestion W5 pick-up is built on its own special tone-arm in order that correct tracking is more or less enforced on the user—a wise precaution!

There are some pick-ups which do less justice to the magnificent recording now available than most mechanical gramophones. Indeed, it is only high-grade pick-ups which give superior results to the best mechanical soundbox, but the superiority in the case of a pick-up such as the Celestion

W5 is considerable, and makes electrical reproduction very decidedly worth while.

## A TRICKLE-CHARGER.

Mr. T. R. Williams, of Netherend, Cradley, Birmingham, has devised a simple primary battery for trickle-charging small 2-volt accumulators. The elements, consisting of copper and zinc and the necessary terminals and leads, are supplied for seven shillings, and these parts have to be fitted into four 2-lb. jam jars, and the necessary electrolyte crystals purchased from a chemist.

But this charger happens to be another of those items that we have to test over some considerable period of time. On the face of it, it would appear to be a quite sound solution to the charging problem for those that live in country districts and employ small-capacity L.T.s.

## NEW VARLEY COMPONENTS.

I have received a copy of Varley's new radio component list. This details all their new components which are to sell at popular prices, although they are of full Varley quality.

For instance, there is the "Nictet" L.F. Transformer at 7s. 6d., the Varley Junior Multicellular H.F. Choke at 3s. 6d., a whole range of "Popular Resistances" of new spiral wound construction, and selling at prices from 1s. 6d. the 5,000 ohms up to 4s. the 300,000 ohms. Also there are Varley Spaghetti Resistances from 6d. up to 1s. 6d. in all the usual values.

This new Varley list should certainly be in the hands of all constructors.

## A FINE PICK-UP.

Quite recently I was able to test an "Audak" Pick-up. This device is handled by Claude Lyons, Ltd., and although it is rather more expensive than most, it is certainly worth every penny of the price asked for it.

The construction is of the highest possible class and the results it gives are such that the most is made of all the recorded frequencies. The reproduction is clear and well-balanced and there is negligible record wear. The volume control that is available gives a smooth and even gradation.

## NEW

## G.E.C. PRODUCTS.

The great Coventry factory of the General

Electric Co. is now vitally active in the production of next season's G.E.C. radio gear.

Included are new sets and loud speakers of exceptionally interesting characters that will sell at lower prices than ever, although, for the most part, their quality has actually been improved—an achievement indeed!

I have been privileged to examine this new G.E.C. apparatus at close quarters, and you can take my word for it, that it is exceptionally fine stuff.

Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department, with the strictest of impartiality, under the personal supervision of the Technical Editor.

We should like to point out that we prefer to receive production samples picked from stock, and that we cannot guarantee their safe return undamaged, as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are, therefore, framed up in a readily readable manner free from technicalities unnecessary for that immediate purpose.

The G.E.C. people are looking forward to a season of unequalled sales, in which all their previous records will be broken. I am convinced their confidence is not misplaced, for they have "the goods" to offer and the public as a whole is now well able to recognise real radio bargains when they see them.

## MORE PRICE REDUCTIONS.

The prices of all Drydex batteries have been reduced and the reductions are considerable. Indeed, Drydex batteries are now competitive in price with any other make, including foreigners.

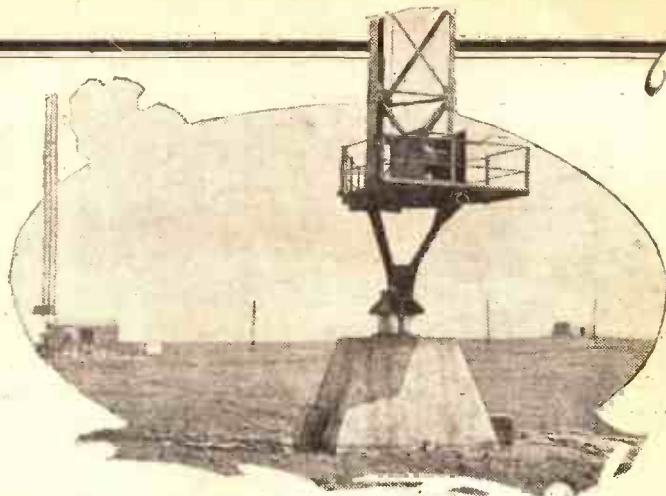
Drydex are, of course, made by the manufacturers of Exide batteries, the largest battery makers in the British Empire, and, I think I can add, makers of the largest batteries. I have seen some of the accumulators produced at Clifton Junction and I can assure you they reach some dimensions. That is, at least, those produced for big power plants, etc.



The "Audak" Pick-up and Volume Control.



# WITH THE B.B.C. in the NORTH



## No. 5. Glasgow—The Engineering Headquarters of the North.

**M**OTORING down from Aberdeen to Glasgow, I switched my portable on when I reached the summit of the highest road in Great Britain. Here, at a height of over 2,000 ft., Daventry 5XX came roaring in, but it was almost impossible, amid the mountains, to get any other station in daylight.

Arriving at Glasgow, I first called at the building which houses studios control-rooms, and offices, and which used to be the B.B.C.'s Scottish headquarters. Now that the Scottish Regional programme staff has flitted to Edinburgh, there is only one programme official at Glasgow, Gordon Gildard, formerly Lieut.-Commander, R.N.

### Comedian and Official.

Before joining the B.B.C. some months ago as Glasgow representative, Gildard had had several years' experience of broadcasting as a member of the "Radioptimists" Concert Party, in which he still plays the part of comedian. The combination of comedian and B.B.C. official in the one person is something new, to me at any rate; but it has this advantage—that here we have one high official who has a direct personal interest in the lighter side of Scottish programmes.

I do feel, with all respect and admiration for the B.B.C.'s keenness in Scotland to encourage young Scottish composers, Scots folk songs, Scottish drama, and talks by the "intellectuals" of Scotland, that the lighter side sorely needs all the energy of such men as Gildard at Glasgow and Webster at Edinburgh.

Until the new control-room at Edinburgh is fitted up, Glasgow remains the engineering headquarters for Scotland and, in fact, for the North of England as well. Here we find the Superintendent Engineer for the North, who is responsible over Scotland and the North of England.

In the same build-

Concluding his tour of Scottish B.B.C. stations, Leslie W. A. Baily describes the interesting equipment at Glasgow. In forthcoming articles he will deal with his visits to North of England stations.

ing, but working independently, there is the 5SC engineering staff. "S.E. North's"

### MAKERS OF RADIO HISTORY



Mr. Noel Ashbridge (standing), Chief Engineer of the B.B.C., and Mr. Liveing, the North Regional Director.

### OUR CORRESPONDENT CROSSES THE GRAMPIANS



And, as you will see, he did not forget to take his portable with him! It was tuned to 5XX when this photograph was taken.

staff numbers 7, and 5SC's totals 21.

The land-lines from England and the lines radiating to the Scottish transmitters all terminate in the control-room here. It used to be a kitchen. A dresser has been converted to hold the amplifier racks and a land-line switchboard hides the cooking range. A cellar is used as an echo room.

Upstairs there are two studios. Glasgow has no dramatic control panel, but one is shortly to be installed. I am told that Glasgow has plenty of good radio actors and actresses, but the supply of "broadcastable" plays and sketches is meagre.

The trouble both in Scotland and England, of course, is that the remuneration offered by the B.B.C. is not sufficient to attract a regular flow of good material from the best writers.

### The Transmitter.

The Engineer-in-Charge of 5SC took me to Fort Dundas electric power station, a mile away, where the transmitter is installed. In the entrance hall he introduced me to the motor-generators; in a cramped little room two stories higher up we came to the transmitter, and after leading me along narrow run-ways at a dizzy height over the Corporation power house and climbing about on a glass roof (Ugh!) he proudly showed me the aerial, which hangs between two 200-ft. chimneys.

The transmitter, a standard "Q," was installed in 1923, and is still going strong, with a service area of 40-50 miles. One of the generators downstairs provides 500 volts and the other charges the L.T. battery (600-ampere-hour), which, in turn, gives 65 amperes at 22 volts to light the filaments of the valves.

The 500 volts from downstairs is stepped up to 10,000 volts by a transformer. This is the H.T. for the transmitting valves.

(Continued on next page.)



## A COMBINED EARTHING SWITCH AND LIGHTNING ARRESTER

Full details of a useful gadget that can be made from an old crystal detector and a few pieces of scrap material.

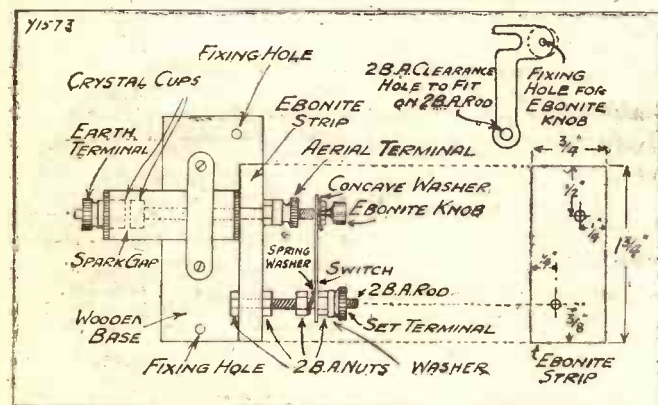
A CRYSTAL detector of the semi-permanent variety can quite simply be converted into an efficient aerial-earth switch. This is how you should proceed.

First remove the crystals from their cups. This can be done by holding the cups in the flame of a lighted match. Clean the cups and replace them in the ebonite tubing.

### Preparing the Ebonite.

Obtain a piece of ebonite  $1\frac{1}{2}$  in.  $\times$   $\frac{3}{4}$  in.,  $\frac{1}{2}$  in. thick, and drill two holes large enough to allow the screwed collar of the spring plunger and a piece of 2 B.A. screwed rod to pass through. The distance between the

### SET AUTOMATICALLY DISCONNECTED



This easily-made device provides perfect safety against lightning discharges.

centres should be about  $\frac{7}{8}$  in., and the holes should be staggered to allow easy access to the terminals.

Remove the ebonite knob, the terminal and locknut from the plunger end and pass through the hole provided. Replace the locknut and terminal but not the ebonite knob.

Next make a small concave washer of brass or copper and solder a small nut on to the end of the plunger, after having dropped the washer in position over the end of the plunger. For the switch-arm a piece of 2 B.A. threaded rod,  $1\frac{1}{4}$  in. long, four 2 B.A. nuts, 1 spring washer and 1 small flat washer and one 2 B.A. terminal top are required.

### Switch-Arm Adjustments

Cut a piece of thin brass or copper to the shape shown in the diagram, then place the nuts and washers as shown. The two nuts which hold the spring washer and switch-arm in position on the rod should be soldered to prevent any movement either way.

The third nut should then be screwed up to the fixed nut and the end of the rod passed through the ebonite. The fourth nut is now screwed on to the rod, and the position of the rod adjusted by the third and fourth nuts.

The terminal top is next screwed on to the end of the rod. The small ebonite knob previously removed from the end of the plunger is now fitted to the switch-knife by means of a small screw.

It is advisable to use a locking-nut on this screw to prevent the knob from working loose. The switch is completed by fastening the ebonite tube to a block of wood,  $2\frac{1}{2}$  in.  $\times$  1 in., by means of a brass clip such as is used for fixing piping on walls, etc.

Test for continuity by means of a flash-lamp bulb and battery connected across the aerial and earth terminals. When the switch is disconnected the bulb should light.

### How to Connect Up.

To connect the switch join the aerial to the plunger end of the switch and the earth to the fixed end. Join the set lead to the terminal on the switch-arm.

When the set is connected to the switch, the spark gap should be approximately  $\frac{1}{2}$  and in. This depends on the thickness of the metal used for the knife on the switch-arm. The removal of the switch knife automatically earths the aerial and disconnects the set.

## RANDOM ITEMS

Handling Valves  
—B. B. C. Land-  
lines, etc.

Pulling a valve out of its socket by the bulb may not appear to harm it, but in time there is a possibility that it will work loose from its base.

If you have a valve whose bulb has been loosened in this way, you can strengthen it by binding sticky insulating tape over the bulb and the valve-base where these come together.

Never "short-circuit" grid-bias battery leads, for this can be much more harmful than disconnecting a G.B. plug when a valve is working.

Properly handled, a one-valve set with reaction and wave-change should be capable of tuning in at least a dozen foreign stations.

At present the B.B.C. use about 4,000 miles of G.P.O. telephone line for S.B. work.

During wet and windy weather the number of faults in B.B.C. land-lines increase by about 300 per cent.

Although the frequency response of a land-line can be corrected, such special circuits are wasteful, and only a fraction of 1 per cent of the power input at Savoy Hill emerges at Brookmans Park.

## WITH THE B.B.C. IN THE NORTH

(Continued from previous page.)

It is alternating current, however, and has to be changed to direct current by passing through the first of the four panels or cages, some 6 ft. high, into which the transmitting gear is divided. These panels can be simply described as follows:

- No. 1. Rectifier panel, containing the two rectifier valves, smoothing chokes and condensers.
- No. 2. The drive (or master oscillator) valve is fixed here—a plump fellow the size of a football.
- No. 3. The magnifier valve here. On the top of the panel is the aerial series condenser and tuning inductances.
- No. 4. Containing the sub-control valve and three valves in parallel which act, in effect, as a single-control valve. The sub-control is resistance-capacity coupled to the control stage.

### Valves with Long Lives.

With the eight big valves glowing brilliantly, the "Q" type transmitter has a spectacular appearance when in action. Despite the almost white-hot condition of their anodes, these transmitting valves sometimes live to a wonderful old age. The Aberdeen transmitter has had only two sub-control valves since it started in 1923.

From the transmitter I was whisked away in a B.B.C. van to the Pollock Estate, a delightful place on the outskirts of Glasgow where the B.B.C. has a unique receiving station amidst shady trees and a flower-carpeted sward. Every B.B.C. transmitter in the land is connected by a land-line to a receiving set permanently tuned to 5 X X, so that Daventry can be relayed by wireless link when the land-lines are not available, but Glasgow has the unique distinction of a directional receiver.

### Special Directional Receiver.

This was installed because of serious interference from Zeesen. It works on the Bellini-Tosi principle, which obviates the necessity of actually rotating the aerial. One mast, 60 ft. high, supports two loop aerials at right angles to each other.

These are connected to the coils of a radio-goniometer in the receiving set in a nearby hut, and by rotating the coils a marked directional effect is obtained.

The success of this means of preventing interference was proved to me when, donning headphones, I listened to 5 X X first with the directional system in action, and then with it switched out.

First I heard reception absolutely clear of all interference, then Daventry's music was accompanied by a disturbing under-current of mush. The receiving set utilises two H.F., detector, and two L.F.

### NEXT WEEK,

No. 6 of

"With the B.B.C. in the North"

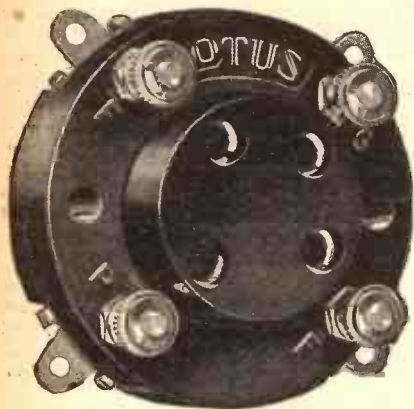
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# LOTUS LATEST DEVELOPMENTS!

## Cheaper Valveholders *but still the same excellent quality!*



Finest Bakelite Mouldings with one piece, phosphor bronze legs and springs. With Terminals, Type VH/27

Without Terminals, Type VH/28, at the same price.

**1/-**

The prices of LOTUS Valve Holders are drastically reduced—in the case of the Anti-Microphonic Type from 1/6 to 1/-, and of the Rigid 5-pin Type VH/31 from 1/- to 10d.

These reductions are made possible by increased manufacturing facilities and economies, there being no alteration whatsoever in the famous LOTUS quality.

LOTUS Valve Holders and other Components are specified for use in all the most successful modern receivers. Their reputation for quality and reliability has been built up on satisfactory service from the earliest days of broadcasting.

The LOTUS range includes Condensers, Transformers, Dials, Coils, Jacks, Plugs, Switches, Remote Controls, etc.

**A LOTUS MINIATURE DIFFERENTIAL CONDENSER WITHIN THE REACH OF ALL POCKETS.**

Introduced to meet the popular demand for a cheap yet efficient Differential Condenser, this new LOTUS Miniature Model is sure of a splendid reception. The flexible brass vanes are interleaved with sheets of bakelite and are specially mounted to ensure smooth operation.

.0001 mF. and .0003 mF.

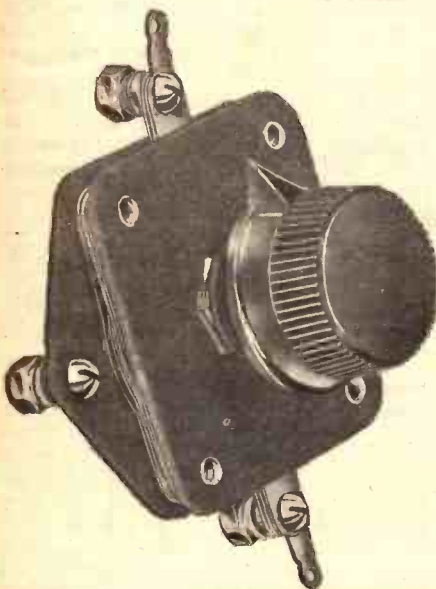
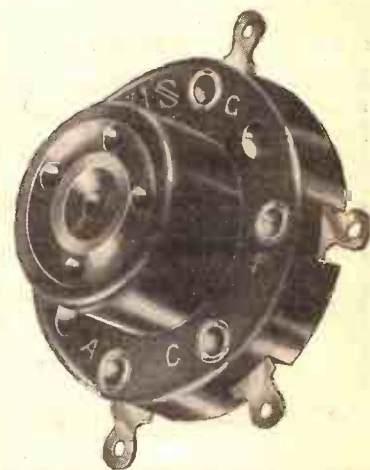
Each

**3/-**

Rigid type suitable for 4- and 5-pin valves. Highly finished with specially heavy sockets. With Terminals, Type VH/31

Without Terminals, Type VH/30 Price 9d.

**10d**



**AND NOW  
A MINIATURE REACTION  
CONDENSER OF SIMILAR  
PATTERN AND THE  
NEW LOTUS STANDARD**

at **2/6** only

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**LOTUS RADIO LIMITED, MILL LANE, LIVERPOOL**







# RADIOTORIAL

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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 specialities described may be the subject of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

## QUESTIONS AND ANSWERS

### OUTPUT FILTER CONNECTIONS FOR THE "COMET."

B. T. H. E. (Chesterfield).—"I have constructed a 'Comet' Three complete with all refinements, and with components recommended by 'P.W.' Now I cannot make the set work with an output filter and the condenser to which it is coupled.

"The foundation circuit works excellently, but I cannot perceive any advancement with the selector coil except very little. The 2-mfd. condenser between plate of last valve and L.S.—stops the set altogether, and the output filter, which is a Pye 32H, will simply not work in the set.

meter and radiogram switch I can get excellent results on medium waves and gramophone. Will you be good enough to enlighten me a little?"

In changing over, no doubt, you removed the wire between H.T.+2 and L.S., but you did not keep H.T.+2 connected to H.T.+ on the No. 2 transformer. Join these two points up, and fit the choke, and you will find that the set then gives full power.

As regards the long waves, your original good results make it certain that something has "fallen off" in efficiency. We suspect the coupling condenser, and advise you to try a new one of good quality, which should restore the set to the full power.

### THE "NIGHT-FLIGHT" THREE.

F. J. M. (Hammersmith).—"I am a 'Comet' enthusiast, getting wonderful results. It is the envy of all who have heard it.

"I am now turning to short waves. Could you give me information with regard to where I can procure circuit, blue print, or constructional data of your 'Night-Flight' Three?"

The "Night Flight" Three was described in the October 4th, 1930, issue of "P.W." (Back numbers of "P.W." which are still in print can be obtained from The Back Number Dept., Amalgamated Press, Ltd., Bear Alley, Farringdon Street, London, E.C.4, price 4d. per copy, post free.)

### DET. AND TWO L.F.

B. J. (Rochdale).—"I have built to specification apart from transformers. With reception is a sort of hum, typical of a mains set, although mine is battery driven.

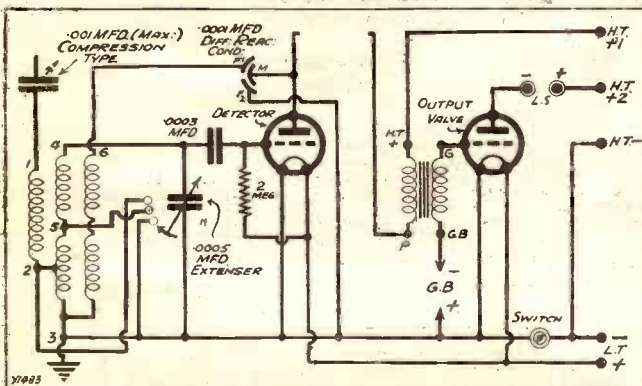
"Last night, whilst playing about with it, I put in a 20,000-ohm spaghetti resistance I had on hand across the primary of both transformers. Reception improved 50 per cent. speech especially being crisp and clear.

"Will this hurt the set or transformers, and what effect is the resistance having to improve reception?"

We notice you did not follow the specification with the transformers, and this is rather important with a detector and two low-frequency set, as when two similar transformers are used there is rather a liability to "peaking."

Trouble is especially likely to arise if the high-tension battery is of the small type. It may sometimes be obviated by reversing the connections to the primary of one of the transformers.

### MISSING LINKS, No. 13.



Here is a useful two-valve circuit of the det. and L.F. type, employing an Extender for tuning and a dual-range coil of the "Explorer" pattern. Two of the symbols have been purposely omitted; can you fill them in? You will find the answer in next week's "Popular Wireless."

"I have tried three 2-mfd. condensers with negative results, and I would be pleased if you could tell me what might be wrong, or what will put it right. Also, when I first constructed the set (foundation circuit) I could receive long-wave stations, but these have disappeared altogether so that the present position is this, that with the foundation circuit in operation plus selector coil, potentiometer and radiogram switch I can get excellent results on medium waves and gramophone. Will you be good enough to enlighten me a little?"

This tends to "flatten out" the response and somewhat similar effect is obtained by the resistance you have connected. You might try that on the secondary of the transformer instead of the primary, and also on the other transformer, to see which position is best for it.

It will not do the slightest harm, but if you find that a reversal of the primary connections of one of the transformers gives equally good results you are better without the resistance, because you probably lose a little volume when using it.

### IMPROVING THE "COMET."

M. L. (Chiswick).—"I do not want a better circuit, but I should like to push it up for the winter as far as possible by doing away with the wave-change switches, and using Extensers in place of them, and also (for economy) cutting out one valve when the loud speaker is not required at full strength. What would the connections be for this using an S.P.D.T switch for the valve cut-out?"

We are not much in favour of switching out a valve, but there is no vital objection to it, provided you keep the wiring as short as possible, and do the job carefully.

To simplify tuning by means of Extensers, on the other hand, would be a great advantage, and this is very easily carried out. The only requirement is that you keep the fixed and moving vane connections as before, and bring the three wires which previously went to the wave-change switch on the panel to the respective three contacts on the Extenser.

You will in practice find that the wiring can be shortened a little, but to make sure of this draw a sketch of it showing the proposed wires, and mark

## "WHY IS IT SO NOISY TO-DAY?"

Perhaps the 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 an unrivalled service.

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

quite sure that all the same points are connected, the only difference being that the three wave-change switch contacts now go to the contacts on the Extenser self-changer.

It would really be better to use a volume control instead of switching out a valve, but if you prefer the switch you will need it mounted as close as possible to the first L.F. transformer.

Undo the 10,000-ohm spaghetti resistance which goes to the plate of V1 and to the P terminal on this transformer, and take this lead to the centre contact on the S.P.D.T. switch. One of the outer contacts of the switch now goes to the P terminal and the other outer contact on the switch goes to the P terminal on the second L.F. transformer.

In addition, you must arrange to break the filament of V3 when the S.P.D.T. switch is in the "two-valve" position. The easiest way to do this is to undo the wire which goes from filament of V3 to filament of V2 (outside the L.F. transformer (2)), and take it instead from the outer filament terminal of V3 round to another filament switch, mounted close to the first one.

The other side of this filament switch can then be joined to the appropriate point on the original wire, namely to that filament socket on V2 which is joined to the L.T. switch, to the filament socket of V1, and to the grid leak.

### THE MOVING COIL'S POT-WINDING RESISTANCE.

H. B. (Canterbury).—"I picked up a moving-coil loud speaker recently at a sale, and should be glad if you could help me to find out what the resistance of the big winding is. It

(Continued on page 672.)



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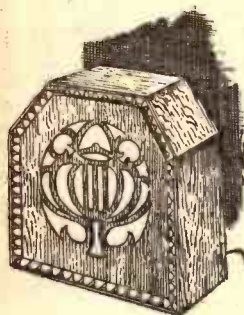
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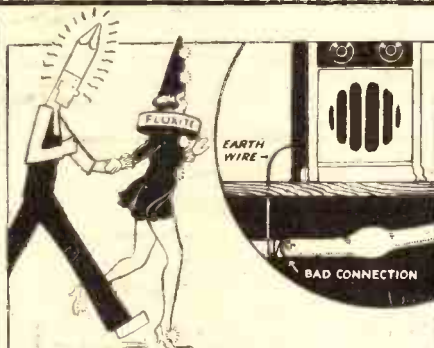
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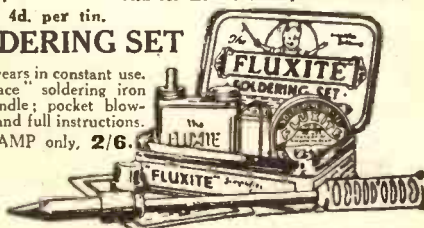
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**IT SIMPLIFIES ALL SOLDERING**



## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 670.)

is provided with a variable adjustment on the back which makes contact inside and apparently puts in resistance wire.

"It would really be hopeless to try and get particulars of what it is from the firm, as it is an old model and they have probably gone bust by now, but I have a milliammeter and understand this can be used for resistance measurement. How could I find out the various resistances given by the switch with an instrument of this kind?"

It is very easy to find the resistances for different switch positions by applying Ohm's law. This law says that resistance (R) = voltage (V) over current (C):  $R = \frac{V}{C}$ . Therefore, by applying a known

voltage (say from an accumulator) and measuring the current you can find the unknown factor—which is resistance.

For instance, if the resistance (R) is somewhere about 2,000 ohms (which is not an unusual figure),

### "P.W." PANEL NO. 30.—CARE OF THE 'PHONES.

Telephones should be wiped over with a soft cloth after being worn for long periods, and put away dry.

Do not wrap the cloth round a pencil or other hard object to clean the diaphragm, and do not press hard on it, as a dent or bend may cause trouble.

Use the little cord near the tags to fasten that end of the lead to the set. Otherwise, a pull on the cord weakens the connections inside it.

you should get one milliamp (C) flowing when (V) a 2-volt accumulator is connected in series with the pot windings. (Because  $\frac{2}{2000} = 0.001$  amperes.)

So that with these connections, if your milliammeter shows one milliamp the resistance is 2,000 ohms, whilst 2 milliamps would be 1,000 ohms, and so on.

### HANDLING GREATER POWER.

"WEST RIDING" (Yorkshire).—"Situated here we have noticed a marked improvement in the strength of B.B.C. programmes since the new transmitter has been used. And, much as we Yorkshiremen like something for nothing, we find that a little distortion is present (on very loud passages) that formerly never occurred.

"Before blaming the B.B.C., which I thought unwise, for their quality has been simply great. I made a few inquiries, and find that in all probability I am 'overloading' owing to the stronger reception here. Having spent all I can really afford on wireless I do not want a new set or any expensive modifications, but can you tell me of any way at all in which I could improve the set so as to take advantage of the louder programmes without this distortion creeping in?"

There is just one thing you can do to improve your power and the set's capabilities, provided you are not at present running it at the maximum allowed by the valve makers.

Put in a few words, the idea is that without any alteration to the set itself, it would be capable of

Another 20 or 30 volts on your H.T. battery with the corresponding increase in grid bias would probably remove the distortion complained of altogether.

### CORRECT NEUTRALISATION.

"OLDUN" (Cams.).—"Please don't say 'we advise an S.G. instead,' because I'm determined not to! I've heard the set going, and it's simply great on foreigners, although it uses the old H.F. valves, which are neutralised.

"This latter is what is bothering me, because you never say anything much about neut. sets in 'P.W.' now, and if I put in a new valve I shall have to re-neutralise I suppose?"

"How do I do that?"

The following method of neutralising is recommended for use in sets employing one stage of H.F. and provided with a reaction control.

Set the reaction control at minimum, and likewise the neutralising condenser. Now, on setting the tuning condensers so that the two tuned circuits are in step with each other it will probably be found that the set is oscillating.

You will probably find that the set will only oscillate under the above conditions when the two circuits are in tune with each other, and this can be used as an indication. It is convenient to perform the operation at some point near the middle of the tuning range.

Now, increase the capacity of the neutralising condenser. (In the case of such condensers as the Gambrell "Neutrovernia" this means screwing downwards.)

Test at intervals for oscillation as this is done, and you will presently find that the set has ceased to oscillate, and will not recommence even when the tuning dials are slightly readjusted. Now increase the reaction a little, until the set once more oscillates, and again increase the neutralising condenser setting until oscillation ceases.

Slightly readjust the tuning condensers again to make sure that the set is completely stable once more. Proceed in this way until it is found that the correct adjustment of the neutrodync condenser has been "over-shot."

The object you must aim at is to find such an adjustment of the neutralising condenser as will permit the greatest setting of the reaction condenser to be used without producing oscillation. It will then be observed that when the two tuned circuits are in step and the set is brought to the verge of oscillation, a slight movement in either direction of the neutrodync condenser will cause the receiver to oscillate.

## TECHNICAL NOTES

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

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

### Short Pick-up Leads.

IN a commercial radio gramophone, where the gramophone and amplifier are all contained within a single cabinet, it is quite an easy matter to keep the leads from the pick-up very short and to keep them fairly well away from the low-frequency end of the amplifier. In addition to this the pick-up leads are often composed of metallically armoured cable, the sheathing being earthed.

When you are using a home-made hook-up with the amplifier a little distance away from the gramophone it often happens that you cannot avoid using a fair length of pick-up leads, perhaps up to as much as 6 ft., or even more.

### Use an Input Transformer.

In these circumstances there is a liability, since the pick-up leads are in the grid circuit of the first valve, to set up instability and howling, and this will be still more accentuated if the leads are allowed to go near to the loudspeaker or, in fact, near to the output end of the L.F. amplifier.

Incidentally, if the amplifier uses A.C. valves, or if the gramophone motor is an electric A.C. one, it is fatal to allow the pick-up leads to go close to the A.C. leads,

as in that case, even with efficient earthing, you are very liable, indeed, to pick up a loud A.C. hum.

The use of armoured twin flex is certainly a very great advantage, but an alternative is to use an output—or, perhaps, I should say an input—transformer separating the pick-up from the grid circuit.

In such a case the transformer may be included in the amplifier so that the leads between the transformer and the grid may be quite short, whilst the other winding of the transformer is connected to the terminals of the pick-up, the grid circuit being in this case isolated from the pick-up leads.

The length of the latter is not so important, although even then I would advise you not to have the leads any longer than you can possibly help. For the transformer, any good quality speech transformer may be used, such as an ordinary L.F. transformer, and this should preferably be of low ratio.

### Headphones with Loud Speaker.

Sometimes you want to connect a pair of headphones to a receiver which is already supplying a loud speaker and, if the voltage output of the receiver is fairly high, the

matter of joining them in circuit is not always quite so easy as it seems.

For one thing, if it is not done correctly, there is a likelihood of upsetting the quality of reproduction and at the same time there is quite a good chance of the user of the headphones getting an electric shock.

Taking as a typical case a three-valve receiver, detector and two low-frequency amplifiers, with transformer coupling between the first and second L.F. stages, a good place in which to connect the headphones is between the anode of the first L.F. valve and the filament battery.

In series with the headphones, and between the headphones and the anode, you should connect a fairly high resistance, the value of this depending upon the impedance of the valve, and also a fairly high-capacity fixed condenser.

### Quality Not Affected.

For the condenser a capacity of 2 microfarads will generally be found suitable, whilst the value of the resistance may be roughly twice the impedance of the valve; for instance with a valve having an impedance of 20,000 ohms the resistance may conveniently have a value of about 40,000 ohms.

The resistance has the effect of limiting the current which is drawn away through the headphones (the current required for this purpose being, of course, small as compared with that supplied to the loud speaker from the next stage) and at the same time it prevents any serious interference with the transformer characteristics, so preserving the quality from the loud speaker. (Continued on page 674.)





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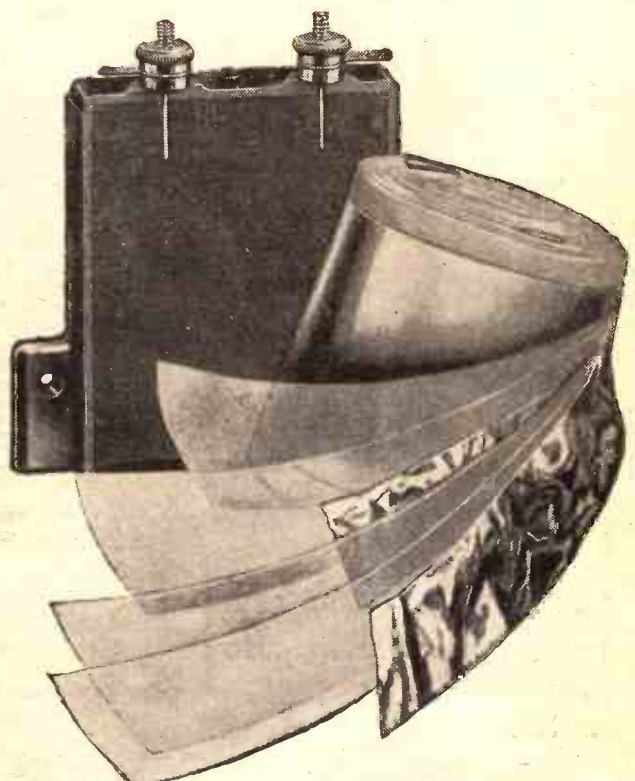
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### INTERESTED IN RADIO-GRAMS ?

You will find : Round the Turntable—Mounting a Pick-Up and Recent Record Releases in the August "M.W."

And as for radio articles of a general nature—well, here are a few titles to show you what wonderfully wide ground is covered by this August "M.W."

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## TECHNICAL NOTES

(Continued from page 672.)

### Simple Cone Suspension.

My references to the "Clear-Cut" Cone in these Notes a week or two back have brought me some further letters from readers and one letter in particular, from a Norwich reader, I think I might perhaps refer to briefly.

He says that with regard to the method of suspension by means of fine wires, he goes one further and does away entirely with any suspension at the back or the front of the cone. Instead he just uses a single piece of strong thread around the centre or "waist," this thread being attached at its two ends to the wooden frame and being adjusted in height until the centre of the cone is brought dead opposite to the centre of the unit.

This method, my correspondent says, gives him much better notes and more volume, as well as giving a generally pleasing reproduction. He states that the unit he is using is a Blue Spot and "it is quite amusing to watch the thread vibrating when the speaker is in operation. You notice it more when talking is coming over fairly loudly."

I pass this idea on in case any of you may care to try it. Incidentally, the adjustment can be made more accurate by winding the thread around a butterfly screw inserted into the wooden frame and turning this so as to raise the cone to the exact position—something after the fashion in which the tension of a violin string is adjusted.

### All About Stations.

I recently received from Messrs. Frank Pitchford & Co., Ltd., the publishers of the well known "At-A-Glance" publications, a useful little article in the form of a double-sided wheel which, as its title indicates, gives, "at a glance," nine important facts in relation to each of 76 of the most important British and Continental Radio Stations.

By the simple process of turning an arrow to the station required you are given at once the distance from London, interval signal, frequency, power, comparative difference in time from London, wave-length, call-sign, and the closing-down announcement for each station. The reference is very quick and easy and a good deal of time is saved by means of this ingenious little device.

A blank space is provided for your own dial readings as you tune in each station on your own set. The article is attractively got up, being provided in colours, and is a record always to hand; it is on sale at a nominal price.

### A De-coupling Difference.

We were talking a week or two back about the use of by-pass condensers in various parts of the circuit and there is one point which I should particularly like to refer to, as it is rather important and is not always sufficiently clear to those who are inexperienced in the designing and making of their own sets.

With a high-tension mains unit you expect this to have already incorporated in it the necessary by-pass condensers and filter resistances to ensure satisfactory results, but if you are using batteries it is

necessary to introduce any such filter circuits into the receiver itself, or at any rate to supply them in some other way.

Now with a receiver having a high-frequency screened-grid stage, you should include a fixed condenser between the filament and the screening electrode whilst at the same time it is very desirable to place another between the high-tension supply and the filament of the valve.

You will find that these by-pass condensers have an important influence in making the circuit stable. So far as including these by-pass condensers in the set itself, this course is preferable, since by this means the shortest possible path is provided for the high-frequency currents and this makes for much better results.

### Familiarity Breeds Contempt.

When using ordinary valves, or even medium-power valves, the voltages which one handles are sufficiently high to be treated with some respect; but I am afraid

## TECHNICAL TWISTERS

### No. 72—TAPPINGS.

#### CAN YOU FILL IN THE MISSING LETTERS ?

When a component (such as a . . . . or a resistance) has provision not only for connection to its ends, but to an . . . . . point (or points) as well, it is said to be "tapped."

Usually the object of taps on a coil is to give different degrees of . . . . . according to the tap which is employed.

The tap on a resistance enables an intermediate . . . . . to be tapped off when the ends are joined to the maximum and minimum voltages of the supply. Such an arrangement, giving control of potential, is often used in a mains unit.

Last week's missing words (in order) were Alternative. Parallel. Condenser. Filaments.

that in most cases familiarity breeds contempt, and we think of a mere 150 or 200 volts as nothing very much to worry about.

But when it comes to real power working and the use of power transformers, you want to bear in mind that you may be working with voltages of anything from 300 to 1,000 volts. For instance, with a power transformer working with a double-wave valve rectifier, voltages such as the latter are by no means uncommon.

It is very important in these circumstances to have the power transformer, rectifier valve, and any associated condensers enclosed in a safety box, so that when the lid of the box is open the power is disconnected.

Even then, remember that the condensers, if holding their charge as efficiently as they should do, can still give you a nasty shock, and so before fiddling around with the inside of the apparatus it is well to "short" each of the condensers by means of some metallic conductor.

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# Wireless Wire

By C. P. ALLINSON, A.M.I.E.E.

CONSIDERING that the art which led up to broadcasting was known by the name of Wireless Telegraphy, and that broadcasting is even now frequently referred to as "wireless," it is probably somewhat surprising to the beginner what a large amount of wire is used in wireless work.

### Never-Ending Variety.

Not only does he find that a large quantity of wire is used, for instance, the windings of a low-frequency intervalve transformer may contain as much as three miles of wire, but also he finds that there seems to be a never ending variety of wires.

The first measure applied to wire is a standard of thickness, and this is distinguished by a numeral. The "Standard Wire Gauge," or S.W.G. as it is usually abbreviated is almost exclusively used in Britain, and in America the standard used is "Browne and Sharpe," usually referred to as B. & S.

The numerals used to indicate the gauge of the wires are not the same with these two standards, thus similar numerals refer to thinner wire in America than that to which these numerals apply under the British standard.

Thus 14 gauge B. & S. is only as thick as 16 gauge S.W.G., and 32 B. & S. is the same as 36 S.W.G.

Under both these systems we find that the thicker the wire the smaller the numerical value of the figure that represents it.

### How the Sizes "Run."

Thus No. 10 S.W.G. is a much thicker wire than No. 20, and No. 20 again is much thicker than No. 30, but the numbers are not directly proportional either to weight or thickness of the wire.

Copper wire can be obtained in many varieties. It can be bare, it can be insulated with a layer of cotton, or two layers, or even four; it can be covered with one or two layers of silk, or it can be enamel insulated. It can also be insulated first with enamel, then with rubber and then cotton, as in some kinds of bell wire. It can also be stranded bare, or stranded and insulated, or specially made up as litzendraht.

The usual forms are referred to as single cotton covered, abbreviated when written to S.C.C., double-cotton-covered (D.C.C.), single-silk-covered (S.S.C.), and double-silk-covered (D.S.C.), the quadruple-cotton-covered being rarely used and generally difficult to obtain.

A very popular wire for use in winding coils for wireless work is the double-cotton-covered wire for the thickness of the insulation has the effect of spacing the turns, which is a desirable feature in a coil, though this is not being used so much now as in earlier days.

Where the amateur has means of spacing his windings, such as a lathe, bare wires can of course be employed. Even then, however, an insulated wire is frequently made use of so as to obviate any risk of one or more turns being short-circuited.

The wire found most suitable by most present-day designers for the construction of efficient coils is silk covered, and those interested will find articles on this subject from time to time in the various technical papers. It is not intended, however, to go into considerations of coil efficiency, but rather to give an indication of the uses to which various types of wire are put.

### Use of Enamelled Wire.

Enamel-covered wire is used at times for constructing tuning inductances, but it has the disadvantage of producing a coil of rather high self capacity. On the other hand, it is impervious to damp and does not absorb moisture as the silk and cotton coverings do, while its insulation resistance is of a very high order.

It further has the advantage of taking up less room than the cotton and silk covered varieties, an important point where space is a consideration.

Enamelled wire is further used in the thinner gauges for winding low-frequency transformers and the speech coils of moving-coil speakers, and even in the case of such gauges as 42 or 47 S.W.G. the enamel is perfectly pliable and does not peel off the wire.

### For Wiring-up Sets.

Before going further, there is a wire which is used to a large extent for wiring up sets, and this is bare tinned copper wire. The outside is tinned so that soldered joints may be made to it with ease. It can be obtained either hard drawn or soft, and of the two the first, in the writer's opinion, is much to be preferred, since although it may be a little more difficult to work it presents a far better appearance when the work is completed, since it does not kink easily like the soft wire.

(Continued on next page.)

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## WIRELESS WIRE

(Continued from previous page.)

A very useful wire for wiring sets, especially leads to valves, etc., is what is known as 2-millimetre flex. This consists of a number of strands of thin tinned copper wire, about 12 strands of 36 gauge, with a thin covering of cotton, the whole being covered with rubber.

The rubber insulation is sufficient to withstand quite high potentials, it is flexible and easily taken round awkward corners or through holes in the baseboard. It is easily bared to make connections, and since it is tinned it is easily soldered.

When buying this wire, however, be sure it is new stock. If it is old, the free sulphur in the rubber covering coats the wire with a covering of black sulphide, which is difficult to clean off and makes it difficult to solder the wire.

Then there is the ordinary twin flex as used for house lighting. This is obtainable in a number of colours and thicknesses. It is very useful for leads from the set to the batteries, or from a mains unit to the set.

If it is used for carrying heater current in all-mains A.C. sets, be sure it is heavy enough to carry the current without dropping the heater voltage. Remember that each heater takes 1 amp. and that 4 valves will need 4 amps. A resistance of .1 ohm will, by Ohm's Law, result in a voltage drop of nearly  $\frac{1}{2}$  volt, which is far too big a drop to be allowed.

### Shielded Flexible Wire.

Since the highly efficient valves and circuits now available often require certain leads to be shielded, you can also obtain wire which is covered with a braided sheath of tinned copper wire, or alternately you can get small-sized lead-covered wire. These wires are useful for anode leads from screen-grid valves, and the latter I have often used for carrying a grid lead to a radio-gram switch.

Then another quite important kind of wire is fuse wire. This is made of a special low melting alloy, so that if too heavy a current is passed through it it heats up and melts, thus protecting the circuit in which it is connected from being damaged by being over-run.

We now may pass on to resistance wire, which is used for making wire-wound resistances for use in mains units, as voltage regulators, for L.F. coupling, for potentiometers and numerous other uses. These wires are not made of copper, since copper is a metal with a very low resistance. They are made of alloys of nickel and chromium, or nickel and steel, or all three.

### Specially for Resistor.

This type of wire is obtainable bare and insulated pretty much like copper wire, though it is frequently made up in a special way for wireless work where high resistances carrying little current are required. Thus a very fine resistance wire is wound on to a string core. The resulting coiled resistance wire can then be wound on to small formers, and a very considerable resistance can thus be accommodated in quite a small space.

Resistance wire is also woven into a net or mat on an asbestos base, and is used in this form where a fair amount of heat or energy has to be dissipated rapidly. These resistance mats are chiefly used in wireless for sets operated entirely from D.C. mains.

## FOR THE LISTENER

(Continued from page 656.)

of three stars. I listened to them a little half-heartedly. I blame the summer for that. You probably gave them a miss and crossed over into the alternative programme.

Then there was Mr. Wells. I am still a hero-worshipper, and I greatly admire the author of the "Time Machine." I had never heard his voice before. It was an amusing voice. Much higher-pitched than I had expected. And the rather breathless, somewhat sing-song delivery was other than I had expected. Continual sforzando and diminuendo. I had imagined a sharp, incisive voice; a measured, fluent delivery. Something, at any rate, distinguished. But I had to admit that he had a bad microphone manner.

### Amazing Gift for Right Words.

But the lucidity of that man's mind is a marvel. In his hands a tangle becomes a pattern, a complexity a simplicity. He dives into a subject and picks out a thread or two, and everything falls into its place on the chosen threads. And the extraordinary precision with which he uses words—"the swiftness and closeness of modern life," for example. There, in a couple of words, he gives the whole of the background of our modern problems and a clear hint of the cause of many of them. The jostle, the irritation, the easy misunderstanding, the lack of perspective, which are so characteristic of this present time.

Mr. Wells was not much more cheery than the three statesmen at the Albert Hall Demonstration. "Where Russia is to-day, we may be to-morrow." And even as he spoke there was the ominous sound in the distance of the closing doors of the German banks!

It was all very disturbing; or, at least, I felt it might have been very disturbing if it hadn't been summer. As it was, what chiefly occupied my mind as I listened to him was, not our chance of falling over the edge into the "melting pot," but his high-pitched, sing-song voice and his lucidity, and his amazing gift for the right word.

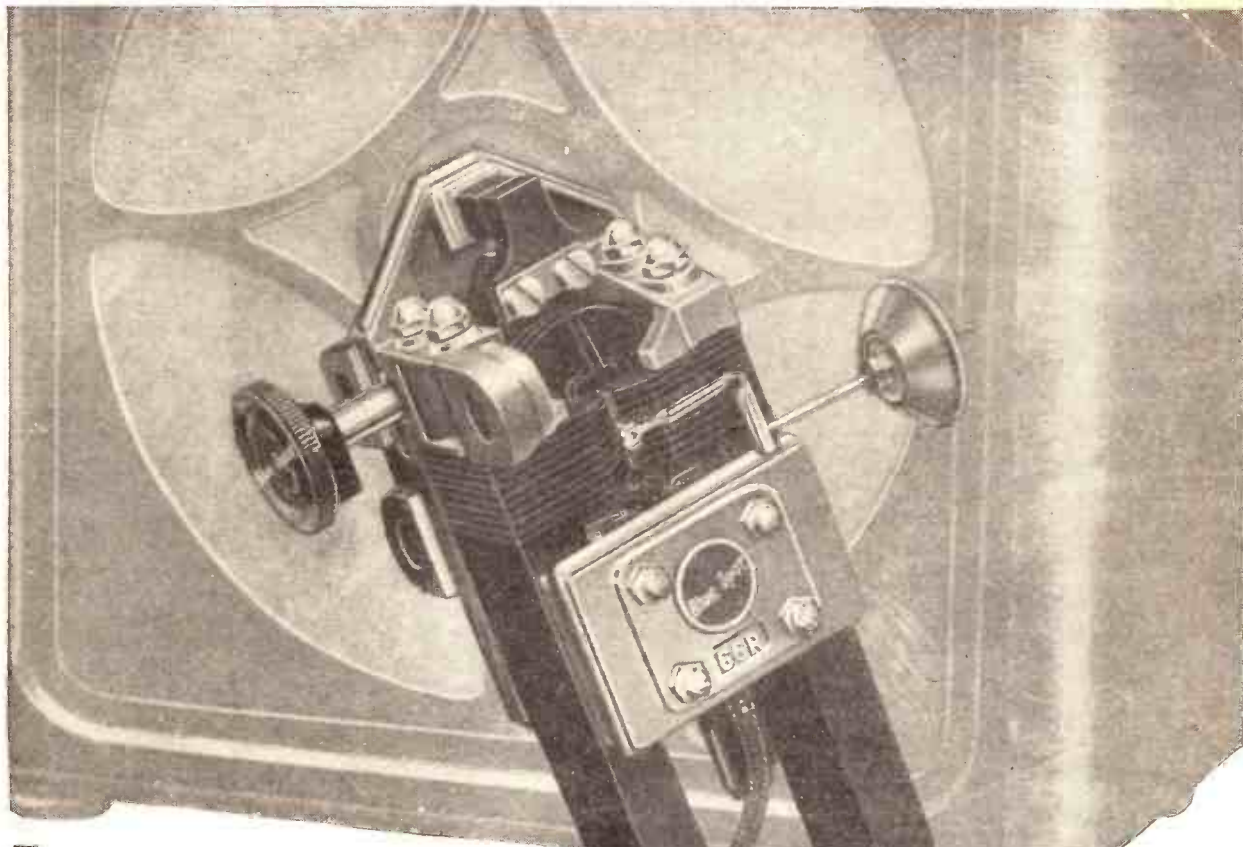
### Listening on the Continent.

And now I am going towards Italy. I shall write to you next week from Holland, where every windmill has its aerial! And the following week I shall be in Germany. I think I shall try to go to Mühlacker for the sake of hearing how their programmes are ruined there by the London Regional! That would compensate me for a good deal of suffering.

Between Germany and Italy I have to cross a high mountain pass—the Stelvio. There are said to be forty-three hairpin bends on the road going up, and forty-four more on the road coming down. So somebody is going to have some fun. If there is an inn at the top I think I will spend a night there and see how wireless goes at a height like that. I wish you were coming with me through those snows and then down into that burning heat!

You don't fancy it? Well, perhaps you are right. But it will be good to be among the Italian peasants again and to see them dancing in the orchard to Jack Payne's Band. For Jack Payne's Band is always in season; it is like the Underground, cool in summer and warm in winter.





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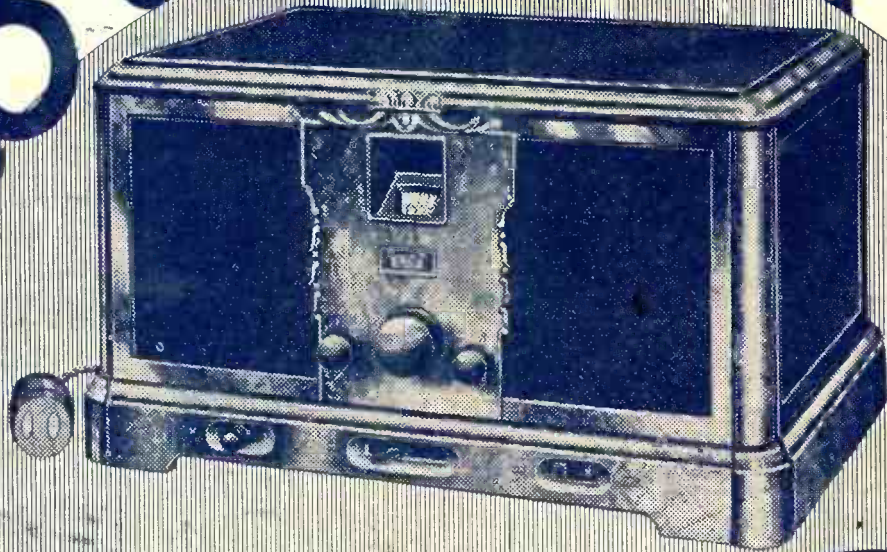


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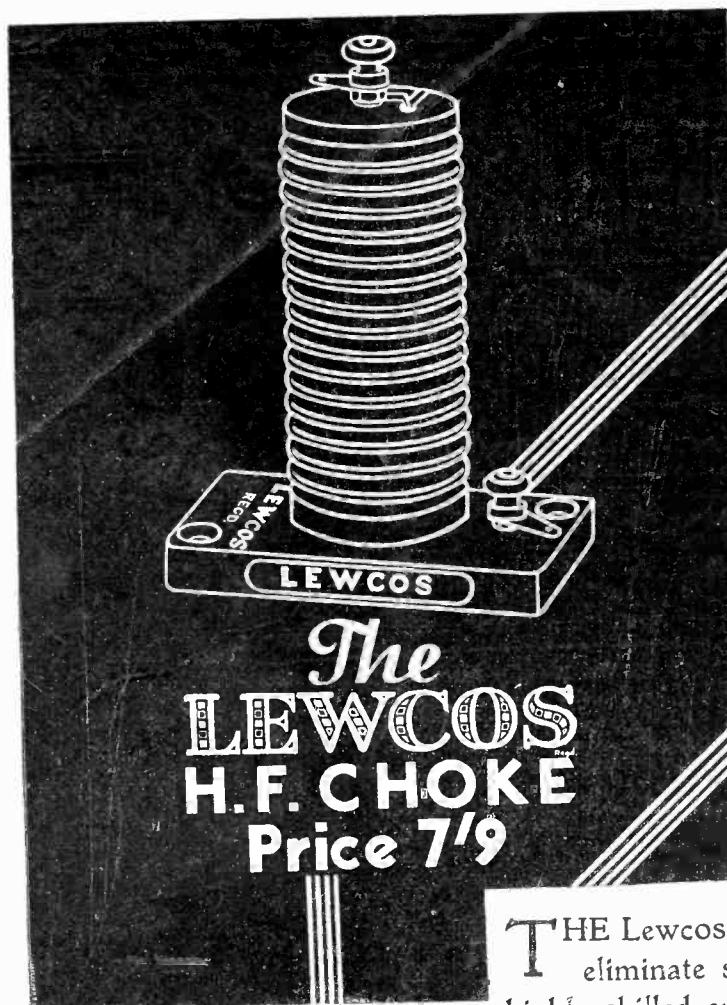


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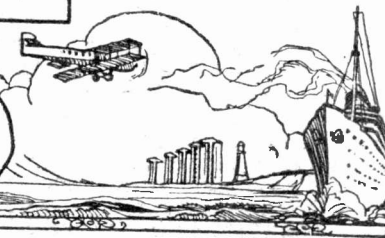


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CRYSTALS AGAIN  
A CHANCE FOR FILMS  
NO CONNECTION...  
B.B.C.'s RISE.

RADIO'S RECORD  
CAUGHT OUT?  
GOODWILL—AND  
GOOD BIZ.  
TRAM INTERFERENCE

## RADIO NOTES & NEWS

### Introductory.

BEFORE we get down to the first item on the Agenda I should like to ask what is the joke about me and the Cotswolds, for the last week's mail has been sprinkled with asides, postscripts, etc., about us. It is true that I traipsed those friendly hills with several tons on my back, and thought that I was having a good time and losing weight, whereas I put on three pounds in ten days although I lost sixteen pints of—hem!—sudorific secretion.

But what is amusing you I utterly fail to conceive. Can it be that you think that I can't walk. By gum, the buses round Stow-on-the-Wold know better! Many's the time they've picked me up! However, if you see me on—not in—Dartmoor early in September—it's me.

### Crystals.

IF FAITH, a dreary matter for a man with the latest type of self-heating, dole-free, non-pinking, valves in his set! I have by me a collection of nice letters from crystal-fellers; all who have written about crystal sets and have had no acknowledgment—you know who you are!—please be made aware of my joy in hearing from you. There the matter rests.

'Pon me shoul. I don't know what to say to you except that I sincerely hope that things will look up and allow you to afford valve sets. I must ask my opposite number of the Motorbike Monthly what he says to chaps who write to him about the tonic properties of "boneshakers."

Nay, think me not unkind. Ebenezer, but really!—valves and m.c. L.S.'s (if you know what I mean!) are really quite decent nowadays.

### Again Crystals.

I AM going to "blue" another paragraph on my collection of crystallographists' letters, because I am old enough—just—to have learned not to despise the old ways of doing things because they are the old

doesn't want to rise and poke the fire, or stretch his legs (or her limbs) and who has the time and patience to fiddle with a cat's-whisker, the crystal set is the best, cheapest and most unsociable receiver ever-invented. Now for the storm!

### HERE ARE THOSE "GECOBIRDS"



This is the "super-eight" used by the G.E.C. to introduce their new season's products at a Coventry luncheon, as reported by "Ariel" in his notes last week.

ways. There is much to be said in favour of crystal reception, but I'll not say it, because I think that there is more to be said for valves and L.S.—and, word-hack as I am, I'm blown if I face both ways—at once! But I'll say this. For a single man, or woman, blessed with horny ears, who

mobile and other industries, but I dare say that some trades are not yet alive to the influence of foreign mass production upon our noble selves. I commend this booklet to you, for its message touches us all closely.

(Continued on next page.)

### A Chance for Films.

WE still lack the real radio film "talkie." Most of the radio bits in films have hitherto been laughably ridiculous. I once helped a well-known film company to supply a wireless flavour to a Wells film, but when I found that the operator had to dash in and out of his cabin, exclaiming, "My Heavens," and waving a sheet of paper, I sickened of the business because, you ought to know, wireless operators are much better people and know much better—and less offensive—exclamations!

If only I had the time—! (And, moreover, these film companies can't realise that sparks are ancient history!)

### Geddes on Mass Production.

THERE has come into my hands a striking little brochure published by the Pelican Press, being a reprint of an address by Sir Eric Geddes to the "1900 Club" on the subject of mass production. I should not have thought that British manufacturers would need reminding of the vital importance of that principle, considering the radio, auto-

NEXT WEEK—THE "SUPER-QUAD" CIRCUIT



# NEWS—VIEWS—AND INTERVIEWS (Continued)

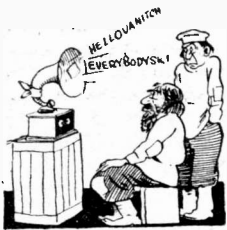
## "No Connection With . . ."

E. T. L. (Cobham) asks whether I am the "Ariel" of the "Daily Mirror." The answer is most positively in the negative. I couldn't hope to aspire to that fascinating style, which I believe to be modelled on that of John Bunyan!

E. T. L. gives two instances of treatment received at the hands of two dealers, one accommodating and the other short-sighted. Well, it takes all sorts to make a world—and the bankruptcy list is full of the names of firms who thought the customer didn't matter.

## The B.B.C.'s "Rise."

I NEED hardly tell you that I have had many suggestions about the uses to which the B.B.C. might put its new wealth to come, some even being to the effect that special broadcasts for Russian consumption should be arranged—a suggestion which was recently made in the House and rejected by the Premier, by the way. I like the idea of A. C. O. (Wood Green) that



the B.B.C. should give serious encouragement to, and make use of, the Esperanto movement. I don't like Esperanto very much—oh, yes! I studied it and achieved some proficiency in it twenty years ago—but I do think that a universal language is a noble conception from several standpoints, and that by its means the use of broadcasting could be multiplied many times and the brotherhood of man thereby be brought near to realisation.

## Radio's Record of Rescue.

SURELY Marconi must be a happy, if not a proud, man when he contemplates the benefits which his inventions have conferred upon humanity, and especially those of security from or succour in the perils which sometimes environ travellers by sea. A careful record has been kept of the number of lives which have been saved at sea by radio since its application to marine work and, not counting what was done during the Great War, the total is about 30,000 lives.

## B.B.C. "Caught Out"?

THEY are saying that Mr. B. H. Jones, who gave that exciting "escape" talk about his experiences of Turkish prisons, pulled off a good joke at the B.B.C.'s expense. You may remember that just before the "treasure" was to be dug up Mr. Jones intoned what was supposed to be a magic incantation, but which was really a sentence in Welsh. Mr. Jones repeated



the words for the benefit of listeners, and it now turns out that they meant

"O that Wales had its own broadcasting station!" The cream of the joke is that the whole talk had been approved beforehand by the B.B.C.!

## Germany's Foreign Radio Trade.

GERMANY is supposed to be as near bankruptcy, red ruin, etc., as makes no odds. Dear, dear! As I live and exhale, we've been like that ourselves after every major war we've waged and won. It's a healthy sign and partly confirmed by the fact that Germany's radio exports were 2,980 tons in 1926 and 7,476 tons in 1930;

## SHORT WAVES.

"Why the dickens doesn't the Postmaster-General buy a wireless set?" said the motorist whose car had hit a telegraph pole and pitched him into the ditch.—"Sunday Pictorial."

## THE RADIO BUG.

Little Lennie, spending his first day in the country, watched a big spider. It swung down from a branch and started spinning a web across two twigs.  
"Hey, Pop! Come here!" said Lennie.  
"Whattja want?" says Pop.  
"Look at this bug, Pop. He's gonna put up a wireless."

Patriotic—The old lady who insisted on having a Scotch wireless set so that she could listen to its "wee Scots accent."

"Nobody could accuse me of being an ethereal type, but I bought a wireless set because it seemed to me the 'nobby' thing to have. But now that I have it it is no use to me at all. . . . Let the grid leak never so wisely, I cannot escape interference."

"Only last night I was dozing over a quintet when an apparently permanent sufferer from tonsils hurled Rhineland potato prices into the middle of a waltz by Brahms."

"Money for jam!"—"Daily Mail."

"Why do you call your grid-bias battery Annie?" asked the amateur's friend.  
"Annie volts up to nine," said the amateur affectionately.

Sympathetic wife (to husband who has been trying to tune in his new set): "Got anything, dear?"  
Husband: "Yes, a headache."

## MIDDLEBROWS.

When we come to have three programmes for the Middle, High, and Low, it will settle things for two Browns, whom we all can trust to know

At which end of the stick their High and Low Brow tastes begin—  
But how about the Middle Brow who's anxious to tune in?

What about the Middle Brow? Who is he, by the way?

What are his tastes? Who knows his tastes? And has he got tastes, pray?

I'd like to know what programme of the harassed B.B.C. can pacify the Middle Brow, who's neither You nor Me.—"Daily Herald."

this year they will be about 8,000 tons. Isn't it surprising, too, that we are her best customer for radio goods? In 1926 we took 1,135 tons and in 1930 no less than 2,040 tons; this year looks like bringing the figure to 2,500 tons.

## Mistaken Identity.

G. E. C. (Sheffield).—Jolly good initials! (By the way, pity his name isn't Brooks! Dickens lovers would love to have a "Brooks of Sheffield" amongst us!) G.E.C. writes nicely to absolve me from blame because he didn't get W. L. S. to take notice, and then goes on to ask me for

confirmation of the w.l.'s of Madrid (approx. 30 metres) and Leningrad (approx. 25 metres). I hope that W. L. S. will give the information on his page next week, for I'm hanged if I can find it. G. E. C. wants to know how other readers get on with the drilling of "Staybrite."

## Goodwill—and Good Bye.

IT is announced that the Short-Wave Broadcasting Corporation of New York are planning an international station to carry "goodwill programmes" to foreign listeners. The station will be W 2 X A L, and the frequencies on which it will work are 6040, 11800, 15250 and 24460 (kc.). That is a fine plan, but it is marred as to its transcendent aim by the additional statement that the service is intended to pave the way for greater acceptance of American products abroad! In other words, Europe, including this country, has got to have radio ads!



## The Post Office Scents Profit.

THE fact that the Post office, in the licences now being issued for radio relay exchanges, includes a clause which gives the P.M.G. the right to buy the exchange, shows that in the eyes of that excellent Civil Servant the relay business is serious and likely to be an institution. The clause provides that the P.M.G. shall have the right to buy at three months' notice, but the valuation is not to include compensation for goodwill or loss of profits. If I might offer the P.M.G. a word of advice, I would suggest that his clause will tend to kill the goose that would have got golden eggs ready for him. In a word, he has been in too much of a hurry with it.

## Interference by Trams.

THE Postmaster General says that he does not feel justified in setting up a committee to discuss radio interference by "electric trolley omnibuses." Quite correct! What is needed is direct action, not talk or beautiful reports.

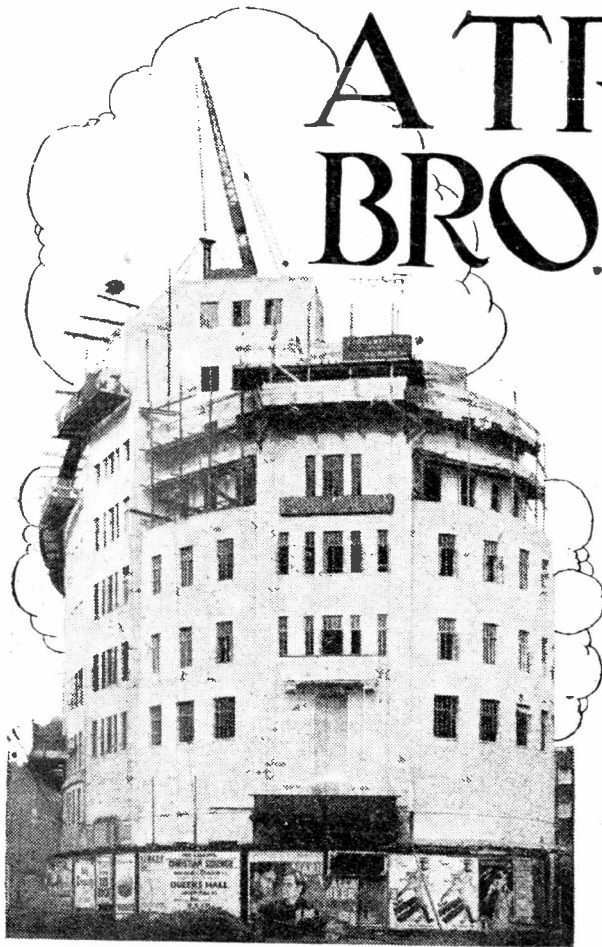
Why doesn't he get Dr. Eccles to tackle the problem? However, he adds that a joint investigation by the Post Office, the B.B.C. and various bus and tram companies is in hand and that he is exploring the legal position of power companies to take action when a consumer causes interference with reception. The thought of a power company solemnly taking action against a tramway system is a rich one. The lawyers must already be licking their chops!





# A TRIP ROUND BROADCASTING HOUSE

By A SPECIAL CORRESPONDENT.



Broadcasting House, the new B.B.C. Headquarters in Portland Place, London, is now near enough to completion for its final form to be quite clear, and for our contributor to give you an intimate impression of its interior arrangements.

idea is to make the tower of the building the home for the broadcasters and the rest of the building the home for the business and administrative section.

This is a trouble at Savoy Hill, because owing to lack of space and the awkward shape of the various buildings, including the additional offices in several streets just off the Strand, the broadcasting, engineering and administrative sections are all mixed up.

construction of Broadcasting House one can go in at the main entrance, that is the big doorway facing down Regent Street, and the concrete stairs and the spaces for the lift shafts are already *in situ*. These lifts will take one up between the main offices in the "round corner" of the building and corridors which divide this part from the studio tower.

#### Lift and Left.

This means that by getting out on any of the five upper floors one can turn *right* to the administrative offices, or *left* to the

(Continued on next page.)

AT the beginning of the year I went along to Portland Place when the mere skeleton of Broadcasting House was being erected, and when the huge foundation well was still a mass of concrete mixers and rough brickwork.

I went along on a tour of inspection last week, and what a change! Where there had previously been a frail-looking steel framework and a vestige here and there of the concrete solidity which is shortly to make the finished building, now there is an edifice, the exterior of which appears roughly complete and the interior of which bears clear signs of what the final arrangements will be like.

Further, I have been allowed to see a wash-drawing which has been made in order to give the large staff concerned with Broadcasting House an idea of how things will be planned. This is necessary, because there are so many sub-branches of the design, even down to those people responsible for the final internal decoration and colour schemes.

#### The Latest Layout.

The brickwork for the centre studio tower is complete now and, as has already been announced, part of this section is sound-insulated with 4 ft. thick walls and with padded seaweed. These little details and the facts about the miles of ventilation tubing needed throughout the whole of the building are now common property.

What has not so far been made known, is the way in which the studios will be arranged in the tower; and it has not been fully explained that the B.B.C. engineers'

To take one example; at Savoy Hill the News Rooms, where the bulletins, S.O.S.'s, weather reports, and so on are received, is two floors away from the studio where these things are generally announced to all stations. Usually this does not matter, but on rare occasions when some late news is received, it makes a lot of difference and causes an awkward break in the announcements.

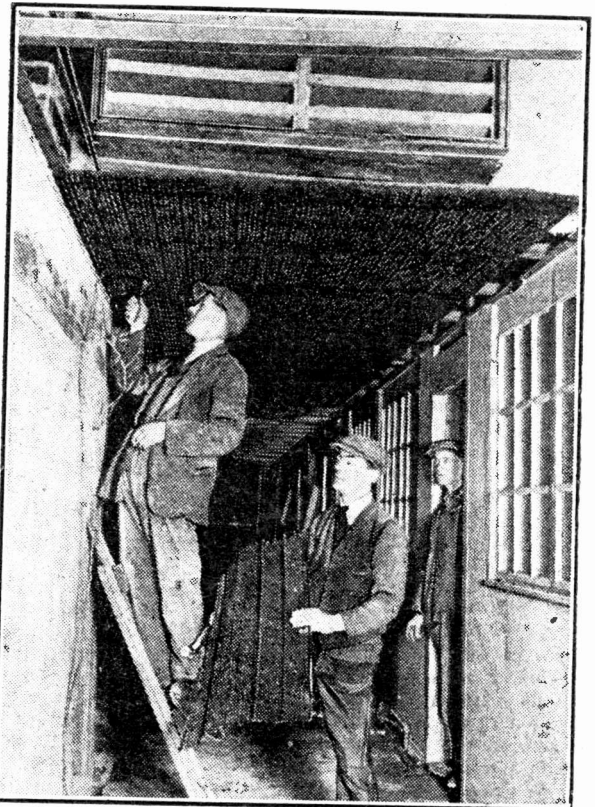
#### An Example.

In the new Broadcasting House the News Editor's room will be right outside the studio from which such announcements will be given, and there will be a special window through which late news bulletins may be passed while the news is actually being broadcast. This is just one example of the benefit that will accrue and the care that has been taken.

It has been possible to plan the building to suit the business in hand. There was no need, as had to be done at Savoy Hill, to convert a building to studio work. (Part of the present B.B.C. headquarters was, a few years back, a household stores!)

At the present stage of

## KEEPING STRAY NOISES FROM THE STUDIOS



These men are busy making Broadcasting House sound-proof, so that no unwanted noises will get into the studios. A tremendous amount of dried seaweed is employed for this purpose.



## A TRIP ROUND BROADCASTING HOUSE.

(Continued from previous page.)

studio block. If you are a member of the general public going in to listen to one of the concerts in the main 1,000-seat studio, then you will not go in at this main entrance, but in either of the two side entrances where stairs lead down to the main floor of the concert hall and up to the gallery.

### The Disappearing Piano

This large studio and its gallery, organ and special lighting and acoustic arrangements have already been described. What is not generally known is that the B.B.C. may have plans in mind for the use of this hall for entertainment work, because it is fitted with entirely separate ventilation apparatus and thus conforms with the L.C.C. regulations for the ventilation of public concert halls.

for the Publications dept., another concert room, and a band room. In other words, there will be no studios immediately above the concert hall, and so no possibility of sound leakage.

### Sir John's Suite

On this same floor to the right, outside the tower and immediately above the entrance hall, is the Council Chamber which corresponds to the Board Room of an ordinary Company. Above it is Sir John Reith's office, or rather suite of offices, for, according to present plans, there will be a large office and two smaller ones for the secretaries.

The two floors above this, in the tower, will be taken up with studios, waiting-rooms, a silence cabinet and artists' dressing-rooms. Above this, again, is the music library.

On this floor, office space at the main corner of the building (that is, directly above Sir John Reith's office) will be reserved for the administrative section. Above again, in the tower are studios, two store rooms, three listening cabinets, and a large waiting-room for the artists. The ceilings of all these rooms are roughly on a

## STARTING YOUR RADIO ANTIQUE COLLECTION.

Some practical hints on the obtaining of old gear.

IN a previous article in this journal I endeavoured to illustrate how the collecting of radio antiques could be made to be both pleasurable and profitable.

We will suppose for a moment you have decided to collect the various pieces of apparatus which I loosely described as "detector apparatus." At this point I ought to say that the collection of such apparatus would not be particularly interesting if it just consisted of the coherer, crystal detector, and various types of detector valves, so I mean types of apparatus connected with detector stages to be included in this category.

### What To Look For

I have got a catalogue from Messrs. Electradix Radios, and they have a good selection of the old types of valves which are worth collecting, including a Marconi-Round valve—this is a real old-stager. They have also coherers and various types of crystal detectors. A look through your own junk box would most likely produce some sort of a crystal detector.

There is a definite limit to the age of goods you can buy from such firms, however. Naturally, it is not in their trading interests to hold stocks of apparatus that no one is ever going to require. Therefore, for the real old "antiques" we must look elsewhere.

This is where our real difficulties begin—but it is by far the most interesting part of all, so don't shun the task.

### No Fakes Yet

I have found auction sales of electrical and radio material to be oftentimes fruitful in the matter of picking up quite old material at a trifling cost.

It is quite impossible to say where the very old types of apparatus can be found, but no doubt it will be unearthed when the owners get to know other people are interested to buy certain types.

Now, then, about recognising antiques. At the present time this should present no difficulty at all, for the collecting of radio antiques is still in such early days that the "faker," who generally invades when there is something to be made from his craftily made "fakes," has hardly had time to accustom himself to the job of making "new radio antiques."

### Those Old Books

In conclusion, I think the best advice I can pass on to you is to procure a very old electricity and radio book, either from a second-hand book dealer or from your public library. It will be found chock-full of illustrations of apparatus in use then, and will act as your guide to genuine antiques. I can recommend "Experimental Researches in Electricity" by Michael Faraday (this book was published about 1839). Also "Fifty Years of Electricity," by Fleming. Also "The Principles of Electric Wave Telegraphy," by Fleming.

In all cases, see the antique you propose buying is in really good condition, and as far as ever possible in working order.

## THEY WILL SOON MOVE INTO THEIR NEW HOME!



This is the famous B.B.C. Symphony Orchestra at the Queen's Hall. When Broadcasting House is finished—and it should not be very long now—you will be able to hear them from the new studios in this colossal building.

This studio takes up three floors, of course, and the floor of the studio is on the lower ground floor of the building. Behind it is a buffet lounge which will be available for the public, and which is also reached by another flight of stairs from the ground floor.

Cinema practice has been studied in the design of this hall. For instance, there is a lift for the piano so that it can be dropped down out of sight when not required.

### Stopping Sound Leakage

Down below the big concert hall is a studio with a gallery, a waiting-room, listening-room and silence cabinet. In the front part of the building in this sub-basement are the heating boilers and some of the machines connected with the ventilation apparatus.

We climb upstairs, for the lifts are not yet ready, to the floor above the concert hall. This floor is to be used for offices

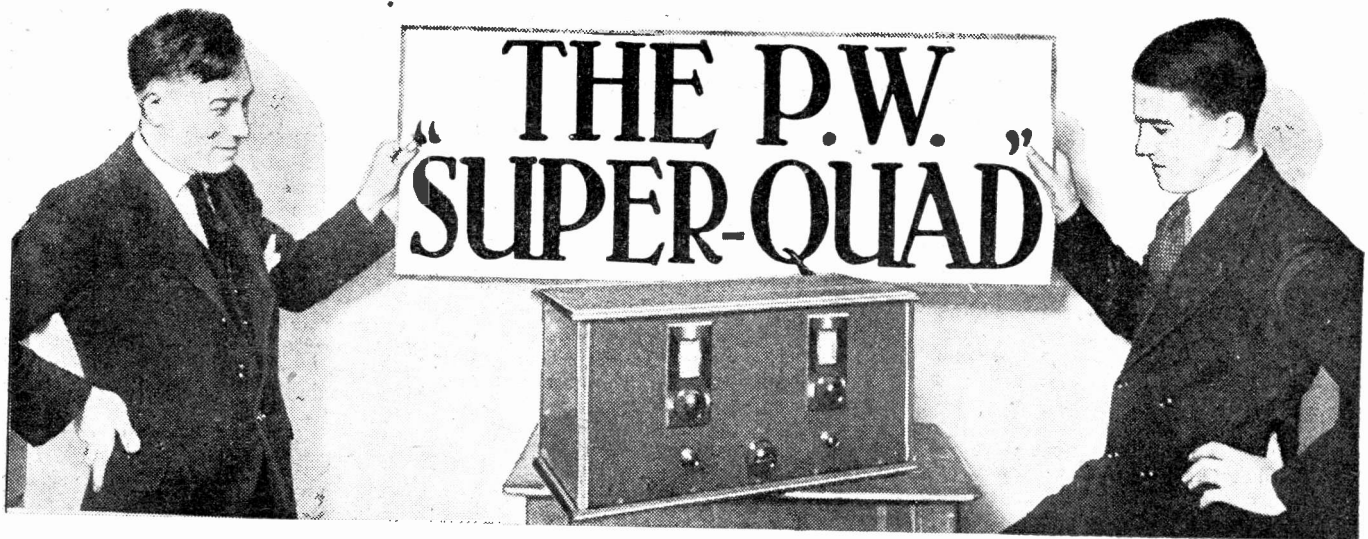
level with the lower edge of the huge sloping roof which crowns Broadcasting House.

Actually in the roof itself is a very large studio now in course of construction which, according to present plans, will be nearly as lofty as the giant concert hall in the semi-basement. Quite possibly the windows which are provided in the studio will actually look out, through the roof, to the sky, and this will be the only studio which has any connection with the outside world so far as sound insulation is concerned.

At the extreme end of this new studio is a listening-room, and on the other side is a large room which can be used as a subsidiary studio for the use of the announcer, or as a waiting-room.

Within the next few months, Broadcasting House will be nearing its final stages of completion, and it is quite on the cards that before the end of the year the first broadcast will be heard from some of the new studios.





**A** DIAL movement of two degrees and the powerful local disappears—that is an indication of the station-separating qualities of the “P.W.” “Super-Quad”! And the number of programmes that it can pick up is limited only by atmospheric conditions.

Nevertheless, this latest “P.W.” achievement in set design employs only four valves, and is as easy to assemble as many ordinary “twos.” And despite its razor-sharp selectivity no previous experience is necessary for the manipulation of the few controls.

Needless to say, such virtues as these are not to be found in any standard hook-up copied from a dog-eared book of reference; indeed, the “Super-Quad” is entirely new, and comprises a four-valve super-heterodyne circuit embodying several completely original features.

Of course, the super-heterodyne principle itself is by no means an innovation. As a matter of fact, it was introduced as far back as in 1919. For one or two years it enjoyed immense popularity because it was then the only known method of obtaining really effective high-frequency amplification.

But when Hazeltine, in 1923, invented his method of neutralisation, the ordinary H.F. valve came into its own and the super-het. fell into the background.

**First Flickers**

You see those early “supers” necessitated the use of at least six or seven valves, and the valves of that period were such enormous L.T. current eaters that the L.T. accumulator would be called upon to deliver as much as five amperes!

However, soon after dull-emitter valves came along, and that eased the situation from this point of view to a considerable extent. And when, four or so years ago, the S.G. valve ap-

Some preliminary remarks concerning a triumph in radio-set design—a full-powered, super-heterodyne receiver which uses only four valves.

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

peared on the market, it gave the super-het. a further lease of life.

But the principle never looked like regaining its erstwhile popularity. It is true that early this year the super-het. leapt up a bit in public favour, but I firmly believe it could never have attained any real prominence so long as it evinced itself as a ten-year old idea with the mere disguising trimmings of modern components.

**A New Criterion**

Until quite recently it has not been possible to make a super-het. having any pretensions to efficiency without using, at the very least, six valves.

But even with our present-day valves, that means much more L.T. and H.T. than

most of us can afford, quite apart from the question of the initial cost of the valves themselves—no small item this in these days of trade depression and shallow pockets!

And, as “P.W.” caters neither for millionaires nor for owners of electricity power stations, we never gave a single thought to the production of a “star” “P.W.” set of the six-valve super-het. class.

Nevertheless, we have given very great thought indeed to the super-het. principle. But instead of rushing in with a standard multi-valve version, we preferred quietly to pursue intensive research with a view to the production of something sufficiently inexpensive to build and run and sufficiently novel to justify detailed description in our pages.

The magnificent result is the “P.W.” “Super-Quad,” a receiver which we can justifiably claim to comprise a stepping-stone in the technique of radio-set design.

For the first time full super-het. qualities are available in a simple four-valve assembly and a new criterion of performance is set up.

It is in this last that lies the “Super-Quad’s” main claim to fame, rather than in the perpetuation of the super-het. principle.

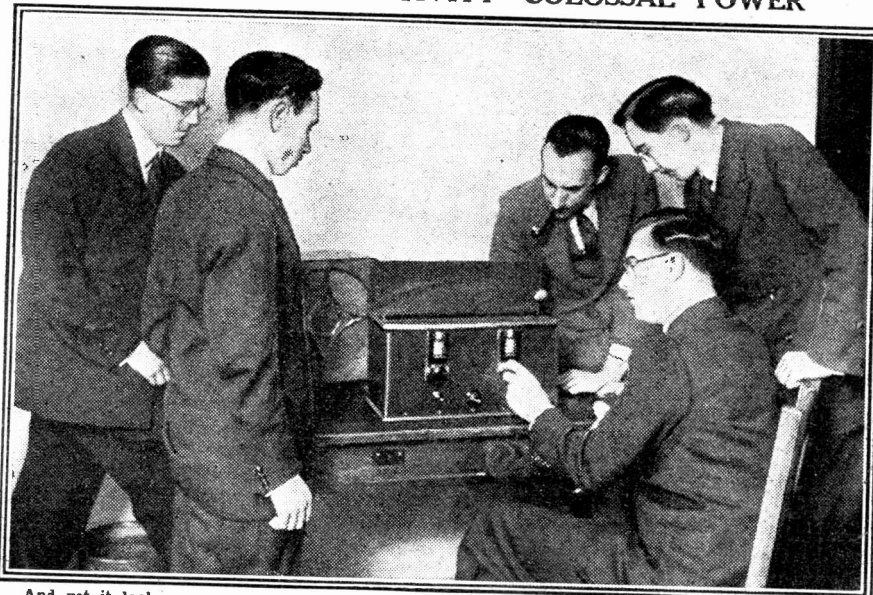
**Beats The Lot!**

There is no other four-valve set in existence (and this is fact, not an expression of personal opinion), capable of such power and selectivity, that can approach it even remotely for simplicity in assembly and operation.

But while it will no doubt retain its superiority for some time, I do not think it desirable that the future should build on a “Super-Quad” foundation. Not because in itself the “Super-Quad” is not an extraordinarily

(Continued on next page.)

**STARTLING SELECTIVITY—COLOSSAL POWER**



And yet it looks no more complicated than many ordinary two-valve sets! Certainly it is simplicity itself to assemble, wire-up and operate, but it gives results which will astound those who have not before encountered a really effective “super.”



## THE "P.W." "SUPER-QUAD"

(Continued from previous page.)

attractive proposition—it very definitely is—but because it takes you as near as can be to the perfect practical presentation of the super-heterodyne principle.

That does not indicate that it is a perfect set—we have a long, long way to go before we can approach that ideal—but, while radio in general must have stretching before it an endless road of progress and advancement, there is pretty strong evidence that we have now explored nearly the whole of the super-het territory.

### Faking the Frequency.

There are very clear physical indications of this, although I do not propose to weary you with them now. Suffice it to say that it is not probable that future generations will tolerate radio receiving apparatus that is fundamentally dependent upon an oscillating condition for its functioning.

But such are the limitations of our present conditions that a good super-het.

is indubitably deserving of a place beside the best of any other kind of receiver even in point of quality or reproduction while, as we have previously mentioned, its selectivity and sensitivity will beat any other outfit, valve for valve and component for component.

One of the greatest disadvantages hitherto associated with super-heterodyne receivers has been largely eliminated in the "Super-Quad," although readers unacquainted with the super-het. principle will not fully appreciate this point unless I say a few words as to what this principle is. Well, here goes:

There are two difficulties associated with H.F. amplification; one is that at least one tuned circuit is needed for each tuned H.F. stage, and the other that the amplification at different wave-lengths tends to vary, the efficiency increasing as the wave-length increases.

From this it will be seen that simpler and more effective amplification should be possible if all the stations, whatever their wave-length, could be converted to the one frequency or wave-length after reception, but before being passed to the H.F. amplifiers.

And this is what is done by the first detector valve and the oscillator of a super-het. A continuous oscillation is set up and made to heterodyne the received energy. This produces a beat frequency corresponding with the wave-length of the H.F. amplifier or "intermediate H.F. amplifiers," as they are termed.

There is a second detector which precedes the L.F. valves in the usual way.

Super-hets. tend to be unduly "noisy" for two reasons. Firstly, there is continuous oscillation and a consequent over amplification of both etheric transients and noises inherent in valves. Secondly, there will be loud squeals and howls as you tune in distant stations owing to the existence of a powerful local heterodyne, but these noises cease when you are finally tuned in to a station.

However, the first item of noises remains. It is initially reduced very considerably in the "Super-Quad" for the obvious reason that this wonderful little set employs only four valves as against the six, seven, eight or nine hitherto deemed essential.

A second force working against noisy "background" in the "Super-Quad" is the carefully chosen intermediate frequency. You see, the lower the frequency of a powerful H.F. amplifier the more likely is it to transmit the "higher audio-frequency" valve noises and atmospheric transients.

But you cannot increase the intermediate frequency in ordinary circumstances without simultaneously decreasing the sensitivity. And that is where the super-het. rests on the horns of dilemma, as it were.

on the oscillator tuning dial or even the reception of two stations on the one setting. And often further "repeat points" are caused by harmonics generated by the oscillator.

In "straight" super-het. designs these recurrences tend to lead the uninitiated into believing he is getting at least twice as many stations with his "super" as is really the case.

He turns the dials very, very slowly and first hears speech and then music, followed by different speech and different music as he tunes in and out of the stations. But the odds are that when he runs through his "repeaters" he does not recognise many of these as duplications of items previously heard!

### He Hadn't Noticed!

I experienced a very amusing instance of this not so long ago. A friend of mine, who knows little or nothing about the technical aspects of radio, built himself a six-valve super-het. One evening, full of enthusiasm, he invited me round to hear the thing.

Admitting that it was undoubtedly "very noisy," he began to "rapturise" concerning its programme pulling powers. "Gets at least ninety stations any night," he burred.

He switched the thing on and started to tune it in. But he hadn't run through many tens of degrees before I spotted that the contraption was simply bristling with "repeaters." One programme seemed to have half-a-dozen settings. Instead of dozens of different stations, he was merely getting the same three or four stations at dozens of different dial readings!

I am not going to say that the "Super-Quad" is completely innocent of "repeaters," but it very undoubtedly is vastly superior in this respect to many super-hets. using fifty-per-cent and more valves.

And when all is said and done, and I have been completely frank, the "P.W." "Super-Quad" remains a wonderful proposition, a set with no existing equal for all-round attractions and one that will hold its own for many years to come.

### The Waiting Crowd.

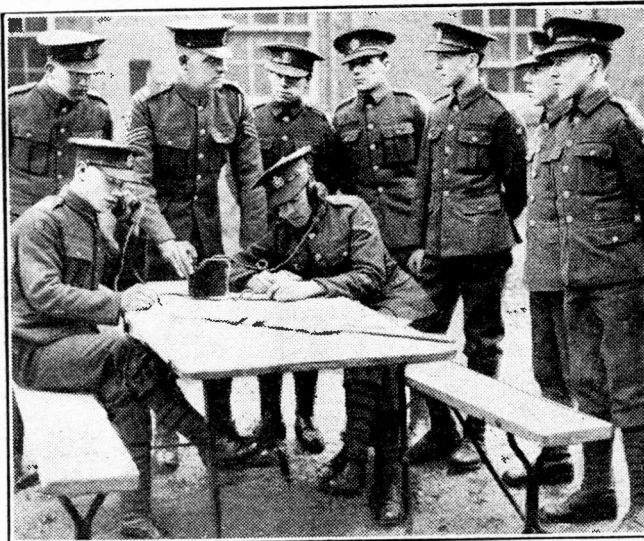
In operation it is a most fascinating little caseful of concentrated effectiveness. To look at, it has a bland air of almost unbelievable simplicity, there are no metal screens or anything at all savouring of complication.

The wiring does not have to be carried out with extreme care, and the whole job can quickly be completed by anyone using only a screwdriver and a pair of pliers.

And yet, when you switch it on the whole of the world's busy ether seems to crowd closely round as though drawn in by a colossal magnetic power.

Stations you've never even heard of before simply tumble in, and dozens of alternative programmes of real entertainment value, and at excellent quality, lurk behind the dials waiting to pounce through the loud speaker the moment you tune to them.

## TELEGRAPHY TRAINING FOR TERRITORIALS



Territorials learning to operate a telegraphic "tapping key" under the supervision of a Regular Army non-commissioned officer.

I cannot claim that we have done anything more than compromise in the "Super-Quad," for we haven't, but, by carefully choosing our values, we have supplemented, in no small measure, the quietening effect of a striking valve reduction.

### Two Vital Factors.

I have not yet even touched upon two of the most vital factors contributing to the success of the "Super-Quad," but I am going to leave the detailed disclosure of these for Mr. Rogers, who will be discussing the "Super-Quad" circuit in our next issue.

There is another disadvantage inherent in many forms of super-het. receiver, and this is generally termed "repeater" interference.

It evinces itself in the reception of the same programme at two different points.

**NEXT WEEK**  
Full details of the "P.W."  
**"SUPER QUAD" CIRCUIT**



# CAPT. ECKERSLEY'S QUERY CORNER



**OBTAINING SMOOTH REACTION—  
NO AERIAL OR EARTH—ALU-  
MINIUM OR TIN?**

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

### Obtaining Smooth Reaction.

A.S.R. (Romford).—"On my det. and L.F. set. I recently found that with the L.T. battery reversed I get much better reaction control. In so far as I can discover, this is not likely to cause trouble except that G.B.+ is now joined to L.T.+ Is this likely to cause any damage?"

A great many detector valves work more effectively if their grids are biased a little positively. No harm can be done.

An optimum point may be found as follows:

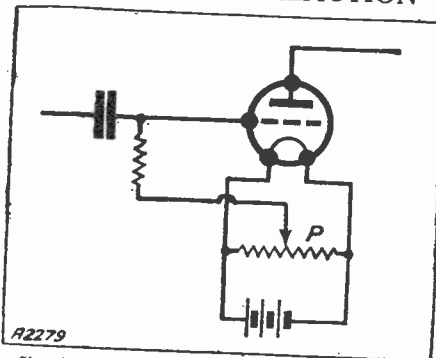
P in my diagram is a potentiometer. Obviously, as the slider is moved one way or another more or less "positive" is applied to the grid, and very fine adjustment of the bias is thus provided.

Make P of high resistance so as not to run-down the low tension battery unduly.

### No Aerial or Earth.

B. E. C. (St. Albans).—"With my three valve receiver I find it practically impossible to cut out the local station. Judge my surprise when recently I found that the

### FOR SMOOTH REACTION



Showing how a potentiometer should be connected to enable the grid potential to be gradually varied.

tuning of the local station was quite sharp, but it was impossible to get foreign stations.

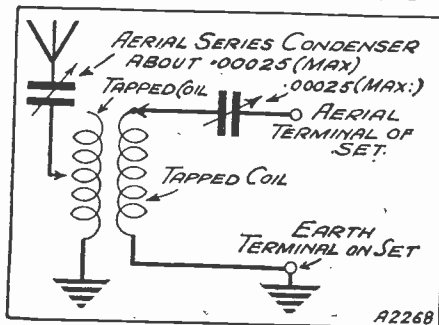
"An examination showed that both the aerial and earth leads had been disconnected from the set. This proved to me that my real trouble was due to direct pick-up, and that possibly screening was the only cure. If this is the only solution should I screen the whole of the set, or only the tuning circuits?"

Needless to say, I have already tried several types of wavetraps."

You may be suffering slightly from direct pick-up, but that is not the whole explanation.

Let me illustrate what I am trying to explain by an analogy. There are many sounds in the air now which you cannot hear.

### IMPROVING SELECTIVITY



This diagram illustrates the tips given by Capt. Eckersley for improving a set's selectivity.

You cannot hear the bees in South Africa nor the buses in Pimlico, nor the conversation of your next-door neighbour while you are in St. Albans. You could hear me talking to you if I sat in a chair the one side of your fireplace while you sat in another the opposite side. Thus you select a particular transmission in terms of sensitivity.

If your ears were now made a million times more sensitive you would still only hear me in your room—very, very loud. But if I stopped talking you would be able to hear if not the bees in South Africa, perhaps the buses in Pimlico.

If your set is very sensitive by having an outdoor aerial close to Brookman's Park you only hear Brookman's Park when that station is transmitting, but when that station shuts down you can get foreign stations.

When your set has no aerial and earth it is much less sensitive and can hear nothing but Brookman's Park and, being insensitive, your tuning is apparently sharp. Thus a big aerial makes a given set unselective by making that set too sensitive for a very powerful local station.

There is no actual cure which gives your set immediately both selectivity and sensitivity to any degree. In general, I should advise reducing the size of your aerial, screening your set, arranging a series condenser

of maximum value 0.00025 and using a coupled circuit as shown in my sketch.

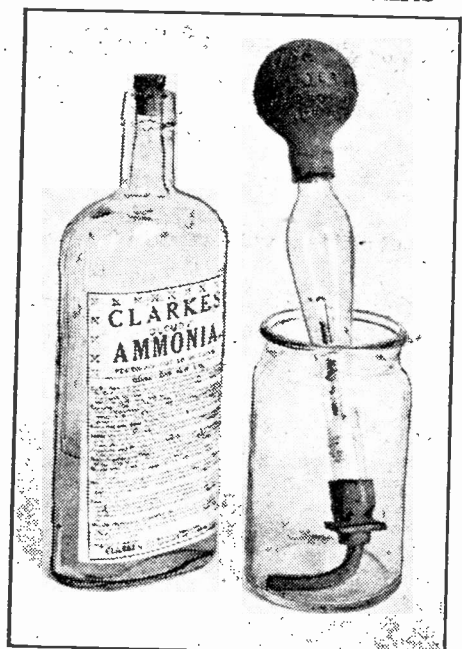
Experiment to find the best coils. Use plug-in if you like for wave-change.

### Aluminium or Tin?

B. H. J. (Deal).—"In a new receiver which I propose constructing in the near future the Screen Grid H.F. valve, aerial coil and condenser should be enclosed in an aluminium screening box. As I already have a suitable box of tinned iron, would it be permissible to use this in place of the original specified type and what effect would this have on the receiver's performance?"

I do not think the material of the screening box will have much influence on performance, always provided iron is tinned and the fields created by the coils are not too intense in the neighbourhood of the metal, i.e. provided the coils are a fair distance away from the sides of the box.

### USEFUL FOR "CHARGERS"



Those who do their own charging will find these two items—a bottle of ammonia and a hydro-meter—very useful. Ammonia, as you probably know, is splendid for "Killing" spilt acid and it may easily save you buying a new tablecloth!



## INTRODUCING THE "SUPER-QUAD."

By THE EDITOR.

"P.W." once again leads the way by producing an entirely novel set design of outstanding merit.

CONSISTENT readers of "P.W."—and they number over 128,000—will remember with little trouble some of the more outstanding innovations we have introduced to the Radio public during the last two or three years. We might cite as one or two examples the "Brookmans Rejector," the "P.W." Differential Reaction system, the "Antipodes" Adaptor, Flexi-Coupling, the "Contradyne," the "Extenser," etc., etc.

These names, taken at random, will easily awaken memories in the minds of "P.W." readers, just as easily as will names like "Titan," "Magic," and "Comet" remind them of receivers which have lasked in the full glare of the limelight.

### Some Old Friends

There is plenty of evidence to show that the Brookmans Rejector proved a trapping device that achieved 100 per cent. efficiency on both waves without any reduction in signal strength; while the "P.W." Differential Reaction system is now in universal practice.

Thousands of "P.W." readers have learnt by experience the value of the Antipodes Adaptor, the first short-wave unit of its kind, now copied the world over; while the system of Flexi-Coupling proved to constructors the value of simplified selectivity with increased power. We mention these few of the many successful innovations we have introduced to our readers during the last two or three years in order more satisfactorily to bring to your notice another outstanding innovation—the "P.W. Super Quad."

During the last few months the Research department has concentrated on problems connected with the Super-Het—not the sort of problems which are inevitably linked with the old-fashioned Super-Het systems, which can well be left in the limbo of "out-of-date" systems—but the sort of problems which must be faced, and solved, if modern super-het ideals are to be successfully attained.

### The "P.W." Way

We have watched with interest—and, be it admitted, with no little amusement—the revival of interest in the old-fashioned super-hets, and although, in deference to public demand, we have been sorely tempted to turn out "P.W." versions of these old-fashioned super-hets, we have resisted temptation. Not without difficulty, be it added, for many readers have written to us during the last few months, inquiring why "P.W." did not cater more extensively for the revived interest in supers. But as we have said, we felt we should not be serving our readers in a really satisfactory way by inducing them to construct super-hets on old-fashioned and, consequently, unsatisfactory lines; we preferred to leave the subject severely

alone until we had some definite and new contribution to offer to the super-het problem.

That consideration has now been very well prepared by the Research department; we feel confident we can now offer our readers something new and something which will have the widest possible appeal.

This "something" is embodied in a receiver which we have named the "P.W." Super Quad.

To begin with, the Super-Quad has one very important merit, it does not require a miniature power station to operate it. And if you know anything about the average type of super-het you will realise

for our claims, and would ask you to pay particular attention to Mr. G. V. Dowding's article on the "Super-Quad," which is printed elsewhere in this issue.

\* \* \*

It was pointed out in the "Daily Telegraph" the other day that England is at present suffering from an unprecedented invasion of American-built wireless sets.

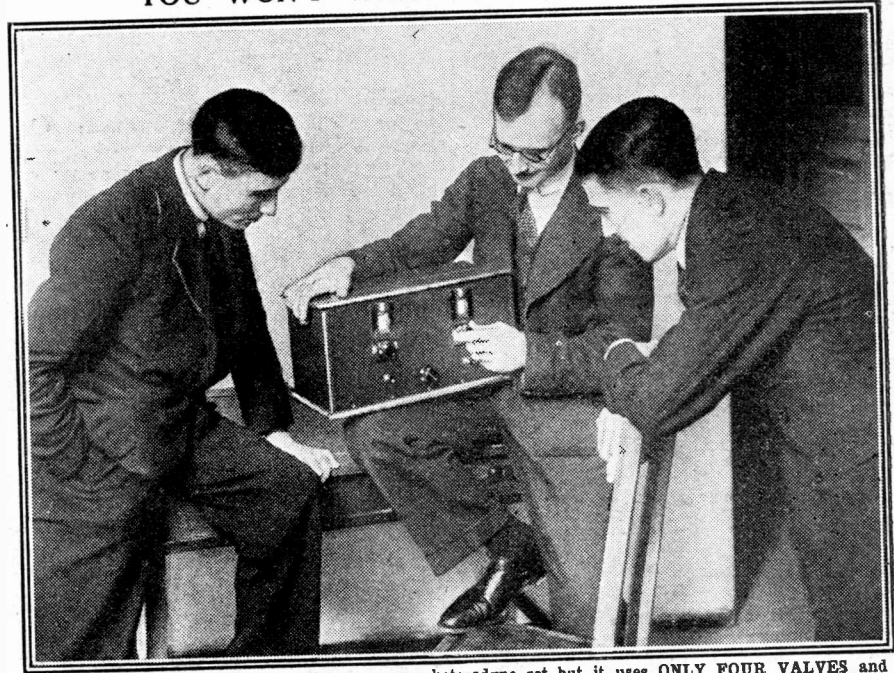
"Radio mass-production in America has received a series of blows which are impelling the manufacturers to dispose of their huge surplus stocks at whatever price they can fetch," wrote a correspondent in that paper, "and the result in England is that home manufacturers have at the moment to face severe competition from across the Atlantic."

### Those Yankee Sets

The situation was discussed with a representative of "The Daily Telegraph" by Mr. R. Milward Ellis, the president of the Radio Manufacturers' Association.

"There is no doubt," he is reported to have said, "that American manufacturers just now are having a very bad time.

## YOU WON'T WANT A POWER-STATION!



The P.W. "Super-Quad" is a full-power super heterodyne set but it uses ONLY FOUR VALVES and does not call for a power station H.T. supply!

the importance of this point. It brings the super-het definitely into the sphere of practical economics in radio design, and that means a good deal in these hard times.

Further, you can build the "Super-Quad" yourself. You don't have to be an expert mechanic, or a millionaire. The set, in short, represents a break away from conventional practice, and we devote part of this editorial article to bringing it to your notice because we emphatically feel that the "Super Quad" constitutes a definite and notable triumph in more satisfactory super-het design, and may will lead to the development of a new technique in the general design of simple but efficient multi-valve designs.

### Try It For Yourself

With these few words we leave you to investigate for yourself the justification

America's existing production-capacity is ten times as great as her normal home requirements.

"In New York, when I was over recently, the ordinary public was able to buy many 'proprietary' types of sets at half their listed prices, and the obsolete sets are now coming into England. Naturally, we resent this influx of dumped radio sets, the product of a system which is already proving ruinous to the Americans.

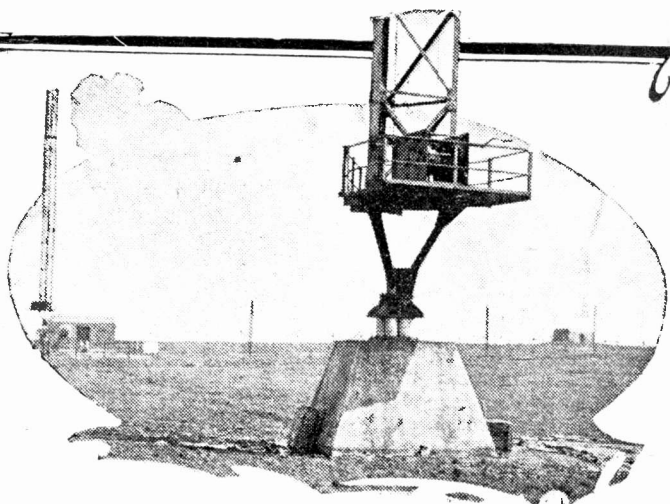
"But fortunately most American sets possess grave disadvantages from the point of view of the English market.

"The mass-produced American set of seven or eight valves has working and replacement costs three times those of the British sets, and although this under-selling is for the moment dangerous, we have good reason to believe that the British set will win in the end."



# WITH THE B.B.C. *in the* NORTH

No. 6. Manchester—The Most Up-to-Date  
B.B.C. Centre.



UNTIL the B.B.C. moves its London headquarters from Savoy Hill to the new building in Langham Place the palm for the most complete and the most modern broadcasting centre in the British Isles must go to Broadcasting House, Manchester.

Of course, there are fewer studios at the North Regional headquarters than at Savoy Hill, but when you inspect the design and equipment at Manchester you have to admit that it is a case of what Manchester has to-day London will have to-morrow. (Chorus of "As usual!" from Lancashire.)

### Quite a Large Staff.

North Regional Broadcasting House is a handsome building in Piccadilly, the heart of Manchester. The ground floor occupied is by a bank, the four floors above by the B.B.C. Counting everybody, from the Regional Director to the office boy, there is a staff of about fifty people here.

For the past two or three years they have been preparing for the day when they would have to provide regular Regional programmes for transmission from the North Regional high-power station. Now, with the opening of Moorside Edge, that day has arrived.

Let us, in imagination, strip the façade from Broadcasting House so that its interior is revealed like one of those ingenious sectional drawings which appear in pictorial papers to illustrate the "innards" of the latest wonder in hotels.

### The Control Desk.

In a room high up in the building we see two or three engineers sitting at a huge control desk. One of the men is watching a meter and occasionally, when the needle moves, he adjusts a knob. He is controlling the National programme, which is passing through this room en route from London to the National transmitter at Moorside Edge. Another engineer is working similarly at another section of the control desk; he is controlling the alternative programme. The National programme arrives

An intimate view "behind the scenes" at the North Regional headquarters is given in this article of our series by Leslie W. A. Bailey describing B.B.C. stations in the North.

along one of the three London-Manchester land-lines which terminate at this desk, and after amplification it is transferred to one of the five lines which run (underground) to Moorside Edge, eighteen miles away.

The amplifiers are in a room adjoining the control-room. They are remote-controlled from the big control desk. Everything,

indeed, has been robotised. The familiar type of switchboard with a maze of plugs and jacks has been swept away. Instead of juggling with plugs and switches the engineers at Manchester press buttons and the robot control board does the rest.

### Permanent O.B. Centres.

There are eighteen concert halls and other "outside" places in Manchester permanently connected to the control-room by land-lines, and the engineers can get "through" to any one of them in a twinkling by dialing a code number, just as you dial on the automatic telephone. This is indeed a marvellous control-room, far and away the finest in the country.

The giant "No. 1" studio, lower in the building, is two floors deep and can be entered either from balcony level or by doors leading on to the studio floor, where, as we watch, the Northern Studio Orchestra is at work round the microphone.

They, at the moment, are the Regional alternative to the National programme; from this microphone their music flashes upstairs to the control-room, then along one of the lines to Moorside Edge, to the North Regional transmitter, which flings it far and wide through the ether.

### Adapting Music.

Incidentally, since the formation of the Studio Orchestra last April in succession to the late lamented Northern Wireless Orchestra, the music department at Manchester has had a busy time transcribing shoals of music. Composers do not write for combinations of nine players, so all the music has to be rearranged. Most of this work is done by that able pair Messrs. Morrison and Fogg, a talented team of whom more anon.

Higher up in Broadcasting House there is a smaller studio, "No. 3," where a rehearsal of the Children's Hour is in progress. Miss O. B. Schill came fresh to the B.B.C. three years ago, and the general supervision of this feature is one of her several

## MANCHESTER LEADS THE WAY!



A view of Broadcasting House, Manchester, which is, at the moment anyway, the most complete and most modern broadcasting centre in Britain

(Continued on next page.)



## WITH THE B.B.C. IN THE NORTH

(Continued from previous page.)

duties. Her able lieutenant is Miss Muriel Levy, who takes charge of the programme day by day in the studio, and has also blossomed out in North Regional programmes as a radio dramatist.

Wind machines and water tanks indicate that the room adjoining "No. 3" is the effects studio. As a matter of fact, most of the "noises" for radio plays are now obtained from gramophone records, and there is a double turntable in the effects studio for this purpose.

### Elaborate Control Panel.

In a room on the floor below an elaborate dramatic control panel enables Victor Smythe to juggle with the cross-fading so beloved by certain radio dramatists. Smythe, who, after sampling the stage, the sea, and the cinema, joined the B.B.C. in its hectic early days at Manchester, is not of the extravagant school, however, and prefers to pin his faith to comparatively simple methods of play production.

"No. 2" studio is a cosy little study where people give talks, which are organised by H. J. Dunkerley, formerly Station Director at Liverpool. Then there is "No. 4," which was once an echo-room.

Our Broadcasting House with the front off also reveals a canteen, an elegant artistes' waiting-room, a board-room where the Programme Board meets weekly to discuss future programmes, and numerous offices containing typewriters, filing cabinets, and charming young ladies.

### Manchester Personalities.

A spacious room is occupied by E. G. D. Liveing, the North Regional Director, in whose hands broadcasting in the North seems likely to flourish. In another there is J. B. Clark, his principal assistant, who came to Manchester from Cardiff several years ago.

And then there is that gifted musician, T. H. Morrison, who made the Northern Wireless Orchestra such an enormous success. He is now Music Adviser to the Midland Region as well as Music Director (there is apparently a subtle distinction) to the North Region.

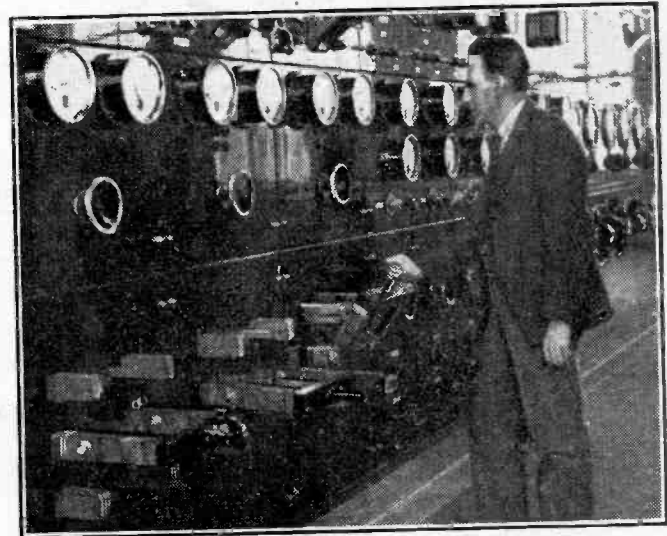
Another tower of strength on the musical side of North Regional programmes is Eric

## TELEVISION'S HIGHEST LABORATORY

Details of the N.B.C.'s latest  
television venture.

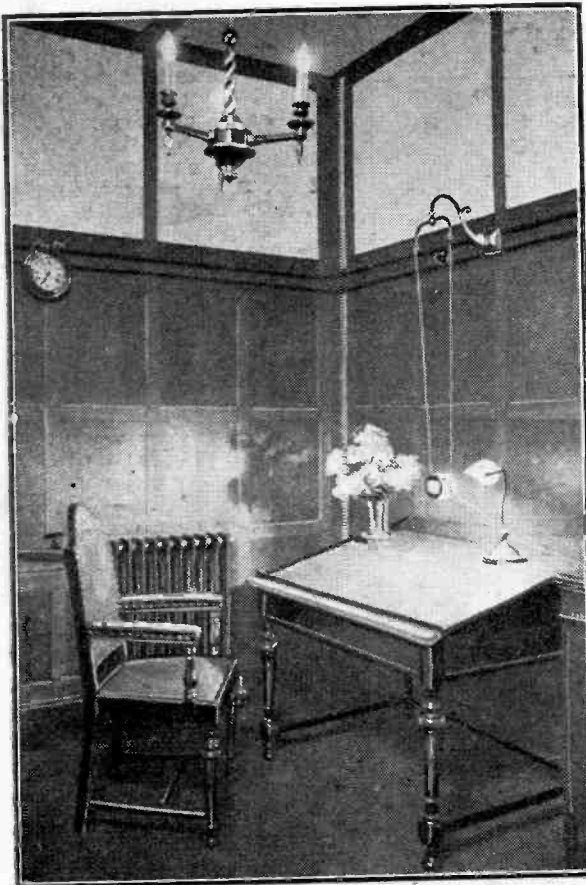
ARRANGEMENTS have just been completed whereby the National Broadcasting Company of America will convert the eastern half of the 85th floor of

## SWITCHING ON AT SLAITHWAITE



An engineer closing the filament switch at the North Region Station.

## "MIKE" IN SERIOUS MOOD!



This is the Manchester Talks Studio. We believe some listeners do not approve of such things!

Fogg, the official accompanist at Manchester. His ability as a composer is receiving outstanding recognition by the acceptance of his new choral work, "The Seasons," for performance at Leeds Musical Festival in October.

### Programme Arranging.

The Programme Board consists of the officials I have named, and also E. L. Guilford, the former Nottingham Station Director, who now does the routine work of programme arranging and also maintains contact with the Press in the North of England; G. P. Fox (Leeds representative); and the two announcers, W. G. M. Shewen (who was formerly at Newcastle and Hull) and Holgate Morris (a recent recruit to broadcasting).

The Newcastle Station Director, G. L. Marshall, also visits Manchester from time to time to take part in the programme discussions.

## NEXT WEEK

The article in this series will concern  
Slaitwaite.

the Empire State Building in New York into the world's highest television laboratory. The height is approximately 1,000 feet above street level.

The new sight and sound studios atop of the Empire State Building will feed directly into aerials supported by the airship mooring mast, the top of which is 1,250 feet high. There are no very tall buildings in the vicinity, so the location should be ideal; only tests will reveal whether it is or not.

M. H. Aylesworth, President of the N.B.C., in making the announcement, said that the reason for the acquisition of the new site was for the purpose of bringing television out of the laboratory and beginning experimental sight and sound broadcasts.

He predicted that after about a year of intensive experimental tests under actual working conditions, television would be developed for public use.

### Cathode-Ray System.

"This does not mean that it will be a hundred per cent perfect," he said, "but television will at least have reached that stage where refinements of technique will be required rather than the development of new basic principles."

This, together with other public statements which have been made recently by R.C.A. officials, is taken to mean that, after several years of work in secret, the R.C.A. expect to have in about a year's time a system of television which will be acceptable to the public. No details of this system are at present known, except that it is a cathode-ray system, for the development of which Vladimir K. Zworykin has been largely responsible.

A. D.



**NOW**

# THE NEW H.F. INTERVALVE COIL

*Matched coils ensure perfect ganging . . .*

**FOR USE WITH THE CONSTANT SQUARE PEAK COIL**



LIST No. BP6

**PRICE 8/6**

Completely screened, and its inductance as screened is exactly matched to that of the Varley Constant Square Peak Coil.

With a good ganged condenser the tuning will keep in step over the whole long- and medium-wave range. Suitable for tuned-anode or tuned-grid circuits.

Extension rods are supplied for mechanically coupling the switch to that of the Constant Square Peak Coil.

# Varley

*Advt. of Oliver Pell Control, Ltd., 103, Kingsway, London, W.C.2.*

## OSBORN RADIO CABINETS

READY-TO-ASSEMBLE



Model No. 218

MODEL No. 218. SPECIFIED FOR THE "WIRELESS MAGAZINE" "A.C. SUPER 60."

A Queen Anne Radio or Radio-Gramophone Cabinet, 3 ft. 10 ins. high, 2 ft. 2 ins. wide, 1 ft. 6 ins. deep. Size of baffle board behind fret, 24 ins. x 24 ins. Metallic fabric for fret front included. Opening at top and back. Cabinet takes panel 2 ft. x 9 ins., or smaller.

PRICES: Machined ready to assemble: Oak £3 10 0. Mahogany £3 15 0. Assembled ready to polish: Oak £4 10 0. Mahogany £4 15 0. Assembled and polished: Oak £5 10 0. Mahogany £5 5 0. All models Carr. Paid. Send 3d. in stamps for 56-page illustrated catalogue.

STAND No. 205 First Floor, Empire Hall, National Radio Exhibition, OLYMPIA, SEPT. 18-26.

CHAS. A. OSBORN, Dept. P.W., The Regent Works Arlington St., London, N.1. Telephone: Clerkenwell 5095. And at 21, Essex Road, Islington, N.1 (1 min. from the Agricultural Hall), Telephone: Clerkenwell 5634.



The Sign of Quality

## Specified for the "P. V." JUNIOR

In order that the very best may be obtained from the special coils used in this circuit, the designer has specified an ASTRA Tuning Condenser with ASTRA Fast and Slow Motion Dial. Use them as advised by the designer and obtain perfect tuning control.

Astra Tuning Condenser 0005 - 5/3  
Astra "Popular" Dial - - - 3/-

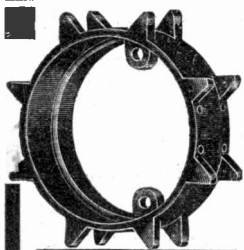
Astra Products are obtainable from all Dealers

## SOVEREIGN SCORE AGAIN!

WITH SOVEREIGN COIL QUILTS

Building "P.V." Sets? Then you'll be glad to hear you can now use Coil Quilts made by Sovereign (Regd. Design No. 763832). Made in moulded Bakelite with 4 drilled holes to start and finish winding, conveniently slotted shoulder and 2 lugs for baseboard or panel mounting. You can also use Sovereign P.J. and P.V. coils as well. All these components are made to correct specification with usual Sovereign quality.

**6D. EACH**



**P. J. COILS**

Wound to exact specification of "Popular Wireless."

P.J. Coil No. 1 2/- P.J. Coil No. 2 1/6. P.J. Coil No. 3 2/-

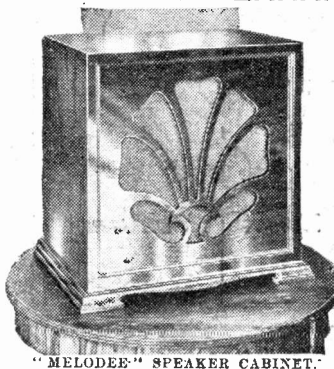
**P.V. COILS**

Wound to exact specification of "Popular Wireless," per pr.

Send direct if your dealer cannot supply (also for full list) to: SOVEREIGN PRODUCTS LTD., 52-54, Regent St., London, E.C.1.



## BETTER APPEARANCE AND BETTER PERFORMANCE



"MELODEE" SPEAKER CABINET.

Get the best out of your speaker unit by housing it in the Camco "Melodee" Speaker Cabinet. The "Melodee" definitely improves speaker performance, and is a handsome and well-finished piece of furniture.

Send coupon now for the new 24-page catalogue, ready Aug. 15th, FREE, to: CARRINGTON MFG. CO., LTD., 24, Hatton Garden, London, E.C.1. Phone: HOI, 8202. Works: S. Croydon.

NAME.....  
ADDRESS.....  
P.W.9.

Every CAMCO Cabinet bears the CAMCO Seal



THE admittedly wide popularity of the three-valver must not lead constructors to imagine that good loud-speaker reception is impossible with a smaller set. This is very far from being the case.

As a matter of fact, the foundation of the three-valver's popularity was laid years ago when receivers in general were a long way behind those of to-day in efficiency.

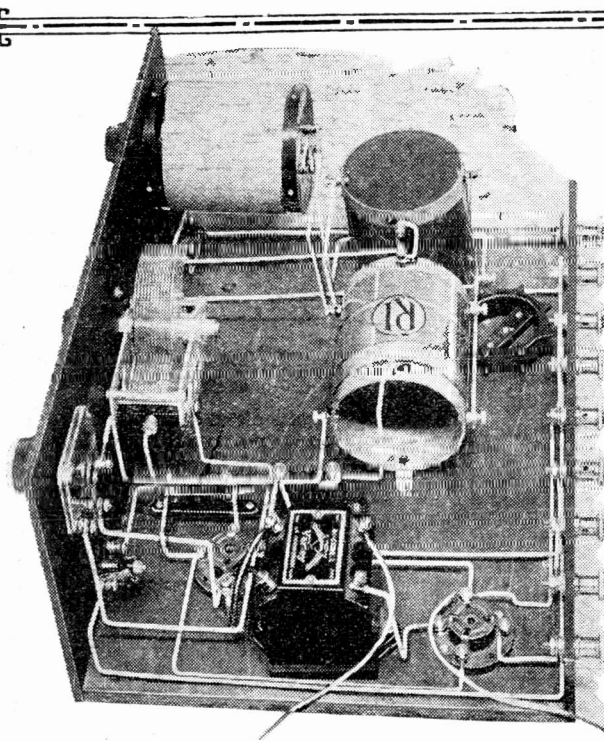
**"Two" Equals "Three."**

Indeed, so greatly has the technique of receiver design advanced, and so improved are our components and accessories, that a two-valver of the present can provide a performance quite equal to that of the earlier "three."

Had we been able to start in with apparatus of to-day's standard, there is no doubt whatever but that it would have been the "two" that achieved the greatest hold on the affection of constructors.

However, as it is, there is no inconsiderable section of the "wireless fraternity" who swear by the nimble "two" to the exclusion of all others. And when there are outfits of the calibre of "P.V." Junior in the class, who is there to say these enthusiasts are not getting their fair share of the programmes that pulsate in the ether nightly?

"P.V." Junior will give many everything they want, and at excellent loud-speaker strength, too. The Nationals and Regionals will roar in at fine quality, and there will be a healthy sprinkling of distant stations to provide ample alternatives to British broadcasting.



There is only one L.F. valve, but you'll be able to get a number of stations at good loud-speaker strength.

The very special feature of "P.V." Junior is that it employs a group of our new coils. There are the P.V.'s (P.V.1 and P.V.2), and a Coil Quoit carrying the "P.W." Contradyne winding. Additionally there is a "P.W." Selector.

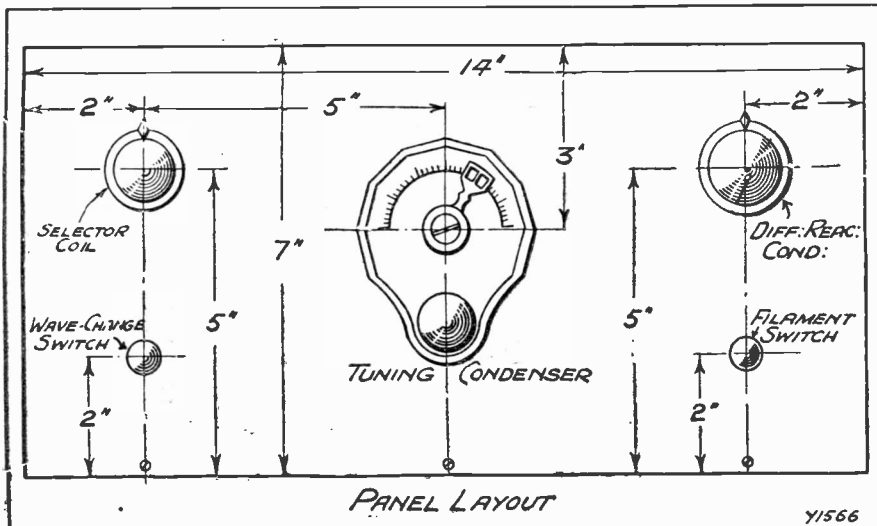
**WHAT THIS SET INCLUDES**

- THE NEW "P.W." "P.V." COILS.
- A "P.W." "CONTRADYNE" AND A "P.W." SELECTOR COIL.
- "P.W." DIFFERENTIAL REACTION
- A "P.W." COIL QUIT.

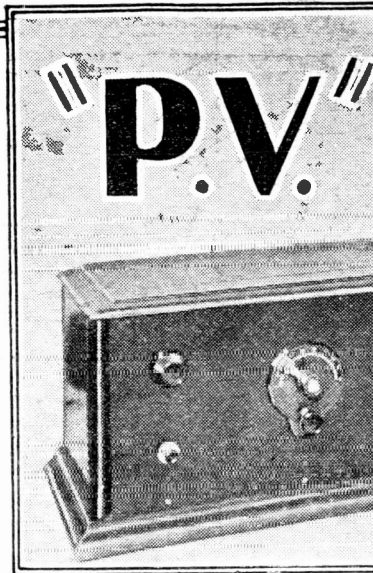
The result is full effectiveness over both wave-bands, and no losses due to compromises in windings and couplings, or to dead-end turns hanging close to inductances that are trying to work.

On the long waves all the windings are active, while on the medium waves the inactive turns of wire are on separate

**ITS CONTROLS ARE A JOY TO HANDLE**



Sharp tuning, wonderfully smooth reaction on both wave-bands and the Selector to provide added power plus easier station separation, make the "P.V." Junior a pleasure to handle.



An extremely inexpensive

By

formers well removed, electrically, others and shorted out.

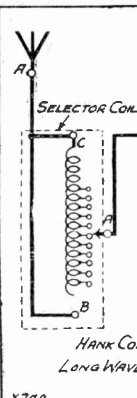
**No Coil Interaction.**

They might just as well be rid of the set for all the interference to occasion to the windings that are bei

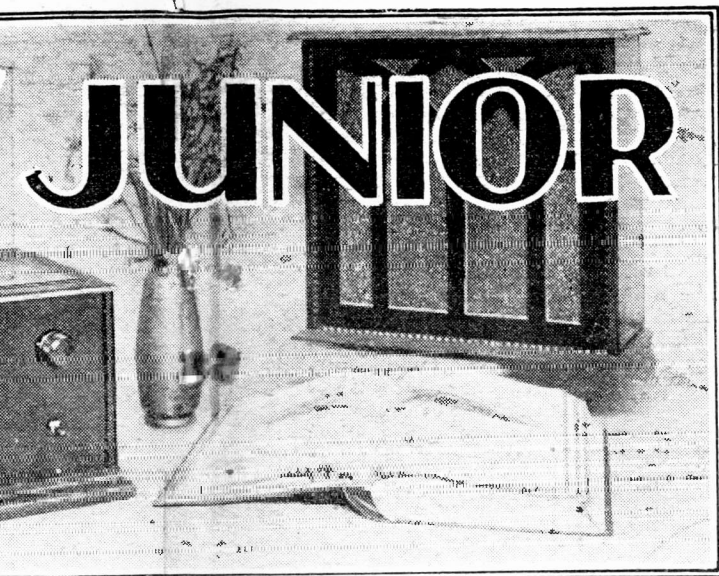
**THESE A**

- 1 Panel, 14 in. x 7 in. (Permcob or Peto-Scott, Parex, Wearite, Goltone, etc.).
- 1 Cabinet with baseboard, 10 in. deep to fit (Peto-Scott, or Camco Pickett, Osborn, Compton, Lock Kay, Gilbert, etc.).
- 1 .0005-mfd. tuning condenser (Astra, or J.B., Cyldon, Polar, Lotus, Ormond, Igranic, Ready Radio, Dubilier, Formo, Burton, Wavemaster, Crossley, Telsen, etc.).

- 1 Slow-motion dial (Astra, or Igranic, Ormond, Ready Radio, Telsen, etc.)
- 1 .0001-, .00012-, or .00015-mfd. differential reaction condenser (Formo, or Telsen, Ready Radio, Igranic, Polar, J.B., Dubilier, Ormond, Lissen, Magnum, Parex, Burton, Wavemaster, Cyldon, etc.).
- 1 Filament switch (Ready Radio, or W.B., Igranic, Lotus, Benjamin Peto-Scott, Bulgin, Magnum, Ready Diamond, Wearite, Junit, Telsen, Ormond, etc.).
- 1 3-pole wave-change switch (Junit, or W.B., Bulgin, Peto-Scott, Read



The circuit is the "P.V."



ve Two-Valver that will give you exceptionally effective two-band results.

G. V. DOWDING, (Associate I.E.E.)

from the

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they can  
ng used!

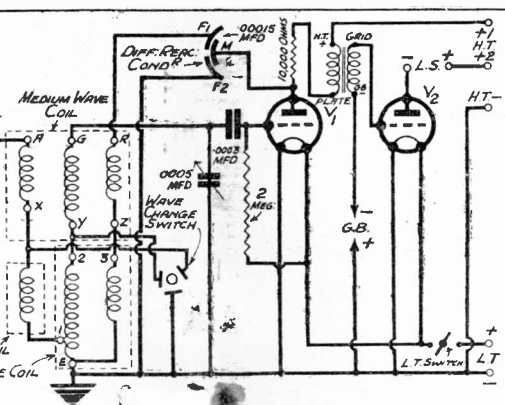
Thus the ideal of perfect two-band virility is obtained. Nothing at all is sacrificed for the inclusion of panel wave-change—the results equal the best that can be done with plug-in coils.

The parts used in the assembly of "P.V." Junior are of an entirely standard nature.

## ARE THE PARTS YOU WILL NEED

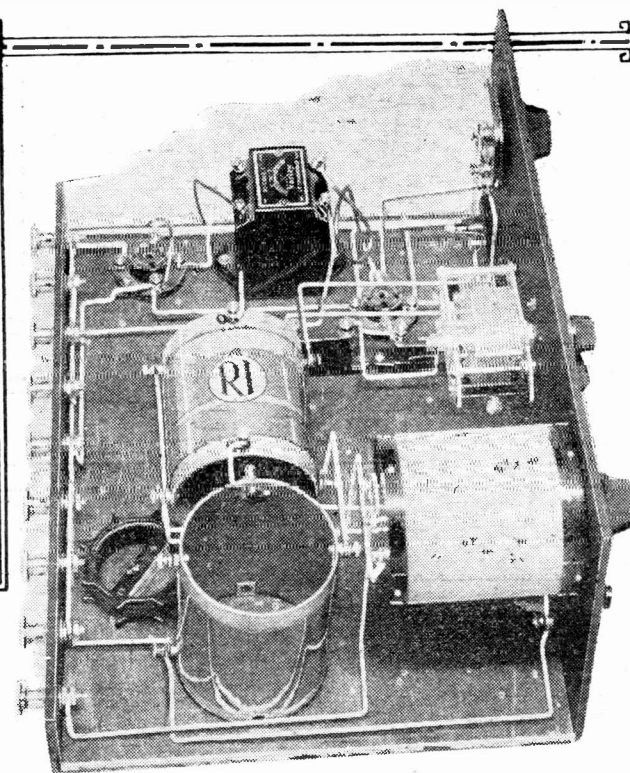
- Radio, Wearite, Red Diamond, Ormond, Magnum, etc.).
- 1 Selector coil (Ready Radio, or Goltone, Wearite, Parex, R.I., Peto-Scott, Magnum, etc.).
- 1 Pop Vox long-wave coil (R.I., or Tunewell, Wearite, Peto-Scott,
- 1 .0003-mfd. fixed condenser (T.C.C., or Ready Radio, Telsen, Ediswan, Dubilier, Ferranti, Mullard, Igranic, Watmel, Formo, Graham-Farish, etc.).
- 1 2-meg. grid leak and holder (Ferranti, or Dubilier, Telsen, Graham-Farish, Ediswan, Ready Radio, Varley, Watmel, Igranic, Mullard).

## UNIQUE "P.W." FEATURES



an aggregation of the most useful features developed by "P.W." Research Department during the past year.

- 1 L.F. transformer (Varley, or Telsen, Lotus, Lewcos, R.I., Ferranti, Igranic, Goltone, Atlas, Formo, Mullard, etc.).
- 1 10,000-ohm spaghetti resistance (Bulgin, or Telsen, Lewcos, Varley, Ready Radio, Peto-Scott, Graham-Farish, Tunewell, Magnum, Sovereign).
- 1 Coil Quoit (Wearite or Peto-Scott, A. E. D., Redfern, etc.).
- 1 Terminal strip, 14 in. x 2 in.
- 2 ozs. No. 24 D.S.C. wire.
- 9 Terminals (Eelex, or Igranic, Belling & Lee, Clix, etc.).
- Wire, screws, etc.
- Glazite or Lacolite for wiring.
- Grid-bias plugs and H.T. plugs (Clix, or Igranic, Belling & Lee, Eelex, etc.).
- Ready Radio, A.E.D., Formo, Melbourne, Goltone, Ferranti, etc.).
- 1 Pop Vox. medium-wave coil (R.I., etc.).
- 2 Valve holders (Telsen, or W.B., Lotus, Igranic, Clix, Bulgin, Formo, Junif, Benjamin, Wearite, Magnum, Dario, etc.).



The special "P.W." coil devices ensure maximum power plus sufficient selectivity for modern ether conditions.

The "P.V." coils are freely obtainable in many different makes at prices that render it hardly worth the trouble to wind them yourself.

As for the Selector, that is rather a different proposition, and most of you would find the construction of this a pretty tricky task. However, we have published full details for the benefit of those who want them, and no doubt we shall repeat them from time to time. The same applies to the "P.V.'s" except that these are easy to wind. And if you glance through a few back numbers you will quickly locate the instructions.

The "Contradyne" necessitates one Coil Quoit, and on this should be wound sixty turns of 24-gauge double-silk-covered wire.

### A Good L.F. Stage.

Buy the best L.F. transformer your pocket-book lets you run to, for, remember, there is only one amplifying valve in this little set and you want to get as much out of this as possible.

Now for the assembly of the parts. The wiring diagram is exactly to scale, so that you can, if you so desire, work out to eighths of an inch exactly where every component goes. But such precision is quite unnecessary in "P.V." Junior. So long as you place the parts approximately as shown, you

will meet with no difficulties, for plenty of space has been allowed.

### "Extenser" Tuning.

Here I must interpolate a few words about the "Extenser." If you include one of these fascinating components instead of an ordinary variable condenser and a wave-change switch, drop the Selector down to a midway point on the panel. This results in a quite pleasing layout.

One of the components on the baseboard, the one that is marked 10,000 ohms, looks more like a worm than a piece of wireless apparatus! It is one of those new spaghetti resistances. I mention this for the sake of those readers who may not yet have met "spags."

### No Soldering.

There is no need to solder the leads, providing you make the connections firmly and the ends of the wires are securely gripped by the terminals and screws on the various components.

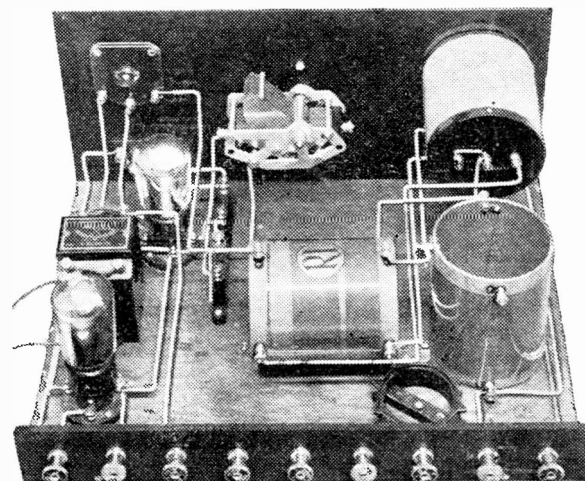
A slight alteration from the wiring illustrated is necessitated by an Extenser. The actual device is mounted on the panel in exactly the same manner as the ordinary variable—indeed, it will probably fit in the identical panel-mounting hole.

There will be two terminals on the Extenser corresponding with "F" and "M" on a variable, and a group of terminals that replace the wave-change switch. To any two of these (there may be three or four of them) go two of the leads otherwise connected to the wave-change switch.

(Continued on next page.)

**WHAT THIS SET WILL DO**  
GIVE YOU EXCELLENT QUALITY  
LOUD-SPEAKER RESULTS FROM  
A NUMBER OF STATIONS.  
PROVIDE AMPLE SELECTIVITY  
FOR MODERN CONDITIONS.

## SURPRISING SIMPLICITY



Notwithstanding the advanced nature of the circuit employed, the assembly of the set remains true to "P.W." traditions—snag-free and within the powers of anyone.



**"P.V." JUNIOR**  
(Continued from previous page.)

The third wave-change switch lead is not required, and this one is described in the caption to the wiring diagram. You see, the Extenser nearly always saves at least one lead!

If your differential reaction condenser happens to have two F.1 or F.2 terminals you can wire up to either, it will merely be that the one terminal point has been duplicated for purposes of symmetry.

There is little else that requires to be said about the construction of this little receiver, for it is a perfectly straightforward job and you can hardly go wrong if you make fairly frequent references to the diagrams and photos that accompany this article.

**Concerning Valve Ratings.**

There is also a list of recommended accessories to guide you in the choice of valves, batteries, etc.

In regard to the valves, you have the choice of three different L.T. voltage ratings, viz., 2, 4 and 6 volts. But I don't suppose there will be many using 4- or 6-volters.

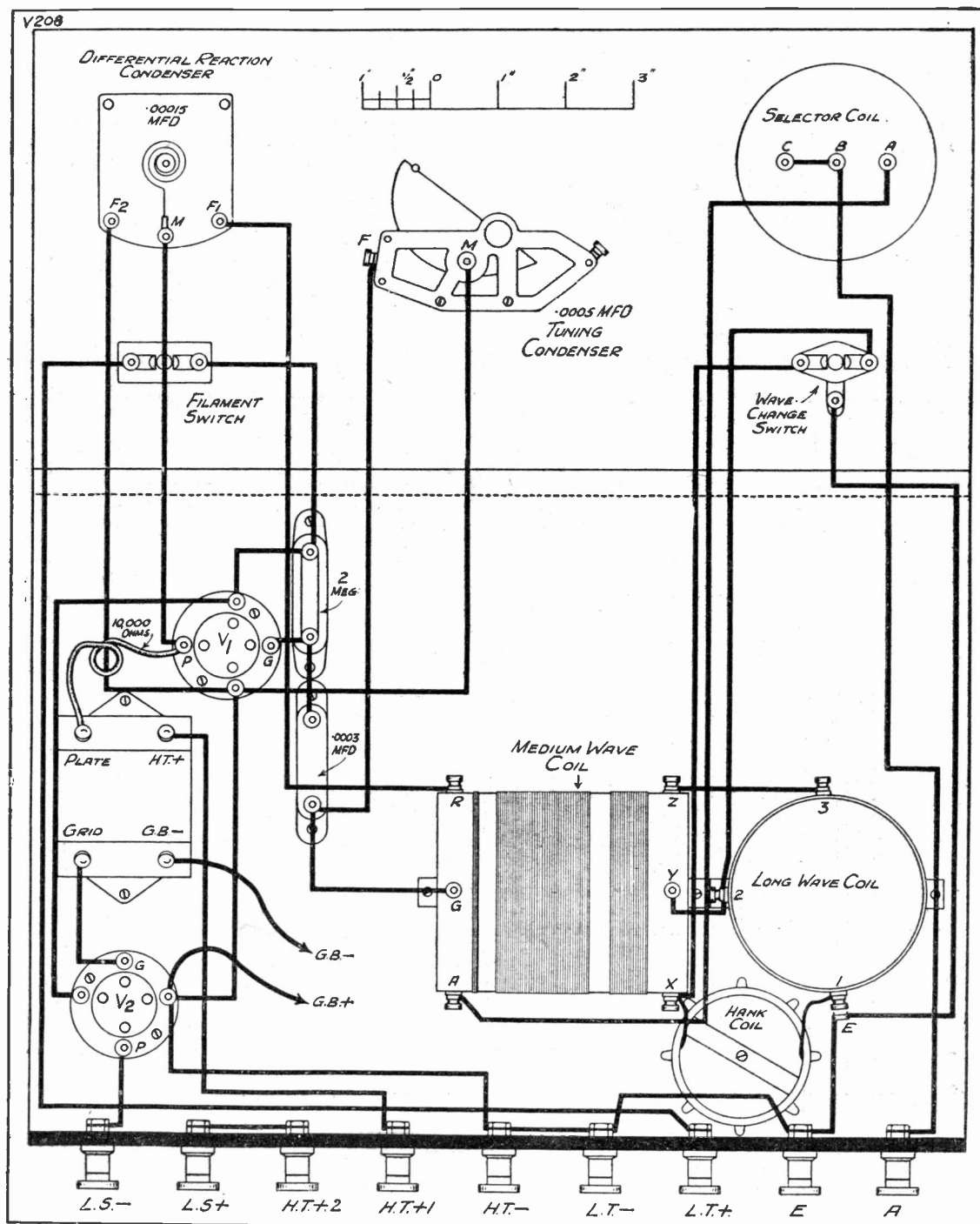
The "two's" are so good these days that there is nothing much to be gained in a set of the nature of "P.V." Junior in going away from this economical class.

And you will need only a very small accumulator for the L.T.; one of twenty ampere-hours capacity will be quite large enough. But see that it is an "Actual" capacity rating and not "Ignition."

One hundred volts H.T. should be ample, but don't try to "make do" with less than that (99 volts is near enough).

You will probably find that 9 volts grid bias will suffice, though the actual figure needed depends entirely on the valve used in the second valve holder. I would prefer one of those 2-volt power valves of modern and efficient make—a super-power type is hardly necessary in this little set.

**THE WIRING WON'T TAKE YOU LONG!**



If you use an Extenser the lead running from the wave-change switch to "E" on the long-wave coil can be omitted altogether.

**A Final Point.**

Some of you may want to use a Pentode and so achieve even greater amplification. But I do not advise you to do this unless you are also prepared to employ one of those

**THE ACCESSORIES REQUIRED**

**LOUD SPEAKER.**

—W.B., Celestion, Ampion, Blue Spot, B.T.-H., Undy, Mullard, Donotone.

**VALVES.**—1 H.L. type for det. Six-Sixty, or Mazda, Osram, Fotos, Eta. 1 L.F. or power type (Mazda, etc.).

**BATTERIES.**—H.T., 100-120-volt battery. Ever Ready, Oldham, Drydex, Pertrix, Grosvenor, G.E.C., National, Fuller, G.B., to suit output (Pertrix, etc.).

**ACCUMULATORS.**—2-, 4-, or 6-volt to suit valves. Fuller, Exide, Ediswan, Pertrix, Oldham.

**MAINS UNIT.**—Heyberd, Ekco, Tannoy, Regentone, Atlas, R.I., Junit.

(State details of set, valves, mains voltage and type when ordering.)

special Pentode output transformers. It is simple enough but rather expensive.

However, "P.V." Junior as it stands is a powerful little outfit, quite capable of giving you all the loudspeaker volume you want from a number of stations.

# POPULAR KITS FOR "POPULAR" SETS —READY RADIO!

You can now buy your Ready Radio Kit from your local dealer, but be sure it is a genuine Ready Radio Kit.

## "P.V." JUNIOR

### THE "P.V." JUNIOR

	£	s.	d.
1 Polished ebonite panel, 14" x 7" x 3/16", drilled to specification	4	6	
1 Hand-polished oak cabinet with 10" base-board	1	5	0
1 ReadiRad .0005-mfd. variable condenser	4	6	
1 ReadiRad Duograph S.M. dial	6	6	
1 ReadiRad .00015 differential reaction condenser	5	0	
1 ReadiRad filament switch	1	6	
1 ReadiRad 3-point wave-change switch	1	6	
1 ReadiRad Star Turn selector coil	12	6	
1 Pair ReadiRad Pop Vox medium and long wave coils	8	6	
1 ReadiRad long wave quito coil	2	6	
2 Telsen 4-pin valve holders	1	0	
1 ReadiRad .0003-mfd. fixed condenser	1	0	
1 ReadiRad 2-meg. grid leak and holder	1	4	
1 Telsen "Radiogrid" L.F. Transformer	8	6	
1 ReadiRad 10,000-ohm spaghetti resistance	1	0	
1 Terminal strip, 14" x 2" x 3/16", drilled to specification	1	3	
9 Belling-Lee "R" type terminals	2	3	
5 Belling-Lee wander plugs	10		
1 Packet "Jiffilux" for wiring	2	6	
2 Mullard valves to specification: Det. and Power	19	0	
Flex. wire, screws, etc.	8		
<b>TOTAL (including valves and cabinet)</b>	<b>£5</b>	<b>10</b>	<b>6</b>

**TO OVERSEAS CUSTOMERS.**  
All your goods are very carefully packed for export and insured, all charges forward.

**KIT "A"** less valves and cabinet **£3-6-6**

or 12 equal monthly instalments of **6/-**

**KIT "B"** with valves less cabinet **£4-5-6**

or 12 equal monthly instalments of **7/9**

**KIT "C"** with valves and cabinet **£5-10-6**

or 12 equal monthly instalments of **10/-**

### THE "POP-PORTABLE"

Completly assembled, with valves and cabinet, ready for use and aerial tested. Royalties included. **£13-9-0**  
or 12 monthly payments of **24/9**

**KIT "A"** less valves and cabinet **£6-16-6**

or 12 equal monthly instalments of **12/6**

**KIT "B"** with valves less cabinet **£9-4-0**

or 12 equal monthly instalments of **17/-**

**KIT "C"** with valves and cabinet **£11-9-0**

or 12 equal monthly instalments of **21/-**

**"POP-PORTABLE" CABINET with Wound Frame Aerial**  
The Cabinet supplied with Kit "C" can be obtained separately with ready wound frame aerial **£2-15-0** Cabinet without aerial **£2-5-0**

### THE "POP-PORTABLE"

	£	s.	d.
1 ReadiRad portable cabinet to specification	2	5	0
2 J.B. .0005-mfd. condensers, slow-motion log type, 40-1 ratio	1	1	0
1 ReadiRad .00015-mfd. differential reaction condenser	5	0	
2 T.C.C. .01-mfd. fixed condensers	5	0	
3 Telsen fixed condensers, .001-mfd., .0003-mfd. and .0001-mfd.	1	6	
2 T.C.C. 1-mfd. fixed condensers	5	8	
1 T.C.C. 2-mfd. fixed condenser	3	10	
2 Lewros 60-ohm flexible resistances	1	6	
1 ReadiRad 10,000-ohm flexible resistance	1	0	
1 ReadiRad 25,000-ohm flexible resistance	1	6	
1 Lewros 100,000-ohm flexible resistance	1	6	
1 ReadiRad 5-megohm grid leak and holder	1	4	
1 ReadiRad 1-megohm grid leak and holder	1	4	
1 ReadiRad 2-megohm grid leak and holder	1	4	
1 Telsen H.F. choke	2	0	
3 Telsen 4-pin valve holders	1	6	
1 W.B. horizontal type valve holder	1	3	
1 Wearite 2-way rotary switch with terminals and indicating knob	4	0	
1 Wearite 4-way rotary switch with terminals and indicating knob	5	6	
1 Telsen "Ace" L.F. transformer	5	6	
1 Set Bulgin frame aerial spacer	1	3	
1 Screen and foil to specification	3	6	
1 Mullard portable loud-speaker unit	1	18	
1 ReadiRad wound medium wave coils as specified	5	0	
2 ReadiRad wound coil quito for long waves	7	6	
4 Oz. reel 24 g. D.S.C. wire for short wave frame aerial	2	2	
4 Oz. reel 30 g. D.S.C. wire for long wave frame aerial	3	0	
1 Packet ReadiRad "Jiffilux" for wiring	2	6	
4 Valves to specification (S.G., Det., L.F. and Power)	2	7	6
Flex. wander plugs, spades, crocodile clips, etc.	1	10	
<b>TOTAL (including valves and cabinet)</b>	<b>£11</b>	<b>9</b>	<b>0</b>

**TO INLAND CUSTOMERS.**  
Your goods are despatched post free or carriage paid.

# Ready Radio

159, BOROUGH HIGH STREET,  
LONDON BRIDGE, S.E.1.

Telephone: Hop 5555 (Private Exchange) Telegrams: READIRAD, SEDIST.

## IMMEDIATE DESPATCH ORDER FORM

To **READY RADIO (R.R. Ltd.)**

159, Borough High Street, London Bridge, S.E.1.

**CASH ORDER.** Please despatch to me at once the goods specified for which I enclose payment in full of  
**C.O.D. ORDER.** Please despatch to me at once goods specified for which I will pay in full the sum of  
**EASY PAYMENT ORDER.** Please despatch my Easy Payment Order for the Goods specified for which I enclose first deposit of

£.....  
£.....  
£.....

Name.....  
Address.....  
Kit required.....



## FROM THE TECHNICAL EDITOR'S NOTE BOOK.

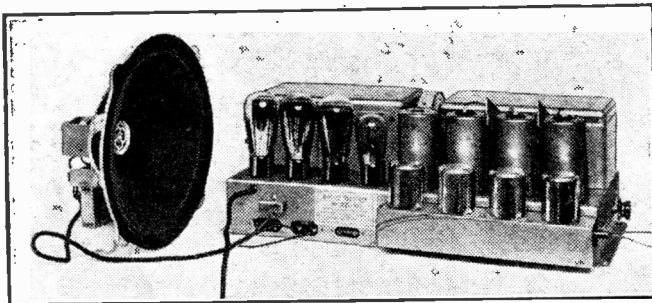
# Tested and Found-?



## KENNEDY CORONET CHASSIS.

I HAVE just completed a series of tests with a Kennedy Eight-Valve Coronet Chassis, lent me by W. Lusty & Sons, who are the distributors of these instruments. It is an all-electric outfit for A.C. mains, and the moving-coil speaker unit which is available with it has a mains-actuated field.

The photo that appears on this page will give you some indication of the compactness of the chassis, but can only hint at the



This is the Kennedy Coronet 8-valve Chassis.

skilful engineering that has been put into the design and construction.

The receiver lacks only a cabinet, and it can be built into any type to suit the individual user.

Both short and long waves are covered, and the power, selectivity and quality of the set are of the most commendable class.

There are many points of interest in the outfit which I would like to mention, but I fear space will not permit. I would advise interested readers to write to Messrs. Lusty, at 79/81, Paul Street, London, E.C.2, for descriptive literature.

## EXTENDING THE EXTENSER.

Sydney Bird & Sons, Ltd., are, I believe, going to produce quite a number of different gang, dual and triple Extensers during the coming season. Apparently they foresee great demands for Extenser applications of this nature.

Personally, I should be greatly surprised if there were not, for with every additional Extenser incorporated in any one set the advantages of the principle leap up by bounds.

For example, take the Cyldon Triple Extenser assembly, a sample of which I recently received for use in a special set.

Two of the sections are ganged, and are controlled by the one drum drive, a second

drum operates the third section. The two drums can be operated simultaneously, and three circuits tuned.

But that is possible with triple assemblies of an ordinary nature; where this Extenser scores is that it can automatically wave-change three tuned circuits as well!

There is no need for a complicated ganged switch system or for three separate wave-change switches as would otherwise be the case.

Moreover, the switch mechanism is in every instance situated exactly where it should be for the most economical and efficient wiring—right on each condenser concerned in the individual circuit.

These colossal advantages are so obvious that there is no need for me to dwell upon them.

But on top of this the drums carry readings applicable to all the wave-lengths, medium and long, and in a commercial set they would, of course, be directly calibrated in wave-lengths or frequencies.

As to the Cyldon Triple Extenser assembly itself, words are hardly adequate to do it justice. It is a magnificent piece

of work, and so robustly constructed that its Five Years' Guarantee seems quite unnecessary. Nevertheless, it must not be thought that it is ugly in its solidity. It decidedly is not, but has an excellent finish, and it is a pleasure merely to look at it.

The movement is smooth, and the "self-changing" imposes negligible resistance and is completely effective.

Sydney Bird & Sons, Ltd., are certainly setting the pace in the application of the Extenser principle just as they did in the construction of ordinary variables in earlier days.

Those Continental and American firms that have signalled their intention to develop Extensers for use in their own countries will certainly have to do wonders to equal, let alone beat, our pioneer Britishers in this latest radio development.

By the way, if you go to Olympia this year, make a special point of examining some of the several Extensers that will be on show on various stands. Should you

not have handled one of these devices before, I am sure you will be fascinated by its action and immediately apparent points of interest.

The Extenser wants to be seen, if possible on a set, and demonstrated before its full

Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department, with the strictest of impartiality, under the personal supervision of the Technical Editor.

We should like to point out that we prefer to receive production samples picked from stock, and that we cannot guarantee their safe return undamaged, as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are, therefore, framed up in a readily readable manner free from technicalities unnecessary for that immediate purpose.

advantages can be fully appreciated. Many constructors have doubted its usefulness before actually coming into contact with it—they do not do so afterwards!

## "LEWCOS" MAKING OUR COILS.

I have some good news for constructors; the London Electric Wire and Smiths Co., Ltd., a concern known more familiarly as Lewcos, are making "Popular Wireless" P.V. and P.J. coils.

This is, of course, a signal compliment for these "P.W." designs, as Lewcos are the premier wire and coil makers of this country.

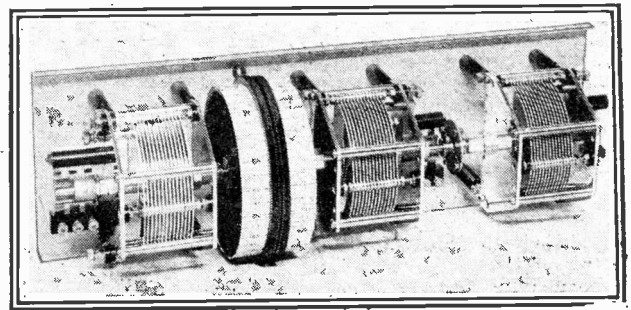
Their Glazite wire must figure in more radio receivers than any other single proprietary production. But I believe even the large quantity used in this way is overshadowed by the thousands of miles of the material employed in telephone installations!

I have examined a complete set of Lewcos P.V. and P.J. coils, and I can assure you that they are really first-class components from every point of view.

They are definitely superior to many other makes, and this, in the circumstances, is hardly surprising!

I particularly like the little mounting feet that are securely fixed to them, for these enable the coils to be mounted either vertically or horizontally.

Constructors should make a particular note of these "Lewcos" P.V.'s and P.J.'s.



The Cyldon Triple Extenser Assembly referred to on this page.

**R**ECENTLY I described how the change over from summer to autumn and winter reception conditions generally occurs. I said, if you remember, that most frequently it proceeded by means of a series of jumps forward, and that interspersed with these were not infrequently short periods in which a setback was quite noticeable.

One of these setbacks occurred towards the end of July, when nearly all stations were distinctly weaker than they had been just previously. This was followed by a marked improvement both in strength and in the number of stations receivable.

**Peaceful Spain!**

It was rather unfortunate that just when the Spanish stations once more gave signs of coming in well broadcasting in Spain should have been interfered with to some extent by political troubles. Both Madrid Union Radio, though, and Barcelona are now returning rapidly to form, and I can recommend them to your notice.

On the long waves Huizen shows signs of becoming one of the best, if indeed not the very best transmission. The volume obtainable from this station with quite a small set is remarkable at present. With a four-valve portable, for instance, loud-speaker reception is obtainable just now at any time when the station is in operation.



Some practical distant programme notes compiled by a special contributor who nightly searches the ether in order to obtain really up-to-the-minute information for "P.W." readers.

Russian transmissions on unauthorized wave-lengths still interfere at times with Radio-Paris, Zeesen and Oslo, but when they are free from interference all of these stations are good. If you haven't heard Motala for some time try for him now, for he is in good form. Kalundborg, too, is better than he has been for some while.

Before very long we shall have Budapest coming in as well as ever and that is saying a good deal. At present both he and Vienna have their evenings and you should never neglect to turn to the settings required for them when you are making a trip abroad with the wireless set.

**Milan "On the Mend"**

Milan has been showing unaccountable weakness for some time, but there are signs now that he is coming back. Langenberg is a station nearly always worth attention. Rome is particularly good just now, and neither Beromunster nor Sottens should be overlooked.

Stockholm varies a good deal, but when conditions are reasonably good you should

Frankfurt, Hamburg, Breslau, Heilsberg, Leipzig and Nurnberg vary a good deal, and the volume obtainable from them is often surprising.

**Some Good "Goers"**

Turin is coming in well at present, being now free from heterodyne troubles. Hilversum is often first-rate. I have had good reception from Goteborg, from both the Brussels stations, and from Strasbourg.

In the next week or two numbers of the smaller stations will make their voices heard again, and you should be on the look out for them. Here are a few that you should try for after dark.

Munich (533 m.), Bergen (493.4 m.), Prague (487 m.), Lyons La Doua (466 m.), Belgrade (430.4 m.), Brno (342 m.), Naples (332 m.), Copenhagen (281 m.), Bratislava (279 m.), Lille P T T (265.4 m.), Moravska-Ostrava (263 m.), Horby (257 m.) and Gleiwitz (253 m.).

If you have a good receiver no doubt you will also hear a lot of the relay stations.

**T**HIS business of identifying short-wave stations is becoming more and more difficult. The "landmarks" become familiar to everyone, after they have listened for a few weeks, but all these stations that spring up in the night are another matter. Especially when they turn out records for hours on end with no announcements!

The tantalising part of it is that one doesn't want to shut down or tune off them without knowing who they are, because one cannot tell from their strength whether they are in Germany or the Fiji Islands. It is most annoying to think that one might have been logging a brand-new station without knowing it.

**Identification Troubles**

Even some of the "published" stations with their own allotted wave-lengths are bad enough. I am thinking of those who come five or six degrees apart on the dial. It is impossible to tell, without a very accurate wavemeter, whether the one you are listening to is on 31.66 metres or 31.97 metres!

This time I am really getting down to the matter, and I am building an entirely separate wavemeter of the simplest possible type that can be expected to keep accurate. I hope the Editor will allow me to exhibit it to the world at large when it is finished.

Has anyone yet heard WSEA, the Wilkins expedition? Naturally, with all the bad luck they have been having with the "Nautilus," they probably have not had much time on the air, but as they really appear to be starting now, we might possibly hear from them.

Incidentally, what a chance of a thrill there will be if they reach the North Pole

**SHORT-WAVE NOTES**

A few interesting observations concerning happenings down on the short waves by W. L. S., a very well-known amateur transmitter and a leading expert on the subject.

and can still put out readable signals. I have heard Byrd's signals from the South Pole, and mean to hear the "Graf Zeppelin" from the North Pole, but a submarine is a different matter altogether. I have logged signals from a submarine once, in fact I have had a two-way chat with him, but that was in 1925. The submarine in question was near St. Nazaire, using the call-sign X E F-8 J T. Does anyone else remember this?

Can anyone identify a station in the region of 32 metres that occasionally broadcasts dance music and announces in English? J. S., of Notts, is puzzled by this, and I seem to have seen other queries on the same subject.

**HELP THE NEWSAGENT.**

Have you ever thought how difficult it is for a newsagent to order just the right number of copies of any particular paper each week? You can make his task much easier if you place a regular order with him. You will not only help him to order correctly and avoid waste, but will make sure of getting your copy regularly each week.

At midnight they apparently broadcast chimes followed by twelve strokes, and then more chimes. If this description is sufficient, and any reader happens to be able to throw light on the subject, will they please set J. S.'s mind at rest?

**A Good "Yankee" Set**

A. W. R., of Watford, confesses to being rather struck by the layout of the well-known American shortwaver called the "Super-Wasp." Yes, A. W. R., it certainly is thoroughly good, and you need not let the six-volt valves worry you in the slightest.

If you make a layout on those lines and use British two-volt valves I don't think you can possibly go wrong. Apologies for the delay, by the way, A. W. R., but the holiday period came in between!

J. H. W., alias G 2 T K, of Hull, kindly offers to become my Northern Correspondent! I am always glad to receive letters of any length, J. H. W., describing short-wave conditions and experiences, and should be very glad if you would join the ranks. Perhaps we shall meet "on the air" again some time.

**"Supers" or "Straights"?**

Again, I am going into the question of short-wave super-hets. versus "heavy stuff" of other kinds, and before I write next week's notes I hope to have had an evening out with a good receiver in each class.

Then I will have something to say to all those who are planning to make a super-receiver for the coming winter session. My preference at the moment lies in the direction of the super-het., but I somehow feel that I am about to be converted!



THE MIRROR OF THE B.B.C.

**BOTHER AND  
NERVOUSNESS**

**TWO MONTHS' LISTENING:  
GENERAL IMPRESSIONS—  
THE COMING "PROMS."**

I HAVE been encountering a good deal of irritation and "nerves" in connection with my normal collection of news and views at Savoy Hill the last few days. I was disposed at first to put this down to the seasonal slump in wireless nerves such as I had encountered rather more definitely in the early days of the B.B.C. But there was something in it more than this, and it did not take me long to get at it.

The trouble is about Broadcasting House. Nobody who knows queries the studio accommodation, but the snag is about the offices. There are not nearly enough, and a good many of those available are not really tolerable.

There is a great deal of unrest in the B.B.C. staff about the whole business, and it would be well for all concerned if Sir John Reith would look into the problem and clear it up in his characteristically thorough and painstaking way.

**Two Months' Listening : General Impressions.**

I have now been listening every night for two months and have been comparing my notes with those I made over a similar period in 1925. There is no comparison.

British broadcasting is an entirely different thing now. Six years ago it was amateurish, sketchy and irregular. To-day it is on a vastly higher level both of entertainment and intellectual values; there are signs of better organisation and a surer touch generally.

But I do miss the intimate note of the old days; I would indeed sacrifice a little efficiency to find it restored. How refreshing an occasional mistake can be when gracefully turned! I got quite a kick when I heard an announcer pronounce Chisholm as it is spelt; but for the life of me that was the only error I could detect in eight weeks' listening.

And there is another point while on this: there is a great growth of the impersonal: just the other extreme from Arthur Burrows' famous "close-down" lines about filling the night with music. Let's get back a little sentiment and soften something of the present impersonality.

**Dance Music Trouble.**

Moves behind the scenes in the dance music trouble are continuing and are due to come to a head in the autumn. No solution has as yet been devised for abolishing the plugging evil, and it seems likely to remain in one form or another unless and until the B.B.C. assumes responsibility for all transmissions of dance music.

I am bound to say I think altogether too much fuss is made about plugging. What matters is the quality and variety of the programmes that get into listeners' homes. There can be no denying that listeners really want as many of the best outside dance bands as possible, and in their best pieces.

If publishers go out of their way to subsidise bands for playing the best music, that is their business. But it must not be overlooked that no bad dance music is ever plugged; it just wouldn't pay, and the fact of the subsidies is in a sense a guarantee of high standard even if it involves repetition.

So let's cut the cackle and have the music we want.

**The Coming "Proms."**

Listeners are fairly well acquainted with this year's series of Promenade Concerts at the Queen Hall, the broad details of which I have given in previous notes. For those who keep a diary of forthcoming radio events it will be worth noting that September and October relays from the "Proms" will be included in the National

Programme on the 2nd, 4th, 7th, 9th, 10th, 15th, 17th, 19th, 21st, 22nd, 24th, 25th, and 29th of September and on the 1st and 3rd (last night) of October.

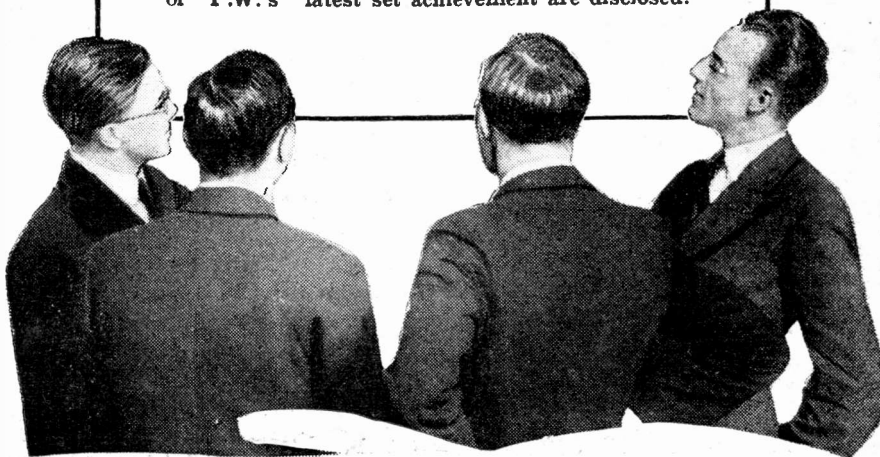
Relays for London listeners have been fixed for September 1st, 3rd, 5th, 8th, 11th, 12th, 14th, 16th, 18th, 23rd, 26th, 28th, and 30th, and October 2nd. All concerts, of course, will begin at 8 p.m.

Phyllis Robbins, a clever syncopated singer, and Johnson Clark, the ventriloquist, who took part in this year's Command Performance at the Palladium on May 11th, are newcomers to the London Regional Vaudeville Programme on Saturday, August 15th, when they will be in the studio with such experienced performers before the microphone as Gillie Potter and Vivienne Chatterton.

IN OUR NEXT ISSUE!

**THE "SUPER-QUAD" CIRCUIT**

A special article in which the technical features of "P.W.'s" latest set achievement are disclosed.



**FOR THE LISTENER**

By "PHILEMON."

Our popular contributor is now abroad, and this week he throws an interesting side-light on radio in Holland.

AS I warned you last week, I am writing this from Holland. We could not cross the Dutch frontier this evening as we arrived too late. There were several reasons for that.

One was Leyden, where we rather overdid our desire to render homage to the works and the memories of the great Dutch painter, Rembrandt. No motorist with a soul could "hog" through Leyden.

Nor, soul or no soul, can he very well hog through Holland, anyhow. You can't hog over "pavé." Pavé is a roadway laid with anything from cobbles to stone and brick sets.

They must wear well; and on the whole I prefer pavé to potholes. In Holland the pavé isn't really bad; but it has the effect of lowering your m.p.h. So we miscalculated our time, and were late at the frontier. The "gates were shut."

There was nothing for it but to stop. A

policeman with his hand up is a stony-hearted fellow, but a Customs officer on a frontier is granite all through. You explain in vain. You beseech in vain. The prettiest woman in your party smiles in vain. Neither blandishments nor palm oil is any good.

Frontiers as a rule are not very interesting places. To me they seem lonelier and more desolate than anywhere else. I feel I might easily be bludgeoned and robbed there.

**Stranded on the Frontier.**

Everybody is foreign. Everybody is hostile. You are like a rat in a trap, and the dogs are watching you from the outside. This particular frontier was not bad; it was pleasant cultivated country, with pine-woods, not unlike some parts of Surrey. So we ran the car under a shed, and prepared to stay the night.

(Continued on page 698.)

# SEND or CALL personal attention always from PETO-SCOTT

**"S.P.V." KIT "A"**  
less Valves and Cabinet  
**THREE CASH or C.O.D. £3-10-6**  
As described in previous issues. or 12 monthly payments of 6/6.

**ACCESSORIES**  
Handsome Polished Mahogany Cabinet 18x7x10 **£1-0-0**  
Set of 3 Mullard Valves as specified **£1-7-6**  
ANY PART SUPPLIED SEPARATELY. IF VALUE OVER 10/- SENT POST FREE.

**SENT C.O.D. SET OF COILS for "S.P.V." THREE**  
Consisting of R.L. Selector Coil, one pair Peto-Scott P.V.1, P.V.2 Coils, and one Peto-Scott Coil Quoit ready wound. **21/-**  
Pay the Postman SENT POST FREE.

**P.V. JUNIOR KIT "A"**  
described this week. (less valves and cabinet) **£2:16:7**  
CASH or C.O.D.  
or 8 monthly payments of 7/9  
Cabinet for above . . . . . 16/8  
2 Mullard Valves for above . . . . . 19/-

**COILS FOR P.V. JUNIOR**  
as included in KIT "A."  
Comprising 1 Selector Coil (12/6), pair P.V.1 and P.V.2 Coils (6/6) Peto-Scott Coil Quoit (6d.) and 2 oz. D.S.C. (9d.) **Complete £1**  
Pay the Postman

**COMET THREE Foundation Circuit Kit "A"**  
(less valves and cabinet) **£4-0-0**  
C.O.D. or CASH with ORDER or 12 monthly payments of 7/4.

**KIT "B"** (with valves). C.O.D. or cash, **£5. 7. 6.** or 12 monthly payments of 9/10.  
**KIT "C"** (with valves and cabinet). C.O.D. or cash, **£6. 7. 6** or monthly payments of 11/8

## The Quoit that is Quite!

**COIL QUILTS**  
As specified and included in latest P.W. Sets. Bakelite moulding with winding holes ready drilled. Shoulder for coil assembly and lugs for baseboard or panel mounting. Ask **6d.** your dealer. **EACH 6d.**  
Or 8d. post free.

**"P.J." COILS**  
Wound exactly to specification; supplied with Brackets for vertical or horizontal mounting.  
"P.J." Coil No. 1 **2/-**  
"P.J." Coil No. 2 **1/6**  
"P.J." Coil No. 3 **2/-**

**"P.V." COILS**  
Wound exactly as specified by "P.W."  
"P.V." Coil No. 1 **6/6**  
"P.V." Coil No. 2 **6/6**  
**A Pair**

**EXCELLENT VALUE FOR £1 C.O.D. SUPER HET-ING? FRAME AERIAL—Century Type.** With Solid Base, accurate fitting bearing bush, wave-change switch, 3-way leads and six spacers. Enamelled multi-stranded wire covered overall ensures maximum results. Correct centre-tapped. A new type frame aerial designed for modern Super Hets. **£1**  
From your dealer.

### POPULAR ACCESSORIES

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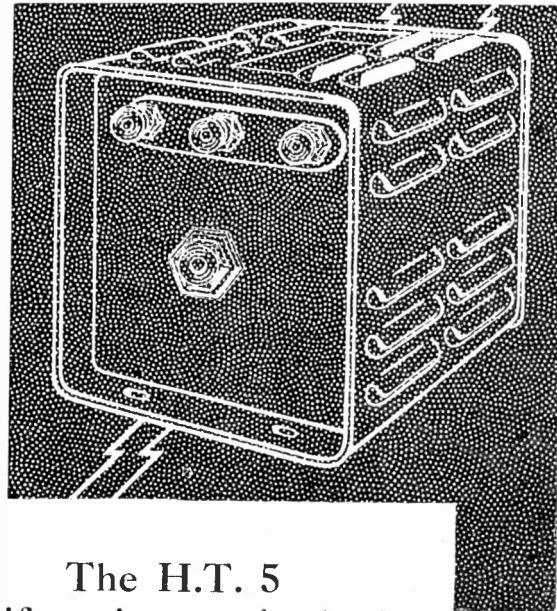
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# RADIOTORIAL

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 the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the subject of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

## QUESTIONS AND ANSWERS

### IMPROVING THE "CONTRADYNE" TWO.

E. N. S. (St. Albans).—"My 'Contradyne' Two proved to be a winner, the only fault that ever troubled me with it being a crackle due to bad contact at switch. I am thinking of renovating the set for next season.

"Could I do away with the wave-change switch and use an Extenser instead?"

"Also would an output filter for the loud-speaker, using a 20-henry choke and 2-mfd. condenser, be O.K. (usual connections)? And is wave-change-switch wiring to go to Extenser 'switch,' if this can be used?"

Both the improvements are well worth while. It is not quite clear from your question whether you wish to use the usual output connections that are already known to you, or to ask what are the usual output connections, so we give the connections (in words) below:

The 20-henry choke must be wired between H.T. + 2 and V2 plate (in place of the L.S. terminals). From the plate an extra-lead goes to one side of the 2-mfd. condenser. The other side of this goes to a new loud-speaker terminal.  
The second, new loud-speaker terminal goes to L.T. -, earth, or any convenient part of the wiring which connects direct to these two points.

The fitting of an Extenser is simplicity itself. Simply take out the old variable condenser and wave-change switch, and mount the Extenser.

"Fixed" and "moving" vanes are connected as before, and the three connections which previously went to wave-change switch now go to the respective contacts on the Extenser's self-changer.

### THE CAPACITY OF THE REACTION CONDENSER.

"BILLYO" (Aberavon).—"Why is it that so many different capacities can be used for reaction?"

"I have twice had trouble over this, once getting bad reaction at the top of dial because I used a '00015 instead of a '0002, and another time I had fierce reaction I could not stop.

"With tuning you always use a '0005. Why not always have the same reaction capacity—say '00015—and stick to it, so that reaction condensers would be interchangeable?"

The reason that quite different capacities are necessarily employed for reaction is that the methods of obtaining it are many and various.

Tuning capacities, on the other hand, can be more or less standardised at '0005, because the tuning coils across which the tuning condensers are placed are of standard values. So except for short-wave work the '0005 tuning condenser is nearly always capable of giving the required range of capacity.

Reaction connections cannot be standardised to the same degree. The size of the reaction coupling, the type of detector-to-next-valve coupling and the class of detector valve employed all affect the question of correct reaction condenser capacity.

By using a standardised coupling coil such as the "P.V." it is possible to ensure that the reaction capacities required for "P.W." sets fall within certain reasonable limits; but until radio design settles down to only one type of reaction (as it has settled down to parallel tuning circuits) there will always be a certain flexibility of reaction-capacity requirements.

### SIDE-BY-SIDE ELIMINATORS.

"NORGE" (Gt. Yarmouth).—"Perhaps you would inform me if two H.T. eliminators can be wired side by side across a set, like two H.T. batteries?"

"In case I have not made it clear I put it so: Negative of H.T.B.1 and negative of

H.T.B.2 go to H.T. — terminal on set. One battery to H.T. + 1 terminal and H.T. + 2 terminal. Other battery to H.T. + 3 terminal.

"Very well? I have seen many batteries used this way. But not the eliminators.

"I have the one eliminator, O.K. for small set. Can I put it to work *part only* big set, like H.T. + 1, + 2, then get (for H.T. + 3) battery or another eliminator?"

Yes, you can use two "H.T. eliminators" in the way you suggest, one supplying some of the H.T. terminals, and the other one supplying the other H.T. terminals. Or you can use one "eliminator" and one battery, the "negatives" being connected together and to H.T. negative on the set.

### POOR QUALITY AND THE MILLIAMMETER.

P. C. K. (Evesham).—"Lately the speech is not so clear and music is 'ringy,' and I notice the milliammeter needle does not go right to 0 when the set is switched off, as it did, but stays at about  $\frac{1}{2}$ . Would this be anything to do with the worse quality?"

Yes. It looks as though you have a faulty fixed condenser, or some insulation failure, and this might easily upset quality and give the effects you describe.

An expert would soon find the faulty component by the aid of the milliammeter reading, and probably when the dud part has been replaced the set's quality will be restored.

Failing this you would have to send the set away to be put right, or if this is impracticable let us have full circuit details, when we can instruct you how to trace the faulty component.

## "WHY IS IT SO NOISY TO-DAY?"

Perhaps the 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 an unrivalled service.

Full details, including scale 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.

### BRIEF REPLIES.

"PUZZLED" (Camberwell).—"One of your components is faulty or unsuitable—you should be getting dozens of stations with an aerial like that. Try substituting the components one at a time with borrowed ones till you find which is faulty. We suspect the reaction circuit, unless the set oscillates nicely now."

"Bonzo" (S.W.7).—"Certainly. We'll back you up."

R. C. (Stapleford).—"Pop Vox," every time.

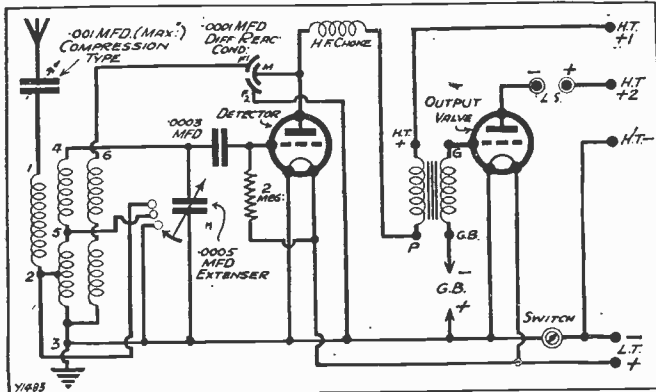
"HARROW."—"Join a piece of wire across each condenser you marked in turn; but for mercy's sake don't do them simultaneously, or you'll blow everything!"

"AJAX" (Ilford).—"Quite suitable with a '5 meg."

J. A. C. (Birmingham).—"Stand the base down in position, with the four sockets in line towards you. There is then one socket to right and one to left. Arrange the base so  
(Continued on next page.)

## MISSING LINKS, No. 13.

### A Useful Two-Valver.



Here is the full theoretical diagram of the circuit given last week. It will be seen that an aerial and H.F. choke were necessary to complete it.

## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

that these two are opposite the third socket counting away from yourself along the centre line.

Now number as follows: 4, 5, 2 and 1, 4 being the nearest and 1 the farthest away of the middle line.

The outer socket on the left should be marked 6, and that on the right is 3.

(Check them several times before inserting coil.)

A. C. (Bristol).—"The 'A.C. Paratune' was fully described in the Feb., 1931, 'Wireless Constructor.'"

"FEDDER."—"We shouldn't contemplate legal action until every other means has failed. Surely there is a mutual friend—or acquaintance—whom you could approach? Get him to take a conciliatory message, and arrange for a talk together. And begin by admitting you lost your temper!"

"Miss M." (Hertford).—"You need two charts, one showing long waves and the other the medium. The same dial numbers 0-100 will appear on both."

The only other way is to use an "Extenser," which gives all medium-wave stations as 2-figure readings, and all long-wavers as 3-figured. But there would be a slight alteration to wiring necessary, because the wave-change switch is unnecessary with the "Extenser."

### THE "P.W." "SELECTOR" COIL.

W. A. (Darwen).—"To bring the price down to the level of my pocket I must make the 'Selector' coil myself. And I haven't made coils before."

"Is it possible to make a satisfactory component first time? And if so, how do I go about it?"

Anyone who is a bit of a handyman could make a perfect job of it at the first attempt. And even the "ham-handed" generally succeed without any

### WHEN WRITING TO US

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difficulty, provided they take the trouble to read the directions carefully. But it takes just a little care and patience, of course, which are more than repaid by results.

All that is needed is a single-layer winding of the correct size, etc., wound on a piece of good insulating tube such as "Pirtoil." There are 84 turns in all, and you have a rotating switch at one end of the tube, with studs connected to every fourth turn, so that the circuit can be tuned by rotating the switch.

The tube must have a diameter of 3 in., length 3 1/2 or 4 in. In each end of this a wooden crosspiece is fitted, one to provide a means of mounting to the panel (two screws) and the other to form the attachment for a disc of ebonite of about 2 1/2 in. diameter, on which the studs and arm of the "Selector" switch are mounted.

The switch has 18 studs, and the arm is fixed on the end of a brass spindle running right up the centre of the coil and out through a hole in the panel. Holes for this spindle are required in the wooden crosspieces, of course, and a knob is placed on the end to enable the switch to be rotated. Some simple kind of pointer is desirable on the knob, to indicate roughly where the switch arm is at any given moment.

The tube carries three small terminals, marked A, B, and C, and a convenient position for these is at the end furthest from the panel. The actual positions do not matter much, but it is best to see that they read A, B, C from right to left as you look at the coil from the back of the set in which it is mounted.

The winding comprises 84 turns of No. 24-gauge wire (either double-cotton- or double-silk-covered will serve) in a single layer. Begin at the end of the tube nearest the panel and wind on 20 turns.

From this point take a tapping to No. 1 stud on the switch. This is the stud on which the arm rests, when the knob is turned fully to the left.

Now put on 4 turns, tap out to No. 2 stud, 4 more turns, tap to No. 3, and so on, until 84 turns are on. Take the finishing end to No. 17 stud, leaving No. 18 blank for another purpose.

Now the internal connections of the unit. Terminal A is to be wired to the arm of the switch, and C to the start of the winding. The 13th stud, blank until now, is to be wired to terminal B.

And here are two final hints. The appearance of the unit would be improved by a covering of Empire cloth over the winding. It is easily stuck in place with a few little dabs of mottled Chatterton's compound.

With No. 24 double-silk-covered wire, wound reasonably carefully, the 84 turns should cover approximately two inches of the tube.

### A FIRST-CLASS SHORT-WAVER.

E. J. N. (Gidea Park).—"I have been getting together the parts for a real first-class short-waver, for use in the autumn and winter. And the circuit will be the one W. L. S. gave in 'P.W.' June 6th."

"Not being much experienced at reading theory diagrams, can you give me the wiring in words. Also where an on-off H.T. switch should be wired?"

### "P.W." PANEL NO. 31.—FLEXIBLE RESISTANCES.

Generally known as "Spaghetti's" these useful components have deservedly attained great popularity during the past year.

They simplify wiring, and are highly efficient in use, with the further advantage of low cost.

Although insulated, they should not touch adjacent metal, but should run clear of other wiring, etc.

When choosing a spaghetti resistance for mains work, remember to ascertain if it can safely carry the requisite current.

The on-off switch for H.T. is best incorporated in the set itself, so we will give the wiring with this included.

Aerial terminal to fixed vanes of .0001-mfd. condenser. Moving vanes to G. of S.G. valve holder (V1), to one side of aerial coil holder, and to fixed vanes of S.G. tuning condenser (.0001).

The moving vanes of this condenser and other side of aerial coil holder are joined together, and to earth terminal, to one filament terminal on each valve holder, to the 2-mfd. fixed condenser near the S.G. valve, to the 60,000-ohm resistance, to one side of the 1.2 coil holder, to the moving vanes of the second .0001- and the .00002-mfd tuning condensers, to the

moving vanes of the .0001 reaction control, to the 4-mfd. condenser, to G.B. + and to one side of the filament on-off switch.

H.T. neg., L.T. neg. and one 'phone terminal are joined to the other side of this on-off switch. The three remaining "filament" terminals of the valve holders are joined together and to the grid leak and L.T. +.

The "screen" terminal of V1 goes to the remaining side of its 2-mfd. condenser, to the vacant end of the 60,000-ohm resistance, and to one end of the 50,000-ohm resistance.

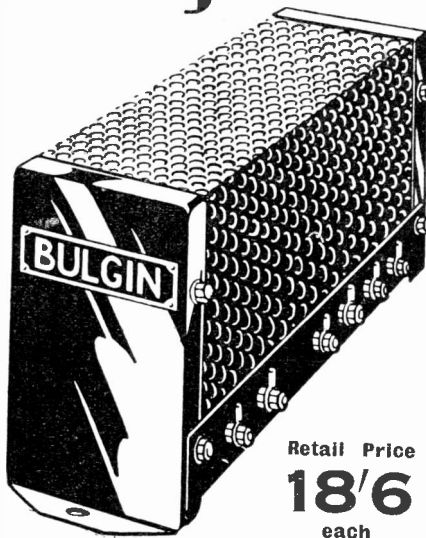
The anode connection from V1 (on bulb) goes to the 100,000-ohm resistance and to one side of the .00005-mfd. coupling condenser (N.C.). The other side of the 100,000-ohm resistance goes to the H.T. on-off switch, to the 20,000-ohm resistance, to the output choke and variable resistance, and to H.T. +.

The vacant terminal on the 50,000-ohm resistance is joined to the other side of the H.T. on-off switch. The remaining terminal on the .00005 N.C. goes to the vacant side of the 1.2 coil holder, to the fixed vanes of its .0001 and .00002 tuning condensers, and to the .0001 grid condenser.

The other side of the grid condenser goes to G. of the detector valve holder, and to the remaining side of the grid leak.

Plate of the detector goes to one side of L3 coil holder, other side of which goes to the first H.F.C. and to the fixed vanes of the .0001 reactor condenser.

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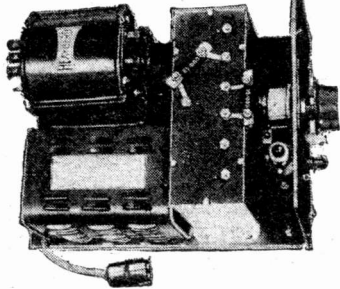
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## FOR THE LISTENER

(Continued from page 694.)

We then found that the only other people in the inn were the Customs Officers themselves. It was amusing to find what a difference it made when they took their official hats off!

One was surprisingly red-headed. Another was sleek and half-bald. They suddenly looked human, like a policeman who has doffed his helmet, or a general who has laid aside his brass hat and unbuckled his belt. They also looked smaller.

When we had first encountered them in their official kit they had loomed rather large in our anxious eyes; but now they were just "little Dutchmen." Pleasant little Dutchmen, too.

The fixed and penetrating stare had gone out of their eyes. The severe lines of the mouth had relaxed. They smiled upon us. They accepted English tobacco. They unbent, as a prison-warder will unbend to a burglar or a murderer.

### Old Dutch Customs!

We had no Dutch; but they had a little English, and we a little German; so we talked of glasshouses and tulips, of windmills and dykes, and of the ex-Kaiser at Doorn, which we had passed on the way. Then—for I spend even my holidays in serving you, you rascals! (as Gillie Potter might say)—I asked if they had the wireless.

They had, though they didn't seem to jump at the idea. It was, to tell the truth, rather a poor set, and had evidently been trained only to bark for Hilversum.

Somebody was talking from Hilversum. It might have been double Dutch for all I knew. It sounded like somebody preaching, and it probably was, for the Salvation Army had command of the transmitter that night. The speaker was very excited about it, anyhow.

Suddenly one of the Customs Officers, the little red-haired one with a freckled face and a bristling moustache, got redder and more freckled and more bristling, and said: "Oh, these confounded talks!" It sounded worse than that in Dutch, but not worse than the man looked! So, as we didn't understand, and they were obviously not caring about it, we switched off.

During the interval I learned that wireless in Holland comes in for much the same sort of criticism as at home. The little red-haired man got quite hot about it, but with good humour.

### "Give Us a Laugh!"

"After spending the day rummaging in the luggage of suspicious-looking travellers," he said with his blue eyes twinkling towards us; "we want to be amused. Who wants talks? Who wants music? Give us a laugh!" And while he enlarged on this his colleagues solemnly pulled at their pipes and nodded their heads.

It was very entertaining to watch these foreign listeners; they leaned towards the loud speaker so as not to miss a word, then rolled about in their seats and slapped their knees, and laughter put a network of wrinkles all over their chubby bright-coloured rather solemn faces. Having had their laugh, they got up and went out.

The next morning they looked once more fierce and hostile, and as hard as nails. The little red-haired man challenged us, "Have you anything to declare?" in his mother tongue. "Gar nichts," I replied casually in the tongue of a cousin several times removed.

He took me at my word like a gentleman, smiled, and with a wave of the hand passed us over the barrier into Germany.

## TECHNICAL NOTES

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

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

I HAVE more than once been asked what is the difference between a potentiometer and a variable resistance, as this point seems to be puzzling, especially to beginners. In actual fact there is no difference at all between the two except that they are used in somewhat different ways.

Ordinarily one understands by the term "variable resistance" a comparatively low resistance such as that employed for regulating the filament current of the valve, the variation being brought about by shifting a slider or contact arm so that different amounts of the resistance are retained in the circuit.

In the case of a potentiometer one usually understands a relatively high resistance, some hundreds of ohms, so high that the current flowing through it with a few volts applied to its ends is relatively small. In this case we may regard the whole of the applied voltage as being uniformly broken down between the two ends of the potentiometer.

### Varies the Voltage.

Sometimes this is expressed by saying that there is a voltage drop or potential gradient from one end of the potentiometer to the other. If, then, we apply a third contact to some intermediate point of the potentiometer, and if the current drawn away from this point is very small compared to the current flowing into the potentiometer, the electrical conditions will be scarcely affected by this third point.

For all practical purposes we can assume that we are merely "tapping-off a voltage." This voltage will depend upon the position of the slider, and can be varied between the limits represented by the pressure applied to the potentiometer terminals.

But remember that there is no essential difference between the two. The difference is only one of degree and not one of kind.

When a choke-feed is used to isolate the D.C. current from an L.F. transformer winding, bear in mind that the characteristics of the L.F. choke may have a considerable effect upon the quality of the reproduction, and consequently only a good quality choke should be employed for the purpose. Some chokes have poor characteristics, especially in the upper register.

It is often a good plan to use an arrangement of this kind, or a resistance and

(Continued on next page.)

## TECHNICAL NOTES

(Continued from previous page.)

condenser arrangement, with transformers having special alloys for the core, owing to the fact that under the influence of direct current the danger of a change in the permeability is often greater with special alloys than with the ordinary type of core.

In the event of the characteristics of the transformer being seriously affected by unwanted D.C. current, there is likely to be a falling off in the amplification of the lower register.

There are various ways of improving the selectivity of a receiver, and one method, which is often very effective but which is not so commonly used as it might be, consists in employing a separate and additional tuned circuit between the aerial and the receiver, and coupling this to the receiver by means of a very small-capacity condenser.

### Variable Coupling.

The extra tuned circuit consists in the ordinary way of a coil and variable condenser, the latter being of, say .0005 microfarad and the coil being of the size appropriate for the particular wave-band which you desire to cover.

I do not think I need say any more about the extra circuit itself, as it is quite straightforward. One point of this circuit may be connected to earth and also to the earth terminal of the receiver. The more interesting point is the coupling condenser between this circuit and the aerial terminal of the set.

This coupling condenser should preferably be of quite small capacity, and you will find in general that as the capacity of the coupling is reduced the tuning will become sharper.

It is important that there should be no magnetic coupling between the coil in this extra circuit and the coil in the receiver. For this purpose the outside coil should be placed at right angles to that in the receiver and as far away as convenient.

In order to test whether there is any magnetic coupling between the two coils you might try disconnecting the coupling condenser altogether, and noticing whether anything is picked up between the coils. For the coupling condenser you will probably find it convenient to use one of the neutralising type.

### A Simple Differential Arrangement.

One of the peculiarities of a set employing reaction is that generally any adjustment of the reaction condenser—where this is the method of reaction control—involves a corresponding adjustment of the tuning and consequently it is, as a rule, necessary to juggle about with these two adjustments simultaneously.

A very simple arrangement may be made by which this trouble may be minimised, if not obviated altogether. The arrangement in fact, amounts really to a sort of rudimentary differential condenser. It consists

in taking a piece of bus-bar, or, in fact, ordinary stout wire will do, and bending this into a semi-circular form, this being then mounted so that it arches over the reaction condenser.

It should be placed so that the axis of the curve of the wire coincides roughly with the axis of the condenser, and should, of course, be in such a position that it clears the moving vanes when these are rotated to the minimum capacity position.

### Increasing Tuning Capacity.

A connection is made from the moving set of vanes of the reaction condenser to one terminal of the tuning condenser, whilst another connection goes from this curved wire to the other terminal of the tuning condenser. The capacity between the curved wire and the moving set of vanes in the reaction condenser is then obviously shunted across the capacity of the tuning condenser, and so goes to increase the capacity of the latter.

You will see that as the moving set of vanes are rotated out of engagement with the fixed vanes they come more and more into proximity with the curved wire and so the capacity of the tuning condenser is increased.

The exact position and size of this wire must be found by experiment, and if the capacity is insufficient with a wire it may be found necessary to use a curved piece of brass strip.

The above-mentioned dodge is sent on to me by a reader, although as a matter of fact it is by no means new. It is not applicable in all cases, but in cases where it is applicable it sometimes forms a simple and convenient method of getting over the difficulty referred to.

### Improving a Dial.

If you have a set fitted with an ordinary graduated dial, and the movements of this dial are too coarse, you can either substitute a vernier dial, or, if you do not wish to go to the expense of that, you can adopt a very simple arrangement which, in effect, converts the existing dial into one of a vernier pattern.

All you have to do is to drill a hole in the panel at a suitable position, just clear of the edge of the dial and preferably at its uppermost or lowermost point, and insert a threaded shaft which is ultimately secured in position by means of a small nut before and behind the panel. Upon this shaft is mounted an ebonite rod drilled so that it turns easily upon the shaft, and having a stout rubber band around it at the part adjacent to the panel.

By properly positioning things you can arrange that this rubber band engages firmly with the bevelled edge of the dial. It is obvious, then, that the dial may be rotated by means of this additional attachment and the whole arrangement forms an effective vernier dial.

(Continued on next page.)

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## TECHNICAL NOTES

(Continued from previous page.)

If you want to have it so that coarse adjustment can be made first and a fine adjustment afterwards, you can introduce a small spring (with a washer at each end) upon the shaft and placed between the panel and the end of the ebonite sleeve adjacent to the panel.

The effect of this is to keep the vernier knob out of engagement with the edge of the dial when not required. When the vernier is required it is pushed forward into engagement with the edge of the dial and rotated whilst in that position.

### A.C. Measurements.

I often get letters from readers who are a bit hazy on the difference between alternating-current and direct-current measuring instruments. Frequently I have been asked why it is not possible to use a D.C. ammeter or milliammeter, for instance, for measuring the current in a transformer. So perhaps a few words on this subject may be useful.

In the first place, the direction in which the armature of an ordinary D.C. instrument moves depends upon the direction of the current. If the direction of the current be reversed the direction of movement of the armature will be reversed also. This means obviously that if ordinary alternating current is applied to an instrument of this kind, the instrument will indicate the algebraical sum of the currents, which in this case will be zero.

### Current or Energy?

If, however, we use an instrument which measures not current but energy, this will be independent of the direction of the current because the energy is proportional to the square of the current, and the square of a quantity is always positive whether the quantity itself be positive or negative.

This is broadly the basis of the majority of A.C. measuring instruments. One type of instrument, as you know, depends upon the heating of a wire by the passage of an alternating current, whilst another type depends upon the heating of a thermo-junction and the subsequent indication of the thermo-electromotive force generated.

There is, however, another type of measuring instrument in which an iron armature is used which is attracted into the centre of a coil by the magnetic field produced by the current and, as the system is without permanent polarity, the magnetic effect is independent of the direction of the current.

### Alternating Voltages.

The foregoing types of instrument, whilst they can be used, and are very extensively used, for the measurement of alternating currents, are in general not suitable for the measurement of alternating voltages, owing to the fact that their resistance is generally comparatively low and so they require a fairly substantial current to operate them.

When we use what may be called an electro-magnetic voltmeter we are really using a high-resistance ammeter and we are assuming that the current consumed by the instrument is so small that it does not appreciably upset the voltage which is to be measured. If the instrument, however, is

of a low resistance, this assumption will be incorrect.

Therefore, we must be sure that the electro-magnetic voltmeter is of a reasonably high (in some cases very high) resistance. This all goes to show that the problem with A.C. is much more difficult than with D.C., for with the latter it is quite an easy matter to obtain a considerable scale deflection with a current of only one or two milliamps.

### The Metal Rectifier.

Within the last couple of years, great improvements have been made in metal rectifiers, and they have been incorporated in A.C. measuring instruments with remarkable results. You will see at once that if alternating current can be effectively rectified by means of a low-resistance rectifier, and one which is very steady and uniform in its characteristics, then our problem resolves itself into the measurement of the resulting D.C. current, and this, as I have indicated above, is a very simple matter.

In fact, it is no exaggeration to say that the introduction of a really steady and

## TECHNICAL TWISTERS

No. 73.—DETECTING DISTORTION.  
CAN YOU FILL IN THE MISSING LETTERS?

One of the best methods of observing if distortion is taking place is to use a  
.....

The instrument is joined in series in an L.F. .... circuit, and watched while the set is working.

If the valve is amplifying properly the needle of the ..... will be steady.

If ..... distortion is taking place the loud passages will be accompanied by corresponding flicks of the needle.

Last week's missing words (in order) were: Coil, Intermediate. Selectivity. Voltage.

reliable metal rectifier has marked a new epoch in the design of A.C. measuring instruments, both for current and voltage.

### A Neutralising Problem.

A curious case was mentioned to me by a reader some little time back in connection with a neutralised set which was drawing its H.T. current from a mains unit. Although you would not expect any polarity, or even apparent polarity, about the A.C. supply, the extraordinary thing was that when the set was connected to the A.C. mains one way the set could not be stabilised, whilst when the A.C. plug was reversed the set behaved itself properly.

At first sight you would hardly be inclined to believe this, but after a good deal of experimenting it turned out that the effect was completely got over by introducing an H.F. choke into one of the leads to the primary of the transformer.

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Radio in the "Free City"	"Long," "Short," and "Medium"
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Station Information	Long-Wave Listening

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## ARE YOU KEEN ON SUPER-HETS?

S.G.'S IN SUPER-HETS.—SWITCHING YOUR SUPER-HET.—MORE ABOUT THE "SIMPLICITY" SUPER—THESE ARE ALL IN THE AUGUST "M.W."

## DO YOU RUN A RADIO-GRAM?

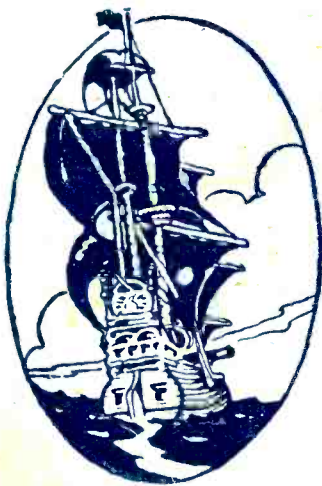
YOU WILL FIND: ROUND THE TURNTABLE—MOUNTING A PICK-UP—RECENT RECORD RELEASES, IN THE AUGUST "M.W."

And as for radio articles of a general nature—well, here are a few titles to show you what wonderfully wide ground is covered by this August "M.W."

ALL ABOUT TONE CONTROL—A RADIO RECKONER—D.C. OR A.C.?—CONTACT RECTIFIERS—AN AERO SHORT-WAVER—CONCERNING TUNING CONTROLS.

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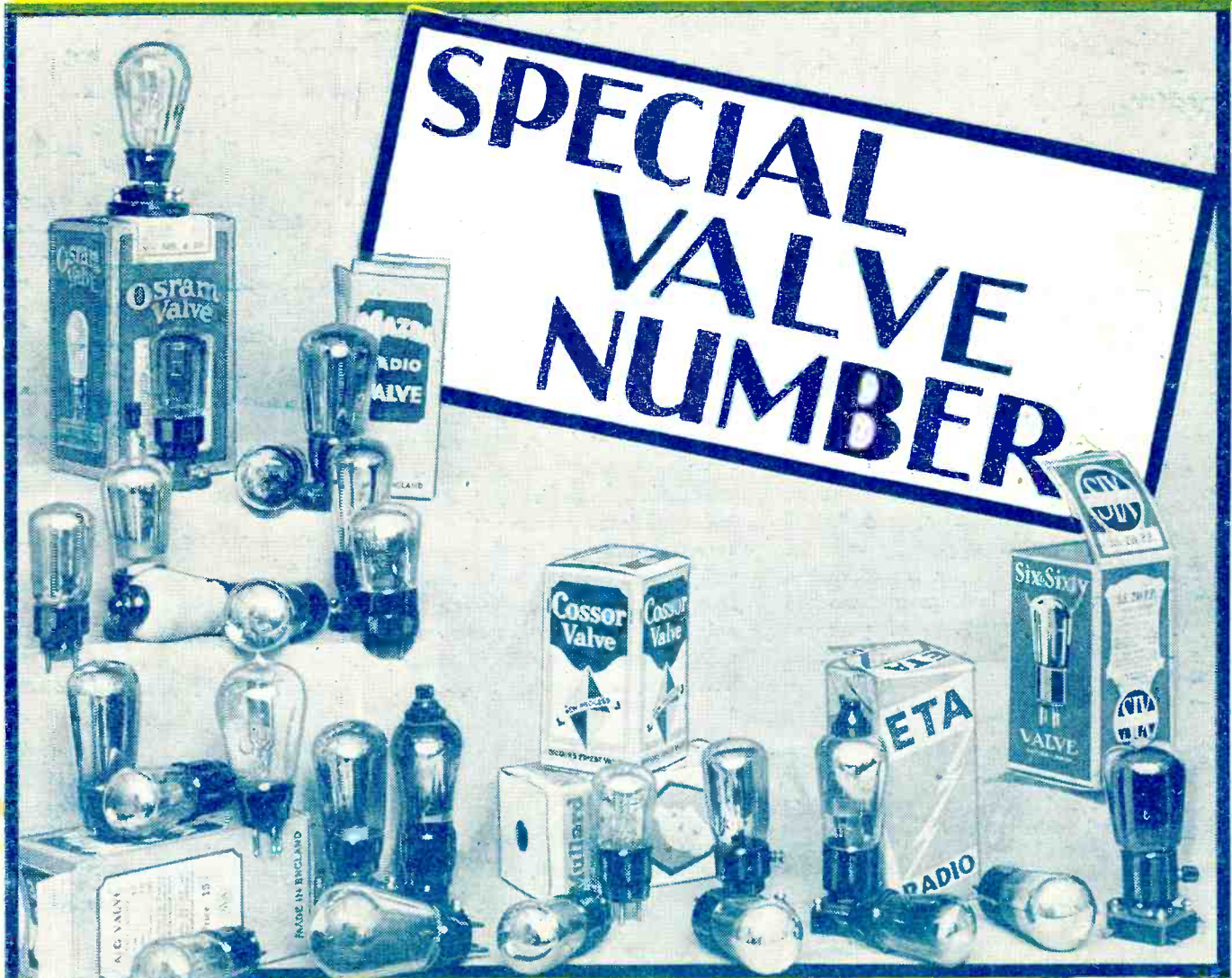
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INCORPORATING "WIRELESS"

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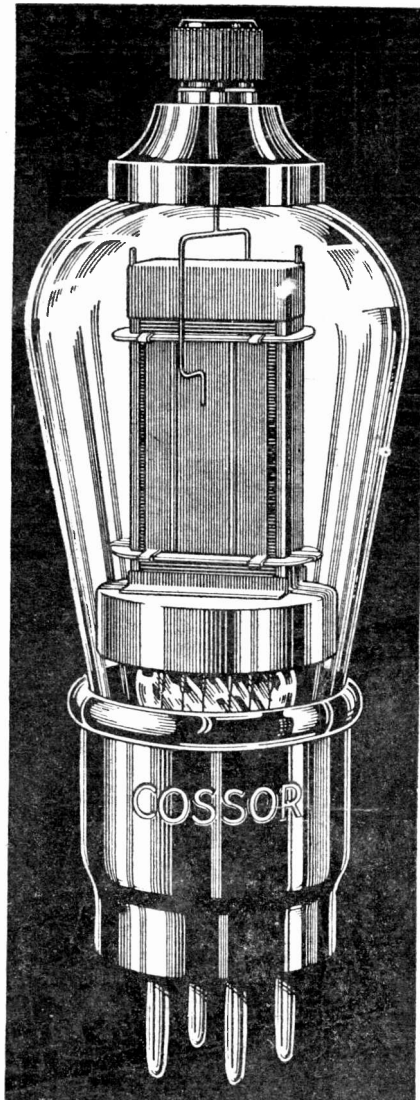


## SPECIAL VALVE NUMBER

A FEW OF THE OUTSTANDING FEATURES:

VALVES OF TO-DAY      USING YOUR VALVES  
CHECKING YOUR VALVE VALUES  
HOW TO MAKE AN "EXTENSER" REJECTOR





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**S**UMMER Radio conditions are "difficult" Stations which normally come in at good loud speaker strength are weak or even unobtainable.

Receiver performance appears to fall away — range is apparently reduced. But these conditions can be overcome. You can restore in large measure the "winter time" sensitivity of your set by fitting a Cossor Screened Grid Valve.

The use of the Cossor 215 S.G. ensures a marked improvement in range and selectivity — sufficient, in nearly every case, to counteract the loss of volume experienced

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 Factor 330. Mutual Conductance  
 11 m.a/v. Normal working Anode  
 Volts 120 Positive Voltage on Screen approx 60.  
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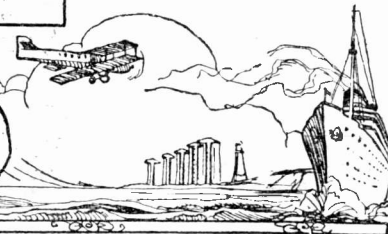
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**"SO TO SPEAK"  
TAKE YOUR PICK  
A RECORD WILL  
THE "NAUTILUS"**

**BACH COMES BACK!  
ALL-RADIO HOTEL  
A COMET IN SHORTS  
WHO IS A. J. ALAN?**

## RADIO NOTES & NEWS

### "So To Speak."

BY way of an appetiser consider this gem of musical criticism which was fired off by somebody called "Kaikhosru Sorabji" in "The New Age." The subject of this lyric is Mr. Miklos Schwalb, a pianist, of whom K. Sorabji says, "he has a fine structure-sense and a subtle and wide command of tone colour. . . ."

But hist! Writing of Mr. Schwalb's performance of the Schumann Toccata, he says, "The so-to-speak mezzanine quasi-lyrical sections . . . were worked masterfully into their logical place in the architectural design. . . ." (*Ses you*).

### Take Your Pick.

A COUPLE of variants of an old joke! American, to radio dealer: "Very neat fuse-box, that!" Dealer: "Fuse-boxes this way, sir! That's a two-valve set!"

Again, American, to radio dealer: "Can I look at some of those samples of metal in that glass case?" Dealer: "Glass case, sir? Oh, no, sir! That's the very latest Pentode!"

I throw in the one about the Scot who having found a radio crystal said to his lassie, "Mary, if I get mairrit on ye an' we hae a wee dochter, remind me that it'll no be necessary forr her tae lairra the pianny!"

### A Record Will.

MR. CHRISTOPHER STONE'S idea of recording his Will on a gramophone record is novel and appropriate—considering his enthusiasm for records—but I do not feel sure that Somerset House will like it. Mr. Stone said his part on an H.M.V. record, colour not stated, and the oral "witnesses" were Jack Hylton and the recording manager of the gramophone company.

I am led to believe that Mr. Stone added a threat to haunt any person who tries to upset the Will. I shouldn't like to be present at the "reading" of such a form of Will, even though I am fairly case-hardened.

### A Bang-up Day.

BEG to report that in spite of the gamblers' weather this year, the cost of barely living, and the weight of accumulators, the Chloride Electrical Storage people ("Exide," y' know) celebrated their 15th Annual Gala, Sports and Horti-

### "P.W." Leads Again!

NET SALES 129,806

### A Message to "P.W." Readers

Our claim to the largest circulation of any wireless paper is once again justified by the net sales certificate which we have received from Messrs. Price, Waterhouse & Co., which we reproduce hereunder:

"To the Chairman and Directors of THE AMALGAMATED PRESS, LTD., The Fleetway House, E.C.4.

July 20th, 1931.

Gentlemen,—We have examined the books of the Company and certify that the average Net Sales of "POPULAR WIRELESS" for the six months ended June 30th, 1931 (after deducting all unsold copies returned during the period and exclusive of free and voucher copies) were 129,806 copies per Issue.

We are, gentlemen,

Yours faithfully,

PRICE, WATERHOUSE & CO."

Listeners and amateurs alike are convinced that "P.W." is, in every sense of the word, the leading radio journal.

Tell your friends about "Popular Wireless," and help us beat our own record!

You have helped us in the past, and we feel confident we can continue to serve you in the future, and thus earn the continuance of your support. We thank you!

cultural Show at Clifton Junction, set to music by the Pendlebury Prize Band.

Chunks of negative plate inserted in marrows were disallowed. One enthusiast who couldn't forget "shop" and tested his bitter with a hydrometer, was suspected of being a Customs Officer in disguise, and had to be hurriedly poked into the band and told to look like second man to the trianglist! Oh, a great day!

### The "Nautilus."

T. R. D. (Coleraine) tells me that on July 26th he picked up Sir Hubert Wilkin's submarine "Nautilus" on 40 metres at 14.30, the operator giving his name as Roy Meyers and the call sign as K 7 X 1. Now this is mysterious, and I should be glad to know what positive evidence T. R. D. has that he was listening to the "Nautilus," because according to my information her call signal is W S E A and 40 metres is not one of the wave-lengths allocated to her. More news, please.

### The "Bart" Wot Ain't.

H. J. H. (Plaistow), who has read "P.W." since 1923 and is still running a crystal set, wants a Bartship. Sir, take a doughnut!

He then comes down with his full eleven stone upon the technical staff because they do not produce two complete sets per week, and requests me to talk to them like a bargee. While I am learning "bargeese," I will pass his letter to them with my cordial invitation to give an eight years' reader a sympathetic hearing.

Take another doughnut, brother.

### Bach Comes Back!

ACCORDING to what I hear friend Bach is coming back to make of our Sunday afternoons those feasts of fun and frolic which they used to be. I always thought that they de-Bached the Sunday programme too precipitately—we had heard only about five hundred cantatas.

However, I suppose that either they have discovered another bale of Bach in the

(Continued on next page.)

**THIS IS THE PAPER THAT MADE WIRELESS POPULAR!**



# "P.W.'s" RUNNING COMMENTARY ON RADIO TOPICS

basement and have got to use it up on the strict Aberdonian principle of "A Bach in time saves a bawbee," or that Someone with a Pull has said, "Bach goes back!"

## The Terrifying Spark.

LATTERLY radio has become silent, thanks to the valve supplanting the good old spark. A cousin of mine, who is by way of being a mighty traveller—I remember seeing him sprawling on a bed, aged 12 months and 18 in. long!—has been through the Peruvian revolution, the young dog, (Dash it, I'm getting old!) And he tells me that the mob which surged over



his pet, the Cuzco radio station, was easily defeated by a few large electric sparks which he stage-managed. The wonderful riffs and still more wonderful slogans of the half-baked revolutionaries were utterly defeated by this boy and his cool English wit, aided by non-committal electrons! The devotees of liberty, equality and bloodshed fled like sheep!

## All-Wireless Hotel.

THE Atlanta Hotel, Rotterdam, has gone "all out" in an attempt to surround its guests with music from the moment when all the windmills begin work till that hushed hour when the footgear is collected from the bedroom doors. All bedrooms have a choice of two programmes; loud speakers blare at you from unexpected nooks, and you can't eat a chop except to music.

Everything is relayed to somewhere else, so that you can be literally chased by the "Melody in F" from ground floor to roof garden. All very wonderful, but give me bacon and eggs in an English country inn with the birds whistling in the garden and the wasps busy bumping the windows!

## "Kept In."

A HUMAN story is told by the H.M.V. people about their Hayes factory hooter. This siren, which has shrieked at 7.30 a.m., noon, and 5 p.m. since about the Norman Conquest, has become such a part of the local scenery, so to speak, that Hayes, Middlesex, has been but a poor customer of the clock trade. In fact the Hayesites have come to regard it



as something invariable, like the new moon—and quarter day. So when the thing recently had to be overhauled the kids at a nearby school were still on the job long after grub-time, when their ma's turned up in force to find out why they had not come home to cold mutton and rice pudding! The teachers were still waiting for H.M.V. to indicate noon!

## They Have Them There, Too!

A READER who somehow or other finds himself at Toro, Uganda—a long way from The Hole in the Wall, boy!—caps the account which I gave of the never-say-die who couldn't arrange for an orthodox aerial and so hoisted some cistern floats, by the brilliant suggestion that a certain device known as the "three golden balls" would serve equally well. Fancy his being haunted by them down in the forest, so to speak!

He asks "How do we decide when a new volume begins?" It joins on immediately after the end of the one before, so we don't have to decide!

## SHORT WAVES.

Wife: "We ought to buy a television set, Henry. It shows everything."

Henry: "Does it show us where to get the money to pay for it?"—"Answers."

## THE CAT'S WHISKER.

A City Councillor, protesting against a scheme for a grandiose wireless exhibition, said: "Gentlemen, if we take up this wild-cat scheme we shall burn our fingers with a white elephant."

It is reported that headphones are practically extinct now in America.

Well, of course, you can't wear headphones and chew gum comfortably at the same time.

"Rest assured all thieves get what they deserve in the end," says a parson. Especially those who steal wireless sets! "Pictorial Weekly."

Deep in a Surrey glen  
One evening, after ten,  
A nightingale outpoured his highest song  
With such a wealth of sound  
That men for miles around  
Said they had never heard him go so strong.

Again and yet again  
(What triumph! Hark! What pain!)  
Forth from his leaves he sang; with none to say  
That wireless men had placed,  
Not in the best of taste,  
A microphone hard by to catch his lay.

Our Australian kin  
By clever tuning in  
Caught up the rapturous music as it flew,  
And, though it came to them  
At some queer hour a.m.,  
The incongruity escaped their view  
"Punch."

## The "Comet" in Shorts.

THIS muscular hiker is giving a fine account of itself on short waves, and a typical report comes from B. E. W. and R. P. S. of Manchester. Fed up with Ghandi, they set up a "Comet," but used a six-pin short-wave coil as specified for the "Interchange" Three, and logged 2 X A D at excellent L.S. strength at 9 p.m.

They have also logged Rome, W 8 X K, Zeesen, Pontoiso and P A O I M. Non-L.S. results enormous. By the way, J. E. S. (Bagshot) has heard C T I A A (Lisbon) testing, and wants to know if others have picked up this station.

## Literal "Blues" Now.

THE R.C.A. Victor Company has evolved what they call a "radio electrical colour organ" by means of which acoustic power controls lighting power,

and thus renders it possible to correlate colour and music, the changing colours synchronising with the varying moods of the music. Thus "Blues" will, so to speak, come true.

I am of opinion that a display of chromatics after this fashion, combined with music or not, would bring my eyes out on my cheekbones and destroy my nerves, but perhaps the rising generation has nerves of guttapercha.

## Who is A. J. Alan?

THAT mysterious spinner of thoroughly unbelievable yarns who charms us much too infrequently with his semi-insolent, "well-off" drawl, is by far the most interesting of the "anons" who have appeared before the microphone. It is fairly well known that he is a senior Civil Servant—some "first division" man, I suppose—but in what office does he do his "ten till four" shift? One suggestion is that he is an Income Tax official, but I cannot support that. His diction lacks the heartless precision of a Snowden shak. I plump for the Foreign Office or the Treasury. Failing those, I should search the Registrar of Friendly Societies' office and the Colonial Office. But I reckon that I'd not find my man, anyway!



## Hot Coals from Newcastle.

A CORRESPONDENT of Newcastle (whose letters, I confess, I like to get in spite of a certain briskness of style, verging on "cheek," which characterises them) considers that "P.W." is stingy because I declined to advertise an American radio journal in these Notes. Wrong perspective altogether! Apply to the Free Library, Geordie! We are happy in our conviction that there are few readers who will support your view of "P.W. Service."

However, I forgive you and as proof give you herewith the name and address of the Newcastle-on-Tyne Radio Society, 21, Collingwood Street, Newcastle-on-Tyne. They will probably give you what crusty old Ariel won't!

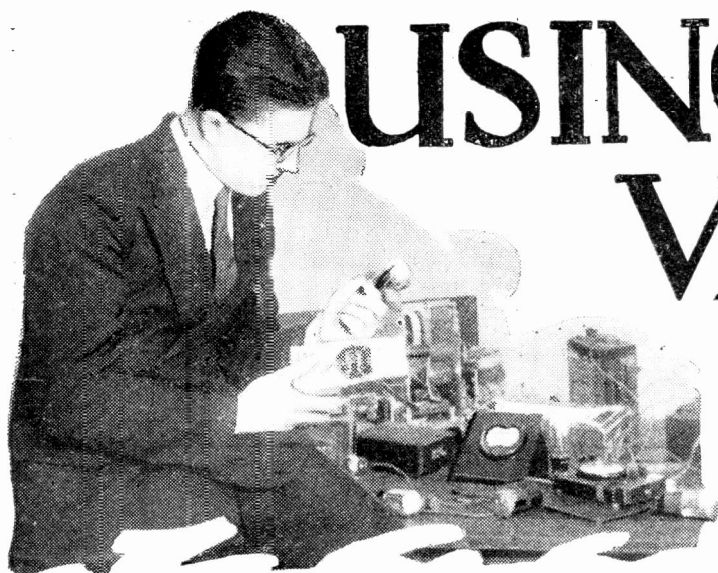
## Smaller Valves for Portables?

FROM the Continent or the U.S.A., or both, we may shortly receive new types of valves specially designed for use in portable receivers, motor-car sets, etc. Rumour says that they are a few times bigger than a thimble—not a very helpful specification!

However, we shall be interested to see them. Incidentally, what has become of the "peanut" valves of some years back?



ARIEL.



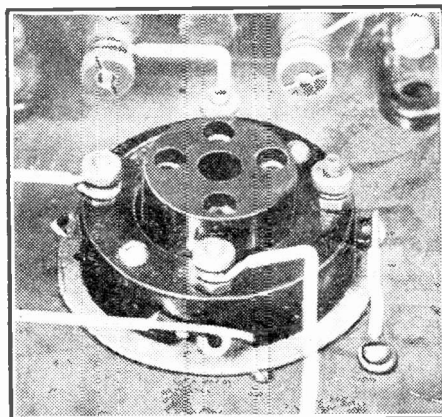
# USING YOUR VALVES

However good your valves may be, their effectiveness can be ruined if they are not properly employed, and here are some practical points that make for good results.  
By P. R. BIRD.

THE modern valve is a robust and very reliable article, but we all need to remind ourselves occasionally not to misuse our valves. It is so easy to become careless—and so useless to be sorry afterwards.

After all, the valve has to hold a key-position in the set, and well deserves to be

## A NECESSARY PRECAUTION



Make sure all joints are tight. A Lotus valve-holder "in action." Note the connection between valve-holder and the metal foil baseboard.

considered and handled properly whilst in service.

The actual mounting of the valve-holder in position is so easy that the unwary sometimes forget that grid and filaments must be lined up to point in the right direction if the wiring is to be short. Another

trap very easy to fall into is to use a very cheap valve holder—as leaky, when considered from an electrical point of view, as a sieve would be considered hydraulically.

Valve-holder insulation *must* be good, for, as you know, a high H.T. is applied across filament and plate. The properly designed holder will be of low capacity with firm contacts and accessible terminals.

Do not forget before mounting it to run over the nuts with a small spanner and tighten up the screws with a screwdriver, because once fixed in position it is a terrible bore to find that something is loose underneath the valve, and all the wiring has to be undone to get at it.

### Watch those "Whiskers."

Pay particular attention to the mounting of the valve-holder when you are using a well-screened set where it will be mounted on foil. It is very easy to let one of the terminal tags sag or bend, and touch the "floor," with pyrotechnic results. (In such cases I always slip a piece of dry cardboard underneath the valve-holder, so that even if the wire at the contact develops "whiskers" it will touch an insulator, and not an earthed floor.)

The mounting of S.G. valves is rendered a little tricky by the almost invariable presence of metal screens around them.

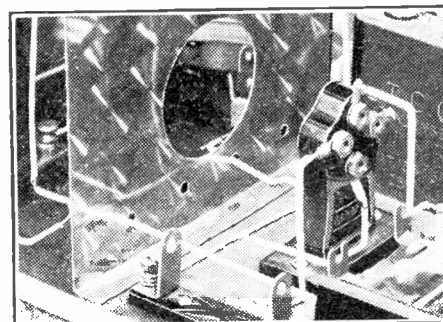
For the anode contact one of those special connectors now available is very useful. And when insulated wire is used to pass through holes in the screen it must be remembered that such insulation is very easily cut by a sharp edge, so that a little

extra insulating tape or other protector may be advisable.

For this process a short length of valve tubing as used for bicycles has much to commend it, and it is easily slipped on the end of the wire.

Detector valves are not so complicated by screening considerations, but the lugbear

## FOR S.G. VALVES

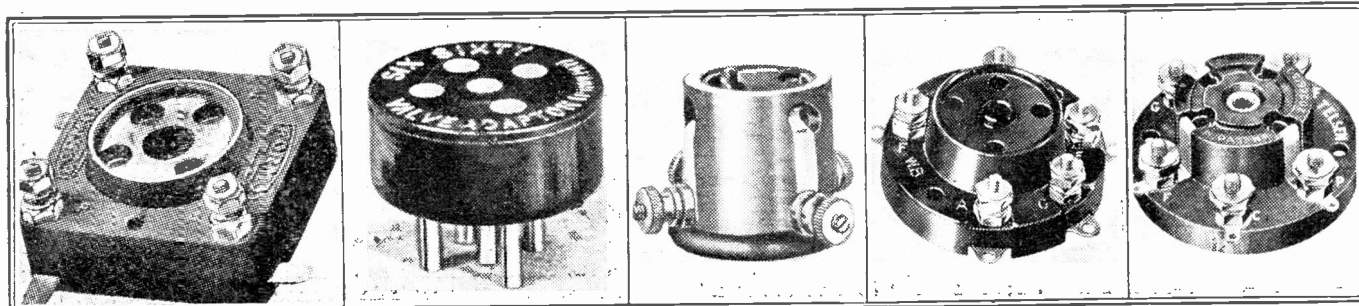


A Parex valve holder for horizontal valve mounting.

here is the liability to microphonic troubles. Many detector valves if mounted in a rigid valve-holder will "pong" whenever the set is touched, and will be liable to give vent to a rousing howl if the loudspeaker is placed too near and directed towards the set.

A well-sprung valve-holder will obviate this trouble, and has the further advantage that the valve is less liable to strain when being pulled out of its socket. Incidentally, never pull a valve out by the bulb, but always by placing the hand down over the base of the valve itself.

## A VARIED ASSORTMENT OF FOUR- AND FIVE-PIN VALVE-HOLDERS



This selection of valve-holders contains a Formo four-pin type (left), the Six-Sixty five-pin adapter, Lissen four-pin, and W.B. and Telsen five-pin holders.



THE MIRROR OF THE B.B.C.

## A THREATENED RAID

THE B.B.C. BOARD —  
SIR JOHN TRAVELS AGAIN.

JUST when the B.B.C. was in the midst of arguments with the Treasury which looked like resulting in a considerable additional grant of licence revenue the Economy Committee suggests that the Treasury should lift nearly another half million, bringing up the State's share to well over a million per annum. It is extremely doubtful, to say the least of it, whether the programmes would continue to attract licences if they were to be starved financially as this further raid would necessitate. Anyway, the corporation can be counted upon to offer sufficient opposition to hold up the application of a new contract for some time.

A curious feature of the recommendation is that the B.B.C. had no foreknowledge even of the fact that its finances were under review. It appears that the Post Office provided all the data and evidence.

Accordingly the conclusion was reached without any expert advice on broadcasting. It was merely a matter of theory and economics. Nor can Savoy Hill be expected to be enthusiastic about the revealing of its confidential financial plans and arrangements without any consultation.

Altogether there is in this episode the makings of a first class row between the B.B.C. and the Post Office. I would not care to have the task of trying to placate Sir John Reith.

### The B.B.C. Board.

The last meeting before the holidays of the B.B.C. Board of Governors took place on Wednesday, July 29th. Mr. Whitley has been back from India for just over six months, during which the affairs of the B.B.C. Board have gone smoother than for any similar period since the Corporation was established in 1926.

One of the Governors whom I met after the recent Board meeting did not show any signs of anxiety about what the Prime Minister was going to do. He wore a care-free expression, and agreed with me when I suggested that it was a practical certainty that there would be no change this year, the present Board being reappointed for another five-year term, when the licence expires. In other quarters, however, quite a different decision is expected from Downing Street.

### New Blood?

It is believed that Mr. MacDonald will set entirely on the advice of Mr. Whitley, which may ask for two new colleagues and no displacements. I doubt if he would ask for an entirely new Board.

Governors of the B.B.C. are paid £700 a year for their services, and they enjoy a good deal of prestige. Odds I hear quoted are: Even money, Dick Sheppard; 2-1 against, Captain Ian Fraser; 6-1 against, Sir Robert Donald, Sir Harry Brittain,

Dame Adelaide Livingstone; 10-1 against, Mr. C. B. Cochran, the Bishop of Norwich, Sir Arthur Yapp, Mr. Nightingale, Dr. Fleming; 25-1, Mr. Donald Calthrop, Miss Hilda Matheson; 100-1, Sir Hugh Robertson, Lord Lloyd.

### Sir John Travels Again.

I hear Sir John Reith is off again on his travels, this time visiting Central Europe, including Poland, Czecho-Slovakia, Austria and the Tyrol. He is combining business and pleasure; an excellent plan which he should have introduced five years ago.

Hyde Park has been the subject of many things, some pleasant, others not so fondly remembered, ever since it was opened by

Charles I, but, so far as I know, it has never been the subject of a radio revue. The very name is suggestive of good ideas for an entertainment of this kind, and in choosing "A Seat in Hyde Park" as a title, C. Denis Freeman has realised the opportunities which the playground of the West End of London offers without too much searching.

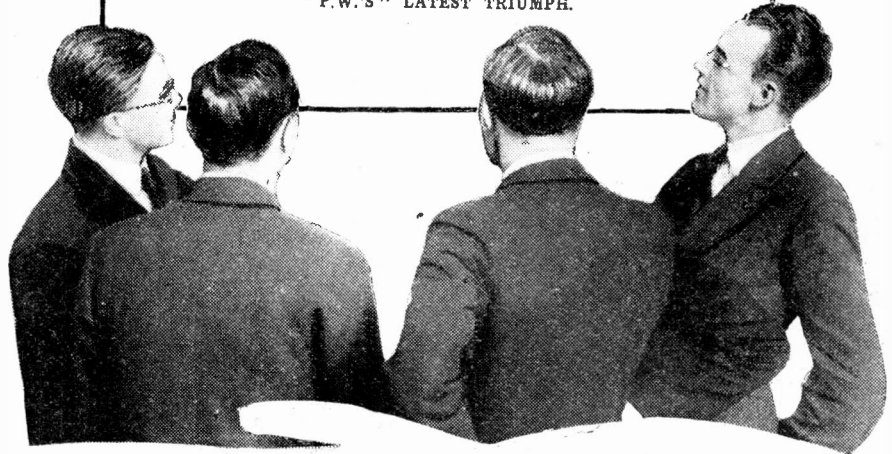
The revue is to be broadcast to National and Regional listeners on Monday and Wednesday, August 17th and 19th respectively, and without giving away too much of the plot, I can state that it will contain three love scenes at the feet of the three statues of Achilles, Byron and Rima.

### NEXT WEEK

The issue of "P.W." on Sale next Thursday will contain the full details of

## BUILDING THE "P.W." "SUPER-QUAD."

ORDER YOUR COPY NOW, AND DON'T MISS READING ABOUT  
"P.W.'S" LATEST TRIUMPH.



## FOR THE LISTENER

By "PHILEMON."

Our well-known contributor tells how he made holiday in Germany, and promptly got "on the air" from a German Station!

If any one had told me that on the occasion of my first visit to Germany I should get entangled with the German wireless programmes, I should have smiled! But so it chanced.

### Pinched Philemon's Hat!

It was partly due to our habit of making no arrangement beforehand as to where we would spend the night. Some days we lounged our way along for perhaps forty miles, and other days we would race along for perhaps a hundred and forty; but always towards evening we would put up at the first village inn or roadside pub.

We had been fairly lucky; indeed very lucky so far as the lodging was concerned, for the beds were clean and the food was good. The only unlucky thing was that we seemed always to run up against Germans who were rather-hazy on the matter of "meum and tuum."

I suppose they had not yet forgotten the souvenir habit acquired during the war.

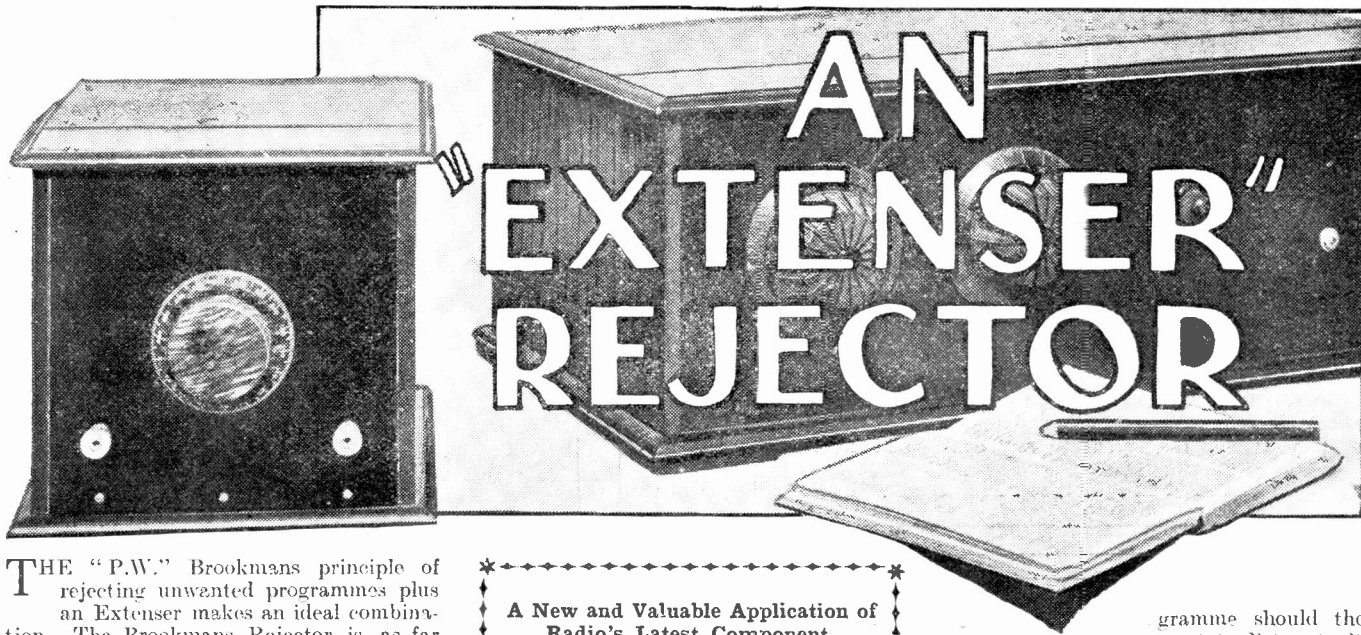
At a little inn, for example, presided over by an amusing fellow who was a real England-hater, somebody pinched my best hat as a souvenir; and the next night at another pub whose landlord was a philosopher who propounded to me the proposition that Germany had lost the world by the will-to-hate and now had to win it by the will-to-love, somebody pinched my camera as a souvenir!

### The Good Companions.

It was on the evening following that, towards sundown, our eyes were scanning the horizon for board and lodgings; when, from a largish house standing just off the roadway, we heard the sound of voices singing. We stopped to inquire.

It turned out to be one of the Youth Hostels which are almost as thick in Germany as blackberries on a hedge. Young people in Germany tramp from hostel to hostel, like tramps in England walk from

(Continued on page 726)



\*-----\*  
 A New and Valuable Application of  
 Radio's Latest Component.  
 By H. A. R. BAXTER.  
 \*-----\*

gramme should they want to listen to it; they merely turn the tuning dial around until it is correctly adjusted for this station, and then a slight rotation of the rejector dial will bring it in at full strength.

**Comparatively Few Components.**

The Extenser Rejector does not call for many components. The main item is, of course, the Extenser itself, and you cannot fail to obtain an efficient make, for, happily,  
*(Continued on next page.)*

THE "P.W." Brookmans principle of rejecting unwanted programmes plus an Extenser makes an ideal combination. The Brookmans Rejector is, as far as I know, the only device in existence that is really effective on the long waves.

**Two-Band "Trapping."**

For instance, you can couple the "B.R." to any set of an inselctive nature and completely suppress 5 X X in favour of Radio-Paris. Moreover, the same incidental advantages of the ordinary wave-band are still present on these long waves.

controllable by the one dial and without the assistance of switches. All you do is to join the Extenser Rejector in series with your aerial and leave it permanently in that position.

Even if you never touch its control the unit will not interfere with your reception in any way whatever.

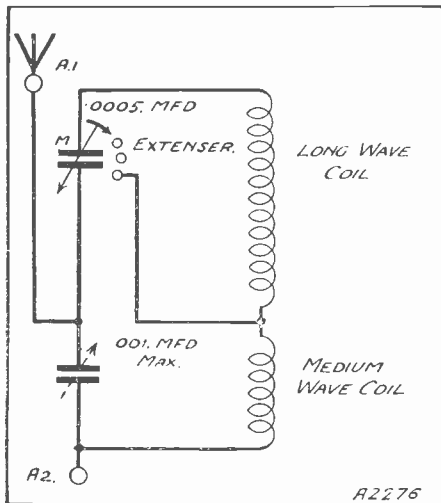
Indeed, left untouched and unadjusted, it will transmit to the outfit some degree of its "better results" quality, and when you are trying to tune in a station, either ordinary- or long-wave, that is spoiled by interference, then a touch on the Extenser Rejector dial will immediately clear the matter up.

**Extra Adjustment.**

There is a small internal adjustment that can be made to the Extenser Rejector in order to vary its station suppression powers. You see, the Brookmans principle provides for the complete elimination of interference, but it is not always advantageous to have one programme entirely eliminated, so many constructors prefer to adjust their Brookmans Rejectors so that there is a faint whisper of the interfering station when it is tuned right in.

They can then easily turn to this pro-

**AN ORDINARY WAVE-TRAP**

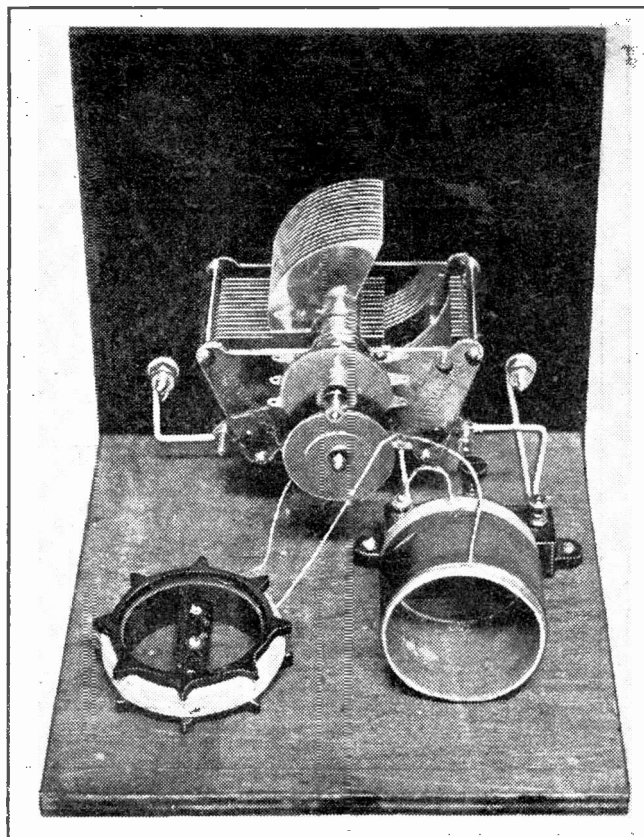


The circuit is that of the Brookmans Rejector, and "P.W." readers will know that this means uninterrupted long or short-wave reception plus an increase in general selectivity.

The general selectivity of the outfit is improved; that is to say, although the rejector is set for the elimination of one particular station you will find that station separation on other parts of the dial is now much superior, and instead, as with ordinary wave-traps, the sensitivity of the set decreasing, there is almost invariably extra power available in the required programme.

And now perhaps you are beginning to appreciate how very useful such a unit as the Extenser Rejector can be. By using the Extenser, a two-band rejector is made

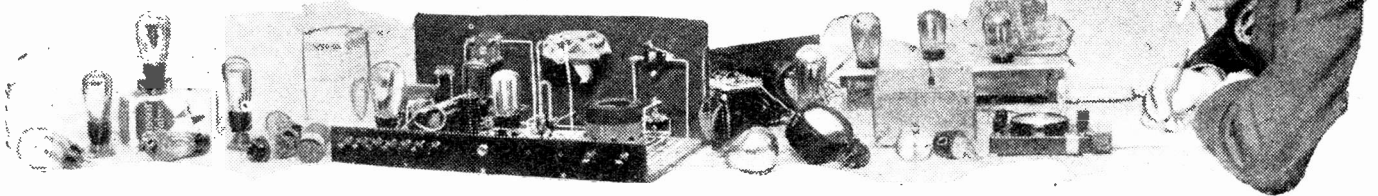
**FOLLOW THEM ROUND**



High and ordinary wave stations—the Extenser Rejector can cope with them all. Chase round after those that interfere, and each will disappear the moment the dial setting is right.

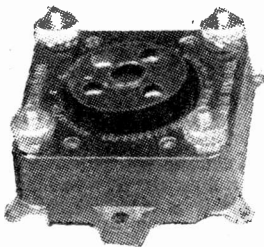


# CHECKING YOUR VALVE VALUES



A VARIETY programme is coming through with excellent volume and quite passable quality. Suddenly, right in the middle of an item, the loud speaker is stricken dumb. Maybe, there is a faint breathing sound, but possibly there isn't even that. Ever had such an experience?

Have you on such an occasion experienced tortuous doubt as to what you should do?



Well tried and popular—the Benjamin holder.

You can quickly find out whether or not it is a station breakdown by twisting the tuning dials round to the setting of the alternative programme.

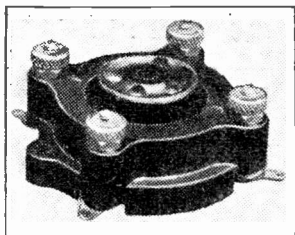
But that means throwing that so-nice adjustment of the controls right out!

And in the meantime, the programme may have re-started and you've lost something that can never be recaptured; an important announcement, the introduction to another item or something else of a like nature.

### Need Not Be Expensive

But there is never any need to go through troublous periods of anxiety like this. You should connect up a meter. You are working in the dark if you haven't got one.

All you want is a cheap milliammeter from 0 up to about 30 milliamps—or a bit



This is one of the Igranite models.

more if your set is one of those big H.T. current eaters. It doesn't need to be an expensive moving-coil instrument—if you see one in the window of your

local radio store at two or three shillings that will do quite well, for you do not need to take precise measurements.

The meter should be connected in the negative lead from the H.T. battery or mains unit. That is, you disconnect the negative lead from the H.T. supply and

\*-----\*  
\* An article of special practical value to every valve-set user. \*  
\*-----\*

join it instead to the one terminal of the meter. The other terminal of this is then fitted up with a wire that goes to the H.T. negative on the set.

### The Trouble at a Glance

The instrument should be placed so that you can view its needle at a glance. You are now in a position immediately to see fairly closely what is the cause of any failure in reception.



A neat moulding is used by Burton.

Take a careful note of the reading on the meter when

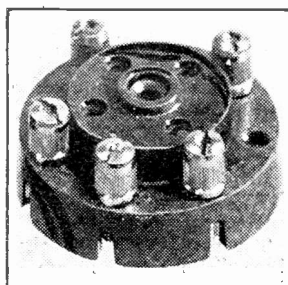
the batteries are all in good condition, and the receiver is operating in a healthy manner.

If the loud speaker volume suddenly begins to weaken and the milliammeter needle slowly falls, that most probably means that either the L.T. or H.T. battery is running down.

### If a Valve Packs Up

If the needle drops a few milliamps, and then remains steady, although the set ceases to function, that is a pretty good indication that one of the valves has packed up. The total H.T. current flow has been reduced by an amount representing that taken by one valve.

This one meter will also provide



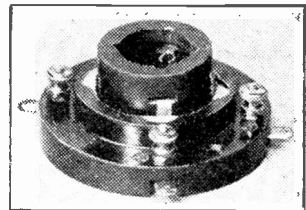
The new Bulgin five-pin holder.

visible evidence of overloading. Should its needle jerk about, then the energy is too great for the valves that are being used, and you will have to ease down the volume.

Should the needle have been steady for quite a time and then started to flicker, that is probably a message to you that the grid-bias battery is packing up and needs attention.

One meter in the common negative H.T. lead will not tell you which of the various

valves is causing the distortion. But it is an easy matter to connect the device in one or other of the separate H.T. positive leads, and so track the valve that is causing the mischief.



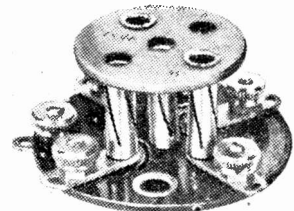
Spring contacts are employed in the Wearite anti-capacity valve holder.

Maybe, in cases, one H.T. positive is made to serve two or more valves, and then you cannot do more than narrow the search down to these without interfering with the internal wiring of the outfit.

### Are Your Valves Greedy?

One of the great advantages of using a meter in the way I have described, is that it provides you with a means of detecting the voracity of your valves. It is surprising how greedy some of them can be! Three tubes in a Det., 2 L.F. can knock you

up 20 milliamps, and even more, particularly if you include something moderately hefty in the way of a power valve. But a few more volts of grid bias may put weeks of life on your H.T. battery. This point was dealt with in a recent article in "P.W.," and it is to be hoped that constructors took careful note of it. H.T. batteries are costly items, and economies in this direction are well worth while.



A Clix valve-holder for mains valves.

## FROM THE TECHNICAL EDITOR'S NOTE BOOK.

# Tested and Found—?



## THE "EELEX" FRAME AERIAL.

MESSRS. J. J. Eastick are making a neat little frame aerial which retails at £1.

Using only one '0005 mfd. variable condenser it covers both ordinary and long wavelengths; a neat switch being fitted to it.

There are two windings and these are paralleled when the device is switched over to the ordinary waves.

The "Ealex" frame has attractive "lines" and stands firmly on its wooden base. Its "pick-up" is good, and "P.W." readers interested in this particular type of antenna should certainly make a point of examining an "Ealex" next time they have occasion to go radio shopping.

By the way, I have been advised that J. J. Eastick are making a number of price reductions in various of their "Ealex" lines. I believe "Ealex" standardised plugs and sockets and "Ealex" treble duty terminals are subject to these—which will be very good news indeed for home constructors.

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The "Ealex" Frame has a wave-change switch on its base.

and sockets and "Ealex" treble duty terminals are subject to these—which will be very good news indeed for home constructors.

## GECOPHONE INDUCTOR DYNAMIC LOUD SPEAKER.

If you have thoughts wandering in the direction of loud speakers, I would advise you to send for one of the G.E.C.'s latest lists covering Gecophone loud speakers, in which their Inductor Dynamic is described. I have not tested one of these instruments, but I heard one in a showroom the other day, and it sounded most "moving-coil-ish."

## LOEWE RADIO COMPONENTS.

The new catalogue describing the radio components of the Loewe Radio Company, Ltd., is well worth securing. It gives full details of a decidedly interesting range of productions.

## PRICE REDUCTIONS.

I presume that by the time these words are in print most of you will have read about the Ever-Ready price reductions in our advertising columns. However, should there be a few who have by chance missed these announcements, I would advise them to search out the information, for the reductions are, in cases, quite drastic.

## TELSEN COMPONENTS.

The latest Telsen catalogue, which covers all the new Telsen components, is, in itself, a fine production. Both lay-out and printing are artistic, and the colour scheme and paper of good quality.

## A LOUD-SPEAKER COUPLING UNIT.

Lamplugh Radio Products have sent me one of their new "Silver Ghost" coupling units. It has been designed for use with their well-known Inductor loud speaker, although, of course, it is equally suitable for employment with any other type.

The retail price of this unit is 18s. 6d. It is built into a compact metal case on the top of which are the four substantial terminals. The structure is arranged so that it can conveniently be mounted on the baseboard of a set.

It will be unnecessary for me to detail the advantages of using a unit of this nature, and the fact that it is essential when H.T. is obtained from the power mains, for all this will be well-known to "P.W." readers, so that it only remains for me to add that this coupling unit is perfectly satisfactory and comprises a convenient method of applying "filter output" to any set.

## PETO-SCOTT COIL QUILTS.

It seems pretty certain that the "P.W." Coil Quoit is destined to be one of the best selling radio lines of this coming season.

Its versatility and neatness and, above all, its inexpensiveness are such that it simply cannot help having the widest possible appeal among all classes of radio enthusiasts.

By the way, "P.W." readers may be interested to learn that when I first thought of the idea the name "Radio Pennies" occurred to my mind, because I visualised the things as little circular affairs costing only a few pennies each!

But "Coil Quoit" is much more expressive and is certainly decidedly more euphonious.

The first firm to see the possibilities of these little gadgets were our old friends Peto-Scott, and they were soon away with "turned" models.

Now, however, they are producing them as high-class bakelite mouldings, although the price still remains at 6d. each. They are entirely above suspicion from an electrical point of view and so accurately are they moulded that they fit into others with beautiful ease and firmness. I did hear that

Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department, with the strictest of impartiality, under the personal supervision of the Technical Editor.

We should like to point out that we prefer to receive production samples picked from stock, and that we cannot guarantee their safe return undamaged, as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are, therefore, framed up in a readily readable manner free from technicalities unnecessary for that immediate purpose.

some six expensive moulds had to be made and destroyed before the final glove-like fit was achieved!

Holes are provided for securing the ends of the windings, and there is a small "cut-away" in the lip of each Quoit for the wire to pass through—an eminently practical point that.

A special feature of these Peto-Scott Coil Quilts is that feet for securing the devices to baseboards, etc., are moulded in the one solid structure. This is a very attractive point and one which adds vastly to their usefulness. And these feet neither protrude nor interfere with their coupling together.

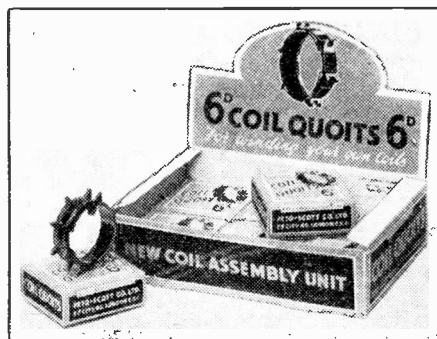
Altogether, the Peto-Scott Coil Quoit is a fine little product and does full justice, and more, to the original design.

## HEADPHONE BARGAINS.

Electradix Radios have had some perfectly new Sullivan's Headphones on offer at 3/6 per pair. I say "had" because by the time these words appear in print they may be sold right out—I should think it very likely.

The headphones are of low resistance but should prove of great value to radio enthusiasts for experimental purposes. A step-down transformer would be needed for driving them properly from an ordinary set.

I have examined a pair and find them to be in new condition. They originally cost the Government 22/6 per pair!



Peto-Scott pack their Coil Quilts in attractive display boxes each containing one dozen.





# THE "SUPER-QUAD" CIRCUIT



AS has already been pointed out by Mr. Dowding, the "P.W." "Super-Quad" is the result of extensive experiments over a period of many weeks. These weeks have not been devoted merely to the production of this one set, neither have the experiments been carried out with the idea of producing just the "P.W." "Super-Quad," but a very careful survey of the position of the modern super-heterodyne has been made.

If you could only come along to the "P.W." Research Department you would be amazed at the number of super-heterodynes there are lying about in various stages of construction and demolition (for when we have done with a set, of course, we do not keep it built up any longer than we can help because we cannot spare the room). But unfortunately we cannot have you all up in the Research Dept., so you must take our word for it; anyhow, there they are: four, five, six, seven, eight-valve supers of various descriptions in various stages of construction and using a multitude of different circuits and modifications.

"Why don't you publish them, then?" you naturally ask. Because the majority of them are too complicated, and not all operate properly. A lot are tricky to handle, others are expensive to build, while others have nothing really new in them, and, as our readers know, "P.W." likes to have something new to offer its readers.

**Very Easy!**

When you look at the photographs of the "P.W." "Super-Quad," you will immediately say: "Oh, there is nothing in it!" Quite right, there is nothing in it, yet a dickens of a lot has had to be put in the original set and gradually eliminated in order to get the final design which we are placing before you.

The building of a super-het as a mere super-het is a simple

By K. D. ROGERS.

"P.W." has tackled the design of a super-heterodyne set on entirely new lines and has made use of the old principles only as a foundation. When you have read this article you will be able to see why it has been possible to produce such an outstanding receiver.

job. It is easy enough to run five, six, or seven valves together, using the super-heterodyne principle, and not-too-efficient intermediates so that the valves are quite stable. We could justifiably say: "Well, here we are, here's the super-het," but that sort of thing, however, does not do.

**No Frame Aerial.**

It does not get you anywhere, and the Research Department realises that the average super-het is a far too bulky piece of apparatus, and it has too many valves. So we said to ourselves, we will bring out a really good super-het, one that is easy to handle, and easy to build, but we will limit it to four valves. That was the task we set ourselves. To design a super

answering those requirements, and in addition we said, we will scrap the frame aerial and let it operate entirely on an outdoor or indoor aerial.

Now that is no easy task to set anybody, but the presence of the "Super-Quad" proves that we have been successful. How? Let us look at the circuit.

The first thing that will strike you is the lack of the frame aerial. Why have we scrapped the frame? For two reasons: firstly, with a frame your pick-up from the ether is smaller than it need be, and therefore you are liable to waste a valve in getting back what you have lost in the frame; and secondly the frame is often a nuisance, in many people's opinion. It is ugly, it is clumsy, and, moreover, its directional property in such a set as a super is more of a nuisance than a blessing.

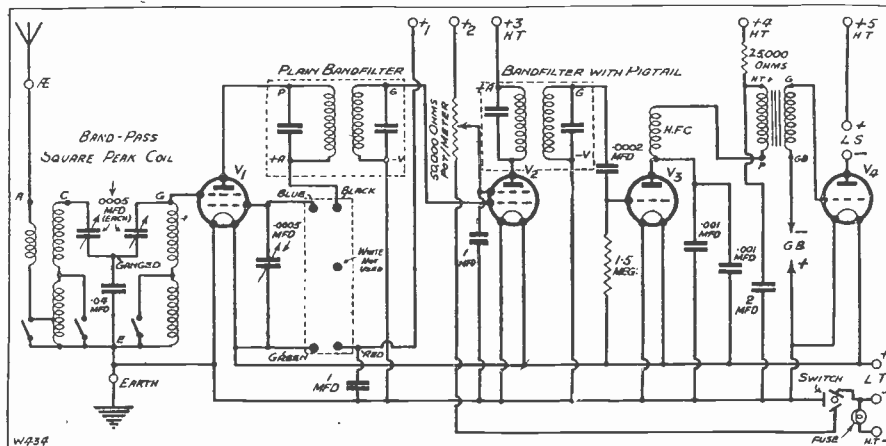
A well-designed super-heterodyne should be selective enough to cut through the stations without requiring recourse to the directional properties of a frame. And, anyway, in most places in England the directional properties of the frame will not avail listeners much, as the majority of stations, certainly the continentals, will come in at roughly one setting, and the direction of the frame will never help you to separate two Regional twin locals. So why have it?

Therefore we made a super that will work off either an ordinary aerial or what we call a "curtain rod" aerial—that is, just a wire stretched from the set up to the curtain rod or picture rail of your house.

**Selectivity.**

Now then, what about the initial selectivity which we have lost by the elimination of the frame, because there is no doubt a frame is selective apart from its directional properties—or should be if it is well designed. That question was

**COULD ANY HOOK-UP BE SIMPLER ?**



For goodness' sake don't judge the capabilities of the "Super Quad" by the simplicity of its circuit. It is one of the greatest attractions of this fine little set that despite its extraordinary power and selectivity it is, ostensibly, just an unusually easy-to-build four-valver.

(Continued on next page)

## THE "SUPER-QUAD" CIRCUIT.

(Continued from previous page.)

answered by the inclusion of a band-pass filter circuit, and in the theoretical diagram we introduce here you will see that a Varley Square Peak coil has been used in the aerial circuit, and this is a very important modification of the set.

It does two things. It enables the selectivity to be maintained, although no frame aerial is used, and, moreover, it prevents re-radiation of the oscillations generated by the oscillator portion of the valves into the aerial, and so out on to the ether to annoy neighbouring listeners.

### Special Valve.

It has been said that the double grid valve, which we have also used, does not transfer so much back to the aerial as would a separate oscillator feeding the grid circuit of the first detector, but we took no chances, and so used a band-pass *as well as* the double grid valve. So there is no danger of annoying your neighbour when you are manipulating your set.

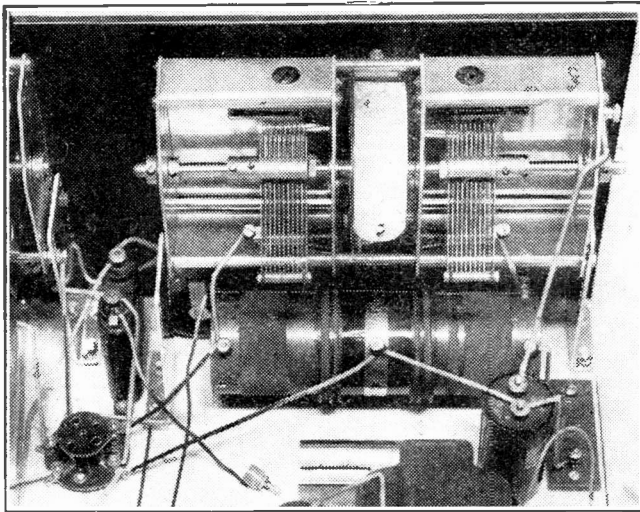
The double grid valve as we have used it eliminates a special oscillator valve and enables a very compact arrangement to be obtained, one grid being used as the control grid for the detector, and the second used for the oscillator portion of the circuit.

From the anode of the valve the mixed frequencies are fed into a filter circuit, and from there they go to a screened grid valve, which amplifies them and passes them through an intermediate transformer to the second detector. Here they are rectified and passed on to an output valve with a high ratio transformer.

### Preventing Overloading.

The intermediate chosen is a very efficient one, and the oscillator coupler, which you will see from the photograph of the complete set has a wave-change knob on it, covers both medium and long waves. The handling of the set is exceedingly simple, but that does not enter into the province of

## REDUCED "REPEATING"—NO RADIATION!



You can use the "Super Quad" on any ordinary aerial, for it has a band-pass (the coil and condenser for this are shown above), and this reduces repeaters and cuts down the radiation to a negligible degree.

this article, so we must leave that for a later date.

There are one or two things more which I would like to say, however. One is to point out the control of sensitivity or volume which we have arranged by means

of a 50,000-ohm potentiometer controlling the voltage on the screening grid of the intermediate valve. This is undoubtedly one of the best ways of pre-detector control of volume, and in a super-het it is absolutely essential that the second detector should not be allowed to overload, otherwise terrible distortion will occur on many stations.

The first detector—that is, the double grid valve, of course—is operating directly on the aerial, and except on the local station, if you are very near, is not likely to be overloaded, but the second detector *is*, and so a volume control which protects the second detector has been employed, and this, by means of limiting the input to the second detector, also protects the output valve, where again overloading is prevented.

It all seems very, very simple now that the set is an accomplished fact, but if you will just sum up the novelties and the special advantages, you will see that the set is simply bristling with good points.

Let us run over them again, so that when you go on to the article next week describing how to build the Super-Quad, you will realise exactly *what* you are getting, *why* you are getting it, and *what sort of results* you will obtain from it.

### Three Main Features.

In the first place, we have a super which will operate on an ordinary aerial, this cuts out the expense of a frame, or the bother of making one. This means that the present super-het is non-directional, in other words, it will receive in all directions equally well *but with perfect selectivity*. This latter is point No. 2, due to the band-pass circuit, which is both easy to build, efficient, and a very big factor in the success of the set.

Then we come to point No. 3—the double grid valve, which assists the band-pass filter in preventing any re-radiation, and also obviates the use of a special oscillator valve. Finally, we have the specially chosen filter and intermediate coil and the volume control of the intermediate to complete a perfect ensemble.

## ITEMS THAT MAKE THE "SUPER-QUAD" A STAR RECEIVER

### SELECTION.

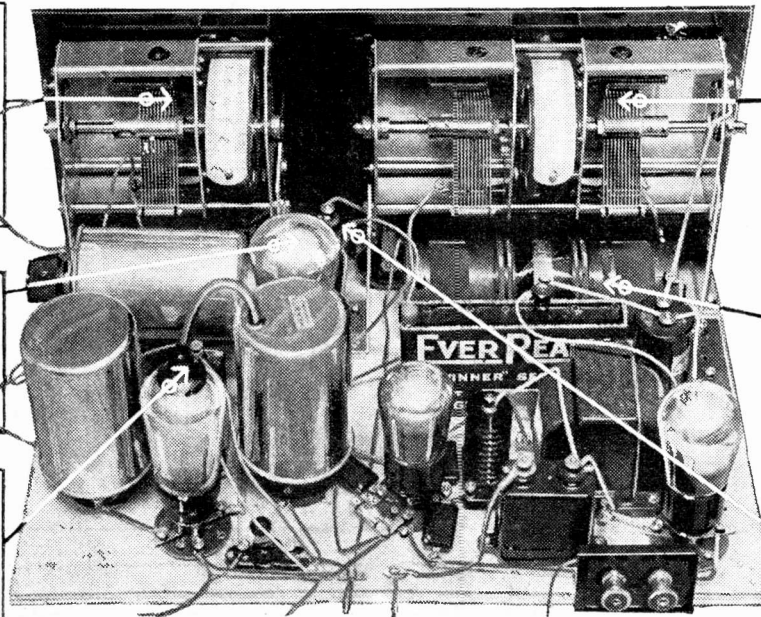
The oscillator tuning control does not bristle with "repeated" stations as do those of many ordinary super-hets and the "local" does not break through at eight or nine points on the long waves!

### ECONOMY.

One of those new Bi-Grid valves is used and is able to do what two valves are required for in the usual way—a great saving in initial and running costs.

### POWER.

An S.G. intermediate valve is employed, and at the chosen intermediate frequency great amplification is given.



### SEPARATION.

This dual-condenser operates in conjunction with the band-pass coil and knife-edge selectivity, with freedom to use an ordinary aerial result. A special frame aerial is not needed, as is generally the case with a super-het.

### WAVE-RANGE.

The special band-pass coil covers both long and ordinary wave-lengths, and gives perfect balance and full efficiency throughout.

### QUALITY.

A properly arranged control contributes a completely satisfactory adjustment of volume plus quality.



## AN "EXTENSER" REJECTOR

(Continued from previous page.)

there are no others in existence! But this does not apply to the .001-mfd. compression condenser, and here you want to take particular note of the manufacturers' name given for this component.

### Alter the Size to Suit.

It is not essential that you should build the Extenser Rejector in the same size or kind of cabinet as shown in the photos. Indeed, you need not use a cabinet at all if you do not want to, although it will protect the parts from dust and damage. But if you alter the layout to any con-

siderable extent make sure that you keep the coils at right angles to each other, as shown in the diagram.

Also, keep them at approximately the same distance apart. Now the coils in any Brookmans Rejector are extremely important items; unless you wind them in the specified manner you will not get full efficiency of trapping. This applies also to the medium wave coil, which, as you will see from the wiring diagram, comprises 70 turns of wire, No. 30 D.S.C., wound on a two-inch diameter former.

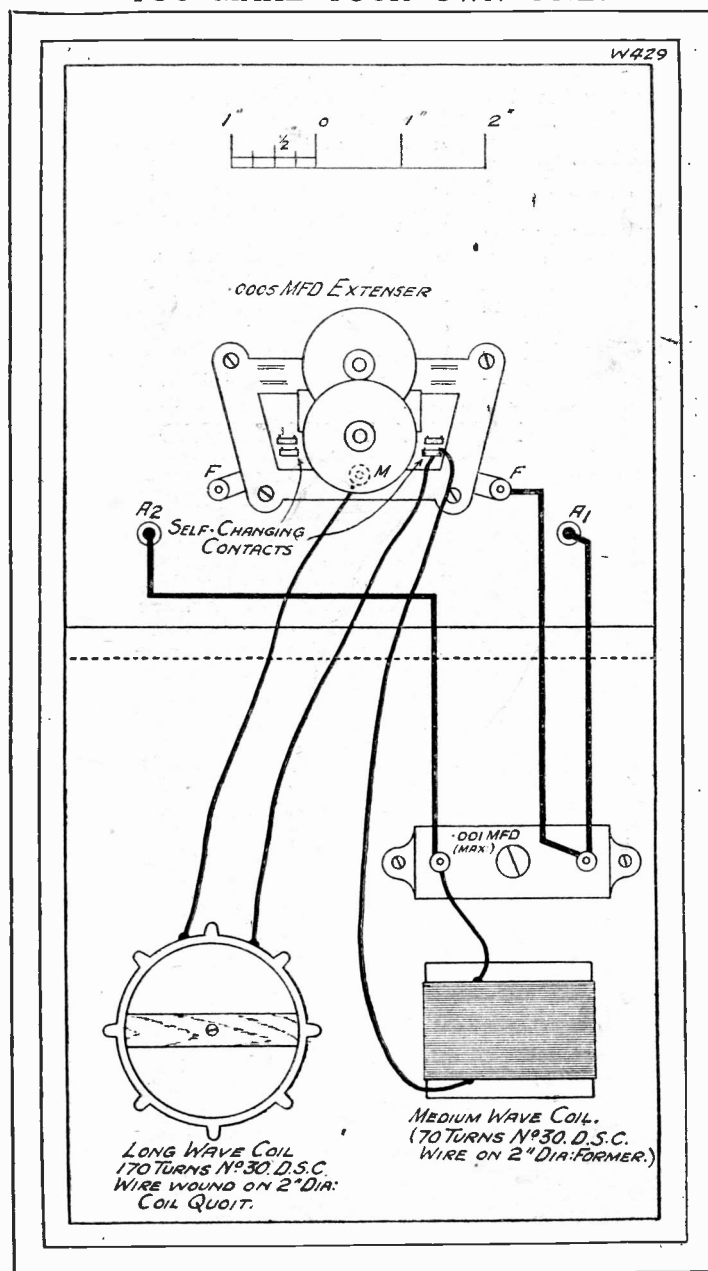
Start the winding by threading the wire through two small holes in the former, and then wind the

one layer moderately neatly, you can wind another over it, and so on.

In wiring up you will need to use only one of the self-changer terminals of the Extenser. On a "Wavemaster" Extenser that will leave three unused terminals.

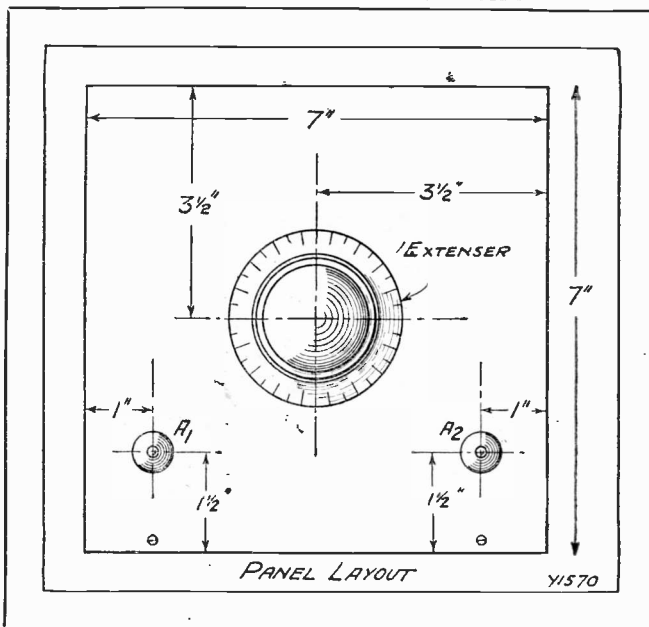
You can employ any one of the four terminals on the "Wavemaster" or any one of the three on either a "Cylton" or "Formo."

## YOU MAKE YOUR OWN COILS



The coils are very easy to wind; in fact, the whole device presents no problems, even if you have never built a radio set or unit before.

## SUITABLE FOR ANY SET



It can be joined to any set in a matter of seconds, and there are no limitations as to its use.

wire on tightly, keeping the turns close together. You can finish the winding off, after 70 turns have been put on, by threading it through two further holes. Leave a few inches at each end for connecting purposes. The coil can be fixed to the baseboard merely by driving a small screw through each end of the former.

### On Long Waves.

The long-wave winding is carried on a "P.W." Coil Quoit, and will not require such careful construction. But you must use exactly the same wire. You will not be able to get all the turns on in a single layer and so, as soon as you have wound


The Extenser Rejector is connected up by removing the aerial lead from the set and joining this to the A1 terminal, the A2 terminal of the Extenser Rejector being taken to the aerial terminal of the set.

In the first instance, the compression

## ALL YOU REQUIRE

- 1 Panel 7 in. x 7 in. (Peto Scott, or Parex, Permcol, Wearite, Goltone).
- 1 Cabinet to take 7-in. baseboard (Cameco, or Peto Scott, Osborn, Pickett, Lock).
- 1 .0005-mfd. Extenser (Wavemaster, or Formo, Cylton).
- 1 .001-mfd. max. compression condenser (Formo, or Igranic, Telsen, Lewcos, R.I., Polar, Goltone).
- 1 Coil Quoit (A.E.D., or Wearite, Peto-Scott, Redfern, etc.).
- 1 Coil former 2 in. diameter x 1 1/2 in. (Paxolin or Pirtoid).
- 3 Ozs. 30-gauge D.S.C. wire for coils.
- 2 Indicating terminals (Eelex, or Belling & Lee, Igranic, Clix, Goltone, etc.).
- Glazite or Lacoline for wiring, screws, etc.

condenser should be adjusted to its maximum capacity, that is with its small adjusting knob screwed right down. You then turn the Extenser dial until your loud local station weakens, or becomes inaudible, and a slight readjustment of the compression condenser will set your degree of trapping, after which it need never be referred to again.



**Ostram  
Valves**

**MADE IN ENGLAND**

EAN  
CARL

Advt. of The General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2



THE marked improvement in all-round signal strength which occurred at the beginning of August is well maintained. At present we are having one of those periods during which strength remains level, and another noticeable improvement is due very shortly. It may even have occurred before these notes appear in print.

Last week I wrote that before long we should have Budapest coming in as well as ever, and you must forgive me if I now administer to myself a pat on the back for my success as a prophet. Here is Budapest's record as extracted from my long-distance log for last week: very good, moderate, very good, fair, very good, very good, moderate.

#### Milan and Munich.

Now "very good" means full loud-speaker strength; "moderate" means small loud-speaker strength, and "fair" means headphones only. You will see then that on four nights out of seven Budapest was able to give full volume from the loud speaker, and that is really pretty good for the time of year. It will not be long before he achieves full marks on six nights out of seven. Other stations in the same region up at the top of the broadcast band are also showing signs of improvement.

I recommended Vienna to your notice lately, and he has justified the recommendation. Munich, though by no means strong



Some practical distant-programme notes compiled by a special contributor who nightly searches the ether in order to obtain really up-to-the-minute information for "P.W." readers.

yet, is coming back. He is nearly always to be found there at telephone strength, and he should soon be up to the loud-speaker mark. Milan is strengthening up considerably and comes through now more often than not with loud-speaker volume.

Brussels No. 1 has been one of the most reliable of stations throughout the summer. I have usually been able to receive him at any time of day when he was working, on a four-valve portable set, using its own tiny built-in frame. He should be enormous in a very short time now.

Rome was showing considerable variations in strength during July, but he is now in excellent form and never fails to score a good mark. Langenberg, Beromunster and Sottens are other splendid stations above 400 metres. Stockholm, for some reason, is suffering a temporary eclipse, and I have not heard more than a whisper from him for some days.

#### Pick of the Bunch.

Between 300 and 400 metres reception has been extraordinarily good on most evenings. The pick of the bunch are Frankfurt, who seems quite reliable now; Toulouse,

who is uniformly good and appears to have got over his heterodyne troubles; Strasbourg, who is fading much less than he was; Brussels No. 2; and Gothenburg, who is now strong and steady. Hamburg and Lwow are very good when conditions are at all favourable.

but one cannot yet be sure of finding them at every trial. Bordeaux Lafayette is coming in better now than for many weeks past.

#### Spanish Silences.

Long-distance enthusiasts should note that the Spanish stations, Madrid, Union Radio and Barcelona, are now reappearing. They should be looked for rather late in the evening. Barcelona is usually silent from 8 to 10 p.m., whilst Madrid has an interval from 9.30 to 11 p.m.

Here are a few stations in the middle of the band to keep an eye on at present. As soon as they begin to come in well you will know that another leap forward has occurred. Katowice (408 m.), Bucharest (394 m.), Brno (342 m.), Naples (332 m.), Marseilles (316 m.).

Below 300 metres things are distinctly better so far as strength is concerned, but heterodynes unfortunately persist, mainly owing to the reprehensible wave-length wandering of French and Swedish stations. Turin, Heilsberg, Nurnberg, and Horby are amongst the best of the shorter wave stations at the moment.

THE threats that I issued recently, in connection with a new short-waver for myself, are gradually being fulfilled. When finished it will be a *very* "straight" broadcast receiver, with no trimmings except those on the front panel.

In this quarter I am allowing myself the luxury of one of those American slow-motion dials that project the figures in colour on a ground-glass screen. With the customary fine tuning required from short-wave work, this is appreciated when once it has been tried.

#### Dinky Dials.

Apart from this component the receiver will be all-British. This rather leads one on to ask why none of our manufacturers has had the courage (or is it the brains?) to put a component of this type on the market. It would certainly sell, for, apart from ease of reading, it has the advantage of showing when the set is switched on, and also it can be read in the dark without having the room lights on!

All of this, in its turn, leads me further still in the direction of the Show. Will the Show this year be as dull as usual for the short-wave man? Surely in all the branches of radio there is no one that is led up to such wild heights of enthusiasm as he, and yet year after year he "goes away empty"!

With the exception of one firm that markets very nice short-wave receivers, chiefly for overseas work, nothing else is outstanding in this line. True, most of our big manufacturers are willing to admit that

## SHORT-WAVE NOTES

A few interesting observations concerning happenings down on the short waves by W.L.S., a very well-known amateur transmitter and a leading expert on the subject.

they have some short-wave gear available, if closely questioned, but how much has one ever been able to see on the stands?

I propose to scrutinise the Show very, very thoroughly, and to take note on the grand total of short-wave gear that there is to be seen there.

#### Casablanca Calling.

Surely I am not alone in noticing the enormous strength reached by Casablanca at times during the last week? I have found him on three days to be as strong as London Regional, and extremely good in quality.

#### HELP THE NEWSAGENT.

Have you ever thought how difficult it is for a newsagent to order just the right number of copies of any particular paper each week? You can make his task much easier if you place a regular order with him. You will not only help him to order correctly and avoid waste, but will make sure of getting your copy regularly each week.

The English announcements that I have heard are slightly reminiscent of Maurice Chevalier, but the French gives one a better chance of realising how absolutely perfect is the speech quality. The announcement "Ra-dio Casablan-ca" is rather fascinating to the family, who never tire of listening to him.

My good friends of the International Short-Wave Radio League, who never fail to send me a copy of their monthly Official Organ, are commenting on the real "International" flavour of this short-wave business. Among the amateur transmitters this feeling is also very noticeable.

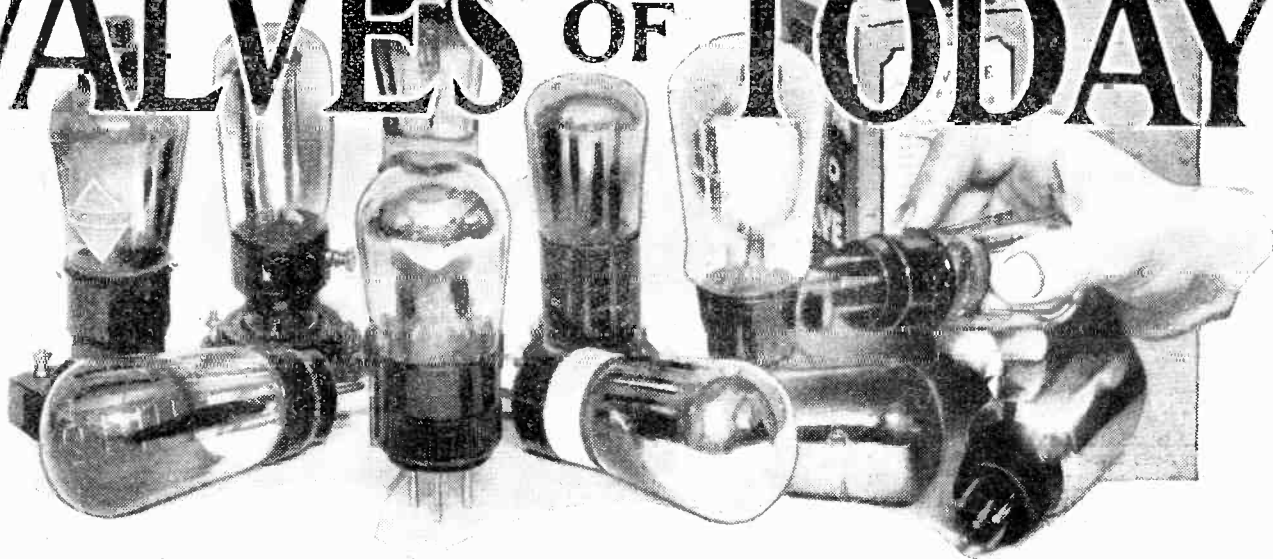
#### Our Great Game.

We all have friends in thirty countries or more, some of whom we may never have met, but all of whom we feel to be brother-enthusiasts, always willing to help. It is a great business, this short-wave radio!

Incidentally, have you ever reflected that the most practical receiver for providing real alternative programmes is a broadcast set adaptable for short waves? Many people seem to be cutting out the long-wave side of their receivers and putting in short wave wave-change switching in their place. In consequence they receive their two local programmes, possibly five or six more on the broadcast band, and upwards of fifteen reliable programmes on the really short waves.

Next week I will make a few remarks on the conversion of a wave-change set on these lines.

# VALVES OF TODAY



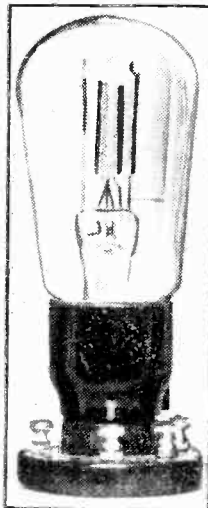
IT is well over twelve months since we published a special valve number of POPULAR WIRELESS, and consequently in reviewing the situation of the modern valve, one may expect to find considerable new development. Nothing very startling has been brought out during the last year, but steady progress on all sides has been maintained.

### The Popular Two-Volter

The 2-volt valve, which is of particular interest to POPULAR WIRELESS readers, is no longer merely a valve which will do "quite well" in place of the 6-volter; it has definitely outstripped its higher wattage brother, and it is now safe to say there is no more efficient battery valve on the market than the 2-volter.

The reason, of course, is that the 6-volter is gradually being dropped by most of the manufacturers, one or two alterations have been made, notably to the 625 and the 625A, but on the whole the 6-volt valve has been neglected (and quite rightly) in favour of the 2 and the 4.

### FOR DETECTOR—



This is the M.H.4 (detector) and —

all along the line from H.F. to L.F. the 2-volter has been improved, the 4-volt battery valve has been left pretty much the same except for the output type. This, of course, is the logical outcome of the use of A.C. mains, the indirectly heated valve having a 4-volt heater potential.

This being the case, the 4-volt output valve is an important addition to the A.C. range, because often it can be used as an output valve with raw A.C. on its filament causing trouble due to hum.

The P.X.4 is an excellent example of

\*-----\*

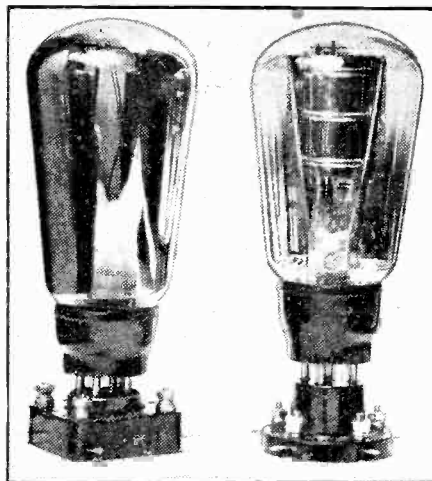
In this article some of the outstanding advances in valve design are described, and indications of future developments are given.

By K. D. ROGERS.

\*-----\*

this. This valve is one of the most popular A.C. output valves on the market. It is equally suitable for accumulator use because it consumes only .6 amp. at 4 volts, and so it is a valve of extremely valuable characteristics.

### FROM PONDER'S END



Two of the new Mazda D.C. valves—made at Ponders End—the D.C. H.L. and the D.C. Pen.

Valuable additions to the 2-volt range, of course, are the new P.2 and the L.P.2, the B.W. 1304, and similar output valves which have exceedingly fine characteristics.

### A.C. Improvements

These have high mutual conductances which were at one time thought to be the prerogative of the indirectly heated A.C. valve, but the 2-volt valve is gradually catching up the A.C. valve; a decided achievement of the valve manufacturers.

A.C. valves have also been improved, however, the Cossor A.C. indirectly heated 41 M.H. and 41 M.H.L. having been given the outstanding amplification factors of 72 and 52 respectively. But, of course, there must be a limit to these high amplification factors, and the more we go in for stage amplification the more difficult it becomes to arrange valves so that the output stages will not be overloaded.

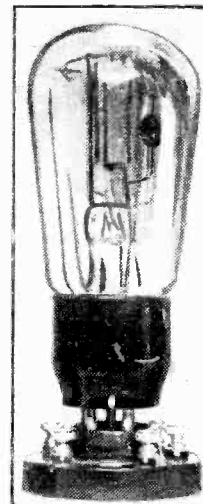
### Tremendous Amplification Increases

For instance, if we have a very high magnification screened-grid valve and a high mag. H.F. valve used as a detector, we find we have to use quite a large output valve in order to carry the grid swing handed to it from the detector. There is also danger when using a high mag. detector (owing to the fact that it has, of course, quite a small grid swing) of overloading the detector.

I think that these tremendous increases in magnification which are taking place must be looked upon with a certain amount of circumspection. It is a great achievement to bring out a valve having a very high amplification factor, but such a valve will easily overload on the local station unless pre-detector volume controlling is employed, and without this precaution overloading from only one H.F. valve is quite a likely and usual occurrence.

Similarly, the high amplification factor means that we cannot use anything like an ordinary L.F. valve, after this detector, and should we by any chance want to use a four-valve set, then we are rather confined in our choice of A.C. valves to follow it. As a matter of fact, in the writer's (Continued on next page.)

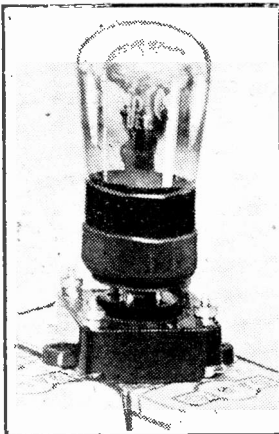
### —AND L.F.



This is the M.H.L.4, both Osram valves.



**A POPULAR  
"TWO"**



One of the Dario Two-Volters.

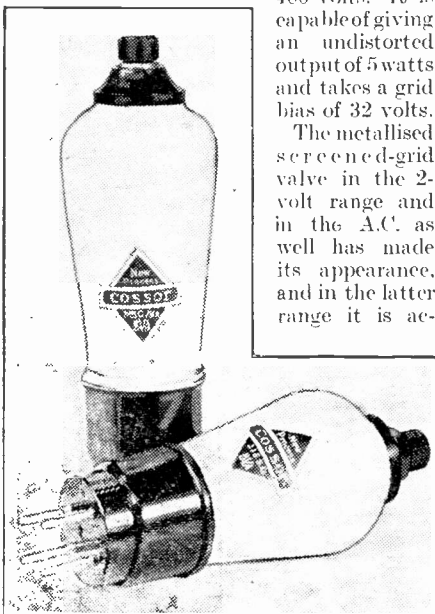
in opinion, there is only one type of A.C. valve which is really suitable as a first L.F. for four-valve A.C. sets. It is rather a sweeping statement, perhaps, but with valves of the H.L. type, overloading in the first L.F. stage is very easily obtained, and so in the writer's opinion the S.S. 4 Det. A.C. (having an impedance of something like 7,000 ohms with a magnification factor of 16) seems to be the only type of valve that is really suitable in this position. This can then be followed by a large or moderately large output valve, and there is a good possibility of obtaining a really big output without overloading, and especially is this advisable in pick-up work.

**Those Metallised S.G.'s.**

An outstanding A.C. valve for power work has been the Mazda P.P.5/400, which takes 2 amps. at 4 volts on a directly heated filament, and which has a colossal plate for heat dissipation purposes and a magnification factor of 9. The impedance is about 1,200, giving a mutual conductance of around 6. Tungram, too, have a similar valve, taking only one amp. at 4 volts, and these set a standard which the battery valve will have a hard job to get up to.

It is essentially, of course, a mains-driven valve and has an anode consumption of something like 60 milliamps at 400 volts. It is capable of giving an undistorted output of 5 watts and takes a grid bias of 32 volts.

**SELF-SCREENED**



A pair of Cosor metallised screened-grid valves.

**WHATEVER YOUR RECEIVER YOU W**

companied by a metallised detector. It is an advance which is of considerable interest, but whether or not the practical value of the 2-volt screened-grid metallised valve is as great as one might at first imagine I am not prepared to say.

**Cutting Down Hum.**

The fact is that a sort of aluminium paint has been employed, and it is doubtful whether this is as efficient a screen as one could wish for. The idea is there, and there is no doubt that the screen does have some effect, but perhaps not a very great one in many cases, while it must not be supposed that it obviates the necessity for the usual type of screening in most circuits.

In the case of the detector valve of the A.C. variety I have found that the screen

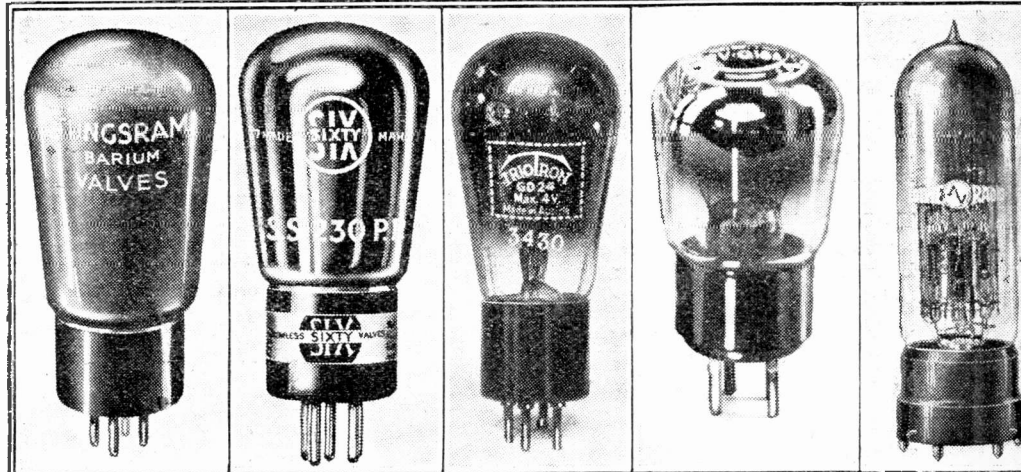
perhaps the biggest of them all has come in the introduction of D.C. mains valves.

For a long time, owners of D.C. mains have had to be content either with working the set off a battery for filament heating purposes, or else have had to go in for rather elaborate D.C. mains receivers in which battery valves were used in series, and had many disadvantages.

**A Great Drawback.**

Such a procedure has often necessitated considerable smoothing not only in the anode circuit, but also the filament circuit, and it has bound down the owners of such sets to the use of valves of the same filament consumption, thus putting an unfortunate restriction on the size of output valve.

**A TYPICAL SELECTION OF—**



Above we have a group of valves that are well known to set owners. From left to right they are: or L.F. work; Loewe triple valve; Mazda P.P. 5/400; Vatea rectifier; Osram

on the outside of the bulb does have quite a considerable effect in many cases in cutting down the hum due to interaction between the elements of the valve and the surrounding wiring.

**Another Valuable Feature.**

Another point in which this metallised coating is valuable is in the dissipation of heat. A.C. valves get very hot, due to the heater, and a metallised coating such as is used in this valve is of great value in the radiation of this heat. It has its snags, of course, in that one must be very careful in working this valve that the metallised coating does not touch any screening in the set (if external screening is used), because in many cases this may easily short-circuit something—as in the case of A.C. mains valves, the automatic bias resistance.

Although big advances have been made in the battery valves and the A.C. variety,

This has been a great drawback, because it has been difficult to find a suitable output valve which will carry anything like a good grid swing because most of the valves used in these D.C. sets have been of the 1 amp. variety.

**New D.C. Valves.**

Now, however, an indirectly heated range of D.C. valves has been placed on the market by Mazda, and possibly by the time this appears in print other valve concerns will have followed their lead. The Mazda D.C. valve has a heater rating of .5 amp., and it is understood that other makes of valves will be coming out with lower heater current, although whether the same efficiency will be obtained with the lower current remains to be seen.

For the present there are four D.C. valves on the market, there is the D.C. S.G.,

**CHOOSE YOUR VALVES CAREFULLY AND**

# YOU WILL FIND PLENTY OF VALVES TO SUIT IT

## A RECENT ARRIVAL



One of the new Eta valves.

H.L., P., and Pentode. These are all of extremely sound characteristics, having practically the same capabilities as the A.C. valves of corresponding types.

### No Smoothing Needed.

The great advantage of these D.C. valves is that no smoothing at all is necessary in the heater circuit, and very little smoothing is required for the anode circuit, so that it is possible to turn out a D.C. set of a fairly simple variety. One snag, of course, is the need for "break-down" resistances to limit the heater voltage, and in the case of the 5 heater valve, something like 100 watts has to be dissipated in a three- or four-valve set by means of an external resistance

and this naturally necessitates more powerful H.T. supply, so that dry-battery users are not having a particularly enviable time supplying power for their receivers.

The super-capacity battery is being used in ever increasing numbers, and every week sees many more mains H.T. unit users. If you have electric light in your house it is a very much more satisfactory scheme to use a mains unit than to go in for dry batteries.

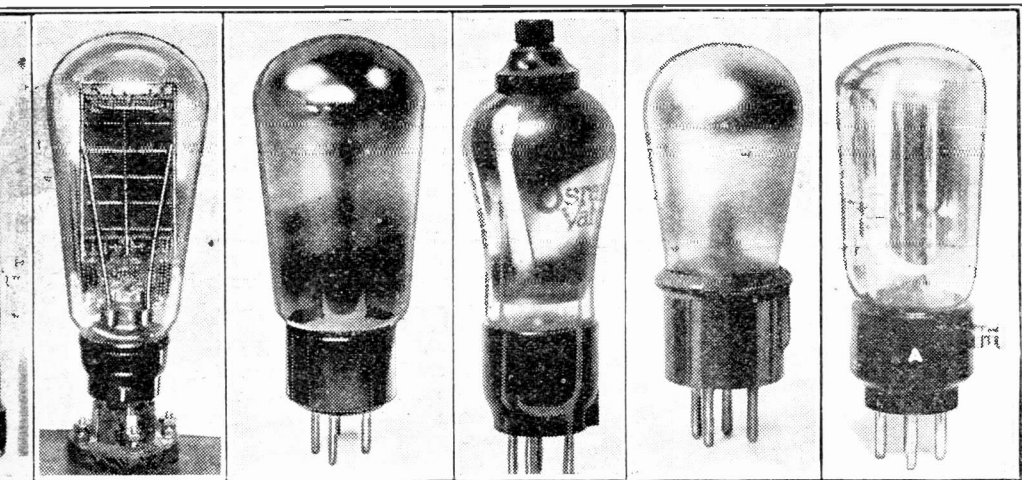
### Pays For Itself.

The keeping of an accumulator driven set from the L.T. point of view, comes under a different category. It is a big job to convert a battery set to all-mains drive, but although there may be a little initial outlay in the purchase or building of a mains unit for H.T. purposes, the saving of batteries

to be seen how popular it will be in this country. Such a valve is used in the POPULAR WIRELESS "Super-Quad" now being described.

Radio has reached a stage in which steady development has taken the place of revolutionary inventions, and we must not expect anything exciting in the realm of valves during the next few years. There may be great and unforeseen developments, but it seems that steady progress is the order of the day, and although this is far less picturesque yet in the long run it is as a rule far more satisfactory and satisfying.

## —WELL-KNOWN RADIO VALVES



Tungram; Six-Sixty Two-volt Pentode; Triotron general purpose; Fotos B.C. 18 for detection 2-volt screened-grid; P.B. general purpose; and a Lissen pentode.

placed in series with the mains and the heater of the valves. This, of course, is wasteful, but D.C. mains when used for the filaments or heaters of radio sets are bound to be wasteful until such valves as those operating direct on 200 to 240 volts for heater purposes are designed.

### More Mains Users.

But the new D.C. valves do place the owners of direct current mains in a different position from what they unfortunately occupied a year or two ago. The D.C. user is at last on a level with his A.C. neighbour as regards the results he can achieve with his radio set, and, as a matter of fact, from the point of view of cheapness in the initial cost, he has a decided advantage over the owner of alternating current supply.

The tendency in modern valve design is to go in for more and more powerful valves,

is, of course, very noticeable, and in a comparatively short time, to use a well-worn and somewhat ambiguous phrase, the mains unit has paid for itself.

### New Double-Grid Valve.

There is a lot more I could say about modern valves, but space is short. Improvement is steady all along the line, and we may look to greater improvements in the future. We must, however, mention the new double-grid super-het. valve, which is being brought out by one or two manufacturers (for instance, by Cossor, Tungram, Osram, and Six-Sixty), expressly for super-hets. This double-grid valve does away with the need for an oscillator valve, and acts not only as first detector (using one grid) but also as oscillator or "mixer" using the other grid. It is a useful scheme and has already achieved great popularity on the Continent. It remains

### Better Than Ever.

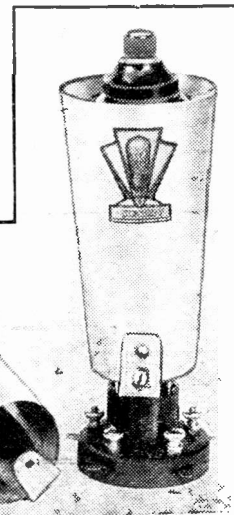
The valve-set user of to-day gets far more out of his set than he did eighteen months ago if he chooses his valves carefully and employs reliable circuit designs. There is nothing very much the matter with the modern valve. It is reliable, long-lived, and thoroughly efficient.

But it is, however, a thousand pities that with all their skill in valve design and construction, the British manufacturers have not seen fit to standardise the nomenclature of their valves. Let the various makes have different characteristics, by all means, but do let us know whether a valve is H.L., L., or S.G., by a mere glance at the designation.

### Methods of Designation.

As matters are now we have such things as the B.Y.6, S.21, 21S.G., P.M.21, all denoting S.G. valves of somewhat similar characteristics, and only one (the third) is anything like a suitable title. I could quote dozens of cases of confusion, but a look at the valve catalogues will show at a glance how chaotic the valve classification is.

## WELL SHIELDED

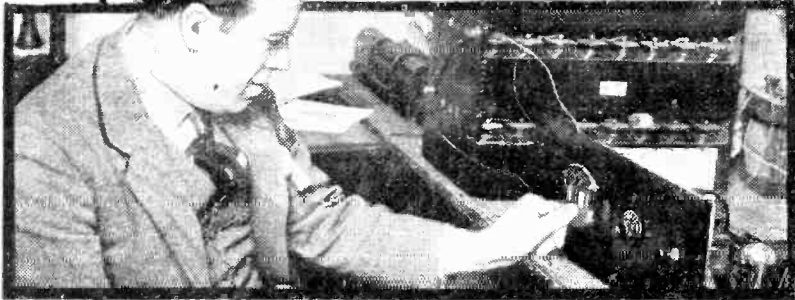


A useful method of screening is this scheme devised by Six-Sixty.

# AND GET THE MOST OUT OF YOUR SET



# CAPT. ECKERSLEY'S QUERY CORNER



**A JACK FOR THE PICK-UP—ANODE  
BEND THAT DOESN'T—HETERODYNE  
WAVEMETER ACCURACY.**

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

**A Jack for the Pick-up.**

J. B. (Burton-on-Trent).—"I wish to add a pick-up switch to my set, and have decided to use a jack of the type commonly employed for L.F. switching.

To obtain adequate volume, the jack is to be inserted in the detector grid circuit. Is a jack of the above type suitable for inclusion in this position?"

Perfectly. You will need to arrange things so that you put negative on the grid of the detector when used as a low-frequency amplifier, otherwise the amplification will not be linear.

I do not know whether you are using grid leak or bottom bend detection, but you will need to work it out so that the jack emerges from circuit, as shown below, when using the gramophone.

\* \* \*

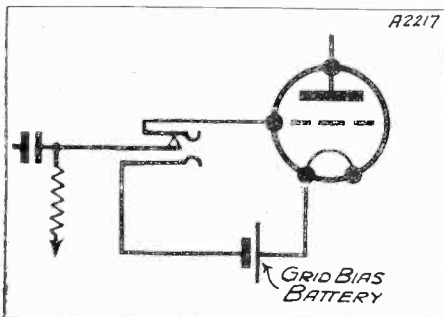
**Anode Bend that Doesn't!**

H. R. (Gidea Park).—"In an endeavour to find the best value of grid bias to apply to an anode-bend detector, I went to the trouble of taking a curve of the grid volts anode current characteristic of a medium impedance valve with a resistance of 80,000 ohms connected in the anode circuit.

"The result did not help me in the least, as my Curve appeared to be nearly a straight line. There was, in fact, so little curve about the characteristic that I was forced to conclude that my readings were in error. Repeating the experiment, however, gave the same result. How does rectification occur with anode bend that doesn't bend?"

Suppose we draw absolutely straight line

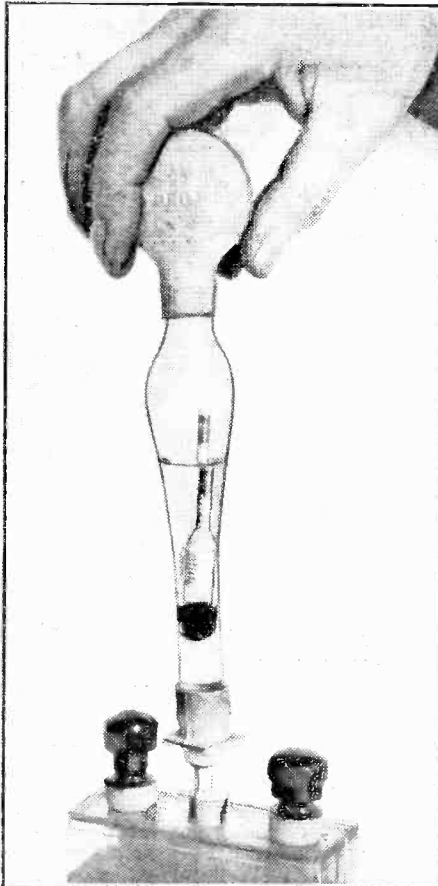
**GRID CIRCUIT CONNECTIONS**



When the gramophone jack is withdrawn its grid bias is disconnected and the detector grid connections are restored.

anode current-grid volt characteristics as I have. I suppose those resemble your curves

**GOT ONE OF THESE?**



The hydrometer, which only costs a shilling or so, enables you to detect the first sign of L.T. trouble!

to some extent. Now suppose the grid voltage is  $V_{g1}$ . There will be no anode current.

Now suppose a high-frequency impulse of peak volts  $V_s$  is added and subtracted to  $V_{g1}$ . Obviously signal voltage  $V_s$  (-) does not produce any anode current, but the extension  $V_s$  (+) produces a peak anode current  $I_a$ .

So the valve rectifies since only one half of the signal produces anode current. The

"bottom bend" is at the point P and may be more or less angular or less or more a bend—what's in a name, anyway?

We mean a rectifier is a bottom bend rectifier when an impulse of signal voltage one way produces more anode current than a signal voltage the other way.

\* \* \*

**Heterodyne Wavemeter Accuracy.**

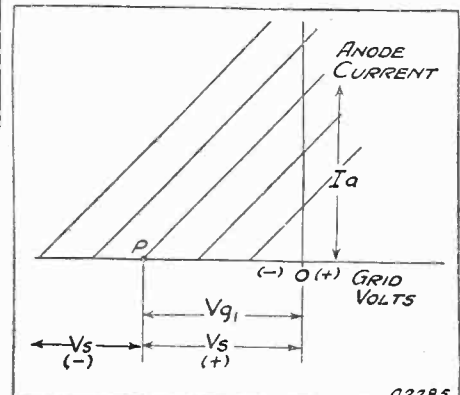
B. Y. (Carlisle).—"I have made a wavemeter of the heterodyne type, using the conventional Hartley oscillator circuit. I want, if possible, for this to remain accurately calibrated throughout the life of the valve.

"Can you tell me if the valve is likely to alter its characteristics after use, and, if so, will such alteration give rise to much change in the dial readings of the meter?"

I should think that once the wavemeter has been calibrated the valve will not greatly upset the calibration as time goes on and the valve goes (a bit) off. But I should be more confident if I knew that your circuit never allowed grid current, i.e. that you used a grid negative battery of correct value to prevent grid current, and not a grid leak for your oscillator.

It is most important to avoid grid current in a heterodyne wavemeter if calibrations are to stay put. At any rate, remember that the B.B.C. stations maintain an accuracy of wave-length above the standard order, and you can keep a constant check on 3 or 4 points in this way.

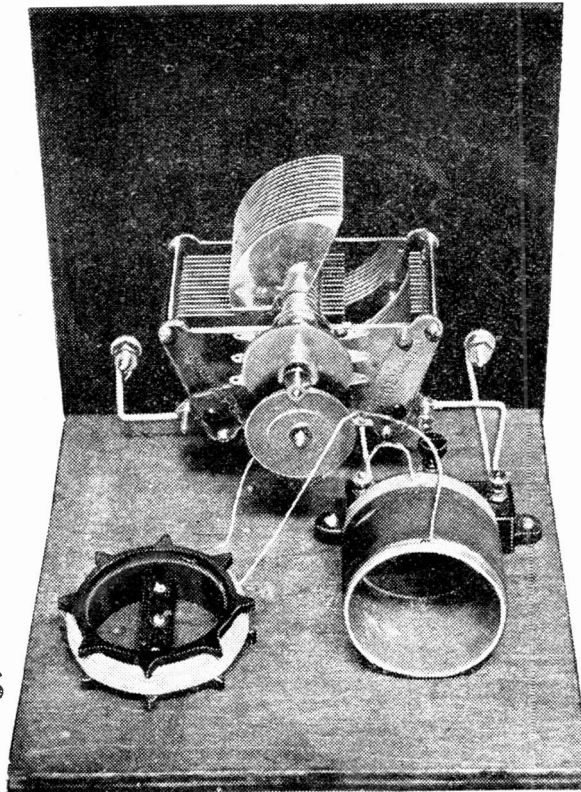
**HOW DETECTION OCCURS**



A2285

Look at this diagram when reading Capt. Eckersley's reply to H. R. of Gidea Park.

**Make  
your set  
really  
selective  
on both  
long and  
short waves**



**Fit the  
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Rejector  
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all  
interference**

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The Cabinet supplied with Kit "C" can be obtained separately with ready wound aerial frame **£2-15-0**  
Cabinet without aerial **£2-5-0**

**ORDER FORM**

To **READY RADIO (R.R. Ltd.)**

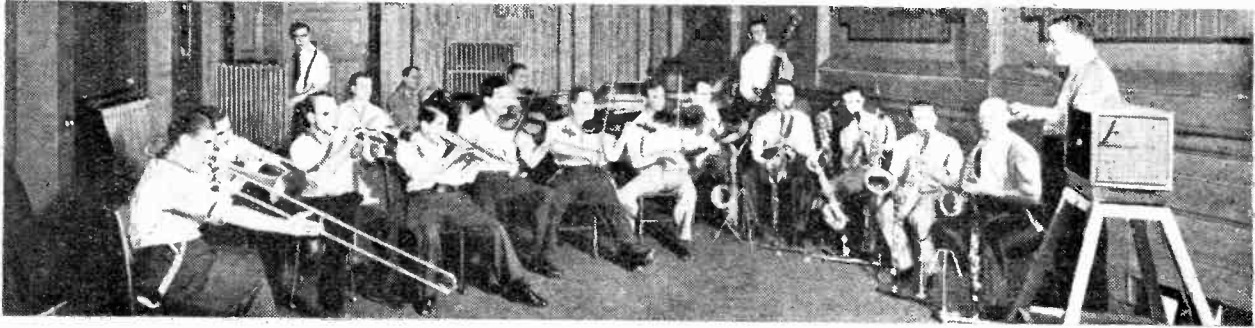
159, Borough High Street, London Bridge, S.E.1.

**CASH ORDER.** Please despatch to me at once the goods specified for which I enclose payment in full of  
**C.O.D. ORDER.** Please despatch to me at once goods specified for which I will pay in full the sum of  
**EASY PAYMENT ORDER.** Please despatch my Easy Payment Order for the Goods specified for which I enclose first deposit of

£..... Name.....  
£..... Address.....  
£..... Kit required.....



# Keeping Cool at Savoy Hill



**I**t was one of England's few broiling days. The heat rained down.

A friend of mine was singing to the world that afternoon via a B.B.C. studio. With memories of Savoy Hill in a heat-wave six years ago, I was not looking forward to the task of affording her even moral support.

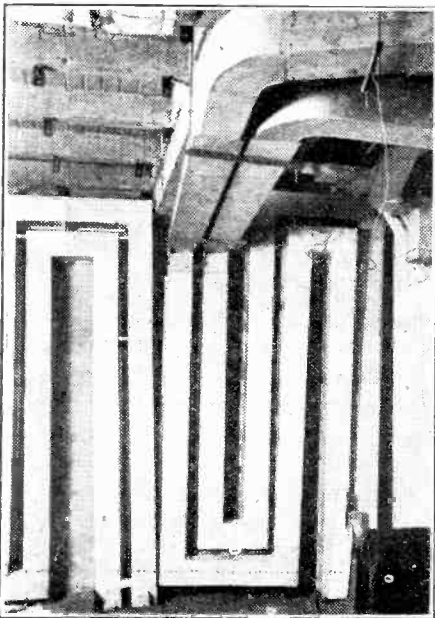
## Very Hot Work

In the days when studios were small and heavily draped, broadcasting during a heat-wave was hot work. I remembered an occasion when Rutland Boughton conducted "The Immortal Hour" one summer night.

The studio was like an oven. The composer took his coat off. The orchestra mopped their brows from time to time. The singers sang, and having done so, flopped into chairs in melting despair. Small wonder that I seriously considered leaving my friend to her fate!

I did not do so. I prepared myself for the ordeal beforehand by steeping my hands in cold water. As it turned out, this precaution was quite needless. Savoy Hill in these days is one of the coolest places in London.

## INSIDE THE WALL



Some of the 150 tons of special cooling ducts at the new Langham Place Studios.

\*-----\*  
**How heat-waves are fought to keep  
 the artistes in the studios cool.**  
 By A Special Correspondent.  
 \*-----\*

Lucky indeed are the artistes who work there in a heat-wave!

The privacy of a studio does not necessarily infer that one can do as one likes in the matter of keeping cool. Jack Payne and his merry men, when they have a studio to themselves, can and do work in their shirt-sleeves when they wish. Other orchestras are sometimes allowed to wear alpaca coats.

## Shed His Shirt!

But for all formal occasions full dress is essential. In Washington a short time ago a speaker who found the heat rather trying removed his shirt. Englishmen are not so informal, but there is a suggestion of discourtesy in partnering a lady or fulfilling an engagement even in shirt-sleeves. And the Announcer always in his dinner-jacket sets a good example.

Not that the broadcasters never disrobe. A few spirits refuse to be quelled. Sir Harry Lauder insists on absolute comfort, and removes his collar. Chaliapin, when he broadcast, took off his coat. In the small talks studio itself, possessing as it does a large window, speakers occasionally remove their coats.

But all these gestures to the sun are unnecessary. Every one of them, Savoy Hill can give points to our luxury hotels in the matter of ventilation.

## Special Cooling Plant

At one time the engineers experienced difficulty in getting fresh air into the studios because of the heavy draperies. Now that these have gone, everything is simple. Thousands of cubic feet of cooled and clean air are brought into the studios every hour in hot weather—the supply varying according to the number of people in the studio.

Down in the basement they showed me a giant fan. This is the starting point. From here the air passes through oil filters, then through metal ducts, and so into the studio through inlet panels at a high level.

After the people there have duly consumed it—with perhaps a passing thought as to its purity!—the enervated air is extracted at a low level. And all this in absolute silence as far as the studios are concerned.

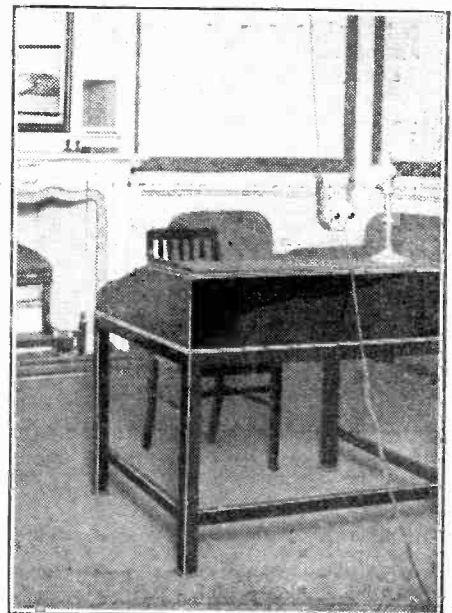
At Broadcasting House next year—or this, if we happen to have a heat-wave in December—conditions will be even better. I have just seen one of the gigantic steel ducts that supply conditioned air to the studio—tremendous things fully six feet in diameter in some cases. Through these 143 tons of air will be pumped in one hour.

## Silent Circulation

Were the steel ducts not carefully insulated against sound waves, they would carry not only the sound made by the fans and motors of the air-conditioning plant, to the studios, but also from one studio to another. These de-humidifying and cooling plants are made to be "commercially silent" since they are usually used in cinemas, talkie studios and similar places, but for Broadcasting House more than the usual precautions had to be taken.

For the "mike" is so sensitive that even the swirl of the air in the ducts and the sound of it entering the studio would, unless specially regulated, interfere with broadcasting. Listeners would take the sounds of the ventilating apparatus for the breathing of the Announcer!

## AT THE TALK'S DESK



Some talkers even remove their coats, but no doubt their listeners often get "hotter" than they do.

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## YOU HEAR IT BETTER WITH PERTRIX



# WITH THE B.B.C. IN THE NORTH



No. 7—Behind the Scenes at Moorside Edge.

By LESLIE W. A. BAILY.

EACH day now, as regularly as clockwork, the North Region Station sets out on its voyage of the ether; each early morning it "docks," the engines stop, and a green B.B.C. 'bus takes the staff home through the darkness to Huddersfield.

When last I came to Moorside Edge, to the launching of the station, all was excitement. Now, visiting on behalf of POPULAR WIRELESS, I came to see how this giant station runs under routine service conditions and how its "crew" find life up there on the Pennine Hills.

## Making Everything "Ship-Shape."

Walking along the rough road leading to the squat transmitter building, I noticed that labourers were still busy concreting and trimming up the paths round the building, and I was told later that the B.B.C. has a scheme for making the station site generally smart in appearance—which will be no small job, for Moorside Edge is a wild plateau covered with coarse moorland grass.

Inside the building, however, everything was as spick-and-span as on board a battleship. In the entrance hall a man was putting a highly efficient polish on the floor—a naval sort of polish. Then the captain of the ship came forward and courteously greeted me.

Grant me that this is an apt metaphor, for the Engineer-in-Charge of a modern wireless station has personal responsibility over a complex mechanism in the service of the public; he has a motley crew, ranging from men who are expert with a shovel to others who are more at home with a slide rule; and his own duties are as varied as those of a liner's captain.

## "All Quiet."

At Moorside Edge there are 16 wireless engineers, a separate staff of four engineers in charge of the Diesel engines, a cook, a clerk, four labourers, and a watchman—a complement of 27. When I arrived, both the transmitters were "on the air." A pretty sight they look.

It was quiet in the big trans-

\*-----\*

In this article of his series on B.B.C. stations in the North our contributor gives an interesting picture of the North Region Station.

\*-----\*

mitter hall, but when you see the valve filaments of both transmitters glowing white, and you notice the meters on the switchboard marking their thousands of volts and amps., the quietness seems pregnant with some enormous force. That force is, in fact, leaping through oceans of space from the aerials outside.

We walked along to the engine room. If one end of the station is quiet, the other makes up for it. Three of the four 345 h.p. Diesels are in action when both transmitters are radiating.

The Engineer-in-Charge has discovered how to pitch his voice to penetrate the noise, so I let him do all the talking (especially as the cook, in a neat white jacket, suddenly appeared and offered me a cup of tea).

"How long before a transmission com-

mences do you start the station up?" I bawled, to set the conversation off.

"Half an hour," shouted the Engineer-in-Charge. The engineers, he explained, come to the station from their homes by a B.B.C. 'bus. The Diesels are started by compressed air, then the generators leap into life, and then the engineers go round throwing in switches according to a routine plan.

There are dozens of switches to be "thrown" and scores of meters to check during this process, but the station has been designed in such an ingenious fashion that it is practically impossible to do things in the wrong sequence, or, say, to put 10,000 volts H.T. across the valve filaments.

## Further Outlook "Unsettled."

Quite rightly, the men have not been expected to take up living quarters on Moorside Edge. Hence the B.B.C. 'bus. At this time of the year the Pennines often look lovely, balmy breezes come across the heather, and there are wonderful views.

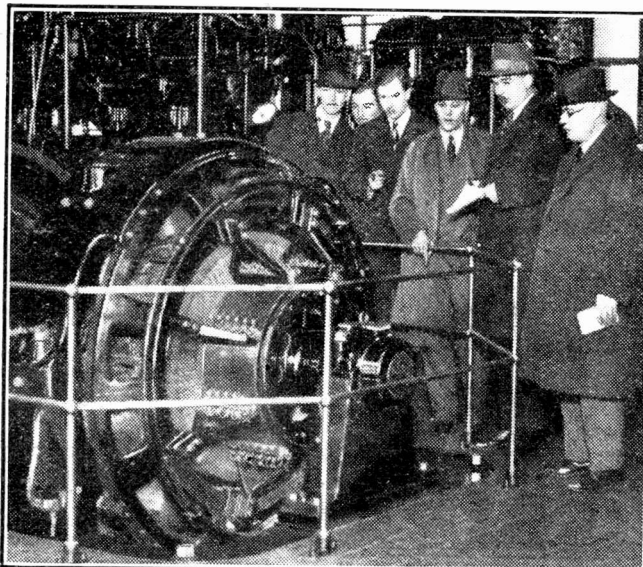
But last winter I went up there while the station was being built and I saw snow yards deep. I saw the mists disappear into solid grey mist a few feet above the ground. I know what the North Regional station will face next winter.

During cold spells the aerials will be electrically heated, to prevent them becoming loaded with ice. Incidentally, the Engineer-in-Charge pointed out to me that although the North National aerial appears to be like the North Regional aerial—a "T" supported by two 500-ft. masts—actually the vertical wire is insulated at the top so that the span is not used. The length of the upright is exactly half the wave-length (301 metres).

## Input and Output.

In the special "listening" room are two switches. One gives you "Regional" one way and "National" the other. The other switches the loud-speaker over from radio reception to direct contact with the land-lines, providing a comparison between the music as it arrives and as it leaves.

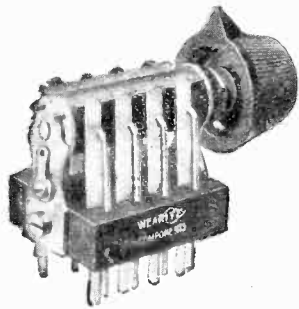
## ALL POWER MADE ON THE PREMISES



Slaitwaite produces its own power by means of Diesel engines coupled to special dynamos, one of which is shown in this photograph.

# MAKE THIS THE BEST SET YOU HAVE BUILT

IF YOU CONSTRUCT  
THE "POP" PORTABLE  
USE WEARITE COM-  
PONENTS AND BE  
SURE OF THE VERY  
BEST RESULTS.



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Any special length can be supplied other than above. Special diameters to order.

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

## QUESTIONS AND ANSWERS

### RESULTS FROM RESISTANCES.

F. L. L. (Middlesbrough).—"I am going to make the 'S.P.V.' Three, which has 'fair' took my fancy.' But before I join up all those resistances I would like to know what in the name of crickey they all do?"

The detector has one grid leak, and three resistances in the plate circuit, 1 sec. And the

L.F. valve has one plate and two grid resistances. And the power valve has one in front of it, which doesn't seem usual! Please tell me what they are all for, and why each one is necessary, for I can't 'resist' wondering about them all!"

We will take them in turn, and need not linger over the detector's grid-leak resistance, for this is found in nearly all sets. Working back from the plate terminal of the detector we come first to the 10,000-ohm resistance. This acts in place of an H.F. choke, to enable smooth reaction effects to be obtained.

Connected to the "far" end of it is a 100,000-ohm resistance for R.C. coupling. Voltages are developed across this by L.F. impulses and these are applied to the succeeding valve via the '01 coupling condenser

Between the 100,000-ohm and H.T. + 1 is a 25,000-ohm resistance which is for de-coupling the H.T. supply circuit from the detector's L.F. plate currents. (You see, all the resistances have important work to do, and consequently you must stick to the values specified.)

So much for the detector part of the circuit. The first L.F. valve is in a normal R.C. stage. The grid leak (500,000-ohms) in front of the output valve is quite usual. (Such a leak is not necessary with transformer-coupled stages, but this is a stage of R.C. coupling.)

The only other point is the use of two grid resistances in front of the first L.F. valve. The 25-meg. resistance is inserted between the 1-meg. leak and grid to act as an "H.F. stopper." It prevents unwanted H.F. impulses from appearing on the L.F.

### WHEN WRITING TO US

will readers please note that all Technical Queries, Orders for Back Numbers and orders for Blue Prints should be addressed to The Fleetway House, Farringdon Street, E.C.4, and not to Tallis House.

side, so spoiling quality of reproduction. The 1-meg. resistance is, of course the usual grid leak to enable grid bias to be given to the R.C. stage.

### STONE CONTROL VALUES.

W. H. N. (Cheltenham).—"With the idea of reducing gramophone scratch and also of toning down a tendency to shrillness, I have been recommended to insert a tone control in my resistance coupled amplifying stage, which consists of a 50,000-ohm anode resistance coupled to the next valve by an '01 condenser.

"The scheme recommended is to join a variable resistance and fixed condenser in series across the anode resistance. If this is practicable, what would be the values to use?"

For an anode resistance of about 50,000 ohms you should use for your purpose an '05-mfd. condenser and a 0 to 50,000 ohms variable resistance.

(Continued on page 724.)

## HERE IS THE RADIO GRAMPHONE CABINET YOU ARE LOOKING FOR

### INSTALL A "LANGMORE"

and have your Gramophone, Wireless Set, Loud-speaker and Batteries all in one cabinet.

These cabinets are very strongly constructed of selected Oak and Plywood. Size overall 3 ft. 2 in. high by 21 in. wide by 15 in. deep.

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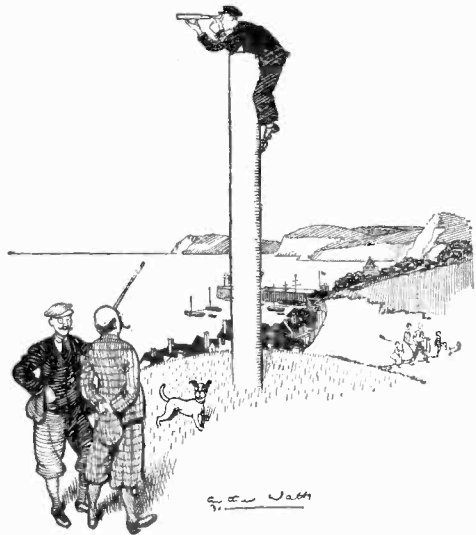
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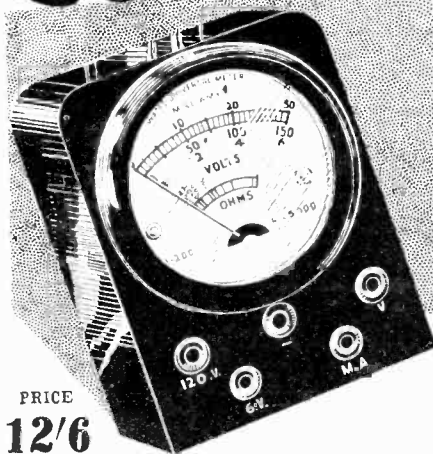
That reminds me. have a

# PLAYER

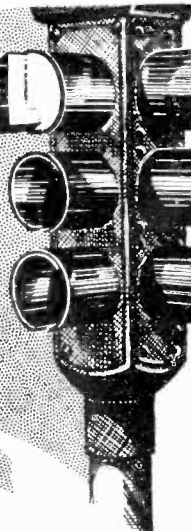


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## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 722.)

Join these two together and then join the vacant end of the 50,000-ohm resistance to H.T. + side on the anode resistance end that of the .05 condenser to the plate side of it.

The arrangement should prove quite effective for the purpose you have in mind.

### WORKS WITHOUT A GRID LEAK

G. R. (Barry).—"I am a regular reader of 'P.W.' and an owner of a 'Comet' Four. Will you tell me the reason why the grid leak No. 3 does not act?"

"I can take out the 1 megohm leak, and it does not alter the set."

We had better explain, first, the two-fold purpose of the 1-megohm grid-leak in the grid circuit of V3. The preceding valve is resistance capacity coupled to V3, via an .01 fixed condenser. The voltages on the grid of V3 due to the incoming broadcasting causes low frequency impulses to flow in the plate circuit of V3, and also to attract a certain number of electrons from the filament to the grid itself.

If the insulation of the valve, valve holder, etc., were perfect and no grid leak were provided, the accumulation of these electrons would "choke" the valve, and after a few minutes' working the output would gradually get weaker and weaker, until finally the valve ceased to operate.

If, however, there is a high resistance pathway between grid and filament, due to leaky insulation on the valve itself, or the valve holder, such accumulations are able to leak away as soon as they are formed, and the valve can continue to operate without choking.

If this were the whole story, your 1 meg. grid leak would, as it happens, be unnecessary; but freedom from this choking is not the only condition that must be satisfied for distortionless reception.

For economical working and for handling fairly large signals as efficiently as possible, the valve also requires a negative grid bias for its grid. This is done by means of the G.B.-1 connection and the pathway afforded by the 1 megohm leak.

Consequently if the 1 megohm leak is removed the grid bias pathway is interrupted, and your third valve is not getting any negative grid bias. The presence of an accidental leak between grid and filament does not therefore do away with the necessity for using this 1 megohm leak, for it is only through this that the grid bias can be applied.

We are surprised that when handling loud signals you do not notice the difference in quality that accompanies the removal of grid bias from the V3 circuit. And we think that if you listen carefully for it when the valve is handling loud signals you will certainly notice that the reproduction is not so clear when the leak is "out," and grid bias is therefore broken, as when it is in position and correct grid bias is being applied to the grid of V3.

We certainly should not attempt to run this set with the leak out, in any case, because this means that you are taking more H.T. current from the battery than is necessary. It will therefore mean buying a new battery sooner than you need.

The fact that there is a leak between grid and filament—although they are supposed to be insulated from each other—should, of course, be remedied by the provision of a new valve holder or better insulation, but in practice such a leak is of surprisingly little detriment to the working of the set.

### DIFFERENTIAL ADVANTAGES.

J. E. R. (Dudley).—"Having been abroad for the past three years I have missed much of the development of radio during that time. I now find, for instance, that nearly all sets employ differential reaction condensers, having two sets of fixed plates and one set of moving."

"I cannot for the life of me see why this is so, and apparently it is an accepted fact, and no explanation is ever given of the working of this curious component. How does it work?"

"Why is it better than the old arrangement?"

As you know, the main requirement of the reaction circuit is that a coil in the plate circuit of the valve should be placed in close proximity to a coil in the

### "WHY IS IT SO NOISY TO-DAY?"

Perhaps the 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 an unrivalled service.

Full details, including scale 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.

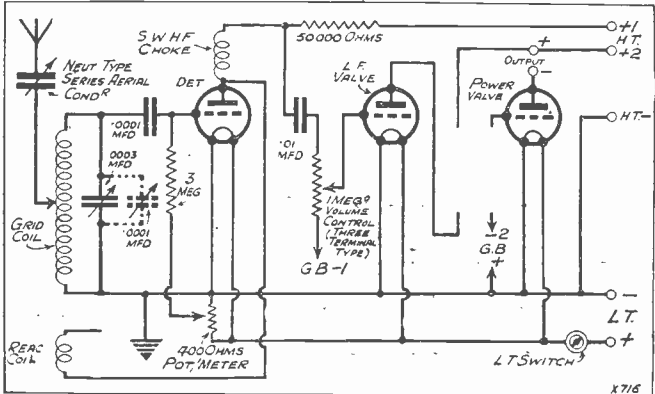
**LONDON READERS, PLEASE NOTE:** Inquiries should NOT be made by phone or in person at Fleetway House or Tallis House.

grid circuit so that impulses can be fed back to be re-amplified. A convenient method of controlling the amount of this feed-back is through a condenser in the circuit, the capacity being variable, and thus presenting a variable impedance which enables the quantity of current flow to be easily controlled by the operator.

The ordinary two-plate condenser certainly presented the opportunity of varying capacity to the required degree, but in many sets it was found that as well as the desired alteration in reaction effects there were undesirable consequences (particularly on quality and sensitivity) of having an external capacity between filament and plate that might be almost zero when the reaction condenser was all out, and up to say .0002 when it was all in.

This drawback, however, is entirely removed by the differential reaction condenser. It maintains the total capacity between the plate circuit and filament circuit more or less constant, and enables the operator of the set to "differentiate" between using the plate-filament capacity almost entirely for reaction, or for little reaction, or without causing reaction effects.

### MISSING LINKS, No. 14 A SHORT-WAVE THREE



This is a good 3-valve short-wave circuit, but two of the "components" are not shown. Can you fill them in correctly? (Look out for the answer in diagram next week.)

### KEEPING THE MILLIAMMETER NEEDLE STEADY.

W. E. (Walsall).—"I should like 'P.W.'s' opinion on this, as you not only gave me my introduction to radio but have often helped to keep me on the safe track when I have been "falling" for some new development.

"It is about quality reproduction. I am mad on quality and having plenty of friends in the radio business I spared neither expense nor trouble to get together a quality amplifier."

(Continued on next page.)

## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

"The trouble is that having a really first-quality sensitive milliammeter in the plate circuit of the last valve, I can, whatever I do, detect a slight flicker of this, on very loud passages!

It seems impossible to cut it right out, although I have got it so steady that all my trouble so far seems worth while. But the question now is, ought I to go on until it is absolutely perfect, or would you be satisfied now that it is really steady and the quality excellent?"

Do not worry about that last little quiver at all, for with a sensitive meter a small needle vibration is inevitable when considerable energy is being handled.

### PRE-DETECTOR VOLUME CONTROL.

L. B. (Old Trafford).—"The set is H.F. Def. and two L.F. and incorporates a volume control on the low-frequency stages. But I want also to control input before the detector.

"I am a little undecided as to which is the better method—control of the screened grid potential by a variable resistance, or control by a high resistance potentiometer across the tuned circuit, with the grid sliding off the required potential.

"Either way would be easy for me to do, though I should like an opinion as to which is the better from a theoretical point of view."

You are far more likely to get efficient amplification by controlling the input to the valve than by changing its screened grid voltage. Theoretically the input control is undoubtedly the better method, and can be applied as suggested or directly to the aerial input by joining the aerial itself to the slider, and connecting the resistance across the aerial coil.

In this latter application the potentiometer can be of a much lower resistance than it should be theoretically for placing across the tuned circuit, so if it is of the order of 50,000 or 100,000 ohms we should use it across the aerial input coil, while if it is a really high value of potentiometer, of half a megohm or so it can be connected as described by you.

### CALCULATING THE RESISTANCE.

R. D. (Littlehampton).—"I have 200 volts available, but wish to drop it down to about 150 volts. What is the resistance required for this?"

For a reason to be given further on you will have to calculate this out for yourself, but it is very easy to do by means of Ohm's law.

One way of stating Ohm's law is to say that  $V = IR$ . We can call the resistances  $R$ , the volts to be absorbed by that resistance  $V$ , and the current to be passed by the resistance  $I$ .

You will now see that in order to solve the equation in your case it is imperative to know the current to be passed. This you do not mention.

This current, of course, is the anode current which must flow through the "dropping" resistance, and is easily ascertained either by measurement, or by calculation from the manufacturer's literature on the subject.

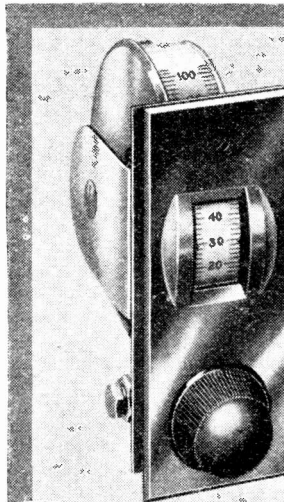
Suppose, for instance that you find the resistance must pass a current of 1 milliamp, then the equation is easily solved because the required resistance  $R$  will be equal to  $\frac{V}{I}$ .

$\frac{200}{0.001}$  amps.

The 50 volts are, of course, those to be absorbed by the resistance and the 0.001 is the 1 milliamp expressed in amperes. It will be seen that the answer to this is 50,000, and this is approximately the number of ohms required in this instance.

Other values may be worked out in exactly the same way.

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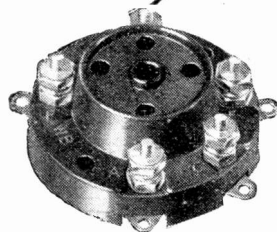
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## FOR THE LISTENER

(Continued from page 704)

Union to Union. You meet them everywhere on the roads.

And this was one of their Hostels. A group of them were singing on a patch of grass in front of the house; and to my astonishment they were singing into a microphone! Singing jolly well, too. Students' songs, or glees, or something like that.

We were not hikers. We had really no business to be there. But they were interested because we were English, and they warmly welcomed us.

You could hire a bed—they call it a "cot"—for threepence; and, if you wanted a blanket, you paid twopence more. A cup of coffee cost a penny; and there was a canteen where you could buy food at similarly ridiculous prices.

It was the cheapest line we had ever struck. So we housed the car under a tree in a lane out of sight, and prepared to make friends.

I asked about the microphone. Apparently in Germany they broadcast hikers, as we broadcast nightingales. One of the smaller broadcasting stations had arranged that night for an "Evening with the Hikers." There were talks on hiking—where to hike, what to carry, the care of the feet, what it costs to hike, and so on—given by who ever happened to turn up at the Hostel that evening.

### Like the Roosters.

They enjoyed themselves thoroughly, interrupting the talk with backchat and jokes. They reminded me a little of our own Roosters, except that it was all impromptu.

There were musical items, for wheresoever two or three hikers are gathered together, there will be a musician among them with a ukulele or a banjo.

It was in the middle of the programme that the organiser of the show asked me if I would "pay my footing," and say something. It was all just as friendly as that!

At first I thought I would broadcast an S.O.S. asking the man who had "found" my camera to send me his address so that I might post him my unused films; but that would hardly have been playing the game; so I said something different, boosted Germany a little, boosted England more, and added my little undertone to what Mr. MacDonald and Mr. Henderson had said in Berlin!

### In the Morning.

Apparently no damage was done. On the following morning Germany stood where it had stood the night before. No flying squad of police appeared. The papers didn't even mention me!

The hikers had obviously passed a good night. So had I. It was a comfortable cot; and the hot coffee was good in the morning when we set off. It was a very pleasant and amusing experience.

I haven't the foggiest idea what the name of the place was. There were hills, and pine woods, and a lovely pattern of clover fields and cornlands over a wide landscape.

Bavaria is a beautiful country; and, if those young hikers were Bavarians, as they probably were, I feel that if I weren't an Englishman I should like to be a Bavarian!

## TECHNICAL NOTES

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

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

### Overloading H.F. Chokes.

IN case any of you wish to try an H.F. choke in the mains lead to your all-electric receiver for eliminating crackling, etc., I should point out that although the effect may be tried temporarily by means of an ordinary H.F. choke, just to see whether this cures the trouble, this kind of choke should not be used permanently because it will be heavily overloaded and probably damaged. If you find that this is the solution of your trouble you will need to make up a choke for the purpose, adapted to carry the necessary load.

### The Right Valve.

I have remarked more than once before how very much the operation of a set depends upon having the right valve in the right place, and this is a point which is overlooked by a surprisingly large number of experimenters. For example, supposing

## TECHNICAL TWISTERS

### No. 74.—DISTORTION INDICATIONS. CAN YOU FILL IN THE MISSING WORDS?

When a milliammeter is placed in the . . . . . circuit of an L.F. amplifying valve, the kicks due to distortion generally indicate how the fault should be remedied.

If the milliammeter needle kicks . . . to a . . . . . reading it shows that average current is increased because grid bias is too . . . . . for the H.T. being used.

When the milliammeter needle kicks . . . . . the grid bias is too . . . . .

If the valve cannot handle the signals being fed to it without distortion, the input to it must be . . . . . (The best method is to use a . . . . .)

Last week's missing words (in order) were: Milliammeter. Plate (or Anode). Milliammeter. Amplitude.

you change over from two stages of transformer-coupled amplification to one stage only of transformer coupling and one stage of R.C.

After having made the necessary alterations you may find that the volume is only two-thirds or perhaps half of what it was before, and the quality has perhaps suffered in the process as well.

This may seem very puzzling, and you begin to wonder whether anything has gone wrong with the H.T. supply or whether the anode resistance is of the proper value. In nine cases out of ten the trouble is not due to

(Continued on next page.)

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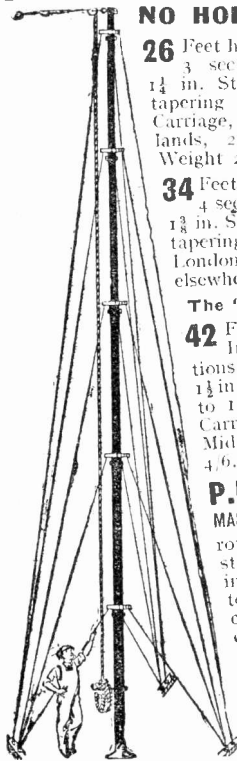
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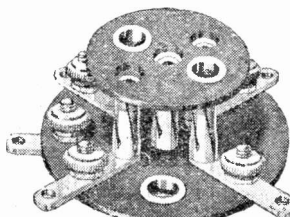
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## TECHNICAL NOTES

(Continued from previous page.)

the battery or to the anode resistance but to the fact that the valve which was suitable and had the right characteristics for transformer coupling is now quite unsuitable for the Resistance Coupling circuit arrangement.

The impedance of the R.C. valve should be round about one-third of the value of the anode resistance, and if you choose a valve of suitable impedance you will probably find your troubles disappear. For instance, if the anode resistance is, say, a quarter of a megohm and the valve impedance is 70,000 to 100,000 ohms, the relationship will no doubt be found to be quite suitable and the set to work as efficiently as expected.

In this connection remember that the internal impedance of the valve is affected very greatly by the amount of negative grid bias applied.

### Mains G.B.

Talking about grid bias, it is often convenient to obtain grid bias from the mains, and if you are using a home-made H.T. unit it is a comparatively simple matter to get your G.B. from this source. With power valves taking a high tension of 200 to 400 volts the grid bias necessary may be anything from 50 volts upwards.

If an additional winding is put on the transformer, you will then require for your grid bias a rectifier, preferably of the Westinghouse metal type, together with a smoothing circuit and a tapped resistance. One end of the grid-bias winding on the transformer is connected to the rectifier, the other side of the rectifier to a smoothing resistance, the other end of the smoothing resistance to the tapped resistance, and the other end of the tapped resistance to the remaining end of the transformer winding.

The latter point of the transformer winding is also connected to the common terminal of two smoothing condensers, the opposite terminals of these two condensers then going to the two ends of the smoothing resistance.

### Values Required.

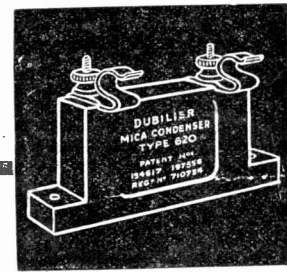
The number of turns in the grid-bias winding on the transformer will depend upon the voltage which it is required to generate for the tapped grid-bias resistance. The two smoothing condensers should be of at least 2 mfd. each, whilst the smoothing resistance, across the ends of which the condensers are connected, may conveniently have a value of 10,000 ohms. For the tapped resistance for taking off the different values of grid-bias voltage, a value of about 30,000 to 40,000 ohms may be used.

### Choke Characteristics.

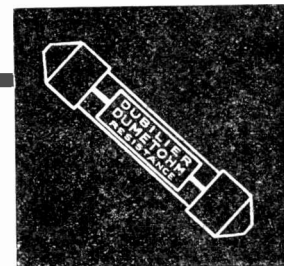
Some low-frequency chokes have a broken or incomplete core, and people often wonder why this is. Apparently the first purpose of a choke is to provide a high inductance and, inasmuch as a gap in the magnetic circuit reduces the inductance, it would seem to be directly contrary to what is required.

If we examine the characteristics of the choke, however, we will see that, in the particular conditions in which it is used in radio work, the problem is not quite so

(Continued on next page.)

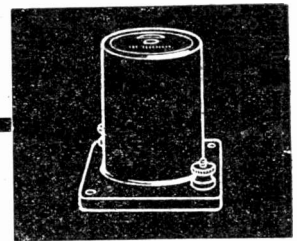


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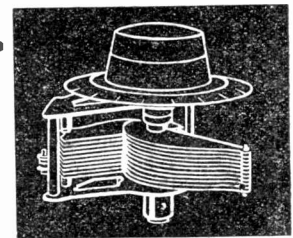


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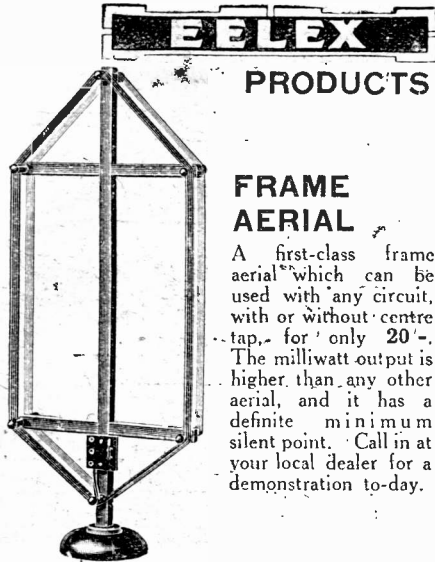
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## TECHNICAL NOTES

(Continued from previous page.)

simple. The complicating factor is the presence of a strong current in the choke, and this may completely upset the inductance.

In practically all circuits in which iron-cored chokes are used to-day there are not only fluctuating currents but also direct currents, so that we are really concerned with the effect of the choke upon fluctuating currents when it is already carrying a steady current. Now it is a well-known fact that the inductance of a choke diminishes more or less rapidly as the steady current through the windings of the choke is increased—at any rate this is true throughout the greater part of the range of steady current values.

## Effect of D.C.

Consequently, if there is a substantial D.C. current in the choke its inductance, which is what matters from the point of view of the effect of the choke in stopping current fluctuations, may be very much reduced. Scientifically we may say that the inductance depends upon the permeability of the iron, or whatever metal in the core, and since the permeability depends upon the state of magnetisation, which again depends upon the steady current, therefore the inductance depends upon the steady current.

If there were no iron core, but merely a core of air or of some other non-magnetic material, the inductance would be relatively very small. The more we can pack the core space with magnetic material, and the greater the magnetic permeability of this material, the greater will be the inductance.

## Gap in Magnetic Circuit.

It follows directly from the foregoing remark that if we introduce a gap in the magnetic core this will have the effect of reducing the magnetisation produced by a given steady current. In point of fact, the effect of even a very small gap is quite considerable, very much greater than you might judge by looking at a diagram of the core.

Now the curious thing is that for very small magnetising forces the permeability increases; it soon reaches a maximum, after which, as already mentioned, it begins to fall. It is obviously desirable, if we can manage it, to work somewhere near this maximum point and this will mean keeping down the magnetic field to a certain extent.

## "P.W." PANEL No. 32.—USING RESISTANCES.

For portables and other sets where small space is available the "Spaghetti" type of resistance can generally be used for R.C. coupling, de-coupling, etc.

Such flexible resistances are useful also in many cases where an H.F. choke is normally employed, such as in the plate circuit of a detector valve.

If two resistances of equal value are joined in series the total resistance is doubled.

If two resistances of equal value are joined in parallel the total resistance is halved.

It is for this reason that the gap is made in the magnetic circuit. This gap, as I have indicated, has a similar effect in the magnetic circuit to putting a resistance into an electrical circuit. Of course, the size of the gap for the best results has to be very carefully arranged in relation to the other constants of the circuit.

## Points of Design.

In a well-designed commercial choke in which the size and position of the gap have been carefully worked out, the inductance should prove reasonably constant over the whole range of variation of the steady current met with in actual practice. Instead of a rapidly falling curve with increasing D.C. current, we get first a curve which is first of all practically parallel to the horizontal axis and only begins to fall very gradually when the steady current reaches a high value.

## A High Inductance.

You might think that in getting away from serious variations in the inductance we were sacrificing the actual inductance value, but this again is not necessarily so. The two curves, showing the variation of inductance with D.C. current with and without the air gap, will cross one another at a certain point, so that beyond that point the actual inductance value without the gap will be less than with the gap.

It so happens that the D.C. currents usually met with bring us on to this part of the curve, and so in practice not only are we getting a more uniform inductance with the air gap in the core, but we are also getting actually a higher value inductance. So you see that, owing to the special conditions in which the choke is used, the effect of the gap is almost exactly opposite to what would at first sight appear.

## Stray H.F.

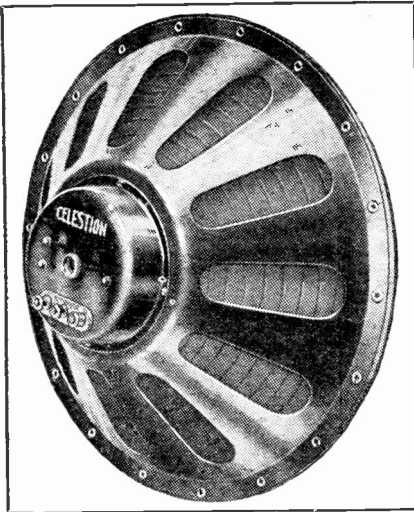
A reader tells me of a curious experience he had with a receiver in which a howl was produced owing to H.F. currents in the loud-speaker leads; as this is not nearly so uncommon as you might think—I have known it to happen in several cases—I think it may be worth mentioning, as it may be useful to other readers.

The set in question had a single power valve on the L.F. side and a shielded H.F. amplifier. Sometimes the set would behave itself more or less normally, but often, long before the anode circuit of the H.F. stage had been brought to the oscillating point, the set would start squealing.

## An Unwanted Coupling.

It was noticed after a time that the trouble was more liable to happen when the loud speaker or the loud-speaker leads came near the high-frequency end of the receiver, and this seemed to indicate the presence of H.F. currents in the loud-speaker circuit. You can easily see how coupling would be set up

between the input of the receiver and the loud-speaker leads, and as the presence of high-frequency currents in the speaker circuit is not uncommon, I thought it might be worth while to draw attention to what might perhaps seem rather mysterious to some of you if you happen to come up against it.



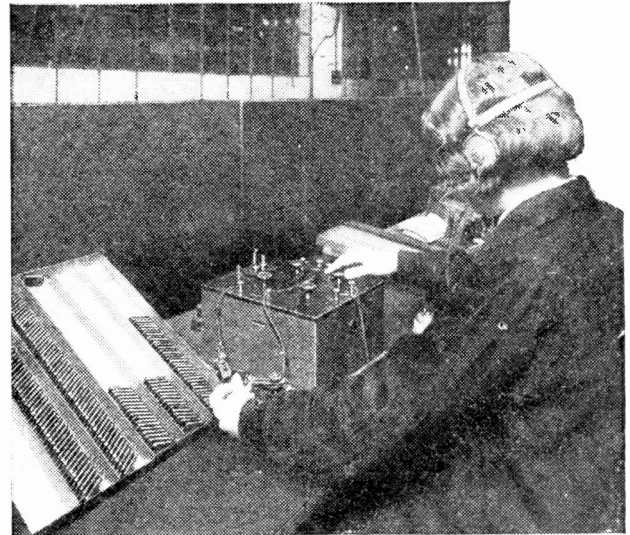
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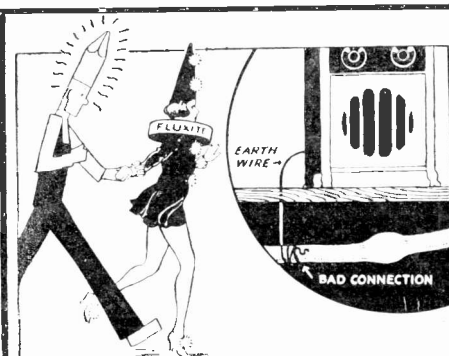
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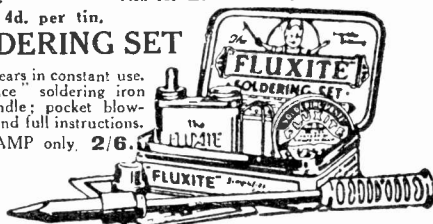


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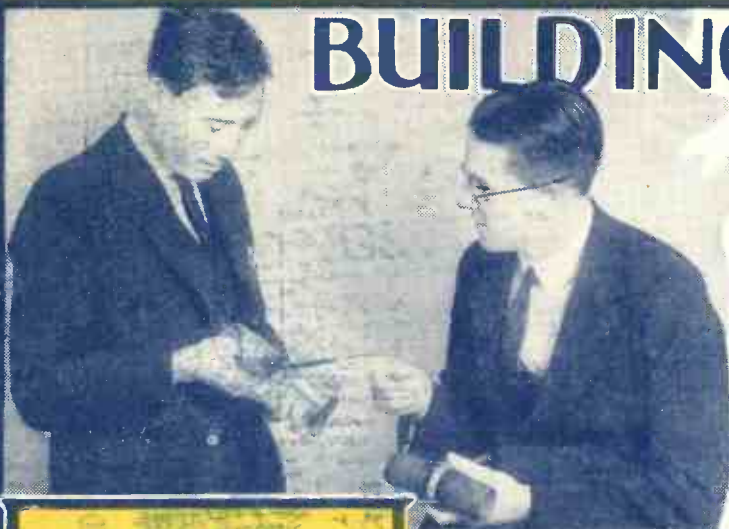
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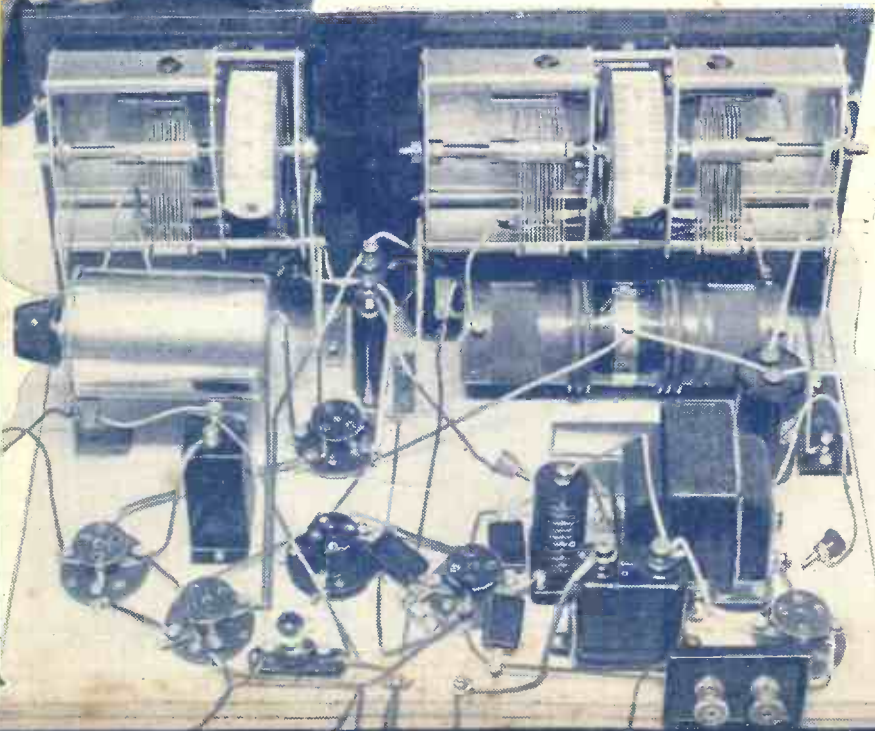
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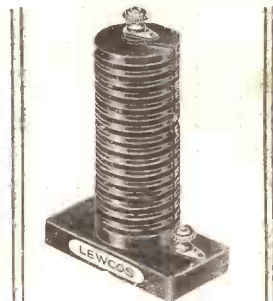
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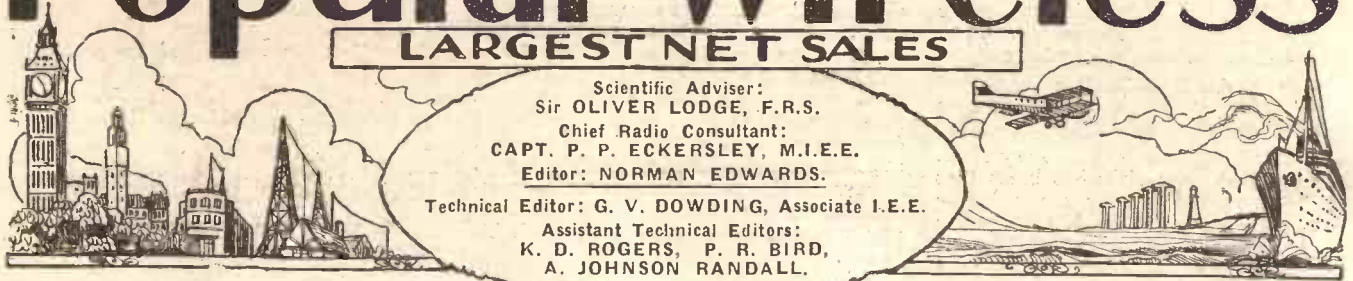
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**OUTDOOR RADIO  
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 A BUZZER PUZZLE**

## RADIO NOTES & NEWS

**LET'S WRITE  
 COMING EVENTS  
 CHASING THE SUN  
 ESCAPE**

### Outdoor Radio.

REAMS have been written about the joys of radio *al fresco*; portables have been sold by thousands and technical men have explained how radio may be fitted to a car. Yet in a day's march what evidence of radio outdoors does one see? Recently I made a trip to Winchester and thence through the New Forest to Bournemouth. I saw no car equipped, heard no loud speaker by the wayside (there were no L.S.'s in Winchester Cathedral, either, thank goodness!), none in the Forest nor on the beach. In a beach café I sat beside a seedy three-valver, badly home-made, with batteries in the last stage of decrepitude, and that was the only sign of radio I saw all day. Does anybody really want it out-of-doors?

### The Great Show.

IT'S really not too soon for a lot of you to be thinking about Radio Olympia, which is to be open from September 18th to the 26th, inclusive, bar Sunday. If in previous years you have not visited this show, you have missed a most enjoyable experience. Such a jolly crowd—school-boys, school teachers, lads of the village, sweet young things, old boys full of beans, smart and attentive stall assistants (sometimes), pa, ma, twins, lodger and young gal, scientist, "listener," coppers in mufti, Navy w/t operators, and over all a world of wireless wonders.

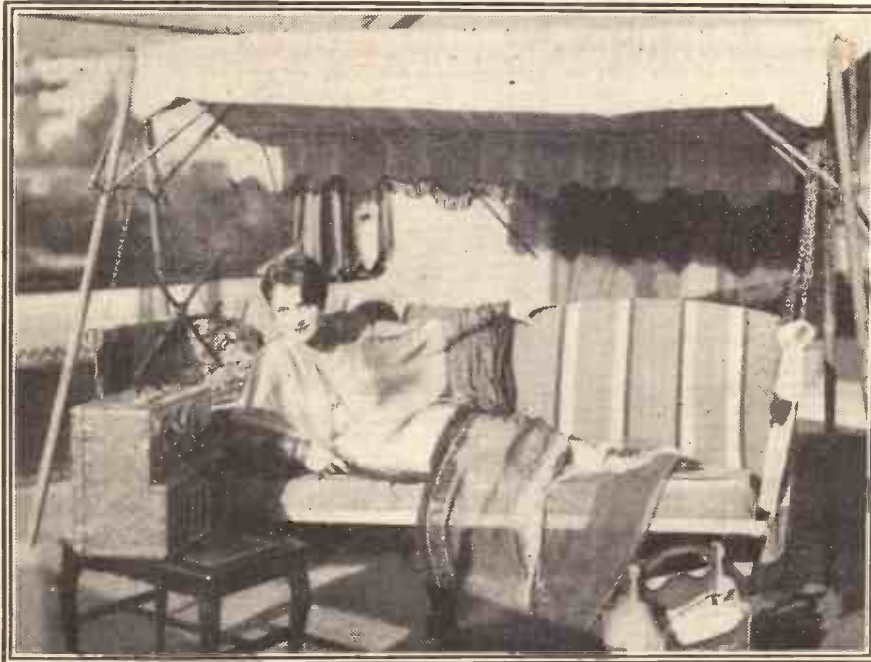
### Mass Attendance.

NOW I'll let you into a secret. (Scottish Regional please relay!). The entrance fee to Olympia for the National Radio Exhibition is 1s. 6d., but arrangements

have been made whereby parties of from 12 to 19 will be admitted for 1s. each, and parties of 20 and more for 9d. each. If you are fixing up such a mass attendance you should write to the Secretary, Radio Manufacturers' Association, Astor House, Aldwych, London, W.C.2, stating date of visit and approximate size of party. Then, when you get to Olympia, you should go to the R.M.A. office there and pay cash for

snappy article, fully descriptive and illustrated, on the "Lock-Tune" Four (4-valve, band-pass, single knob) by Mr. Rogers (who came out of his vacuum specially for this occasion). Then there is the "New D.C." Three, fully described, and oodles of other articles of general radio interest. You ought to buy the kids an ice-cornet apiece, and then treat yourself to this knock-out number!

### NO YAWNING UNDERNEATH THIS AWNING!



Miss Billie Dove, who appears in the First National Pathé pictures, is a great believer in radio as a mental stimulant and boredom-preventer.

the required passes. Make this dead secret known far and wide, please!

### Modern Wireless.

I OBSERVE "M.W." with the critical eye of an ex-editor of a wireless monthly, and I am bound to say that it gets better and better, like M. Coué's clients. In fact, it is so good that I have stopped telling 'em how, in my opinion, they ought to run it. The blighters have cut in and passed me! Their August issue contains a

Newry. Having perused this I have decided to take Counsel's opinion before I venture to dot another "i." Lor' bless me, these readers of ours weigh and measure every blessed word! bless em. B. L. points out that in our issue of August 1st Samuel Morse's daughter has her photograph, and that we say that she is 80 years old, and that her pa sent the first telegraphic message to her in 1844—which is 87 years ago. Well, it all depends when the lady was 80, doesn't

(Continued on next page.)

### Bravo, Glasgow!

TRAMS! Interference! That's the topic. The G.P.O. and B.B.C., etc., are still talking about interference, meanwhile Glasgow, having spotted the offending animals are replacing them by Fischer Bow Collectors, which—whatever they may be—don't interfere with radio reception. Glasgow—I take back all my Scotch jokes, and transfer them to Manchester!

I understand that even Aberdeen is cautiously experimenting along Glasgow's lines, and that Sunderland and Birmingham are following suit. (A blooming revolution, I call it!)

### The Microscopist.

I HAVE before me a charming letter from a jovial Irish person, B. L., of

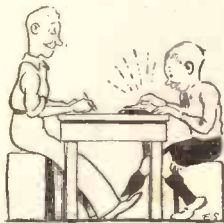


# "P.W.'s" RUNNING COMMENTARY ON RADIO TOPICS

it? Anyhow, if I carry this any further I'll be hurting somebody's feelings, don't you think? Let's shove it on to the printer again!

## A Buzzer Puzzle.

J. G. and R. S. W. (Nottingham), aged 17 and 14, write radiofully in eulogy of "P.W." "Comet"—not to say Ariel. They are such ultra-violet-hot hams that they are swotting Morse. Good young beans! Morse is the toilsome road to real radio interest. Up to 10 words a minute the way is rocky and monotonous; thereafter up to 15 w.p.m. it is positively dangsome, but from 15 to 25 is generally a cakewalk. But I haven't got to the buzzer puzzle part yet. They fixed up a circuit containing a battery, buzzer, tapping key, and two pairs of telephones all in series—and the 'phones were dumb.

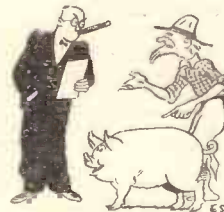


## Here's the Puzzle.

BUT when they "shorted" the telephones "out of circuit" they got the buzzer signals O.K. Their procedure is not quite clear, but one of the following explanations will probably fit. If the 'phones were taken right out of the circuit and shorted, the signals were due to induction between the buzzer circuit and the telephone circuit. If the telephones were shorted while still in the buzzer circuit—that is, merely shorted—the signals were due to leakage through the 'phones. I expect that the 'phones were removed from the circuit, however, and actuated by induction. Low-resistance 'phones would no doubt work better in circuit.

## Let's Write.

I KNOW that our post-bag generally contains a gem or two of the finest water, and that the B.B.C.'s is even richer in treasure, but that of the National Broadcasting Company (U.S.A.) is a Golconda—a King Solomon's mine of 'em. I have been able to hear something about them and was struck chiefly with the frankness of some of the love-letters addressed to pet "stars."



Then that was a beauty in which a farmer asked the N.B.C. to broadcast from coast to coast his offer of a three-legged pig for sale; this might be bracketed with the one from the Pennsylvania coalmines announcing that a mule had been named after a certain popular broadcaster. (However, we have our Mr. Crawford, and the gent with the iron bedstead.)

## A Layout Suggestion.

R. V. H. (Pewsham) kindly draws my attention to his method of ensuring an accurate layout when constructing from a "P.W." blueprint. His method is

simple, but may not have occurred to everybody. He uses a full-sized print and lays it on his baseboard from the dotted line backward and fastens it on with drawing pins. Then with a sharp pencil he pokes a hole through the print at the position of each screw socket of the components and makes a corresponding mark on the board. Removing the print, he places the components on the board in their indicated places, screws them down, and there is his layout.

## Coming Events.

PAUL ROBESON, a negro with a glorious singing voice, is due to give a recital of negro songs to-night (Thursday) which, he will sing divinely, if precedent is

## SHORT WAVES.

"Johnson Automatic Charger, \$5." runs an advertisement in the "Boston Post." We suppose that the power of the industrious ants charges the battery; in which case we will certainly try one with our portable when we have our next picnic.

## SPEAKER-BY-LAW.

Chattham Town Council has passed a by-law regulating the use of loud speakers. The by-law states that no person shall operate a speaker in such a manner as to cause annoyance or disturbance.

A henpecked resident complains that even this drastic measure has had no effect on his "in-laws."

A correspondent writes telling us of a prophecy of wireless which is to be found in "Paradise Lost," Book V:

" . . . when  
Cherubic songs by night from neighbouring  
hills  
Aereal music send . . . "

## ORDEAL BY WATER!

"I view with great trepidation the coming of the day when, by television, my morning ablutions at St. Albans will be reflected on a screen in New York."—The Bishop of St. Albans.

" . . . Then may no television spy  
Upon your bathroom's privacy.  
And though I am convinced it would  
Do Gotham quite a lot of good  
To see you, Bishop, sit and scrub  
In your chill, matutinal tub,  
May it be yours to end your days,  
Uplifting men in nobler ways.  
"Evening News."

anything. But how the dickens they can give a running commentary on the sheep dog trials in the Vale of Rydal I'm hanged if I can imagine, though the B.B.C. will supply the answer to-day. The running commentary on the St. Leger (September 9th. National) sounds more promising. If you like Jeanne de Casalis as "Mrs. Feather," look out for her on August 27th and you will hear St. Stephen as well—"St." meaning "Stainless"—full stop.

## "Chasing the Sun."

MEANWHILE, it is encouraging to look forward to what is described as a holiday revue, entitled "Chasing the Sun," by Denis Freeman, whose light productions are coming at nice regular intervals—which is down in the Regional programme on Friday, September 4th, with a repeat performance for National listeners the following night.

And we must not forget our old friend

Charles Brewer, and the good work he is still doing at Birmingham. I see that on Wednesday, September 2nd, he is putting on another of his intimate little entertainments. It is called "Elixir," and it contains sketches by F. Morton Howard.

## Television.

IT is stated that the Victor Talking Machine laboratories have brought television to the "crystal set and ear-phone stage" reached by broadcasting nine years ago. Hurrah! Perhaps in nine years from to-day I shall be able to get a set at the "four-valve" stage! On dit that a Brooklyn runner complained to his room-mate that his waking moments at night had been marred by the sight of pink rattlesnakes. He blamed television for the display. "Did they have top-hats on?" asked his mate. "I'll say they done!" he replied. "Then it ain't tallervision," assured his mate, "for I seen 'em myself before tallervision was invented!"



## For Music Lovers.

I HEAR that a comparatively new Italian opera, entitled "Love Triumphant," by Countess Marie Van den Heuvel, is promised as a feature of the autumn programmes. It has only two characters, soprano and baritone, and these will be played by Miriam Licette and John Morel, the well-known radio baritone, who performed the work a few months ago in Bath before the Italian Ambassador and his suite.

That first performance which was given with orchestral accompaniment was done in Italian, but the forthcoming broadcast version will be in English.

A selection of the songs and cries of old London are included in the London Regional programme on Saturday, August 29th. They will be rendered by Guelda Waller and Vera Loconochie. The cries include "Turnips and Carrots," "Primroses," "Knives to Grind," and "Chimney Sweep."

## "Escape."

IT is so seldom that we get a series of "talks" which are as thoroughly satisfying as "Escape" that I venture to refer again to this feature. These "talks" have all the virtues of fiction plus the added attraction of being true.

That given by the German on July 18th was excellent both in matter and delivery, and so was the one from Herr Herman Tholens. This gentleman was captured from the "Mainz" in 1914 and quodded in North Wales, whence he got a message to Germany asking for a submarine to be sent to his aid!



ARIEL.





# STATION FIXATION

**M**OST owners of wireless sets to-day indulge in some kind of calibration. Sometimes (like Molière's M. Jourdain, who discovered with astonishment that he had been speaking prose all his life) they calibrate unconsciously, not realising that the making of a simple list of a few stations with their condenser settings is worthy of so high-sounding a name; sometimes the process is very thoroughly carried out, the condenser settings being plotted against wave-lengths or frequencies in the most elaborate manner.

**Everyone Does It.**

But the eventual result is the same: the listener is able by means of his calibration chart to turn straight to the stations that he wants to hear. In the present article I am going to describe novel and very useful methods of making both lists of stations with their condenser settings and tuning curves covering the whole range of the coils in the set.

We will deal first of all with the simplest form of calibration which need terrify no one since it involves neither squared paper nor graphs. This is the plain list of stations that the set regularly receives, or should be able to receive, in which the dial readings are entered as soon as each particular transmission has been picked up and identified.

There are several methods of making such a table. Some people use the backs of old envelopes for the purpose, a plan which has much to recommend it on the score of economy, though it is sad to discover too late that the spill which you have just made and used to light your pipe contained all the facts and figures of your foreign station settings!

**Many Different Methods.**

Others employ neat cards which are carefully filled in and answer very well indeed in their first youth. But such cards are apt to get lost, and even if they don't they soon lose their pristine freshness.

My own method is one that will strike a familiar chord in the bosom of any artillery man past or present, for he will recog-

\*-----\*

"P.W." sets bring in so many foreign stations that you simply must have some kind of list to help you to remember the dial settings. And here are some topping ideas for simplifying your searching, and keeping all your foreign programmes easily available.

By R. W. HALLOWS, M.A.

\*-----\*

nise it as founded upon the traditional way of making pocket range tables.

During the war we had to carry about with us long and very elaborate tables concerning the performances of guns under all conditions of temperature, barometric

You will be wise to write in not only stations that you have logged, but also those which your set should be able to bring in. The tuning figures for the latter class you fill in subsequently as they are received and identified.

The columns suggested contain: 1, the wave-length in metres; 2, the frequency in kilocycles; 3, the name of the station and its rating in kws; 4, the reading of the first condenser; 5, that of the second condenser, if there are two dials.

**Column for Each Dial.**

Few modern sets have more than two condenser dials, but should there be a third, another column can be made. There is, of course, no actual need to put in the wave-length, the frequency, or the power rating of a station, but these facts are useful, as we shall see presently.

When all the details have been filled in on the linen paper strip, the exceedingly simple job of turning it into a portable tuning table is undertaken. About 1½ in. should be left blank at the top of the strip.

Apply a little seccotine, or some other good adhesive, right across the top edge on the underside. Then lay it on one of the pencils, wrap the paper round and stick it down firmly. Fix the bottom edge of the strip to the second pencil in the same way.

When the adhesive is dry, roll the strip tightly on to the first pencil until the second is brought close up against it. Then over the strip and the pencils slip the umbrella-ring. Your tuning table is now finished!

**Stations Found with Ease.**

You will soon discover how delightful it is to use. Hold it with the pencils lightly grasped between the first and second finger of each hand. Move the right thumb towards your body, allowing the pencils to revolve in the left hand. The strip unrolls from the first pencil and rolls on to the second.

The umbrella ring keeps the two pencils  
(Continued on next page.)

**DO YOU MAKE A LIST LIKE THIS?**

Metres	Kilo-cycles	Station.	No. 1	No. 2
1875	160	Huizen, 8.5 kw.	62	78
1725	174	Radio Paris, 17 kw.	56	70
1635	183.5	Königswusterhausen 35 kw.	52	65
1554.4	193	Daventry National, 75 kw.	49	60½
1445.7	207.5	Eiffel Tower, 15 kw.	43½	54
1411	212.5	Warsaw, 158 kw.	42	52
1352	221.9	Motala, 40 kw.	39	48
1200	250	Reykjavik, 21 kw.	29	37½
1153	260	Kalundborg, 10 kw.	26	34
1071	280	Oslo, 75 kw.	19	27

It's a good way of starting calibration, but there are more interesting and better methods, as explained in this article.

pressure, wind velocity and so on. They had to be of pocket size, durable and adapted for easy and quick reference.

Such things were readily contrived with the aid of two ordinary lead pencils, a strip of the paper known as architect's waterproof linen, and an umbrella ring. The handiest of wireless tuning tables can be made in exactly the same way.

The strip of paper required is about 5 in. in width, and from 12 to 24 in. in length, according to the number of stations that are within the range of the receiving set. Rule off your strip lengthwise into columns as indicated in the table, Fig. 1, and fill in the names and particulars of the stations that you wish to include.



## STATION FIXATION.

(Continued from previous page.)

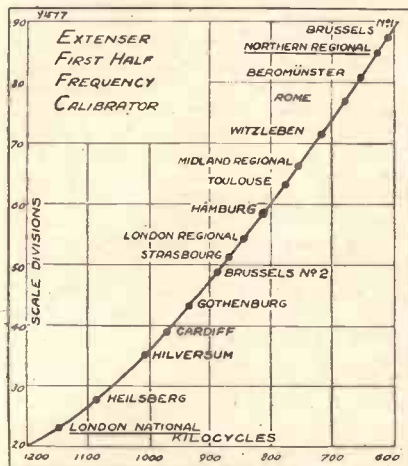
in place and parallel and prevents the linen strip from slackening. You will find that you can turn into view any station with its particulars in a second or so. Could there be anything handier or more convenient ?

If you have a typewriter, the names of stations and their particulars can be typed on to the linen strip, otherwise you can write them in neatly, or you can prepare the table in manuscript on ordinary paper and have it typed on to the strip at small cost by any typewriting bureau. Whether it is written or typed, see that the table is thoroughly dry before you roll it up, otherwise it may smudge.

### Where the "Extenser" Scores.

This system works splendidly with the Extenser, the readings being shown straight through from 200 at the top to 0 at the bottom, or, rather, from the reading of the longest-wave station logged to that of the shortest. With ordinary condensers, used

## PLOT THE FREQUENCIES



Here is the lower end of a typical Extenser curve—they are the simplest to draw, for the long-wave stations come in at the top of the same straight line.

in conjunction either with two sets of coils or with combination coils and a wave-change switch, long-wave and short-wave readings between 180 degrees and 0 degrees (or 100 and 0 divisions) are shown.

The reader who likes to keep his wireless as simple as possible may wonder why I recommend the insertion of the wave-length, the frequency, and the power rating of each station. Here are the reasons :

### "Nabbing" the Newcomers.

If your table contains the wave-lengths in metres of stations that you have picked up you will never have much bother in logging new powerful stations as they come into operation, or existing ones which, though previously unreceivable owing to their small power and long range, presently blossom out into super-power giants.

Suppose, for example, that a big new station began to transmit on 1,250 metres, you could turn to it almost instantly after referring to your table. From this you would

see that its condenser settings must lie between those of Reykjavik and those of Motala. The field of search is therefore narrowed down to something quite small.

Even if you haven't logged Reykjavik, the band between Kalundborg and Motala is not a wide one. The wave-lengths, therefore, are of very great help.

But why frequencies as well ? These enable you to judge at once whether or not stations are too close together for your set to be able to separate them.

### The Limit of Selectivity.

On the long waves the ordinary set will not separate stations whose channels are less than 12 kilocycles apart, whilst on the medium band 10 kilocycles is the general limit. Unless, therefore, you possess a receiver of abnormally high selectivity you cannot hope to receive stations working with a smaller separation.

It would be useless, for example, to try for Warsaw if the Eiffel Tower were working and *vice-versa*. The power rating figures help you to form a pretty good idea of the sensitiveness of your set and of the distances covered by high-, medium- and low-powered transmitters.

We can pass now from range tables, which are lists of stations with their condenser settings, to calibration charts, which are curves drawn on squared paper showing the condenser settings required for any wave-length or frequency within the tuning range of the circuits. Is calibration best done in wave-lengths or in frequencies ?

### Metres or Kilocycles ?

That depends upon the type of variable condenser in use. If you have straight-line wave-length or square-law condensers then you will find it best to calibrate in metres, since this will give you the nearest approach to a straight line. Straight-line-frequency condensers should be calibrated in kilocycles for the same reason.

The logarithmic condenser has the outstanding advantage that you can calibrate it according to your preference in metres or in kilocycles, obtaining something very like a straight-line curve in either case. The Extenser belongs to this class of condenser, and if you look at Fig. 2 and Fig. 3 you will see how very flat both the frequency and the wave-length curves are.

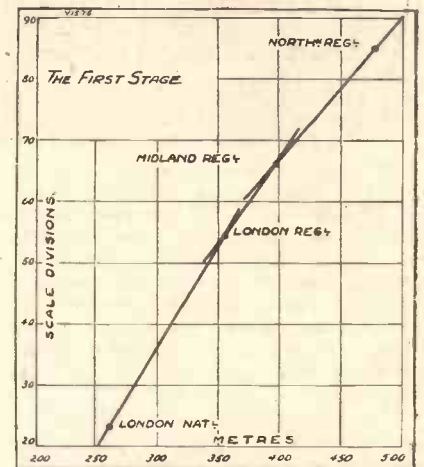
Probably the majority of readers think

producing a good calibration chart to work on paper whose squares really are square.

The best kind of material is that ruled off into large squares with one-inch sides, each of these being sub-divided into a hundred little squares with tenth-of-an-inch sides. This is obtainable from almost any stationer.

Starting at the left of the bottom edge of the paper mark off a scale of metres. The vertical line which forms the left-hand border may represent 200 metres, the next one, one inch to the right, 250, the next one 300, and so on, until you reach the eighth heavily ruled vertical line, which is marked 550 metres.

## HOW TO START IT



By plotting three or four of the main stations an approximate, but very useful curve can be drawn.

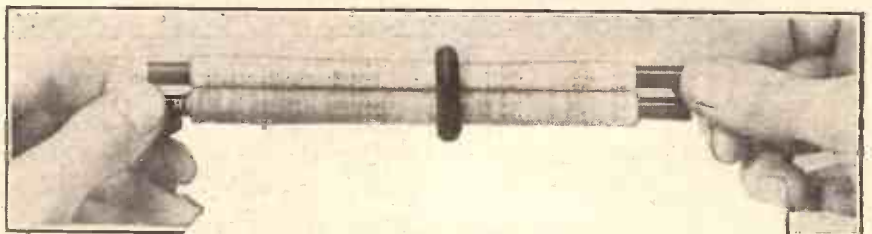
The sides of each large square thus represent 50-metre divisions and those of each small square 5-metre divisions. Going back to the left-hand border of the paper, mark the bottom horizontal line 10 or 20 and then go up by tens to 90 or 100 or 180, as the case may be.

### A Rough Graph First.

Those who live in this country are very conveniently situated for calibration purposes, since on the medium wave-band high-power transmissions from stations which keep accurately to their wave-lengths are available at both ends of the scale and in the middle of it.

Near the bottom of the scale we have the

## A PAIR OF PENCILS AND UMBRELLA RING!



Wind your list on one pencil as you unwind from the other, and so keep it clean and tidy. You ought to try this scheme!

in wave-lengths, so we will consider first of all the making of a calibration curve in metres. The only materials required are some sheets of good quality squared paper, a sharp-pointed pencil and a ruler.

Do not buy common graph paper, which is usually very inaccurately ruled. That of good quality is quite inexpensive and it makes all the difference to one's success in

London National on 261.3 metres, at the top there is the Northern Regional on 479.2 metres, whilst in the middle are the Midland Regional on 398.9 metres and the London Regional on 356.3 metres. These provide all the data required for making the first rough calibration, and later we will carry on with a full description of the actual work of calibration.



# Examinations for Broadcasting

## *A Suggestion*

BY CAPT. P. P. ECKERSLEY M.I.E.E.

EVERYBODY is aware of my desire to help forward the development of broadcasting. My suggestions are numerous, my enthusiasm never called in question, my advice free and valuable. Pursuing my well-understood rôle of helper and public adviser to the B.B.C., I am outlining an idea which is so simple and so practical that it, at least, should receive serious consideration by the authorities.

I realise that much that I demand is, from the B.B.C. viewpoint, impractical because it is idealistic. Here at least is something simple, concrete and practically helpful.

It is obviously more and more important that the B.B.C. should be staffed by the right kind of people. The B.B.C. is nearly a Government department now, and its responsibilities to itself are therefore greater as its activities and scope increase.

There is a special examination for candidates for the Civil Service, why not a special examination for applicants for appointments in the B.B.C.? That is the idea! I will make the idea clearer yet and will give, for the benefit both of intending applicants and examiners, a specimen paper thus:

**British Broadcasting Corporation.**

**GENERAL EXAMINATION, 1½ HOURS.**

Candidates must write on one side of the paper only, and number each answer according to the number of the question.

**General Knowledge of B.B.C. Ideology.**

QUESTION I.—In a conversation with a senior member of the staff it is your duty to interspace your replies to questions with the address "sir." How many times per 100 spoken words would you say "sir" when speaking (a) to the Chairman, (b) to the Director-General, (c) to the Controller (d) to the Secretary of the Sports Club? How in this connection would you address the Lady Governor?

QUESTION II.—If you were paid less than £500 per annum and were not allowed to have a secretary in your office, although you had an office to yourself and three weeks' holiday per annum but no Christmas bonus, and you met the Director-General (a) in the lift at 9.40, (b) at the Royal

There is some sound commonsense behind our Radio Consultant's piquant humour in this provocative article. And readers will enjoy his sly digs at certain aspects of the present B.B.C. organisation.

Enclosure at Ascot, how would you start a conversation?

QUESTION III.—Which do you consider the means to quickest promotion in the Corporation: Expressing a great interest in religion, being an active member of the sports' club, acting in the B.B.C. Dramatic Club productions, or being related to people with titles?

**Personal Examination.**

QUESTION I.—Are you a gentleman? (Not more than 1,500 words.)

QUESTION II.—If you were ever to have an office to yourself and a secretary in a

room adjoining, and freedom to have your office decorated according to your taste, how best would you indicate business efficiency and artistic soul?

**Physical Fitness.**

QUESTION I.—Are you, in case of having made a mistake, able to stand at attention for half to three-quarters of an hour?

QUESTION II.—Can you put up a good show at Rigger if (a) you have worked in the office during normal hours for 5½ days, (b) you have been in constant attendance in the ventilated studios at Savoy Hill? If (b) explain how you explain this and give any particular physical peculiarity you may possess.

The following question need be answered only by those who are candidates for either the engineering or the programme staff, or those who are candidates for the balance and control section.

QUESTION A.—If connecting a one microfarad condenser across a loud speaker makes a string orchestra sound like a military band, would connecting an inductance in series with the loud speaker make a military band sound like a string orchestra? If so why and what value?

QUESTION B.—If F. be the fame of a speaker and T. the time you would allow him to go on speaking after the next item is due to start (or commence), and if P. be the popularity of the item as mentioned, express T. in terms of F. and P., giving limits within which the equation may be said to be substantially accurate.

QUESTION C.—When referring to office accommodation, what does the controller mean by bulkhead and thwartships? Illustrate your answer with a diagram.

Every candidate must attempt the following:

QUESTION V.—Write an essay (1,000 words) on either "The influence of broadcasting upon the gentility of the common people," or "Should alternative programmes be designed to enable listeners to escape what they do not want or choose what they do?"

QUESTION VI.—What did the American reporters mean when they described Sir John Reith as the Czar of Radio? (Not too witty.)

It's very easy, very practical, and—I mean—why not?

**NOT OSCILLATION!**



"Little Tweet" and his mistress, Miss Betty Auckland. He has been "billed" to broadcast, and it is to be hoped listeners did not confuse his cheerful twitterings with the "chirrup" of the human radio canary!



THE MIRROR OF THE B.B.C.

**BROADCASTING HOUSE  
TOO SMALL!**

**THE NEWCASTLE AFFAIR—  
MRS. SNOWDEN AND MORN-  
ING TALKS—DRAMA, SUMMER  
AND AUTUMN.**

THE storm about my exclusive disclosure of certain facts concerning Broadcasting House has now at least partially subsided. I am glad the B.B.C. thought better of sticking to denials that could not be supported. Apparently it was construed in the beginning that I was attacking the judgment and capacity of the Civil Engineer in charge of the job for the B.B.C.

This, of course, was not the case. Nobody was attacked; least of all the official in question, for whom I have the greatest respect and admiration, and who had, no doubt, to make his plans according to the space available, which has now proved to be quite inadequate. Now that it is admitted that additional premises are being taken in Portland Place, next the main site, it is obvious that my main point about Broadcasting House not being big enough was the truth.

Also, I observe that the question whether some members of the staff will have to work in artificial light in one or other of the floors underground has not yet been decided.

The third point was that Savoy Hill would not be entirely vacated. Although naturally the B.B.C. will try to get clear of Savoy Hill and its other buildings, it is by no means certain that this will be possible.

So there we are, and one cannot exclude some reflection of surprise at the attack of "nerves" which my simple statements of the truth produced.

**The Newcastle Affair.**

The effect of the attempt to put Newcastle and North Regional on the same wavelength was not gauged in advance with the characteristic accuracy and caution of the B.B.C. engineers. The mush area turned out to be much more widespread than was thought likely.

The error of calculation rather emphasises the high standard of accuracy in forecast which has applied to anticipations of the effects of such changes as the introduction of 5 X X, 5 G B, the change over of old 2 L O from Marconi House to Oxford Street, and then the move to, Brookmans Park with the twin transmitters, and lastly the introduction of the North Regional transmitters. All went very closely to plan.

The other point about the Newcastle experiment was the decided preference of local opinion for London programmes instead of North Regional programmes. The result will mean probably the permanent relay status of Newcastle, with the gradual demobilisation of what remains of the programme staff and headquarters there. There is no chance of the granting of a separate wave such as 200 metres.

**Mrs. Snowden and Morning Talks.**

Mrs. Philip Snowden, whose interest in broadcasting as one of the Governors of the B.B.C. is much greater than what the

general public know of her work inside and outside Savoy Hill, is undertaking a conscientious task on Monday, September 7, when she will introduce to listeners the autumn programme of morning talks.

Morning talks were started some two or more years ago as an experiment to discover what demand there was among housewives to know more about the thousand and one things which affect their daily lives in the home and outside. The demand was instantaneous. Women simply clamoured for them, and long before the experimental period was finished the B.B.C. realised that morning talks had come to stay.

**What's In the Papers?**

Much of the credit for starting these talks must be given to Miss Elsie Sprott, whose duties at Savoy Hill have now been extended by her promotion from the Talks

Department to the Information Staff, and the autumn programme will include a series by her on "Cookery for Beginners." Another new feature will be a weekly summary under the title of "What's in the Papers."

**Drama—Summer and Autumn.**

Whether or not we shall notice it I cannot say, but the B.B.C.'s summer season of drama finishes on Tuesday, September 1st, for the autumn season to start on the following Saturday. Only two plays remain for the summer period, namely, Lord Dunsany's "If," which is to be revived on Monday, August 24th (National), and the following night (Regional), and "The Romantic Young Lady," Martinez Sierra's comedy, to be heard on Monday and Tuesday, August 31st and September 1st, National and Regional respectively.

**THE KING'S HOSPITAL BROADCAST**



His Majesty delivering the inaugural speech at the opening of the King George V Hospital at Ilford.

**"Consider Your Verdict."**

Lawrence Housman's jury play, "Consider Your Verdict," with which the autumn season begins, is a more serious type of radio production, and like practically all plays it will have two performances, Monday and Wednesday, September 7th and 9th, being the dates allocated to it. Next comes E. M. Delafield's new comedy "To See Ourselves" (September 14th and 15th), to be followed by Compton Mackenzie's play, "The Lost Cause," which deals with the "Young Pretender," on dates yet to be announced.

**FOR THE LISTENER**

By "PHILEMON."

Our popular contributor is now abroad, and this week he throws an interesting side-light on radio in Italy.

WE are in Italy at last. Beetle has brought us safely over "the highest pass in Europe"—Beetle being the car.

We call him Beetle because he is black. By the time he got here, he was more white than black; for the Italian roads are thick with dust. If a car overtakes you on the road, you may quite easily go to heaven, like Elijah, in a cloud, if there is a precipice handy.

The only thing is to pull up and wait. On some roads you would be glad to wait for ever; for these Italian roads just now are the worst ever. However, we're through.

I wrote quite a lot to you last year from here. But my portable set is not the miracle she was a year ago. These peasants have become almost blasé in the matter of radio. They have an enormous set at the local

pub. It seems to occupy the whole of a long table in the room where they eat.

This set, and not my portable, is now the "big noise." There is no doubt about the noise. You could dance comfortably to the music half a mile away; more comfortably indeed than in the same room with the set.

**Jazz for the Jaded.**

It is always dance music. They seem to want nothing else. The people here work from dawn to dusk; and then they want to dance, or to sit around and watch others dance.

The Italian programmes are not varied enough to be popular. After eight o'clock it is usually Opera. Jaded working-people don't want Opera—not every day.

(Continued on page 751.)





# CAPT. ECKERSLEY'S QUERY CORNER

## CAUSE OF DISTORTION—EFFECT OF COIL ON SELECTIVITY.

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

### Cause of Distortion.

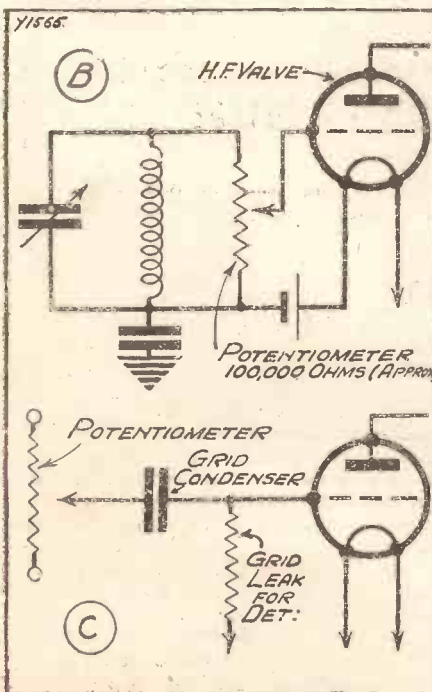
T. J. K. (Glasgow).—"Do you consider that the following is due to the overloading of my last valve, or to some other cause?"

"My set (det. and R.C. trans.) gives quite good results on a normal loud-speaker output. When receiving the local station, a milliammeter joined in the plate circuit of the last valve kicks violently in an upward direction, irrespective of the grid bias setting.

Of course, if the valve is biased until signals are only at fair loud-speaker strength, then the needle ceases to kick, but the quality is terrible."

I fail to reconcile your two statements: (1) My set gives quite good results on a normal loud-speaker output; (2) If the valve is biased until signals are only at fair loud-speaker strength... the quality is terrible.

### POTENTIOMETER "PICK-OFF"



Two useful methods of varying volume.

But do I take it your sufferings occur only when you tune in to the local station? If so, I suggest that high frequency is leaking past the detector and becomes a strong component of the disturbance fed to the last stage of your set.

This high frequency component may be very strong on the local station and yet as it will always be relatively as strong on distant stations it is always harmful. Two things require to be done, I think.

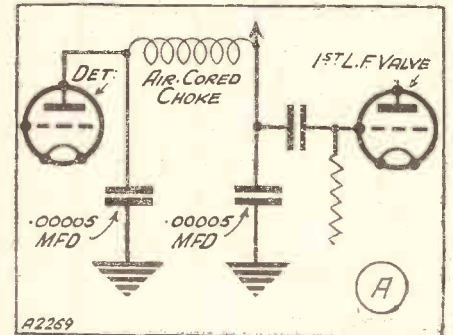
(a) Introduce a high-frequency filter between detector and first L.F.

(b) Use some method of making the intake of high frequency less generous when tuning to the local station. As to (a)—try the scheme shown and marked (A). Similarly, the diagram marked (B) shows an input regulator. Varying the potentiometer "pick off" will vary the sensitivity of the device and you will not saturate the detector. If you have no H.F. valve use a potentiometer again, but feed in from the potentiometer to the condenser as at C.

resistance in series and really the circuit is like Fig. 2.

When the circuit is in resonance it has a high impedance and a higher voltage appears across it than when it is of lower impedance because of the resistance  $R_s$ . But  $R_s$ , if

### AN H.F. FILTER



This arrangement keeps the H.F. impulses out of the L.F. amplifier.

### Effect of Coil on Selectivity.

M. W. (Norwich).—"My interest in wireless is mainly to "log" as many stations as possible and, with this end in view, I employ a highly efficient one-valve receiver and a large outdoor aerial.

Although my large aerial is an aid to sensitivity, I find that it does not assist selectivity and this is especially troublesome with stations that appear at the lower dial readings of my .0005-mfd. tuning condenser. I use only one aerial coil with which I can tune to nearly 600 metres.

Would any gain in selectivity accrue from employing a selection of smaller aerial coils and, if so, why?"

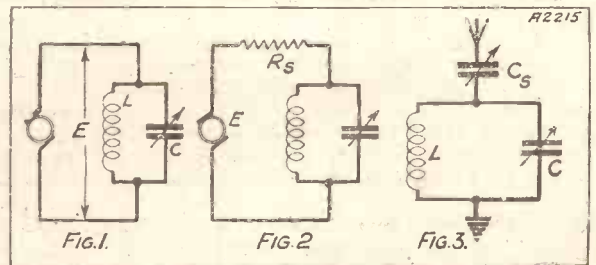
You can re-draw your circuit something like Fig. 1, where E is the alternating high frequency signal and L.C. is your capacity-inductance circuit.

If there is no resistance in series with E or lots of power as it were, the voltage across the inductance does not vary with the tuning condenser at all, it is proportional to the frequency and the inductance and E only. But there is some effective

big enough, may give selectivity but not sensitivity. You could increase selectivity by inserting series resistance—the best way is to insert a series condenser (variable max. 0.00025, say) in the aerial as in Fig. 3. The circuit then becomes series tuned,  $C_s$  being with that part of the inductive reactance of L, not cancelled by the capacitive reactance of C.

If  $C_s$  is small, C becomes large and vice versa. You will find an improvement in selectivity if you adopt the proposed arrangement.

### WHEN USING A LARGE AERIAL



Sharpening the tuning by using an extra variable condenser in the aerial lead.



## LATEST NOTES FROM THE NORTH

By OUR SPECIAL REPRESENTATIVE  
Theatre and B.B.C. Co-operation  
—New Leeds Premises—Bad An-  
nouncing—The Newcastle Ex-  
periment.

WHEN the first act of a revue at a North of England theatre was broadcast in the North Regional programme recently the curtain was deliberately held down by the stage manager for seven minutes, while the announcer in London read the fat stock prices.

### Real Co-operation.

It had been arranged between the B.B.C. and the theatre management that the broadcast excerpt was to commence at the beginning of the act, but, unfortunately, the previous item in the evening's broadcasting considerably overstepped its time.

An official of the B.B.C. sat in the wings of the theatre listening on a portable set and headphones. For seven minutes the entire theatre was kept waiting, then the prices of porkers came to an end, the official gave a prearranged signal to the stage manager, the curtain rose, and the broadcast commenced.

I tell this story because it is an example of the extent to which theatre managements are co-operating with the B.B.C. in the North. Since alternative programmes started from Moorside Edge the regional programme organisers have depended tremendously on relays from external sources.

Neither the National programme nor any other provincial region has anything comparable, either in quantity or style, with this series of relays from theatres, seaside concert parties, and external orchestras, and it is interesting to find that the people from whom these broadcasts are taken are so eager to go to trouble to make the broadcasting a success.

### Good for Business.

I know of one northern theatre where the bookings jumped up phenomenally after an excerpt had been broadcast. The publicity value of broadcasting is one reason behind the keenness of the promoters, and another is that they are sincerely eager to "make a good show" on the ether, partly on account of rivalry with other concerns, and partly because these hard-headed northern business men apparently believe in broadcasting.

This is what the manager of the fine Spa Orchestra at Scarborough said to me: "By allowing its concerts to be broadcast the Spa is contributing towards the inevitable, if gradual improvement of public musical appreciation which broadcasting is achieving, and this, in the long run, will be to the good of every musical organisation."

Whether the North Region's elaborate "O.B." scheme is worth all the trouble and expense has been questioned. Some of the relayed programmes have been below par, but generally speaking, my impression is that listeners in the North place a high value on the "O.B.'s."

Critics in London who hear the Northern

programmes should beware of hasty judgments. Firstly, they should not (as some have done) judge the broadcasting capabilities of the North on a single programme. Secondly, they should remember that the Northcountryman has very different tastes from those of the Southerner.

There are many London programme features, especially in the vaudeville programmes, which are appreciated in the South and despised in the North!

### In the Winter.

At the end of the summer season a good many of the external sources will dry up, but I learn that arrangements are being made for a considerable number of relays from northern theatres during the winter.

There will, however, be more studio work in the North Regional programmes than there is just now. The broadcasting of long plays, which has been deliberately held up during the summer, will recommence. One of the plays to be done will be J. L. Hodson's war play, "Red Night."

Part of the equipment at the new Broadcasting House, Leeds, will be a dramatic control panel, which will enable modern technique to be used for play production at the Yorkshire broadcasting centre.

### New Leeds Premises.

It is unlikely that the B.B.C. will go into the new premises at Leeds until October or November. Extensive alterations must be carried out to the old Quaker Meeting House which is being taken over. The one-time meeting hall will make a fine concert studio.

There will also be a talks studio, and the building will house the "S.B." distribution centre for the North. The landlines will be

## HIGH-POWER AMPLIFICATION



When public-address loud-speaker apparatus first came into vogue, the amplifier looked much like an ordinary receiving set. Now it looks more like a complete high-power transmitter, as you can see from this photograph of special amplifiers for outdoor loud speakers.

transferred from the present premises in Basinghall Street to the new Broadcasting House.

### Famous Artists.

The present Leeds studio, dating from 1924, is totally inadequate for modern needs. When Olga Haley, the soprano, sang in the North Regional programme's series of weekly recitals by famous Northern artists, she travelled to the Manchester studios, although she lives on the outskirts of Leeds. Evidently the Leeds studio was considered unsuitable for a singer of such eminence.

These recitals are going a long way to prove what good talent there is in the North of England. Frank Mullings (tenor), Isobel

Baillie (soprano), Edward Isaacs (the blind Manchester pianist), Harry Mortimer (chief clarinet of the Hallé orchestra), and Kathleen Frise-Smith (the Leeds pianist) are among those who have been heard. All the artists in the series will be people actually residing in the North.

### Bad Announcing.

There has been some bad announcing from the London end since the Moorside Edge transmitters came into service. The announcers at Savoy Hill should be reminded that their voices are now relayed by two powerful transmitters, North Regional and North National, serving a highly populated area.

The North National transmitter relays the London National programme, but when this programme closes down the announcer says: "The London National transmitter is now closing down, but there will be dance music from Daventry . . ." He does not mention the North National transmitter, which, I submit, is as important as London National, and whose listeners should be told what is happening.

Likewise, when the London, Midland, and North Regional transmitters give the same programme the announcer sometimes announces it as the "London and Midland Regional programme."

### In Scotland.

It has been suggested in certain quarters that the B.B.C. is considering the erection of a relay station in Northern Scotland. I am able to state definitely that no plans will be formulated by the B.B.C. until the Scottish high-power transmitters are in operation next year. Meanwhile, good progress is being made with the constructional work at Falkirk.

### The Newcastle Experiment.

As Captain Eckersley had predicted in POPULAR WIRELESS, the B.B.C.'s experiment of synchronising Newcastle and North Regional on a wave-length of 479 metres was not a success—at first. An official statement issued by the B.B.C. admits that during the first few days of working under synchronised conditions the result proved less satisfactory than was hoped, due to some extent to difficulty in obtaining and maintaining an exact synchronisation of the two transmitters concerned.

I have heard, in fact, from listeners in such districts as Teeside that the North Regional programme has been accompanied by a "burble" which made the programme entirely useless for listening.

The B.B.C.'s announcement states, however, that closer synchronisation has now been obtained with a corresponding improvement in reception conditions. Tests are being carried out at various distances and in various directions from the Newcastle aerial in order that the area in which satisfactory reception is obtainable may be ascertained definitely.

"Whether or not the present experiment can be made a success and be adopted as a permanent arrangement cannot be decided immediately," says the B.B.C.



"P.W." readers will remember an exclusive interview with Professor Esau, of Jena, Germany, which appeared some years ago, when he spoke of his new development of Ultra-Short Waves.

Since that time a lot has been done, and only a few months ago the German press got to hear of the U.S.W. and head-lined them into the sensation of the season.

Now what are U.S.W.? Very simple, just what their name tells you, —short waves—only

more so. They range from somewhere about 3 metres to about 10 metres.

And please realise that in that wave-band of 7 metres there is room for all European broadcasting stations and some more, with double the number of kes. between each.

**No Atmospherics!**

No wonder articles appeared telling trusting readers that here was the way out of all difficulties. U.S.W. are not interfered with by atmospheric or other disturbances. The only source of interference is the spark plugs of our motor-cars, but luckily they only interfere within a radius of some 40 ft. from the car.

U.S.W. in a great number of ways resemble optical rays. The moment you are at a certain distance from the transmitter they fade out completely unless you climb up on to a hill where you get them again.

They seem to have no reflected ray, so that their service area is extremely small, only something like 10 miles. Which means that you can place a number of U.S.W. transmitters very close to each other, can operate them on practically the same wave-length and still have no disturbance.

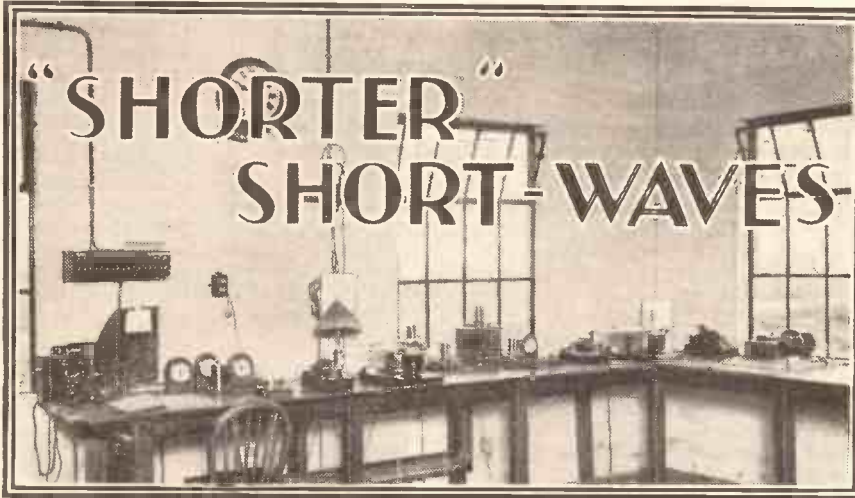
Now let us go ahead and cover the whole of Britain with a net of U.S.W. transmitters; there will be no disturbances, no atmospherics, no fading whatever.

It will be possible to erect two or three U.S.W. transmitters in a large town, like London, Manchester or Birmingham, and furnish listeners with a twin or threefold programme. As disturbances are greatest in large towns this additional broadcast service would no doubt prove of great value.

**Limited Range.**

Tests have been going on for years and we know that steel and iron have screening effects, it is therefore suggested that a transmitter be erected at a good height in the centre of a town to get big range with comparatively low power, for U.S.W. can only be heard as far as, theoretically speaking, one can see.

Then television experts will pounce upon U.S.W. as they



casting is possible by means of these waves, as long as we take their limitations into consideration. In Berlin already three transmitters are at work. One operated by the Reichspost, one by the Lorenz Co., and one by Telefunken.

The Reichspost intend making television experiments very shortly with their U.S.W. transmitters. The transmitters operate on wave-lengths between 6 and 8 metres, and the public, notably keen amateurs, are

making reception tests.

A three-valve set will do it easily, and on the loud speaker. And what is more, any existing three-valver will do it, that is, the two-valve L.F. part will.

But the detector circuit will have to be home-made. Now I see eyes all aglow, but I am sorry, I'll have to put a damper on.

**Broadcasting in Berlin.**

There are three U.S.W. transmitters broadcasting in Berlin at the moment, but as far as I know none in London. But here are some details as to how the Germans are building their U.S.W. adaptors.

A common or garden detector circuit with reaction is used with some special additions. The aerial, which can be 100 ft. or 10 ft. in length, is of the normal type.

It is necessary to insert resistances of from 300 to 500 ohms in the aerial circuit to make the set as free as possible from capacity effects, if the aerial should move, or anyone approach the down lead.

Reference to the accompanying diagram will show further modification. The anode current is passed through a variable resistance of some 30,000 ohms as reaction control has to be effected by variation of the anode voltage.

The grid and reaction coils consist of only a few turns of copper band and the condensers are of extremely small capacity, so more or less everything has to be home-made.

There is one other phase I would like to draw your attention to, and that is, point-to-point communication over short distances. This is even more important than it seems at a first glance.

**Quite Portable.**

An Ultra-Short Wave transmitter working with ten or even one hundred watts is, unlike his larger brother, quite a portable and inexpensive affair.

And already Alpine clubs have started developing a portable set by means of which it will be possible for a section of guides looking for lost climbers to communicate with their base. So perhaps the time is not so very far off when we will be able to take our portable telephones along with us!

**FROM  
A SPECIAL CORRESPONDENT.**

Recent developments in the ultra-short-wave field have revealed that the extremely high frequencies are very useful for short-distance services. In Germany, the experts are endeavouring to use them for broadcasting purposes, and as their range is only, broadly speaking, as far as one can see, they are almost ideal for local Relay Stations. And in this article our contributor deals very fully with their possibilities in this direction.

permit of very wide frequency bands being used for modulation, and thus television with good quality pictures is a step nearer.

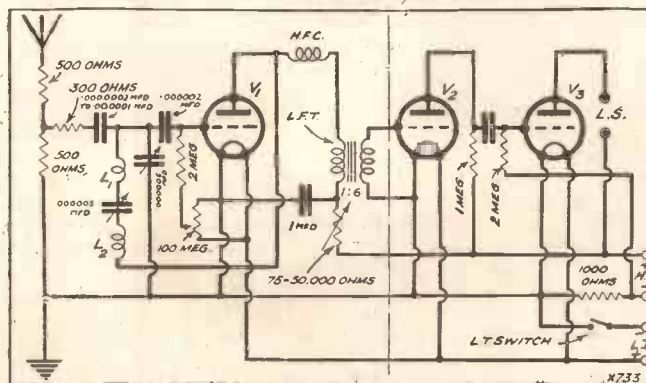
**German Pioneers.**

Ultra-Short Waves, it will be seen, are not going to oust our present high-power stations, at least not for the moment. Perhaps somebody may discover that U.S.W. have a reflected ray, and then they will also have greater range.

Now that is about all I have to say of the transmitting side of the affair: Ultra-Short Waves have been developed in Germany by a number of large firms, by university professors, and by the Reichspost.

It can be said, therefore, that broad-

**AN INTERESTING CIRCUIT FOR  
THE HIGHER FREQUENCIES**



This circuit has been specially developed for operation on waves below 10 metres, and is characterised by the heavily damped aerial and very low condenser values.



## TELEVISION GETTING NEARER?

By G. B.

Some of the greatest radio organisations in America are determinedly attacking the problems of television, and it appears that important developments are imminent.

**M**ORE and more television rumours continue to reach us from the United States, and they seem to support the idea, now pretty prevalent in this country, that America is gleefully preparing a television surprise-packet. Of course, the newspaper accounts we have read have included a plentiful sprinkling of "wonderfuls," etc., and the word "revolutionary" has been used *ad nauseum*; but behind all the verbal exaggeration there seems to lurk a germ of fact which, in itself, is of definite interest.

### Something Revolutionary?

There seems to be no doubt that research workers in the U.S. have been tackling the television problem with deadly seriousness, and that, allowing for optimistic exaggeration, really substantial progress has been made, especially by the Radio Corporation of America. Money seems to have been spent like water, but whether the results obtained by this out-pouring of cash on research work have included a "revolutionary" discovery it is as yet too early to say.

We understand from several of our reliable correspondents in America that the Radio Corporation people have been concentrating on an improved cathode ray scheme, and that ultra-short waves play a very important role in the method now being evolved.

Of course, the cathode ray idea is not new; and ultra-short waves have been tried before. But in both cases there has always been room for much improvement,

and it may well be likely that the Radio Corporation engineers have cleared up many minor problems and in doing so produced a television system with a reasonably commercial appeal.

Promises have been made that a greatly improved television set will be on the market before twelve months are out, and preparations are being made to convert America to visual wireless. The main idea at present is to reduce the high cost of television so that thousands and thousands of people may be able to instal receiving sets.

### New Station.

Newspaper accounts seem to confirm this view. The "News-Chronicle" stated the other day that New York is preparing to enter the television age with a flourish, and that the National Broadcasting Company has already obtained permission from the Government to build a 5,000-watt station on the top of the Empire State Building.

It is reported that the combined talents of the engineers of the R.C.A., the General Electric Company, the Westinghouse Company and some German firms were used in the research work at Camden that has led to this development.

### "It Sounds Good."

According to the "News-Chronicle": "It was a lawyer's application to the Federal Radio Commission for permission to start a new visual wireless station that gave the American public the first hint that television was about to leave the experimental stage and become a domestic reality. The technical details given in this

## RADIO FIELD-DAY PRIZE-WINNERS



In this group are the prize-winners of the Golder's Green and Hendon field day competition. The smaller set is the first prize.

legal brief indicated that the R.C.A. believed the images would be as clear as those in the average home cinema." It certainly sounds good!

### Better and Faster.

Great secrecy is being maintained by the Radio Corporation, but we understand that, whereas the present American television stations broadcast images which consist of sixty lines, with twenty exposures a second, the new system allows the use of sixty, one hundred and twenty, and two hundred and forty lines, with eighteen, twenty-two, twenty-eight and thirty exposures a second.

Meanwhile, it is reported that an important improvement has been made by Mr. Baird, and is to be used in all future transmissions from Savoy Hill.

This is an extended screen, which allows a picture of normal proportions to be televised instead of an image which is abnormally long and narrow in appearance.

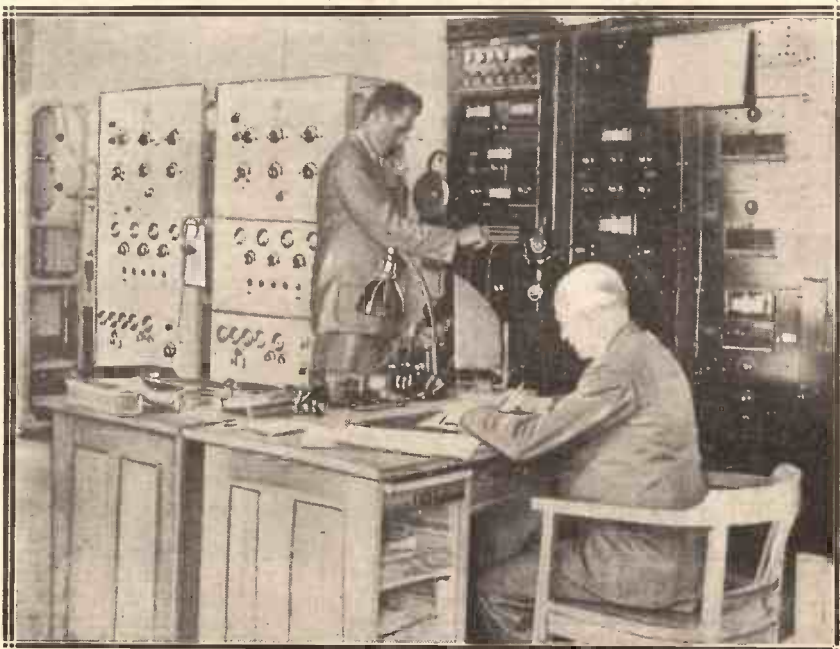
### Mr. Baird's Latest.

It is stated that a way has been found of doubling the width of the beam, so that it is now possible to televise a picture which is approximately square.

Mr. Baird told a reporter that: "The first items broadcast on it were wrestling and tennis demonstrations. Neither of these performances could have been given satisfactorily on the old type of screen."

All existing television receivers will be able to receive the transmissions in their new form.

## ANOTHER HUGE GERMAN STATION



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1 .0005-mfd. condenser with vernier drum drive. J.B.	19	0	0
1 Square-peak aerial coil. Varley	15	0	0
1 Oscillator unit, type O.2. Wearite	1	17	6
1 Band filter unit with pigtail. Wearite	1	17	6
1 Band filter unit. Wearite	1	17	6
1 25,000 ohms Spag. resistance. Leucos or Peto-Scott	1	6	6
1 3-contact push-pull switch. Peto-Scott	1	6	6
1 50,000-ohm potentiometer. Sovereign	4	6	8
1 4-pin valve holders. Telson or Peto-Scott	2	8	8
1 5-pin valve holder. Trison	4	8	8
2 1-mfd. fixed condensers. Peto-Scott	3	0	0
1 2-mfd. fixed condenser. Peto-Scott	3	0	0
1 .04-mfd. non-inductive fixed condenser. Dubilier	2	9	0
1 1.5-men. grid leak and holder. Dubilier	2	9	0
1 .0002-mfd. grid condenser	1	3	0
2 .001-mfd. fixed condensers. T.C.C.	3	0	0
1 H.F. choke. Peto-Scott	2	6	6
1 L.F. transformer, high ratio, 7-1. Telsen	12	6	3
1 Fuse holder and fuse. Ready Radio	1	3	8
1 Terminal block. Junit	1	3	8
2 Terminals. Belling-Lee	2	1	3
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# YOUR RADIOGRAM

Some interesting remarks concerning the electrical reproduction of gramophone records which will prove a great help to all those readers interested in this branch of radio.

By C. P. ALLINSON, A.M.I.E.E.

AS a result of recent experiments, I have come across some very interesting facts about radio-grams that I feel should be passed on.

I think the best way to attack the subject is to start at the electrical end of it. The question of the choice of the pick-up is generally a matter of the depth of one's purse and one's susceptibility to a certain type of advertisement; or else it is a matter of purely individual preference.

## Controlling the Volume.

I will assume, however, that you have chosen the pick-up you like best and that you have taken all the usual precautions to make sure that your set is doing its stuff, and that the milliammeter needle in the output valve is not kicking.

Yet there is one point where you may have gone adrift, and that is in the method of controlling volume. If a potentiometer is used across the pick-up you must make sure that its value is suitable for use with the particular pick-up you favour.

With a *high resistance* pick-up, for instance, a high value must be used if no diminution of the upper register is to result. The higher frequencies may be seriously impaired if less than .5 megohm is used for the volume control.

This may be modified a bit by the set of course. An amplifier and loud speaker having a strongly rising characteristic might make the use of a much lower resistance desirable.

## The Danger of Dust.

This is the case with my own set, and I find that a 50,000-ohm potentiometer works very well, and that the top notes are as good and strong as I want them.

Now, how about your loud speaker. Is it properly adjusted, free from dust, and placed in the most advantageous position? It is amazing what a lot of trouble can be caused by just a little dust. I had a moving-coil speaker that used to develop the most

distressing symptoms from time to time just because a bit of dust had found its way into the gap.

If the speaker is badly located, standing waves can be set up at certain frequencies that will ruin the balance of the music you are listening to, and anything in the way of a loose screw in the fixing, a glass ornament near it that can tinkle, or a bit of metal that can buzz—all these play havoc with the music.

Now let's turn to the gramophone part. Is the turntable mounted direct on the wooden board or have you used rubber mounting washers, and is the loud speaker directly underneath it without any form of baffle interposed?

## Points to Watch.

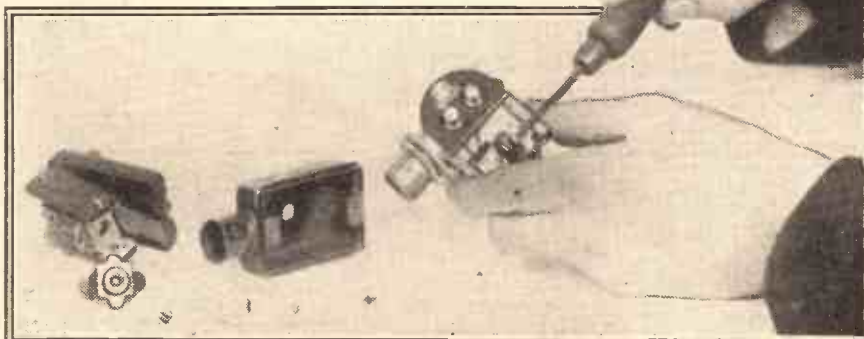
I have come across radio-grams that made the most unpleasant sounds as soon as the volume control was turned up because mechanical reaction between the loud speaker and pick-up was present. A touch on the pick-up needle would set the thing going and a shattering roar was built up in a second.

Next have a look at the turntable. This should run perfectly true, otherwise you will find that even the best records will have a waver in the music that quite spoils one's enjoyment.

It is also stated by the discerning that the turntable should be dead level and that the pick-up should be perfectly balanced and so mounted that it has no natural tendency to swing either one way or the other.

I know that if the pick-up exerts much

**DON'T  
DO  
THIS!**



Pick-ups are very delicate instruments, and on no account should you take them to pieces unless you are a really "old hand." If they go wrong it is much better to return them to the makers.



more pressure to one side than the other the purity of tone is considerably impaired, so that it is quite logical to assume that a small departure from the ideal condition will be accompanied by a small departure from tonal fidelity.

The records, of course, must be flat, and considerable care should be taken over their storage so as to obviate any risk of warping. A friend of mine had a very unfortunate experience when the first fire was lighted last autumn, and a number of records near it all warped so badly as to be unplayable. Records can either be stored quite flat or else vertically in a slot in which they are a close, though not tight, fit.

## It Ruins Reproduction.

They should be kept away from the fire and their surface should be free of dust. It is also important that the records rotate at the correct number of revolution per minute. Any departure from the correct speed not only spoils the "tempo" in the case of music, but the pitch as well. The result of this may well be to affect the timbre of the various instruments.

This brings us to the motor. There are a number of A.C. motors of the induction and repulsion type which are dead silent while running, and absolutely steady even when extremely heavy orchestral passages are being reproduced. Unless the motor is strong enough such passages may "pull" it, and the resulting slowing down sounds most unpleasant.

The tendency for this to occur is, apparently, greater with D.C. motors, and I am of the opinion that great care needs to be taken over the choice of this component.

## ANOTHER "POP-VOX" APPRECIATION

Praises from a Surrey reader.

The Editor, POPULAR WIRELESS.

Dear Sir,—Hearty congratulations on your success in designing that excellent receiving set, the "Pop-Vox." I have assembled almost every set published in the "P.W." as far back as the "Titan," including "Magic" and "Comet," which have been passable, or perhaps I had better say good; but, believe me, the "Pop-Vox" does—well, speak for itself both in simplicity and tone. I have never written to "P.W." before, but could not resist this time, as the "Pop-Vox" is a set worthy of praise.

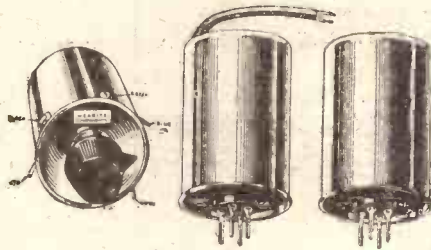
Yours sincerely,

R. A. S. DISBOROUGH,

Mitcham, Surrey.

# WEARITE SUPER-HET COILS SPECIFIED for the P.W. "SUPER QUAD"

**THE STANDARD BY WHICH  
ALL SETS ARE JUDGED**



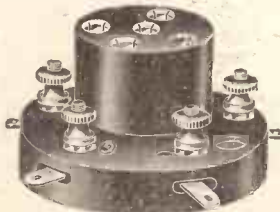
## WEARITE SUPER-HET COILS

Three of the original "Wearite" Super-Het Coils (British Patent No. 349403) are used in the "Super Quad." 1 Oscillation Unit, Type O.2, 1 Band Filter Unit with pig-tail, Type OT.1, and 1 Band Filter Unit, Type OT.2. The original coils are supplied only by the concessionaires, Wright & Weaire, Ltd.  
Price per set of three **37/6**

## WEARITE THREE-POINT SHORTING SWITCH



A simple Switch with a host of potentialities. Originally specified for wave-changing schemes in tuned circuits, the G.23 Switch has now been commissioned for the "Super Quad." The third contact allows the H.T. lead to be broken to avoid waste of H.T. current through the 50,000-ohm potentiometer.  
Price **1/6**



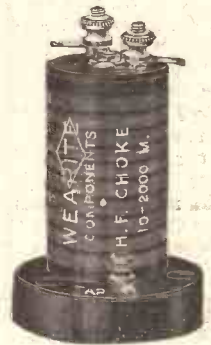
## WEARITE VALVE HOLDER

Suitable for use in the "Super Quad." This valve holder is fitted with sockets which split in four places and are therefore ideal for the new solid pins fitted to modern valves. Fitted with terminals and soldering tags.  
Price **1/3**  
Also 4-pin valve holder, price 1/3.

Once more the superiority of "Wearite" Components is proved. "Popular Wireless" recommend "Wearite" for all the vital parts of the new P.W. "Super-Quad." Follow their example and be sure of the best results.

## WEARITE H.F. CHOKE

A first-class component especially recommended for the P.W. "Super-Quad." It covers efficiently the remarkable range from 10 to 2,000 metres without any marked resonances. Self-capacity very low.  
Type H.F.O. **6/6**



## PAXOLIN PANELS

Supplied in Mahogany, Black or Walnut finish. Size 8 in. by 16 in. drilled to specification for the "Super Quad."  
Price **7/6**  
Supplied in all sizes.

## G.B. BATTERY CLIP

Grid-bias battery clips, strong and robust construction, as specified in the "Super Quad."  
Price **3d.** EACH.

WRITE FOR LEAFLETS OF THESE  
AND OTHER COMPONENTS.

WE ARE EXHIBITING AT



STAND 152

# WEARITE COMPONENTS

WRIGHT & WEAIRE, LTD.,  
740, HIGH ROAD, TOTTENHAM, N.17.

'Phone: TOTTENHAM 3847/8/9.











# BUILDING THE P.W. "SUPER-QUAD."

(Continued from previous page.)

Do not fix the right-hand bracket on the double condenser (looking at front of panel) in the usual manner, because it has to clear the potentiometer, and can, therefore, only

be clamped to the condenser chassis by one nut, which will be the one furthest away from the panel. A glance at the photographs showing the interior of the set will make the arrangement clear.

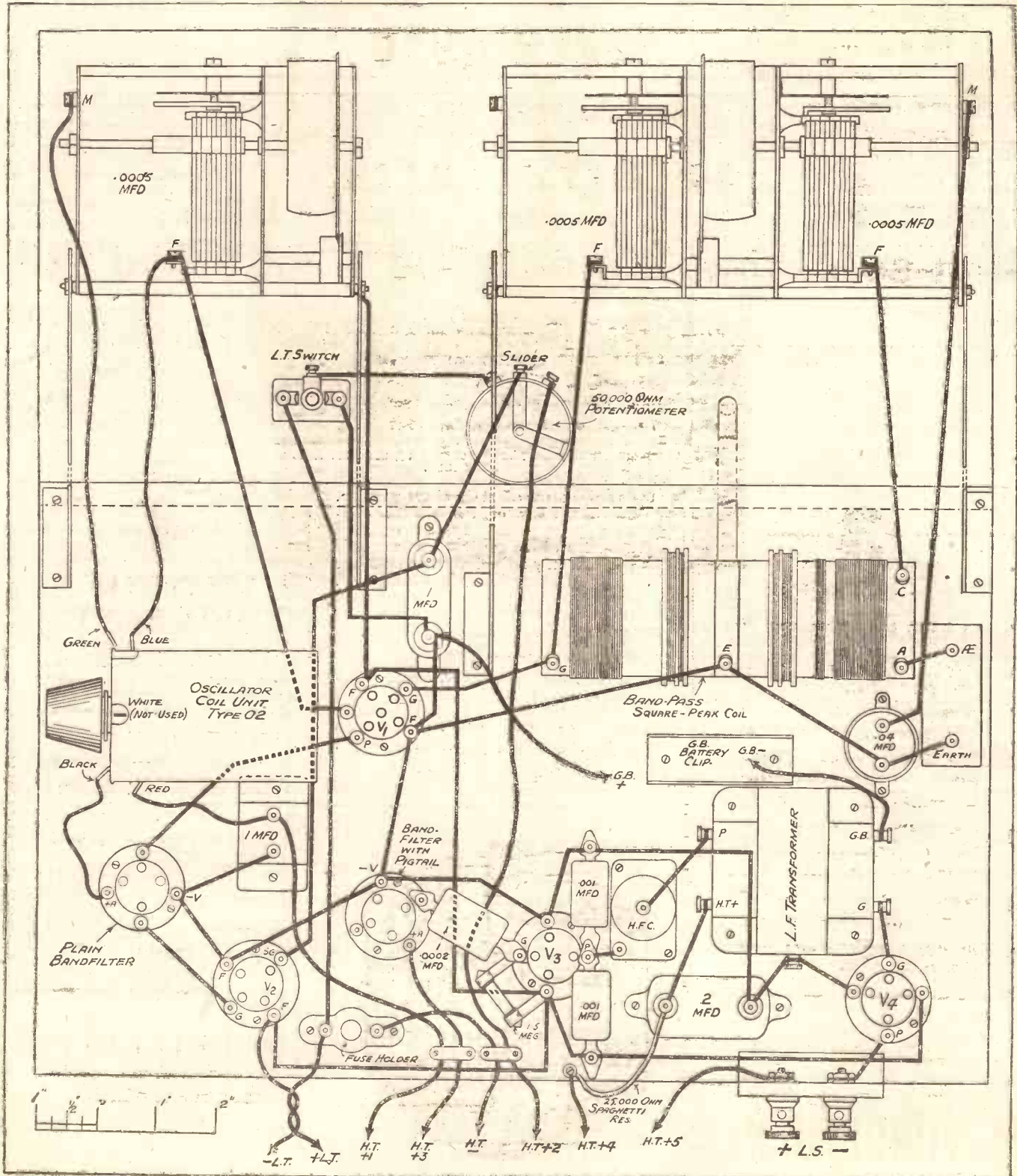
### Placing the Drums.

It is sometimes necessary to insert small cardboard packing pieces under the condenser supports, as their height from the top of the baseboard may be such that the holes on the brackets do not quite come in

line with the screws and nuts on the chassis. Further information and details are given on the instruction slips accompanying the condensers.

For the further assistance of constructors it should be mentioned that the drums on the condensers should be as close to the dial plates as possible, since the closer the two are together, without touching, the better the dials can be read. Similarly, the packing pieces under the condenser supports should

(Continued on page 754.)



### JIFFILINX

By using Jiffilinx when wiring your receiver you not only simplify construction but also obtain a more certain degree of electrical efficiency and eliminate the possibilities of poor reception and subsequent troubles.

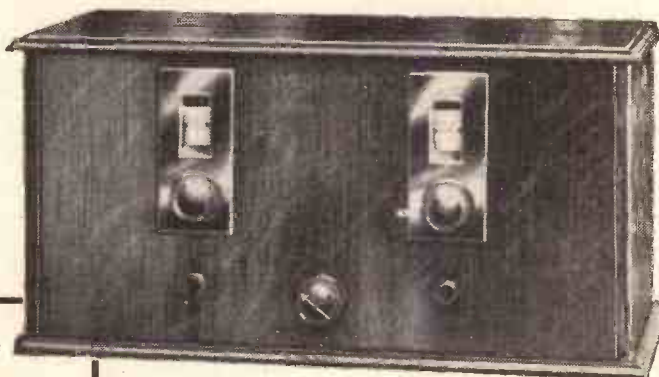
Four reasons why you should build the 'SUPER QUAD' with a

### SERVICE

Every constructor who builds the 'Super Quad' with a Ready Radio Simplified Kit is entitled to free information and advice from the experts of the Ready Radio Service Department and is consequently assured of the best possible reception from his receiver.

**1** — **READY RADIO** — **2**

**non-soldering — simplified — matched kit**



**3**

### CHOSEN COMPONENTS

The Ready Radio 'Super Quad' Simplified Kit consists of components chosen for their high efficiency and reliability — Jackson, T.C.C., Lewcos, Varley, etc. You consequently know that your set will be the best of its kind at the lowest price consistent with high quality.

**4**

### SPECIFIED COMPONENTS

Built strictly to specification, the 'Super Quad's' four valves give seven-valve performance. Make sure of getting best results by building with a Ready Radio Kit which will be identical in appearance and performance to the original model.

Cheaper to build, cheaper to run, easier to construct, easier to operate than any other Super-het. Uncanny selectivity — tremendous power — but make sure by using a Ready Radio Kit

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*Ready Radio*  
 159, BOROUGH HIGH STREET.  
 LONDON BRIDGE, S.E.1.  
Telephone Map 5355 (Private Exchange)  
Telegram: READIRAD, SEQIST

Order direct from Ready Radio or from your local dealer, but insist on a Ready Radio Simplified Kit.

Turn to page 747 for price lists and further details.





# 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 specialities described may be the subject of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

## QUESTIONS AND ANSWERS

### WIRING A.C. RECEIVERS.

O. M. S. (Rochdale).—"I notice that the filament wiring to the valves is carried out in the wiring diagram with twisted flex. Is there any special reason for the use of this class of wire?"

Yes. As the current carried to the valves by the flex connection is unsmoothed A.C., it is likely to give rise to humming interference unless precautions are taken against it.

By using twisted wire for the common heater circuit, the magnetic field caused by one wire is virtually cancelled out by the other, and thus the liability to interference is greatly reduced.

### FOR THE LOCAL STATION.

J. F. (Brighouse, Yorks.).—"While I was messing about with the set the other night I made an important discovery. It may not seem much to you, but it solved a big problem

"nearly all in" position when changing over from long distance to local station reception, and even then I did not get the perfect quietness which comes when the aerial is taken off altogether and the set is receiving on just the lead from the window.

### "P.W." PANEL No. 33.—THE SUPER-HETERODYNE.

Super-heterodyne receivers require two detectors, and work on the "beat" principle.

Their advantage as compared with other methods is the great selectivity which they permit.

Until recently the accompanying disadvantages were many, and at least six valves had to be used to get good super-heterodyne results.

But "P.W.'s" latest super-het (The "Super-Quad") employs only four Valves, and retains the advantages of super-het selectivity and power.

"I am wondering if there is any objection to making a permanent job of it, as I should certainly like to try this if there is not."

There is not the slightest objection, and in your position we should certainly disconnect the main aerial for local listening. The best way to do this would be by an ordinary single-pole double-throw switch of good quality, connecting it so that the aerial lead comes to the centre contact.

One of the outer contacts can then go direct to the earth lead outside and the other outer contact can go to the input on the set. Then, when out for foreign stations you can throw over the centre contact (aerial) so that it joins up to the set, and at all other times you can throw it over in the other direction thus directly earthing the main aerial.

As the aerial should be earthed when it is not being used for reception this would be a very convenient and satisfactory arrangement to employ, but choose a good robust switch, so that there is a positive connection or disconnection and that no losses can occur.

### USING AN EXTENSER INSTEAD.

P. S. (Acocks Green).—"Can I use an Extenser in the 'Comet' H.F. Unit instead of the ordinary .0005 mfd. and

a 3-point wave-change switch? If so, please give the alterations in words, and also say if there would be any objection to the use of a 15,000-ohm spaghetti instead of an H.F. choke between the H.T.+2 and plate of S.G. valve (I have a spaghetti of this value on hand)."

An extenser can easily be used instead of the ordinary tuning condenser, and it certainly will simplify your tuning, which is an important consideration when using any type of separate H.F. unit.

To fit it, all you have to do is dismount your old condenser and wave-change switch, noting where the various leads were attached. Then rewire, with fixed and moving vane connections as before.

Three self-changer contacts on the extenser can be considered exactly as though they were the three switch-points of a wave-change switch, so you will find the change-over is extremely easy.

As regards using the spaghetti instead of the H.F. choke, it is not satisfactory to use a resistance at all in this position.

### NEGLECT OF GRID BIAS.

A. D. C. (Salisbury).—"I recently took advantage of an opportunity to buy a voltmeter for testing various voltages, etc., and found to my astonishment that the grid bias for the power stage was down from the supposed 21 volts to about 15!

"I had thought that quality was not too good, but did not realise there was all this difference in the battery, which had only been purchased about five months. Is such an unexpected alteration in voltage likely to have any effect besides introducing distortion?"

Grid bias on a power valve is so important that we are afraid you have undoubtedly suffered by neglecting to check up the voltage before.

If the H.T. that was being applied when the voltage on the grid was 21 was still being applied when the bias battery was down, a much larger anode current would be flowing, due to the drop in grid bias voltage. This not only means a drain on the H.T. supply that was unnecessary, but it probably means also that the filament had been called upon to give an excessive emission, and in this case the life of the valve would certainly suffer.

The importance of maintaining the correct negative grid bias on a large power valve cannot be emphasised too strongly.

### THE FAULTY RESISTANCE.

R. F. A. (Holyhead).—"For nearly an hour we could get nothing out of the set at all. But then I happened to accidentally touch my fingers across the 30,000-ohm resistance (a new one) in the anode, and weak broadcasting came through, which when tuned in proved to be quite strong and clear.

"Unfortunately it goes as soon as the fingers are taken off the resistance and joining the resistance over with a wire is no good. Does this mean that the resistance itself is faulty?"

Yes. Undoubtedly you have a faulty resistance and must replace it by one of good quality and similar value. If it is quite new we should take it back to the dealer from whom you bought it, explaining the circumstances and asking him to have a look at it.

### SCREENING AND THE VALVES.

"CURIOUS" (Willesden Junction).—"Would it not be possible, by having all metallised valves in the set, to do away with the necessity for screening altogether?"

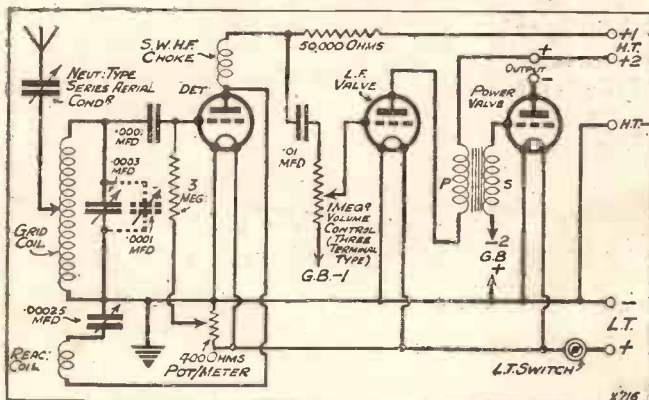
Certainly not when using ordinary components. It is not merely the electrodes inside the valves that require screening from each other, but the whole circuit associated with the various electrodes must be kept free from unwanted interaction.

Thus the grid circuit of an S.G. valve must not come too near the plate circuit, and even if grid and anode inside the valve are satisfactorily screened from each other the trouble would occur if the grid coil was placed too close to an anode coil. Even if some of the grid wiring ran too close to the anode wiring, the small capacity effects between the two might be quite sufficient to afford the necessary interlinkage for impulses to pass back from the anode to the grid circuit, and there, of course, they would be enormously amplified by the action of the valve.

It is impossible to contain the whole circuit in the ordinary valve, so external screening is absolutely

(Continued on page 752.)

### MISSING LINKS, No. 14 A SHORT-WAVE THREE.



Here is the diagram of the set which was given incomplete in last week's "P.W." It will be seen that the missing "components" were a reaction condenser and an L.F. transformer.

for me, for I found that by taking off my aerial I got the National and Regional wavelengths (according to the tuning), at absolutely perfect strengths for comfortable listening. "Formerly I always had to adjust the volume control on the set right down to the

# THE SUPER KIT

## for the

# "SUPER QUAD"

### THE "SUPER QUAD"

	£	s.	d.
1 Polished ebonite panel, 16x8x3/16 in., drilled to specification		5	4
1 ReadiRad polished oak cabinet with 10-inch-deep baseboard	1	2	6
1 Jackson Bros. model D.2. gang condenser with drum drive	1	6	6
1 Jackson Bros. model D.1. .0005 mfd. condenser with drum drive		19	0
1 Varley Square-Peak coil		15	0
1 Set Lewcos Super-het coils to specification	1	17	6
1 Link resistance 25,000 ohms		1	6
1 ReadiRad 3-pt. push-pull switch		1	6
1 Sovereign 50,000-ohm potentiometer		4	6
5 Clix 4-pin valve-holders		3	4
1 Clix 5-pin valve-holder		1	0
2 T.C.C. 1 mfd. fixed condensers		5	8
1 T.C.C. 2 mfd. fixed condenser		3	10
1 Dubilier .04 non-inductive fixed condenser		2	0
1 Grid Leak 1.5-megohm, with clips		1	6
1 T.C.C. .0002-mfd. fixed condenser		1	0
2 T.C.C. .001-mfd. fixed condensers		2	8
1 ReadiRad "Hilo" H.F. Choke		4	6
1 Telsen L.F. Transformer, ratio 7-1		12	6
1 ReadiRad fuse and holder		1	3
1 Junit terminal block			8
2 Belling Lee "R" terminals L.S., L.S.—			6
8 Belling Lee wander plugs, 6H.T. and 2G.B.		1	4
2 Spade terminals			3
1 Aerial and earth block			6
1 Packet "Jiffilix" for wiring		2	6
4 Valves to specification, Cosor 210 DG, 21 5SG, Mazda HL210 and P.220A		3	2
Wire, flex, grid-bias clip, etc.		1	2
<b>TOTAL (including valves and cabinet)</b>	<b>£12</b>	<b>1</b>	<b>6</b>

### THE "SUPER QUAD"

#### Recommended Accessories.

	£	s.	d.
1 Fuller S.W.X.9 Acc.		11	0
1 Fuller 16-volt G.B. Batt.		2	10
2 Fuller 60-volt Super-Cap. H.T. Batteries		1	7
1 Celestion D.10 Loud Speaker		3	0

### THE "SUPER QUAD"

Completely assembled, with valves and cabinet, ready for use and aerial tested. Royalties included, **£14-1-6**  
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You can now buy your Ready Radio Kit from your local dealer, but be sure it is a genuine Ready Radio Kit.

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#### KIT A

(less valves and cabinet) **£7-17-0**  
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(with valves less cabinet) **£10-19-0**  
or twelve equal monthly payments of **£1-0-0**

#### KIT C

(with valves and cabinet) **£12-1-6**  
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All your goods are very carefully packed for export and insured, all charges forward.

#### TO INLAND CUSTOMERS.

Your goods are despatched post free or carriage paid.

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To **READY RADIO (R.R. Ltd.)**, 159, Borough High Street, London Bridge, S.E.1.

**CASH ORDER.** Please despatch to me at once the goods specified for which I enclose payment in full of **£**..... *Kit required*.....  
**C.O.D. ORDER.** Please despatch to me at once goods specified for which I will pay in full the sum of **£**.....  
**EASY PAYMENT ORDER.** Please despatch my Easy Payment Order for the Goods specified for which I enclose first deposit of **£**.....

Name.....  
Address.....



## FROM THE TECHNICAL EDITOR'S NOTE BOOK.

# Tested and Found—?



## THE NEW PHONOVOX.

A LIST recently issued by the Igran Electric Co., Ltd., describes the new "Phonovox," which is a 37s. 6d. pick-up improved and now available at the low price of 21s.

## THE R.I. "UNIGRAD."

A modern set demands a smooth volume control. The jerky, unreliable potentiometer of five years ago would not stand much chance of selling in these enlightened days!



A Volume Control with a very smooth action.

But there are some pretty poor specimens still to be found in the radio shops, although, on the other hand, there are some very excellent ones available.

However, I do not remember handling one that had quite the velvety smoothness of the R.I. "Unigrad," a new product of Radio Instruments Ltd.

The "Unigrad" is wonderfully smooth in action—as smooth as if its moving member were rotating over mercury. Nevertheless, it is not "loose"—don't confuse smoothness with freedom of rotation.

You do not want "cycle wheel" absence of friction. What is needed for the perfect variable condenser or volume control is a smoothly even "resistance."

And they've got one-hundred per cent of that in the R.I.!

Also, it is a neat, slick little component that is good to look at as well as handle.

In operation it gives an excellent control of volume from inaudibility to full strength in all the conventional positions.

The resistance is approximately 500,000 ohms.

## SELECTANET.

This is an indoor aerial of new design. It comprises a 9-foot length of tubular copper mesh,  $2\frac{1}{2}$  inches in diameter. At each end are insulated suspension springs, and there is a terminal for a lead to the set.

Selectanet is British made by a South Tottenham concern.

I have carefully tested it out in comparison with similar lengths of ordinary conductor, and I find its pick-up definitely good; certainly equal to a small sausage aerial of the same dimensions, and definitely superior to that of a double wire "run" with 12-inch separation. By the way, Selectanet aerial is available, to special order, in anything up to 40-foot lengths.

## CLIX "VICEGRIP" WANDER PLUG.

Lectro Linx, Ltd., are now manufacturing a new wander plug of a distinctly useful character. Instead of the usual split-pin arrangement, there is a special and powerful spring prong comprising a hard-drawn wire that links back right into the body of the device.

The result is that the springiness and adaptability to sockets of different sizes are vastly increased.

Another advantage of the "Vicegrip" is that it is provided with a connecting screw that ensures positive and permanent metal to metal contact. The red or black engraving is right on the top of the plug.

The price of the Clix "Vicegrip" wander plug is 1½d., and at this it should achieve no inconsiderable success.

## WEARITE "POPULAR" FRAME.

Frame aerial reception has its advantages, and these are very definite advantages, too. But it is not a complete argument in favour of the frame aerial to say that, by doing away with the extended wire, it makes for neatness, for the frame itself has to be accommodated somewhere near the set itself inside the house.

And it is quite debatable as to whether or not a frame is an object pleasurable to the eye. Certainly some frames are more so than others.

For instance, the Wearite "Popular" a product of Messrs. Wright & Weaire, is quite an attractive-looking article and, moreover, it can be obtained either in polished oak or polished mahogany at the same price of 32s. 6d.

Further, its ebonite spacers and green stranded wire add to its appearance.

Of course, the great feature of the frame is its power to discriminate between radio energy arriving from different directions.

This enables keener station separation and greater freedom from etheric transients to be obtained on a given outfit.

But to take the greatest advantage of

such it is necessary that the frame should be provided with a base on which it easily rotates.

Again the Wearite "Popular" Frame is right up to scratch in this regard.

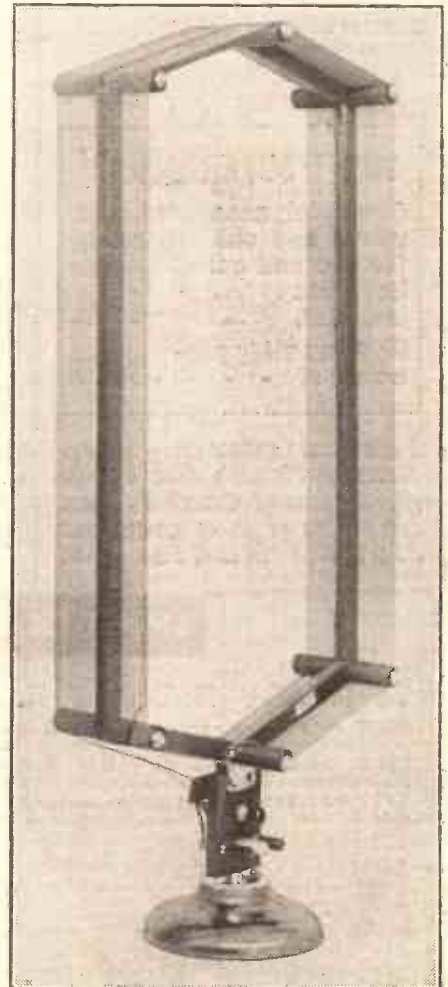
Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department, with the strictest of impartiality, under the personal supervision of the Technical Editor.

We should like to point out that we prefer to receive production samples picked from stock, and that we cannot guarantee their safe return undamaged, as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are, therefore, framed up in a readily readable manner free from technicalities unnecessary for that immediate purpose.

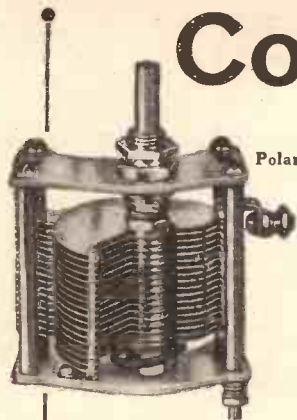
Further, I must not forget to mention that a wave-change switch is incorporated and that the frame adequately covers both long and ordinary wave-lengths.

We have used the accessory with various standard receivers, mostly super-heterodynes, and have found it to be completely satisfactory.

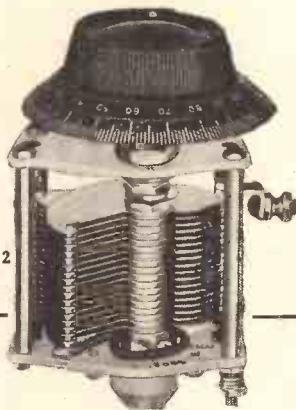


The Wearite "Popular" Frame Aerial.

# Build with these NEW Polar Condensers



Polar No. 4



Polar No. 2

**STAND 60**  
RADIO EXHIBITION, OLYMPIA

Wingrove & Rogers, Ltd., 188/9 Strand, W.C.2.

No. 4 Direct Drive - - - **4/-**  
No. 2 Fast and Slow Motion - **6/6**  
(With Knob and Dial)

The Polar No. 4 at 4/- and the Polar No. 2 at 6/6, while maintaining the high efficiency of Polar design and construction, offer the public the greatest condenser value obtainable. Both these condensers are made with aluminium vanes and end plates, bonded rotors and ball bearings. Rigid construction with four brass pillars.

Polar No. 4. .0005, .00035, .0003 - - - **4/-**  
Polar No. 2. .0005, .00035, .0003 - - - **6/6**

Obtainable from all dealers. Catalogue Free on request.

# POLAR CONDENSERS

Polar Works, Old Swan, Liverpool.

## OSBORN RADIO CABINETS

READY-TO-ASSEMBLE



Model No. 218

MODEL No. 218. SPECIFIED FOR THE "WIRELESS MAGAZINE" "A.C. SUPER 60."

A Queen Anne Radio or Radio-Gramophone Cabinet, 3 ft. 10 ins. high, 2 ft. 2 ins. wide, 1 ft. 6 ins. deep. Size of baffle board behind fret, 24 ins. x 24 ins. Metallic fabric for fret front included. Opening at top and back. Cabinet takes panel 2 ft. x 9 ins., or smaller.

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Sovereign Coil Quits (Regd. Design No. 76832) in moulded Bakelite with simplified constructional features, Sovereign P.J. Coils and Sovereign P.V. Coils all made to specifications of this journal. Use these components in building "P.W." Sets because Sovereign is behind them and your results will be assured. Fit Sovereign and improve any circuit.

COIL QUITS 6d. P.J. COILS No. 1 2/- P.V. COILS 6/6 each No. 2 1/6. No. 3 2/- per pair



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THE first half of August has given us a good deal more than our fair share of thunder and its accompanying atmospheric disturbances. Unfortunately these thunderstorms had their birthplace out in the Atlantic and travelled slowly eastwards, passing over this country and the central parts of Europe.

Much work has been done in recent years upon the problems of atmospherics, and it has been established that an electrical discharge in the air can cause interference at a range of at least 4,000 miles.

#### A Bad Period

We therefore suffered from atmospherics of increasing intensity as the storm centres moved from the Atlantic towards our shores, and had a terrific dose of them whilst the disturbed areas were over this country, and then reaped the aftermath as they travelled eastwards over the Continent.

The net result has been that for a longer period than I can remember during the last ten years long-distance work has been almost out of the question. The farther a station is from you the greater, other things being equal, is the magnification that you must employ to bring it in, and if you amplify the incoming broadcast waves you amplify also those due to atmospherics, with heart-(and ear!) rending results.



Some practical distant-programme notes compiled by a special contributor who nightly searches the ether in order to obtain really up-to-the-minute information for "P.W." readers.

Every cloud, though, not excluding that which contains an electrical charge responsible for an atmospheric, has proverbially its silver lining and, though long-distance work has been under a cloud for some time, we shall reap our reward very shortly.

As soon as conditions become a little more settled, we shall find undoubtedly that there is a big increase in the number of foreign stations receivable, and that the list is much longer than it was compared with that of a week or two ago, before atmospherics were so troublesome. This almost always happens when there is an atmospheric period in August.

#### Conditions Improving.

During the more or less quiet intervals foreign stations have, in fact, shown signs of a notable increase in strength. Milan is a good example. This station was showing promise before the atmospheric visitation and he is now better than ever. Stockholm, too, is strengthening up and Goteborg is surprising at times.

Don't bother to try for long-distance stations if you find that atmospherics are about when you switch on; but if they are absent I am bold enough to prophesy that you will be surprised at the liveliness of the set the next time you take a wireless tour round Europe.

Let me recommend for your particular attention Paris P T T, Prague, Hilversum, Lwow, Berlin Witzleben, Vienna and Munich. All of these are stations of which comparatively little was heard during the height of summer, but all or most of them will be coming in well very shortly.

The long waves are nearly always hopeless when there are a lot of atmospherics about, and the last dose we had did not prove any exception to the rule.

#### The Place for Atmospherics!

If you want to hear a really "fat" atmospheric you should take a trip down to the tropics. At times static is so bad that even commercial stations have to close down.

Fortunately, we do not have anything quite so bad as this to put up with in this country, so I suppose we really have a lot for which to be thankful.

After all, what does it matter, the winter will be with us soon, bringing with it those "staticless" nights of almost unlimited Radio range.

MY new receiver, already mentioned, is now in fighting trim. I am quite pleased with it, although I admit to a feeling of "Good-bye, old friend!" as I demolished the old one. Before doing so I had a lengthy listen round to see how conditions were, so that I could form an opinion of the successor.

I will not say that I am satisfied, because that is contrary to my principles. Further, when I reach that stage, I pull the set to bits and make something else. I am, however, "quite pleased."

Conditions, on the whole, are not too brilliant. Rome on 25.4 metres continues to be the star turn. W 2 X A D is the best American during the early evening, and later there is not much to choose between W 2 X A F and W 8 X K.

#### Heard This One?

Incidentally, how many readers have logged the station squeezed in between Rome and W 8 X K? This is Chicago, W 9 X A A, who has been up to quite a reasonable strength once or twice.

The Pontoise station, too, works in this region, although he has two wave-lengths, one below W 8 X K and the other just above Rome.

W 3 X A L's harmonic on 24.59 metres continues to come over at good strength when his official wave-length of 49.18 is completely dead. This only occurs when conditions are moderate down below and bad up above, which they have been this week.

Did anyone else log the broadcast from W 2 X A D of the world's largest airship

## SHORT-WAVE NOTES

A few interesting observations concerning happenings down on the short waves by W. L. S., a very well-known amateur transmitter and a leading expert on the subject.

launching at Akron? I heard parts of it, but fading was very bad at times and, although I logged the dimensions of the ship, and the fact that one could play football in the hangar, I lost the name of the airship. The name of the airship is, of course, the "Akron."

Enough about myself; let us see what the other man is doing.

First, J. D. H. T., of Ealing, wants to know who the Yankee station is that works on about 21.7 metres. It sounds as though it should be an amateur; but for the broadcast of Negro Spirituals and sermons. Can anyone oblige?

#### A Mystery Station.

J. P. S., of Ealing, reports an unidentified French station on about 32 metres. I also have heard this man and failed to catch an announcement. The Eiffel Tower works on 32.2 metres, as F L J, but I do not think it could be he.

Likewise he has heard a station on 31 metres with a lady announcer. No, dear reader, this is *not* Rome! I rather think it is Poznan, Poland, but again am not sure.

J. P. S. finds W 2 X A D fading out somewhat.

Our old friend A. B. T., from Fort Portal, Uganda, is now licensed as a "ham," with the call-sign V Q 5 N T B. He accordingly keeps up tradition by starting his letter off with "Dear O.M."

No, A. B. T., I do not recollect the 5 and 10 metre receiving circuit, although practically any straight circuit will behave well down there with a little care expended on the layout. I must not give away the secret about my own call-sign, but if I ever get into touch with you I will "own up" at once.

#### Straight Sets Best.

J. P. asks three queries of general interest, which I will quote. First, he wants to know when I am going to describe the promised low-power transmitter. That, J. P., is on the way.

Next, he says, "Do you consider a neut. stage of any value in a short-waver?" Candidly, I do not. I prefer S.G. if one must use H.F., but would sooner do without that if it weren't so necessary as an "aerial de-coupler."

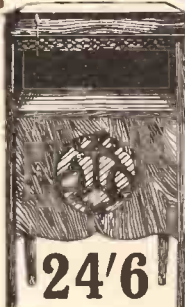
Thirdly, he asks, "Is it possible to get confirmation reports from short-wave broadcast stations?" Yes, it certainly is, if you send them a really useful report.

You should give time, date, wave-length, type of receiver, strength, fading (if any), and a few notes on the programme heard. Most of them you will find will send you some small acknowledgment. But you must make sure that your own report is likely to be of some value to them.



**Enclose your set in this BEAUTIFUL CABINET**

Here is a Cabinet of outstanding beauty at a really remarkable price. It costs only 24/6 and enables you to enclose all batteries, etc., giving a neatness and beauty of appearance worthy of your set. Constructed mainly of oak finely



polished a rich nut-brown shade, this Cabinet stands 36 inches high. The panel space measures 18 x 7 ins. while the top is 21 ins. wide by 14 1/2 ins. deep. The loud speaker aperture is 10 ins. diameter and is covered with fine amber silk. There is a removable panel back giving free access to batteries and speaker. The deep-hinged lid enables the set to be removed bodily. Decide now to have this fine Cabinet in your home. Money back if not entirely satisfied. Send to-day to

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Transformers 4/-. Headphones 4/-. all repairs magnetised free. Tested, guaranteed, and ready for delivery in 24 hours.

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**LEAD-IN SAFETY SWITCH**  
Prices now include a 2 D.W. Plug.  
With 6" Tube 5/6  
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Protect yourself against Thunderstorms by fitting the Elex Switch. Write for List T.27

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Ealex House, 118, Bunhill Row, LONDON, E.C.1.  
Phone: Metropolitan 0314/5/6.

**FOR THE LISTENER**  
(Continued from page 734)

They cry for the Jack Paynes of Europe. So, not being able to afford the big sets, they go without any. There are comparatively few listeners in Italy.

In Germany, where the programmes are more varied, much more like our own, listening appeared to be a much more common habit. As you go through the small towns and villages of the countryside in Germany you see the aerials; not such forests of them as in England, but quite a noticeable number.

In Italy the sight of an aerial is rare. Indeed the only one I have seen so far turned out to be a telephone.

On arrival here, I inquired about the small set which my neighbours bought last year when mine had inspired them with enthusiasm for listening. They looked rather shame-faced about it. They had, in fact, sold it for a mere song after a few weeks.

Then they brightened as they showed me the piece of furniture they had bought with the money—a wooden three-legged stand with a fern in a pot on the top of it, a horrible thing! But they couldn't live by Opera alone. And re-charging the accumulator is no joke in a place which is eight miles away from the nearest electrical plant.

**His Old Aerial.**

My old aerial was still stretched, where we had left it, between the farm-building and the cottage. A purple convolvulus, which grows rank here like a tropical weed, had found its way up the side of the house and was already twining itself along the aerial. My neighbours said it looked pretty; and they were sorry when I yanked it down.

So now we are settled in. We were greeted by a thunderstorm which lasted for 36 hours, with torrential rain; and as cold as an English July. Quite a homely feeling!

On the following day the thermometer stood at over 90 degrees; and we rubbed ourselves with olive oil so that we shouldn't blister. How white our legs and arms looked—like stalks of seakale grown under cover! Sickly-looking things that had rarely seen the sun.

The older people here go heavily clad; but the younger ones have bare legs and arms and shoulders; and how one envies them their brown sun-soaked bodies! At first one feels ashamed to walk among them in shorts and a singlet! But the colour bar will disappear in a few days!

**Cricket Broadcasts.**

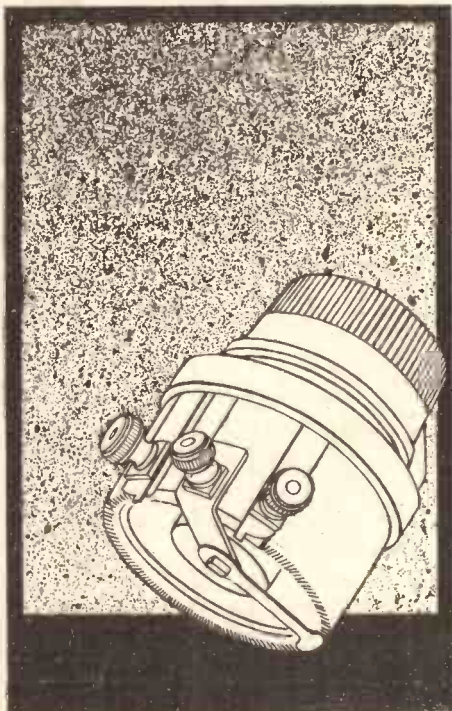
You will forgive these holiday notes for once in a way. At the moment, wireless does not interest me very much.

I am listening neither to Opera from Milan, nor to Vaudeville from London; but to the crickets singing in the grass and in the trees, and the frogs croaking in the back-water by the lake.

Also to the children talking a strange language. I can understand them better than their parents. They speak simpler words and their voices are clearer.

It is all so intriguing that I cannot play the "wireless critic" for the life of me! But the novelty will pass, alas! and next week we shall be down to business again!

**A NECESSITY IN EVERY SET**



**—THE VARIABLE COLVERSTAT**

Made by the manufacturers of Colvern Coils—a guarantee in soundness of construction—this component has established itself firmly in the world of radio and has been specified in numerous home-constructed sets.

Specified for the "P.W." "SUPER-QUAD"

Wire wound, smooth in movement, silent in action, constant in setting. For all voltage regulation and volume control. In the following standard values: 1,000, 2,500, 5,000, 10,000, 15,000, 20,000, 25,000 and 50,000 ohms.

Price 5/6

**COLVERN RADIO**

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Advt. of Colvern Ltd., Mawneys Road, Romford.



## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 746.)

necessary under these conditions. (There are, however, the Loewe special types of valve, in which the coupling resistances, etc., are so compact that they can be placed inside the glass bulb.)

### THE PENTODE'S INTERNAL CONNECTIONS.

P. M. (Cardiff).—"On checking over the theoretical diagram of the set I find that there is a connection between the cathode of the pentode valve and the grid which is nearest to the plate of that valve. This connection is given in the theoretical diagram, but there is no corresponding wire on the actual set.

"Do the terminals on the valve-holder need connecting together, or is this a mistake in the theoretical diagram?"

It is not a mistake, but merely indicates the internal connections of the valve. These have already been attended to by its maker, and therefore do not need attention by you in the wiring.

When the pentode was manufactured its cathode was connected internally to one of the "grids" and this fact is shown in the theoretical diagram, but you cannot do anything in the matter, and it has already been attended to in the assembly of the valve.

### "A ROAR LIKE THUNDER."

T. L. P. (Clacton-on-Sea).—"I hope you can explain why it is that my set has been giving out a roar like thunder.

"It is an all-from-the-mains three-valver, and has given excellent service with no trouble at all until about a fortnight ago, when this dreadful roar commenced.

"Since then the set has been all right except that on two other occasions it has given this out, and I notice that it happens when one of the light switches upstairs is

### "WHY IS IT SO NOISY TO-DAY?"

Perhaps the 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 an unrivalled service.

Full details, including scale 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.

turned on or off. Would it be something to do with the fact that the set has no batteries, and draws all its current from the mains?"

All that is wrong is that you have a faulty switch in the house wiring circuit, and when this is at one certain position it gives rise to interference, which the set picks up and magnifies to the form of the roar you heard.

Get an electrician to look at the switch for you and make its contacts satisfactory and you will find that your trouble will automatically disappear.

### A CRYSTAL "STAND-BY."

S. F. F. (Sheffield).—"I have a question to ask about your 'Three-Pound-Three,' and before I put it I should like to say how very satisfactory the set has been since we made it up in June. From your description at the time it seemed to be the very thing we wanted,

(Continued on next page.)



# NEW DARIO RADIO VALVES

with  
*The Very Steep Slope*

Made in one of the most modern factories in the world under a special secret process, Dario valves incorporate the new Radio Micro Dull Emitter Filament which ensures great sensitivity, unequalled performance and utmost current economy.

DARIO UNIVERSAL BIVOLT - 5/6  
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Also 4 volts and A.C. Mains types.

Write for illustrated folder giving full particulars.

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Dario Transformers are made under a special process of wiring and insulating the different circuits. Notwithstanding their very low price they give marvellous results.

Ratios 1-3 and 1-5.

Constructor - - - 4/6  
Normal - - - - - 5/-  
Super - - - - - 6/-

Also available extensive range of mains transformers and Filter Chokes.

### DARIO SILVER OXIDE CHARGER

the best in the world. Enables you to charge your accumulators in your own home. 17/6

### DARIO SETS

The Dario S.G. 3 Battery Type Receiver now reduced to £5-17-6, complete with Dario Valves. Represents amazing value. Highly sensitive, gives wonderful volume. - Renowned for its purity of reception.

The Dario Regional Straight 3 Transportable housed in an attractive oak modern cabinet complete with Dario valves and matched speaker - - - £4-17-6

Inside frame aerial  
10/- extra.





## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

but we had no idea how really good it was going to be, and I must say I am surprised you have not printed more letters about it.

"What I would like to do now is to put a crystal in so that when the accumulator is charging we can still listen on 'phones. You did this for one of the other "P.W." sets, and I am hoping to see it for the "Three-Pound" Three, but so far no luck.

"Can it be done and if so how should it be wired?"

It is quite easy to apply the stunt you mention to the "Three-Pound" Three, and in fact to practically any receiver if there is plenty of panel room, for it merely involves a slight alteration to the tuning circuit.

All you need are two terminals and a crystal detector, and these should be mounted near the tuning condenser and wired up as follows:

Fixed plates of the tuning condenser to one side of the crystal detector; the other side of the crystal

## TECHNICAL TWISTERS

### No. 75.—NUMERICAL ABBREVIATIONS.

#### CAN YOU FILL IN THE MISSING WORDS?

To facilitate the easy use of very large and very . . . . . numbers it is customary for those engaged in radio work to employ many prefixes.

Thus, for one-thousandth of an amp. we say . . . . .-amp., the prefix . . . . . always meaning 1/1000th.

Similarly, we can have . . . . .-volt and . . . . .-watt, each of these being 1,000 times smaller than unity.

Last week's missing words (in order) were Anode (or Plate). Up, higher, high. Down, low. Reduced, volume control.

detector to one of the new telephone terminals; the other new telephone terminal to earth or some point connected to earth.

That completes the wiring, and in future all you have to do is to connect a pair of telephones to these terminals when the accumulator is at the charging station, the set being then transformed into a simple crystal set. When you get the accumulator back again simply take the 'phones off these terminals and use the set as before as a valve set.

We have had many appreciative letters about the "Three-Pound" Three, but it is impossible to print them all as space in "P.W." is strictly limited and it is possible to give only a representative selection of reports.

### LINKED BY RADIO.

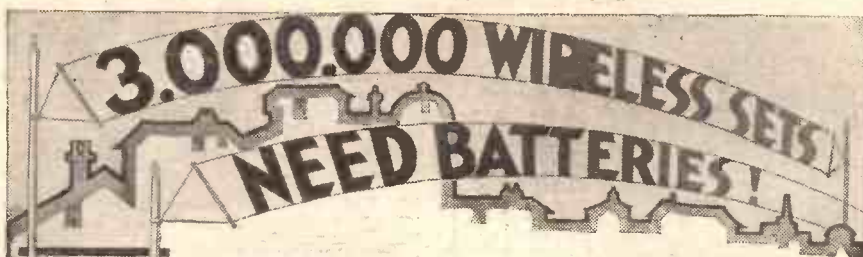
"ABERDONIAN" (Forest Gate, London, S.E.).— "Is it a fact that the B.B.C. programmes are sent to Aberdeen not by landline but by a radio set there picking up 5 X X?"

The main Aberdeen programmes go by landline, but certain of the daylight transmissions have been handled by the B.B.C. in the way you mention, and do not go over the landline at all.

### DETECTOR-VALVE CURRENT.

E. W. C. (Horseferry).—"Recently when checking on a milliammeter in the plate lead of the detector valve, joined between H.F. choke and primary of the low-frequency transformer, I was surprised to notice that the milliamps flowing showed a sharp drop when the set was accurately tuned in. Even some of the foreign stations showed a slight decrease in anode current, but on the stronger British

(Continued on next page.)



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Whether you are a Wireless Enthusiast or not, you know what an enormous demand there is for Wireless Batteries—a demand which is ever increasing by leaps and bounds. If you are a Wireless Enthusiast you know also that you and millions of others are constantly on the look out for BETTER Batteries.

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Here is a way in which YOU can meet the demand for BETTER Batteries, and Profit Financially—make them yourself in your Spare Time by means of our Patented Method and Formula! By making your own batteries you can SAVE money—by supplying your friends and others you can MAKE money; and you can make up to £300 a year per Licence!

**ANYBODY CAN DO IT!** It has probably never crossed your mind before. You have thought of batteries as "Technical" things—always regarded them as something "mysterious."

The exact opposite is the case. Study the pictures on the left and you will see how really simple it is. You will need no expensive "plant" or machinery—only a few simple tools and hand presses. You need have no special accommodation—a start can be made upon your present kitchen table. The children can help you.

**WE WILL TELL YOU HOW** You may know nothing about Wireless or Electricity—it doesn't matter in the slightest. We will tell you how to do it—FREE. After receiving our instructions you can start right away to manufacture! And the work is intensely interesting, as well as easy; more fascinating than making your own Wireless Set! The saving is huge—an

average worker can complete a 60-volt H.T. Battery in 2 hours, at a cost of 2/3 approximately! Compare this with Shop Prices!

**MAKE YOUR FRIENDS' WIRELESS BATTERIES—AND MAKE MONEY!** Consider what this means to you. Not only can you SAVE money on your own batteries, and get BETTER results, but directly your friends know of them they will want some, too! Thus, you can begin to build up a Profitable Spare-Time Business and reap a Golden Harvest from the Wireless and Electrical Market. Many men are already making comfortable EXTRA incomes in this Pleasant, Easy Way.

There's MONEY in it—big money if you are energetic and anxious to get out of the rut! What could you do with £300 a year?

### PROFITS GUARANTEED.

Your market is unrestricted—it can never become overcrowded—you sell where you like and when you like. If necessary we will purchase sufficient of your output to guarantee you a Weekly Profit providing it reaches the required standard of efficiency which is easily attainable. We will continue your training FREE until you reach that standard—that's fair, isn't it? Don't hesitate—if you have never seen a battery before you can MAKE Money this way. Let us explain this GILT-EDGED HONEST PROPOSITION fully. Write AT ONCE! Make Your SPARE Hours GOLDEN Hours!

Send this Form for FREE Instructions How to Start.

## COUPON

To Mr. V. ENGLAND-RICHARDS,  
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Sir—Please send me at once, and FREE, full details as to how I can Make Money at home in my spare time. I enclose 2d. stamp for postage.

Print your name and address boldly in capital letters on a plain sheet of paper and pin this Coupon to it.

"Popular Wireless," 22/8/31.





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MODEL C.150.

150 v. @ 25 m/a. Three tappings: 60, 80 v. S.C., 120 and 150 v. Westinghouse full-wave rectification. Ready assembled in Handsome Case. Requires wiring up only. Simplified point-to-point diagram. Price **76/-**

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**HEADPHONES**—H.W. Sullivan's Wireless Light Headphones, new 120 ohms, 3/6. Ditto store soiled unboxed 120 ohms, 2/9. New High Res. Long Range Model 8000 ohms, 4/3. S.G. Brown's Headphones with Headbands 120 ohms, 7/6. Ditto 1500 ohms, 12/6.  
**FIELD HEADPHONES**—Double Field Headphones D.111 with all-leather Headbands and cords L.R., 2/6. Ditto pairs without Headbands, 2/0. Single phone with cord, each 11d.

## Garrard Electric Power Units for Gramos.

These are the Electric Motors with pulley and enelo. adj. Resistance, with bakelite panel fitted 12 adjustments for any mains voltage. Motor and Res. only.

OUR PRICE—

Motor 25/- Mains Resistance 7/6

Or the Pair 30/-

Now is the time to buy.

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Make

## The DAILY SKETCH

YOUR Picture Paper

## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

it was really quite marked. I am wondering if this is usual, or anything wrong?"

With a grid-leak detector it is quite usual to have a marked decrease when a strong station is tuned in. In fact, this method of inserting a milliammeter in the plate lead is sometimes taken advantage of when very sharp readings are required, because the visual indication is so much clearer than the alteration in sound values, as the tuning condenser is moved.

### BULGIN D.C. MAINS RESISTANCE.

In the advertisement of the above named component on page 697, "P.W." August 8th issue, it was said to be tapped for all mains 250-250 volts. This was a printer's error, and the sentence should read "Tapped for all mains 200-250 volts."

### HELP THE NEWSAGENT.

Have you ever thought how difficult it is for a newsagent to order just the right number of copies of any particular paper each week? You can make his task much easier if you place a regular order with him. You will not only help him to order correctly and avoid waste, but will make sure of getting your copy regularly each week.

## BUILDING THE "SUPER-QUAD."

(Continued from page 744.)

be arranged so that the readings on the drum dial are level with the two pointers fitted to each escutcheon plate.

With the completion of the panel assembly the most exacting part of the construction is finished, and it only remains for the base-board parts to be mounted and screwed in position to complete the set, with the exception of the wiring. Before passing on to the wiring, however, it would be as well for the constructor to try the set in its cabinet, to observe the fit and to drill the hole for the oscillator control spindle.

As will be seen, the Oscillator unit is mounted on a slotted metal bracket. Measurements can then be made between the centre of the spindle and the bottom of the base-board, and between the front point and the back of the panel.

### Fixing the Unit.

The measurements thus obtained can be applied to the side of the cabinet, but before the hole is drilled the height and depth of the proposed hole should be carefully rechecked to avoid disfiguring the cabinet by incorrect measurements.

Of course, if the height of the hole is found to be slightly incorrect, it is only necessary to shift the Oscillator unit up or down the bracket; the same correction cannot be applied laterally.

Very little need be said about the wiring, as it is quite straightforward and free from anything which requires comment. It was previously mentioned that no soldering was involved in the wiring; this is quite true, since the only component which comes within its scope is the Oscillator unit, which is fitted with sterling silver connecting lugs. For the purpose of the constructor, however, it is sufficient to clean the ends of single rubber-covered flex and squeeze the serrated metal tags over the bare wire with a pair of pliers.

## TECHNICAL NOTES

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

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

### Amplifying the Low Notes.

A GOOD deal is said about the importance of reproducing the low notes both in the amplifier and in the loud speaker. This is all very well so far as it goes, but the argument can easily be pushed too far and, as has more than once been pointed out by Captain Eckersley, there is a tendency to exaggerate the extent to which very low frequencies are reproduced by any present-day loud speaker.

In fact, I have sometimes been told by proud owners of the "extra special" type of loud speaker that such and such frequencies were properly reproduced when, in fact, the frequencies in question, even if they were reproduced, would contribute little or nothing to the audible result.

### "Motor-Boating" Troubles.

With a resistance-capacity-coupled amplifier, or an amplifier with resistance and transformer stages, it is necessary, if you want to reproduce low notes adequately, to arrange the capacity of the coupling condenser properly in relation to the resistance of the grid leak.

But what I want to point out is that when you go for the very low notes you are liable to run into other trouble in the shape of motor-boating, unless, of course, you care to go in for special filters.

For this reason it is just as well to sit down and consider for a moment whether you are not running into a whole lot of trouble in your amplifier for the sake of preserving something which, if you face the fact, you cannot eventually deliver from the loud speaker. Personally, I think a compromise is much more sensible and that it is better to forget about the really very low frequencies altogether.

In order to cut down the very low notes, of course, you may reduce the capacity of the coupling condenser; the actual value for the best results must be found by experiment.

### Scratch Filters.

When electrical reproduction of gramophone records was first introduced, one of the great advantages foreseen for it (apart from the obvious possibility of amplifying to any desired degree) was the cutting out of surface noise by means of electrical filters. Corresponding attempts had already been made with acoustical filters in the days before electrical reproduction, but, so far as

(Continued on next page.)

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FROM

# FERRANTI



## TECHNICAL NOTES

(Continued from previous page.)

my experience goes, all such mechanical filter arrangements involved a serious loss of volume.

With electrical reproduction any such loss of volume is not a very serious matter, as this can easily be made up by amplification, whereas that was, of course, not possible with the non-electrical system. Now that we have had some years of experience of electrical reproduction, opinion seems to be divided on the question of attempting to cut out surface scratch by electrical means.

Some people are all in favour of it, whilst others believe that in cutting out the scratch noises, which are of relatively high frequency, we cut out at the same time the desired high frequencies in the reproduction and so lose brilliancy in the overall result; in other words, that the remedy is as bad as the disease.

### A Question of Opinion.

There is, however, plenty of scope for personal opinion in this matter, and much depends on whether you attach more importance to the disagreeable effect of scratch or to any lack of naturalness in the reproduction, due to the absence of the higher frequencies.

Personally I am all in favour of scratch filter arrangements—if properly carried out—because I believe that, notwithstanding anything which may be said to the contrary, there are precious few people who can really notice a slight cutting off of the higher frequencies—or the lower frequencies for that matter. On the other hand, everyone knows how disagreeable surface noise is, especially when this is amplified, as it will be with the electrical reproduction if no scratch filters are used.

Of course, surface noise has been greatly cut down during the past three or four years by improvements in record manufacture, so that the problem is not in any case nearly so serious as it was before that time.

### Mains Valves.

With mains valves, whether those heated directly or the now more popular indirectly-heated type, remember that it is very important to have a really good connection to the pins of the heater or filament. As a rule the filament or heater voltage is very low, or at any rate the current is relatively heavy.

For a low voltage and heavy current it means that the resistance is low, and consequently any additional resistance which may arise at the contacts of the pins with the sockets may make quite a difference to the current passing. It is, therefore, particularly important that the contacts should be good and efficient, and it is a wise plan to go over the filament or heater pins and be sure that these make a firm connection with the sockets.

### Effect of Grid Leak on Response.

The correct value of grid leak is very important, for reasons which are generally well known. One reason, however, which is not so well known, is that the incorrect value of grid-leak resistance may cause a weakening of the higher frequencies.

I daresay some of you may have experimented with grid leaks of different values.

(Continued on next page.)

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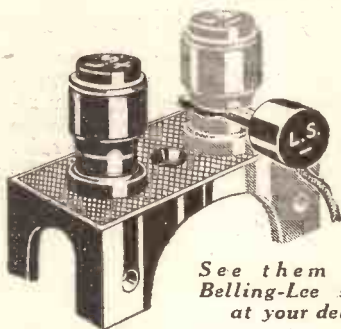
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## TECHNICAL NOTES

(Continued from previous page.)

If you do you will probably find that often the use of too high a value of grid-leak resistance in the detector stage will cause the higher acoustical frequencies to be weakened, whilst with a low value of leak the reproduction tends to be higher pitched and apparently more brilliant.

### Television Prospects.

Not so much has been heard lately about television in this country, although quite a lot of people are working at it very hard. Two or three years ago there was such a tremendous fuss about television that it seemed to occupy almost the centre of the radio stage.

As I pointed out then and on several other occasions, however, it will take a very long time before television reaches what I personally should consider to be a really practical stage.

In fact—again only in my own opinion—television will never become really practical until some radically new principle is discovered, just in the same way that radio telephony, including broadcasting, of course, only became really possible with the advent of the thermionic oscillator.

No doubt if the valve had not been discovered, attention would have been concentrated upon other high-frequency generators, but the advent of the valve completely revolutionised the whole situation and opened the way for perfect transmission of sounds, as distinct from mere signals. It would appear that some similarly revolutionary principle must be awaited in the field of television.

### Progress in U.S.A.

Notwithstanding all this, there is quite a good deal of interest being shown in television and its prospects in the United States of America, where many radio stations now regularly transmit television programmes, and quite a number of amateurs and experimenters own and operate television receivers.

Some of the leading members of the radio industry in the States seem to be of the opinion that, even on the basis of the present state of scientific knowledge, television in the real sense is already close at hand. With this opinion, however, as I have already said, I entirely disagree.

### Alexanderson's Opinion.

Several of the United States newspapers regularly devote space to television news and technical matter, and the "New York Sun" in particular regularly gives over a full page to this subject. On the other hand, Dr. Alexanderson, the world-famous radio engineer of the American General Electric Company, said recently:

"Just now television is far from its goal. Television to-day is in the same state as radio telephony was in 1915. We may derive some comfort from this experience of the past, but on the other hand we are not sure that the analogy is justifiable and that television will repeat the history of radio telephony."

### The Sanabria System.

One of the latest systems of television in America, is being developed by Sanabria, and

for this great claims are made. The picture is "painted in" by forty-five parallel horizontal strips working upwards from bottom to top. Each line overlaps slightly to reduce the "striping" effect.

The secret method used by Mr. Sanabria has the effect of varying the light over 400 times as the beam travels from one side of the picture to the other, and on this account the Sanabria pictures are stated to show extraordinary detail.

In a recent demonstration in Chicago a six-foot picture was shown and illuminated by means of a neon arc lamp of great brilliancy. One of the special features of this Sanabria system, I understand, is an improved amplifier which amplifies the impulses from the bank of photo-electric cells with the minimum of losses and preserves the fine graduation of light as the subject is televised.

### Ratio and Impedance.

Inasmuch as an inter-valve transformer usually has a step-up ratio and so acts to step-up the voltage supplied to it, there is a natural temptation to wonder why this step-up process should not be pushed further and a high-ratio transformer employed.

At first sight it seems obvious that if a three-to-one transformer gives good results, an eight-to-one transformer should give correspondingly better results, since the voltage of the output will be more than twice as great.

There is, however, a limit to the ratio which can be employed effectively, and this depends upon the valve with which the transformer is to be used. If the anode impedance of the valve is fairly low, a high-ratio transformer may generally be used with good results, but if the valve impedance is high the transformer ratio must be fairly low.

For instance, with a valve of, say, 4,000 ohms impedance a transformer ratio of perhaps 6 or 8 to 1 may be used, but with an impedance in the region of 20,000 ohms better results would be obtained with a transformer ratio of only perhaps 3 or 3½ to 1.

### Actual Inductance Value.

In any case, the mere ratio of the windings of a transformer is not always a very reliable guide as to its performance, since a good deal depends upon the dimensions of the core and the magnetic properties of the core metal.

The actual value of the inductance of the primary under working conditions is another important factor, whilst, as I have already indicated, the impedance of the primary winding at various frequencies, together with the transformer ratio, have to be taken into consideration in judging whether a transformer is suitable for a particular purpose.

### Study the Valve.

The majority of inter-valve transformers on the market are of a comparatively low ratio and have been specially designed so that they will operate well in the majority of cases ordinarily met with.

In using a transformer you should first of all carefully study the performance curve which is generally supplied with it by the manufacturers, so as to see what results may be expected when using that transformer with any particular valve which you propose to use.



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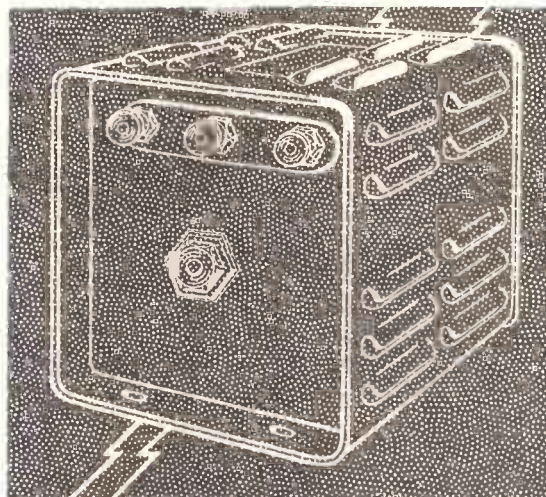
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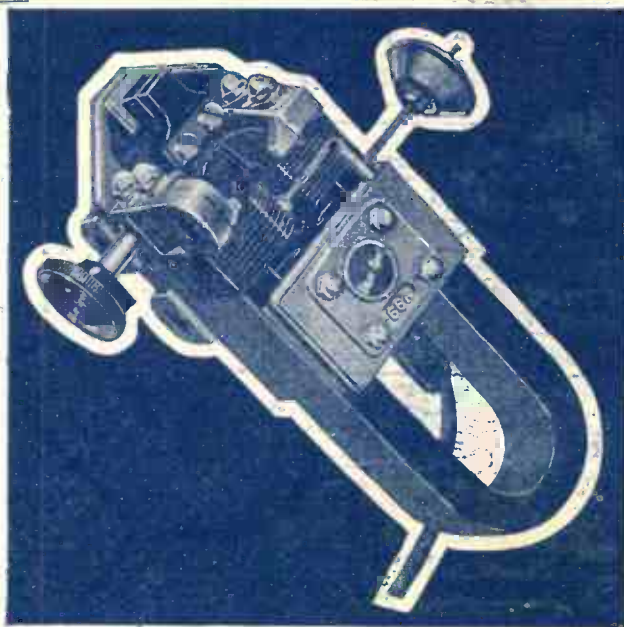
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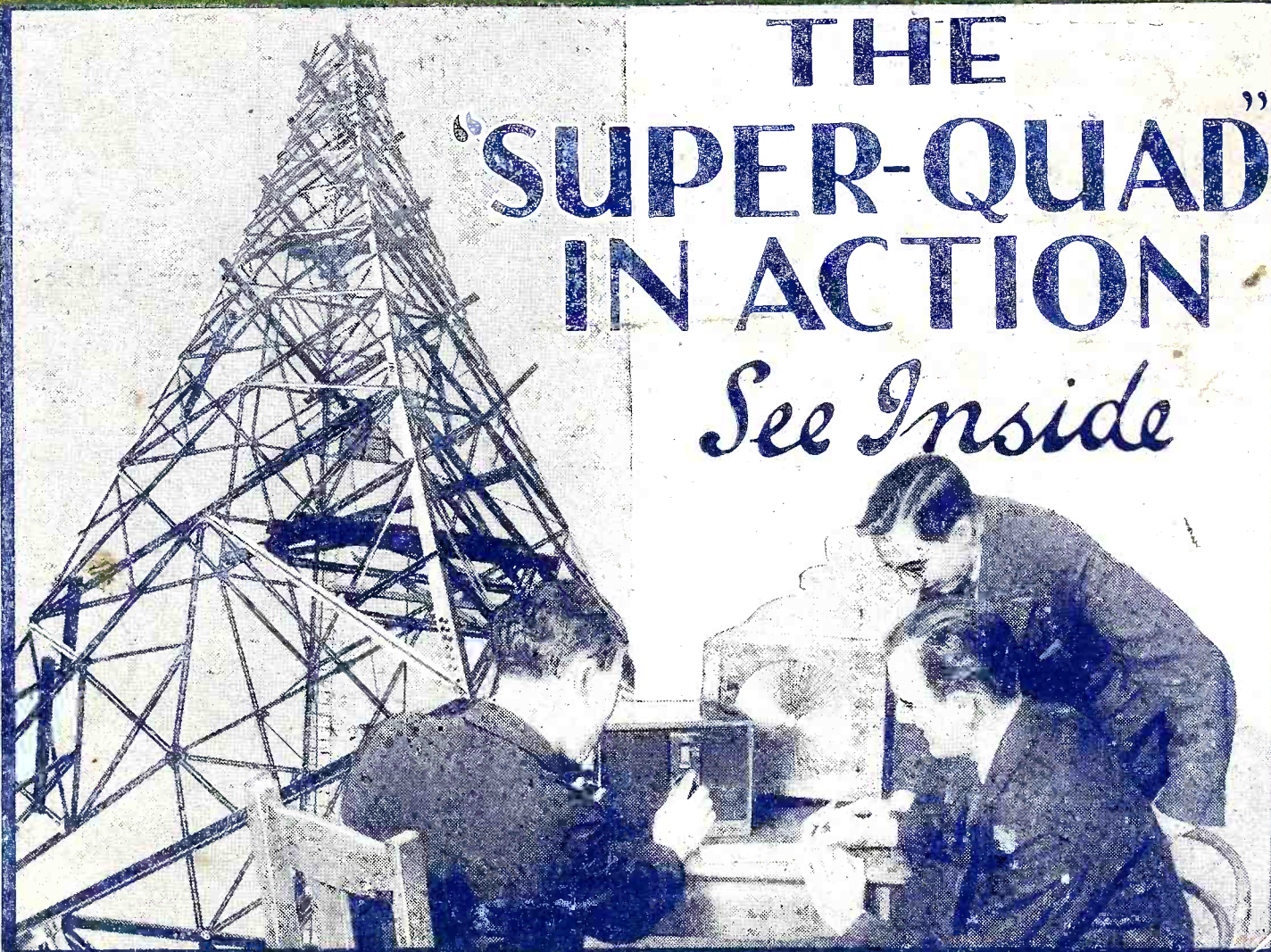
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*See Inside*

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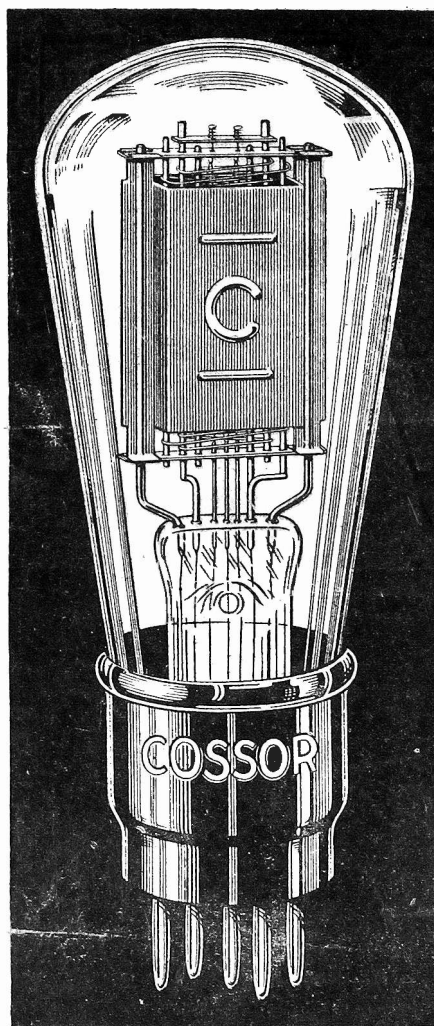


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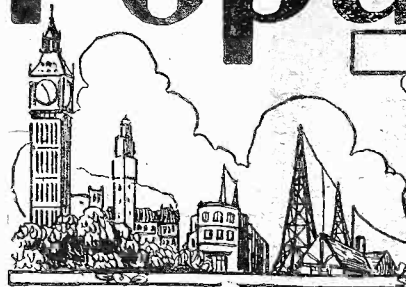
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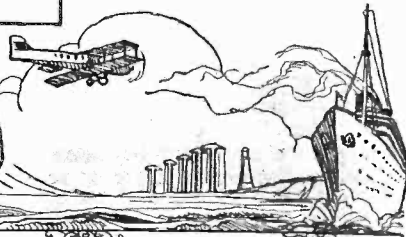
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# Popular Wireless

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DAVENTRY CHANGES?  
 NEWCASTLE ANNOYED  
 TO THE RESCUE  
 LINDBERGH PASSES

SUMS BY ELECTRICITY  
 THE RELAY RACKET  
 OUR LATEST TROUBLE  
 CIVIC AUTHORITIES

## RADIO NOTES & NEWS

"P.W.'s" Great Summer Hint.

**B**BETTER late than never! We have been verifying the following formula by means of a diving rod, and the darned rod ran away with the operator and didn't stop wagging till it reached the Thames, when it burst into small fragments, like the "wonderful one-horse shay." Still, I think we can risk it! Look out! *When in the summer reception falls off, a few buckets of water poured over a buried "earth" will improve matters.* Copyright! This formula can be found in no other paper.

We congratulate Mr. O'Heffernan, and bid him beware of any likely-looking gangsters. Does he want to be "taken for a ride"?

Changes at Daventry?

**I** HAVE become quite confused between one and another of the B.B.C.'s explanations of their "schemes," changes of wave-lengths, and power, etc., so that I do not understand what is at the back of

sea. A good many of the dwellers in that part got useless results when the change was made, which is a bit rough considering that the north-east region is a prolific source of income to the B.B.C.

Moreover, the Newcastle's feel that Tyneside and district need special programmes. I expect that the B.B.C. will do its best to meet the views of the complainants, but lacking knowledge of their side of the question, I hesitate to do more than sympathise with W. B. E. and others who have written.

### HERE ARE THE DAUGHTERS—WHERE'S THE SUN?



Bathing belles of Brighton who checkmated the dull holiday weather by taking a portable set to enliven them on the beach.

Mind the Water!

**I**N response to hundreds of requests, I give a few technical notes on the Great Summer Sell. The bucket should not be procured from a "bucket shop," but from under the scullery sink. Be careful not to kick it.

Distilled water should be used, but failing that, H<sub>2</sub>O from the Nile, Niagara, Sahara, or the falls of Lodore should be obtained. *On no account use rain water!*

Keeping the eye steadily on the "earth," swing booket cheerily hence and hither, keeping time with a metronome. To make a metronome— (*This is not the "B.O.P."*—Ed.)

With Regrets.

**O**H, all right, then! Let's get on to something solemn. It is with the deepest surprise and regret that we announce that a Britisher has been foolhardy enough to win the International Relay competition which is promoted by the American Radio Relay League.

The dare-devil in question, Mr. H. L. O'Heffernan, received more than twice as many marks as any other competitor. The contest is very exacting, lasts a fortnight, and involves a lot of night work.

the rumour that, if the Post Office agrees, Daventry is to be boosted up to 100 kw. at a cost of between £150,000 and £200,000.

If the idea is to put Daventry as a large blob on the radio map of Europe, I think it is rotten, but if it is to spread the National programmes over a bigger slice, I would rather see more stations put up, subject to there being ether-room—and that's where the rub is, I expect.

Newcastle Annoyed.

**T**HEN, the changing of Newcastle's wave-length to that of the Northern Regional started a violent scream from the Geordies, who consider themselves to be now between the devil and the deep

Radio Advertising.

**A**N interesting sidelight on the small controversy I had about the value of radio advertising in the States, or elsewhere, is thrown by an article by Sir John Reith in the "Nineteenth Century." He believes that the great wireless "chains" of the U.S.A. will be the means of reducing considerably the advertising and that the public are dissatisfied with the programmes, as also are the broadcasting chiefs themselves.

Now why, if radio advertising is so successful (as we are told), should there be any question of reducing it? For the more successful it is the better the programmes it can sponsor.

I pause for a reply.

Heartless Trick on Radio Man!

**T**AKING advantage of the attraction which the McMichael "portables" have for discriminating freelance "collectors" of radio apparatus, a hard-hearted Bond Street dealer placed a dummy model in his window, and this hollow sham was in due course gathered in by an unsuspecting smasher-and-grabber.

Is there no limit to the brutality of modern  
 (Continued on next page.)



## "ARIEL" REVIEWS THE NEWS OF THE WEEK

business methods? Here a poor, hard-working man goes and expends a perfectly good brick in good faith, upon a mere lath-and-varnish model. Probably he is by now the butt of the "crook" fraternity and has been chucked out of his Club. It's really too bad.

Such methods may be all very well for Chicago but we look for more humanity from the West End.

### To the Rescue.

**A** HANDY tip from A. H. R. (Malvern Link) for trying the effect of fixed condensers of different values in the aerial. The various connections cannot well be described in one Note, but given the idea your own gumption will suffice.



A two-inch square of ebonite is screwed to the wall by the aerial lead-in; into each corner is fixed a terminal with a square nut

and a milled finger nut. The two top nuts will take "Formo" type condensers, which can be connected in circuit by means of leads with spade terminals.

I am returning his photograph, because it won't reproduce well, and I apologise for the lack of a covering letter; my typist is swimming the Channel!

### Lindbergh Passes.

**T**HIS talk of examinations—cuss 'em! brings to mind that the great Lindbergh and his wife, who have been flying to Japan and getting into the papers thereby, sat for an examination in telegraphy before they started and succeeded in getting "commercial third-class licences."

Such licences demonstrate that the holders can send or receive at least fifteen words a minute in code. Good for Lindy & Co.

Lindy is not only a good plucked 'un and a fine airman, he is a gentleman in grain, and a credit to the telegraph fraternity.

### "Let the Credit Go."

**W**E may not all see eye to eye with Mr. Lloyd George, but everyone is sorry that his illness prevented us from having an opportunity of hearing him on August 6th. Let's hope he'll soon be fit enough to tread his native heath and spout about the Eisteddfod. And, by the way, the Welshman who wrote me about the Abbey Players' presentation of



"Let the Credit Go," on August 10th, is unlucky, because I was at Southend on that day, making merry with the E. K. Cole Convention, and hearing some fine sets demonstrated. We had a great time, too, finishing up at "The White Horse Inn." Not the pub—the play, mark you!

### Sums by Electricity.

**T**OO late, too late for "Ariel," who was ever a duffer at "maths," comes the invention of Dr. T. S. Gray, Massachusetts Institute of Technology, of a device for solving mathematical problems by electrical means, the device being called the "Photo-Electric Integrator."

You put the sum in the slot and the answer is shown on the screen. Dearie me, how useful that would have been to me on many a stricken field in the days when I had to pass exams.

One of the Arielettes is on the brink of matriculating and is having frightful times

### SHORT WAVES.

There's one thing to be said in favour of the hiker—he can't take a portable set with him.

#### MODERN MUSIC.

A music critic, referring to the B.B.C.'s modernistic effort at the Queen's Hall, at which tubicab horns were included in the instruments of the orchestra, observes: "Yet mingled among it all were moments of great beauty."

I take it that he is referring to the intervals. "Morning Post."

A Brixton man has just been sentenced to three months' hard labour for "receiving" a stolen wireless set.

He probably thinks it well worth while—if it was stolen from his next-door neighbour.

"I am of the firm opinion that wireless is the cause of all this unnatural weather," writes a critic.

It's the cause of quite a lot of unnatural language, anyway.

An Atlantic liner has been supplied with a natural flower bed. It is said that the officer responsible pinched the earth from the wireless operator.

"Inarticulate sounds from a loud speaker can only be classed as noise," we read in the "Northern Echo."

Yes, and not only the inarticulate ones, either.

(Wireless telephone messages between London and New York are stated to have been picked up by listeners in several parts of the world):

It was my brilliant notion

To propel in your direction

O'er the intervening ocean

Pledges of my fond affection.

For a private talk I would not

Mind a charge distinctly bigger,

But to tell my love—I could not,

While the fans sit round and snigger.

Since the ether may disclose all

Secrets in this same conjunction,

I'm determined my proposal

Shall not be a public function.

"Morning Post."

with those two ghastly men who have nothing better to do than to walk from A to B, and with taps which run, quite uselessly, into tanks. If she sees this note I shall be pestered to buy her a "Photo-Electric-Integrator."

### "Yew Gotta Have It!"

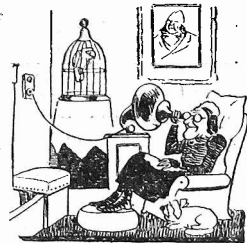
**S**O convinced are the U.S. army authorities that radio is good for all ills, they have arranged for all their hospitals, one hundred and five of 'em, to be equipped for reception. Every bed has "gotta" have it, and if the patient can't sit up and wear the telephones, then

by heck! he's gotta have one of these here "radio-pillows." Killed by kindness, eh?

Pity they don't give the poor fellows time to think and time to pray. But possibly Americans don't feel the need to do either!

### The "Relay" Racket.

**T**HE relay service is proving a great boon, especially to invalids and deaf old ladies with car trumpets. Mr. N. R. Phelps, radio dealer, of Brighton, has shown that he is a man of broad views and sound business instinct, for when he found his business threatened by the possibility of a relay service being opened near him he promptly went into the relay game himself, and is, I hope, doing well. Mr. Phelps confirms what I have always maintained, that "radio relays" are a legitimate form of competition. Recourse to petitions to Town Councils is a sign of weakness and mal-appreciation of the functions of town councils.



### Our Latest Trouble.

**F**IRST bedsteads, then bees; now beans: Gosh! Shall we ever work down to Z? The bedstead man at last has dropped us and the bee chap seems to have cooled off, but every other day—almost—I get two foolscap pages from somebody, J. Trick or T. Trick or H. Brick, who seems to think that radio is the cause of beans not being what they were in his young days.

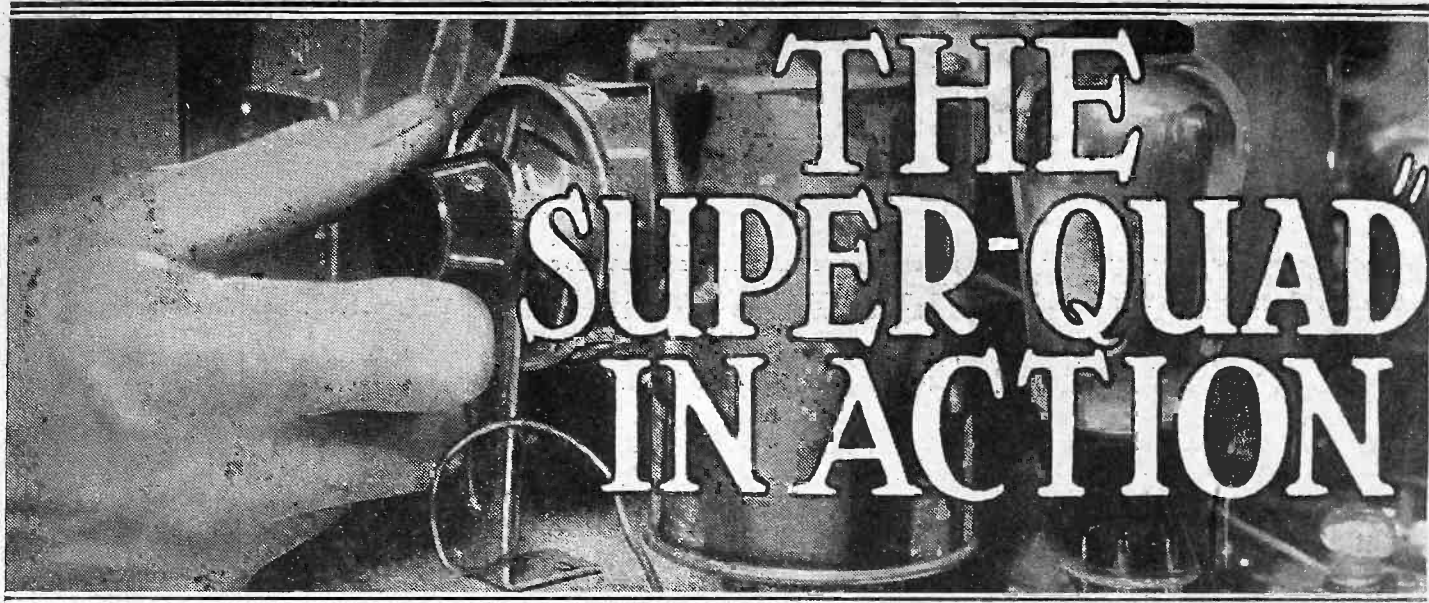
Granting his theory—which I do because I believe in soft answers to hard-baked theorists—I would point out to P. Thick (or T. K. Rick) that his quarrel is really with Hertz, Lodge and Marconi—not "P.W."

We are a remarkable publication—but radio cannot be laid at our door. Try long walks and cold baths, there's a dear fellow. I'm busy.

### Civic Authorities.

**V**ERY interesting reports are coming in about the attitude and arguments adopted by the various civic authorities in regard to the establishment of radio exchanges. In Colchester the council was disposed to give the idea a chance, but local dealers petitioned against it and the matter was referred back to the Highways Committee. Camberwell turned the idea down; ditto Folkestone. Leeds Council approved a minute of the Highways Committee approving in principle the proposal to instal relay exchanges.





NO doubt by now most of you who intend doing so will have completed the "Super-Quad." So this week I am going to tell you how to get the very best from it.

That it is capable of giving good results I can confirm from experience, as I have just spent a most enjoyable week testing the original model out. And I can honestly say that during that short period I heard most, if not all, of the more important broadcasting stations of Europe.

**There is no fuss.**

The first thing that will probably strike you on switching the set on is that there is no oscillation whatever. The stations just rolling in with a lack of fuss which is almost uncanny.

When I say there is no oscillation, I mean in the sense that it is used in ordinary receivers to boost up the strength of weak stations. All super-heterodynes have an oscillating valve attached to them, for changing the wavelength of the received signal to that of the intermediate amplifier, as Mr. Dowding explained in his first article. But it is not accompanied by all the squeaks and squeals which are the more or less recognised indication that a receiver is in an oscillating condition.

It is easily the most stable and genteel super that I have handled. In fact, in this connection, it could quite well put a number of ordinary straight sets in the shade! I tuned in over forty stations on the first night without a single squeak!

Now, I suppose I must get down to "brass tacks," otherwise there will be no space left to tell you how to put "ginger" into your "Super-Quad."

**Ordinary Aerial.**

To start with, most super-hets. are designed for working off a frame aerial. The main reason for this is that the average super, if connected to an outside aerial, would spoil other listeners' reception for miles round by the radiations from its oscillating valve.

\* \* \* \* \*

**This account of a week's working with the "Super-Quad" makes fascinating reading, for the set seems to put the world at your finger-tips. Some very useful operating hints are included.**

**By F. BRIGGS.**

\* \* \* \* \*

The "Super-Quad," however, surmounts this difficulty by using hand-pass tuning in the aerial circuit, so you need not be afraid of hitching it on to your best outdoor aerial! In fact, you could not use it on a frame if you wanted to—so that's that!

Perhaps a few words about the H.T. voltages would not be out of place here. There are five tapings, and they feed the following points: bi-grid valve, screen of intermediate valve, S.G. plate, second detector, and the last one the output valve.

The only one that is at all critical is H.T. + 2, which is the screen tapping for the S.G. valve. This should not be given more than about 100 volts, otherwise it may be found that the potentiometer volume control is a little sudden.

The remaining tapings should be tried in various voltages. Assuming you have a 120-volt battery, I should suggest: No. 1, 80 volts; No. 2, 90 volts; No. 3, 120 volts; No. 4, 80 volts; and No. 5, 120 volts.

**Mains Unit Suitable.**

My own experience was, however, that they could all be given the full 120 volts (with the exception of No. 2) without any loss in strength. Of course, if you can scrape up 150 volts all the better, as most valves nowadays will stand it quite well.

I also tried the set on a mains unit with excellent results. There was not the slightest sign of instability and there is no doubt that it is a great improvement over the dry battery method. If you do decide to use a mains unit then be sure to get one giving an output of at least 20 to 25 m.a.

The same also applies if you decide to work the set from dry batteries. Don't go and buy the "standard" sizes, as these are really only suitable for small receivers, using a couple of valves or so. The triple-capacity type is the most economical in the long run, and if you are wise and get this larger size you will not be disappointed.

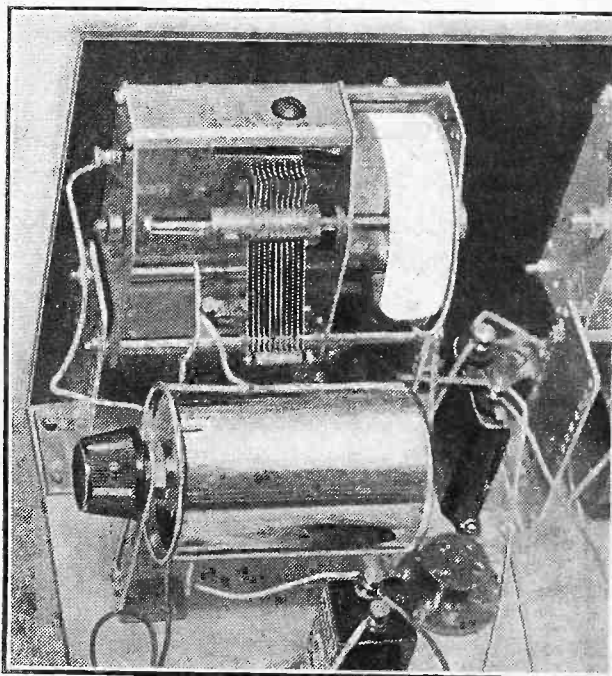
**"On-off" Switching.**

You will notice that a three-point on-off switch has been used. The reason for this is that the potentiometer which controls the voltage on the screen of the H.F. intermediate valve is normally across the H.T. supply, and when the receiver is switched off it is necessary to break this circuit in addition to the L.T. circuit.

Valves are rather important in the "Super-Quad." The first one acts both as a first detector and also as oscillator. It is of a special

*(Continued on next page.)*

**THE OSCILLATOR TUNING**



Mounted on the extreme right of the panel is the oscillator condenser, shown here from the back. Close to it is the oscillator coupler. The knob at one end is for easy wave-change switching.



## THE "SUPER-QUAD" IN ACTION

(Continued from previous page.)

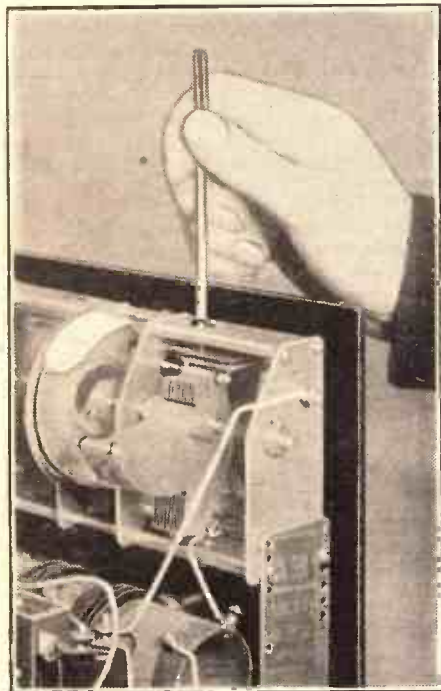
type, having two grids wound one outside the other.

This valve is really the heart of the receiver and has only just come on the market. The one I used was a Cossor, although the Osram people also make one.

### Efficient S.G. Stage.

The intermediate S.G. valve is quite normal. And it is as well to give it as much H.T. as possible up to the limit stated by the manufacturers. If you use the metallised type be careful which side of

## THE FINAL TRIM



To get the ganging exactly right adjust the two balancing condensers, as shown above. Set the tuning to receive a very weak station first, and you will find that the final trim gives you the last ounce of sensitivity.

the filament is joined to the metal coating. It should be L.T. minus.

Now the second detector is also not very important, almost any ordinary detector valve will do—something of about 15,000 to 20,000 ohms impedance, say.

### Choice of Output Valve.

Last, but by no means least, is the output or power valve. The whole performance of the set depends on this one, and it should be of sufficient size to handle a fair amount of power.

If you do not want very loud results, an ordinary power valve would do. It is a much better plan to use a good super-power valve if you have ample H.T. current available.

A pentode has not been used in this set, as the amplification obtainable with normal power valves is ample and the introduction of such a valve would probably only make the set unstable.

### Adjusting the Ganging.

There is one other small point that should be mentioned and this concerns the ganged condenser for tuning the band-pass coil. On the top of this component there are two small adjusting screws for balancing purposes and these should be adjusted for maximum signal strength when tuned to a fairly weak transmission.

Before a set of this type can be fully appreciated it must be heard under "home conditions." During the week I had the "Super-Quad" on test, every one of the medium-wave stations given in the attached list were actually identified.

Of course, there were dozens more to be heard, but they were either on the weak side, or the stations did not give any announcements from which they could be identified.

There was one point which struck me rather forcibly during this brief test. That was the extreme selectivity of the receiver. As an instance, it was found possible—with a little care in tuning—to completely separate Graz from London Regional at a distance of about 12 miles from the latter.

### Dozens of Stations.

If you refer to the list of stations given on this page, you will see that there is only one degree difference in the readings—not bad, is it? I assure you that if you build

one of these wonderful sets it will do just the same for you. There is nothing difficult about the tuning, so don't let that worry you.

On the other side of London Regional there is Mühlacker. This, by the way is the station which interferes with the London programmes so badly, with that annoying whistle. Well, he was only half

Station	Oscillator Dial Reading	Station	Oscillator Dial Reading
Vienna . . . . .	81½	Strasbourg . . .	56½
Brussels No. 1 . . .	80½	Brno . . . . .	55½
Milan . . . . .	80	Brussels No. 2 . .	55
Prague . . . . .	78½	Naples . . . . .	53½
Northern Reg. . . .	77½	Breslau . . . . .	52
Langenberg . . . .	76½	Goteborg . . . . .	51
Beromünster . . . .	75	Genoa . . . . .	49½
Rome . . . . .	72½	Cardiff . . . . .	48½
Stockholm . . . . .	72	Bordeaux . . . . .	47½
Dublin . . . . .	68½	Northern Nat. . .	46½
Witzleben . . . . .	69	Hilversum . . . .	46
Sottens . . . . .	67	Turin . . . . .	45
Midland Reg. . . . .	66½	British Relays . .	43½
Bucharest . . . . .	66	Bratislava . . . .	41
Frankfurt . . . . .	65	Heilsberg . . . . .	40
Toulouse . . . . .	64	Bremen . . . . .	38
Lwow . . . . .	63½	Lille . . . . .	37
Hamburg . . . . .	61½	Moravska-Os-	
Radio L. L. . . . .	61	trava . . . . .	36
Mühlacker . . . . .	59	London Nat. . . .	35½
London Reg. . . . .	58½	Leipzig . . . . .	34½
Graz . . . . .	57½	Horby . . . . .	34

a degree above the Regional transmission and yet, mark you, it was very nearly possible to receive him also without interference.

### The Last Word.

When you go over to the long waves you will not find quite so many stations, because this waveband is not by any means so thickly populated. But you will get all there is to be had, and that is saying something.

Now I think that covers everything, and I only hope you will have as enjoyable a time with your "Super-Quad" as I did with mine. The evenings are drawing in and soon there should hardly be a transmission in Europe that is not within the reach of this wonderful set. So you can look forward to a good "bag" before many weeks are out.

## A SHORT COMPONENT LIST FOR A POWERFUL SET!

- 1 Panel, 16 in. × 8 in. (Paxolin, or Peto-Scott, Parex, Permeol).
- 1 Cabinet, baseboard 10 in. deep (Camco, or Pickett, Osborn, Peto-Scott, Ready Radio).
- 1 .0005-mfd. two-gang condenser with vernier drum drive (J.B., or Polar, Lotus, Cyldon, Formo).
- 1 .0005-mfd. condenser with vernier drum drive (J.B., etc.).
- 1 Square-peak aerial coil (Varley).
- 1 Oscillator unit, type 0-2 (Wearite, or Lewcos O.S.C. 126).
- 1 Band filter unit with pig-tail (Wearite, or Lewcos).
- 1 Band filter unit (Wearite, or Lewcos).
- 1 3-contact push-pull switch (Ready Radio, or Bulgin, Peto-Scott, Wearite, Telsen, Goltone).
- 1 25,000-ohm spag. resistance (Lewcos, or Bulgin, Ready Radio, Telsen).

- 1 50,000-ohm potentiometer (Colvern, or Sovereign, Igranic).
- 5 4-pin valve holders (Clix and Wearite, or Telsen, Lotus, Bulgin, Formo, Igranic).
- 1 5-pin valve holder (Clix, or Telsen, Wearite, Bulgin).
- 2 1-mfd. fixed condensers (Formo and Dabillier, or T.C.C., Igranic, Hydra, Helsby, Peto-Scott).
- 1 2-mfd. fixed condenser (Dubilier, or Formo, T.C.C., Igranic, Hydra, Helsby, Peto-Scott).
- 1 .04-mfd. non-inductive fixed condenser (Dubilier).
- 1 1.5 meg. grid leak and clips (Loewe, or combined grid-leak and holder, Dubilier, Telsen, Ferranti, Ediswan, Ready Radio, Igranic, Graham-Farish, Watmel, Varley).

### RECOMMENDED ACCESSORIES.

(Mazda P.220 A or Osram P.2). (If other valves are used characteristics should be as near those of valves mentioned as possible.)

**BATTERIES.**—G.B. to suit last valve. H.T., 120-150 volts super capacity (Drydex, Pertrix, Ever Ready, Lissen, Magnet).

- 1 .0002-mfd. grid condenser (T.C.C., or Ready Radio, Telsen, Goltone, Ferranti, Ediswan, Igranic, Formo, Watmel).
- 2 .001-mfd. fixed condensers (T.C.C., etc.).
- 1 H.F. choke (Lewcos, or Ready Radio, Peto-Scott, Telsen, R.I., Varley, Lotus, Wearite).
- 1 L.F. transformer, high ratio 7-1 (Telsen).
- 1 Fuse holder (Ready Radio, or Bulgin, Telsen).
- 1 Terminal Block (Junit, or Belling & Lee).
- 2 Terminals (Eelex, or Belling & Lee, Igranic, Clix, Goltone).
- Battery plugs and spade terminals (Belling & Lee, or Eelex, Clix, Igranic).
- G.B. battery clip (Wearite, or Bulgin, Burton).
- Glazite, wire, screws, flex, etc.

**ACCUMULATORS.**—Voltage to suit valves (Exide, Ediswan, Lissen, Pertrix, G.E.C.).

**MAINS UNITS.**—State voltage and type of mains, and give details of set when ordering (Heayberd, Regentone, Lotus, Atlas, R.I., Ekco, Tannoy).

**LOUD SPEAKER.**—Blue Spot, B.T.-H., Amplion, Celestion, Undy.

**VALVES.**—1 Double grid (Cossor or Osram), 1 S.G. (Mazda, or Cossor, Osram, Six-Sixty), 1 H.L. type or 2nd Detector (Six-Sixty, Mazda, Fotos, Osram, Lissen, Cossor), 1 L.F. valve of power type

**A**UGUST, I am glad to say, has not let me down as a prophet in long-distance matters, for though we had a very bad time owing mainly to atmospherics during the first few days of the month, a very steady improvement in the strength of foreign stations and in the number receivable has been noticeable ever since.

On the long waves the improvement has been quite remarkable. There are, of course, quite a number of long-wave stations which hardly ever fail us, stations I mean such as Huizen, Radio-Paris, and Kalundborg. But there are others which are much more affected by adverse conditions, and from these reception was possible only now and then during the height of summer and for some little time after the longest day.

**This Month's Log.**

An examination of my log for the middle fortnight of August shows that first-rate reception has generally been possible from almost every big station on the long waves. Huizen, Zeesen, Radio-Paris, the Eiffel Tower, Warsaw, Motala, Kalundborg, and Oslo have all come in at full loud-speaker strength on almost every occasion when entertainment was sought from them.

On the medium wave-band stations that were faithful standbys during the summer have strengthened up greatly and there are a good many old friends which are



Some practical distant-programme notes compiled by a special contributor who nightly searches the ether in order to obtain really up-to-the-minute information for "P.W." readers.

making a reappearance after weeks of partial or complete silence.

Amongst the latter I would mention particularly Berlin, Witzleben, Bordeaux, Prague, and Katowice. Budapest, though not yet thoroughly into his stride, is trying hard to let us hear him. This station is always worth trying for now, for reception at full loud-speaker strength is often obtainable, whilst there are few nights upon which he cannot be found.

Vienna, who seemed recently to be on the verge of staging a come-back, still remains rather a chancy station, though I do not think that it will be very long before he becomes as reliable as ever. Milan is another station worth attention and Langenberg shows great improvement.

**"Fickle" Stockholm.**

Stockholm was one of those worst affected by adverse conditions all this summer, and this is rather curious. His power is exactly the same as that of Rome, and both stations are about equally distant from the middle of this country.

But whereas Rome has always been a

good station, Stockholm has shown enormous variations, being unreceivable on some nights and coming in at full loud-speaker strength on others. His good nights, though, are now beginning to outnumber those upon which he is weak.

Sottens is also better and Frankfurt usually gives fine reception. Toulouse Midi seems to have come to anchor after a period of wave-length wandering which resulted in his jamming other stations and being jammed himself. Strasbourg is better heard than for some time, and other very good stations just now are Breslau, Brussels No. 2, Goteborg, Hilversum and Turin.

**For Long Wave Listeners.**

On the long waves readers have probably heard tests from the new big Paris station which is shortly to replace the present Radio-Paris. With a power rating of 80 kilowatts this station should be one of the best heard Continentals in this country.

Paris has always given us fine transmissions since the days when the original Eiffel Tower station was the only regular broadcaster in existence. When the wave-bands were less crowded the original Radio-Paris with his 8 kilowatts was the easiest of foreign stations to receive, and on the medium band we used to obtain wonderful results from the old Ecole Superieure, though in those days the station was rated at a modest half-kilowatt.

**A**GAIN there is no event of outstanding interest to chronicle except, perhaps, the fact that the "Nautilus" (Sir Hubert Wilkins' Polar submarine) has been heard at last. G 2 T K, of Hull, worked him when he was in Devonport Dockyard.

The "Nautilus" was using the call sign K 7 X 1, on the 40-metre amateur band, using telephony. A schedule arranged then for 11 p.m. has apparently failed to produce anything of interest.

**A Good "Yank."**

W 2 X A D is very good again, though unreliable. On one evening, for instance, he was every inch as good as Rome on 25.4 metres. Yet for the next two evenings he was completely spoilt by quick fading and the distortion that accompanies it.

One of the best telephony it is possible to hear nowadays is P L E (Bandoeng, Java). He works on 15.9 metres, and gives broadcasts on Tuesday afternoons from 1.40 to 3.40 p.m. His transmissions are *always* as loud as those from Rome!

Our mutual friend Mr. Fred Easter (of Cincinnati) kindly sends Melbourne's latest schedule. He is again transmitting (from V K 2 M E) at the following times, on 31.28 metres: 5 a.m. to 7 a.m., 9 a.m. to 1.30 p.m., and 7 p.m. to 9 p.m.

These times apply every Sunday, and are in G.M.T. In view of the weather at the moment I simply have not the heart to talk of British Summer Time.

In Cincinnati G 5 S W, Rome, and the Pontoise station on 25.6 metres are

**SHORT-WAVE NOTES**



By W. L. S.

all received well. All the European stations round about this wave-length increase in strength, as one would expect, till 10 p.m. (again G.M.T.), and then begin fading out.

Generally speaking, the 25-metre band appears to be getting across better than the 32-metre band, while the latter seems more efficient for transmissions from Australia to the U.S.A.

**Varying "Best" Times.**

Mr. Easter makes one observation that is very interesting to us over here. This is that there is a noticeable difference in the best times for the reception of Zeesen and Rabat. How well we notice this sort of thing on the American stations! I often find that W 3 X A L's harmonic on 24.5 metres odd is far stronger than W 8 X K, and yet on other nights the reverse will hold good.

J. K. M., of Liverpool, having just returned from West Africa, in company with a short-wave receiver, thinks that the dance music transmissions mystifying one or two readers emanated from the Copenhagen

relay on 31.51 metres. Anent the remarks upon American short-wave receivers, he says "Buy British every time."

He also mentions logging a station calling "Hallo, hallo, Radio Español, Madrid!" This was located just below P C J. Has anyone else a claim on this one?

Strangely enough J. K. M. remarks that W 2 X A D seems to have gone out of existence. I remember what happened to me when I made a similar remark early in the year, and consequently will not be hard on J. K. M.

**Have You Heard These?**

Other stations about which information is wanted are these: Radio L L, between 38 and 40 metres; a Buenos Aires station in the region of 32 metres; and a French station that transmits a little below W 3 X K. This latter does not refer to Pontoise on his lower wave, but to another, and unknown, station.

Having had many pathetic letters from would-be operators that want to know how to learn Morse, I am constrained to repeat my old advice.

Stage 1, learn it up first of all in terms of dots and dashes. Stage 2, get a good-tempered and patient friend to send strings of letters to you very slowly on a buzzer. Stage 3, find a station that is sending slowly enough for you to pick out a letter here and there, and just stick to him until you find you are improving.

It is most encouraging to find yourself drawing fewer and fewer blanks, and is a sure incentive to success. There are several suitable stations on short waves.



THE MIRROR OF THE B.B.C.

**A NEW BOARD OF GOVERNORS?  
STAFF CHANGES—ECONOMY CUTS—POINTS FROM PROGRAMMES—SOME IMPORTANT TALKS.**

**A**LTHOUGH I still incline to the view that the Prime Minister will prefer to make no change this year in the Board of Governors of the B.B.C., some political circles continue in agitation about the matter. It is believed that the Postmaster-General is really anxious to make changes in the direction of a younger board.

What are the views of Mr. Whitley, the recently appointed chairman, has not yet emerged. The decision will, I understand, be controlled primarily by his recommendation direct to the Prime Minister.

**Staff Changes.**

Some important staff changes will take place in the B.B.C. about the end of the year. I should not be surprised to see a considerable reduction of administrative posts, and a greater concentration on programme organisation.

It is felt in official circles that such a rationalisation would not only effect economy but would also increase efficiency.

**B.B.C. Pension Scheme.**

Sir John Reith had a very busy time during the last few days before he left London for his holiday on the Continent, but apparently he went away with a feeling that everything will be safe both inside and outside Savoy Hill until his return.

Just before he left he explained the outlines of a scheme to provide staff pensions by the purchase of annuities at the age of sixty. The scheme is to be operated by compulsory deductions from salaries, to which the Corporation will contribute an equal amount, as is done by some of the large business houses.

**Economy Cuts.**

Sir John also decided, after consultation with his departmental chiefs, what shall be the reply of the Corporation to the recommendations contained in Sir George May's Economy Report that the B.B.C.'s revenue shall be reduced.

The Corporation requires more, rather than less, money to carry out its commitments and schemes of development. There is no doubt that whatever attitude the country generally may adopt concerning savings in other directions, the majority of people will be inclined to the view that the work of the B.B.C. must not be reduced or curtailed for want of funds.

**Points from Programmes.**

Melville Gideon, who recently came into the programmes as the conductor of the Dorchester House Dance Band, which has been taking the place of Ambrose's Band in the Saturday night programmes, is appearing in the National vaudeville programme

on Thursday, September 3rd. Other artists already engaged are Elizabeth Pollock (impressionist), Rex Evans, Athene Seyler and Maurice Cole.

On the previous day London Regional listeners are to hear a relay from the Palace Pier, Brighton, of the concert by the band of the Coldstream Guards. Their programme, which will consist mainly of popular items, will include a cornet solo by Sergeant George Morgan.

Thursday, September 24th, is rather a long way ahead, but National listeners will probably like to know that on that day a running commentary will be broadcast on the launching of H.M.S. "Leander" at Devonport Dockyard.

**Some Important Talks.**

Two important broadcasts are down for Wednesday and Thursday, September 23rd

**HE WROTE A THRILLER!**

This is the Eton schoolboy whose play, "The Smugglers," was broadcast some weeks ago from London. He was only fifteen years of age when he wrote it, but the B.B.C. productions department were so struck by it that it was produced in the main programme.



**FOR THE LISTENER**

By "PHILEMON."

Our popular contributor is now abroad, and this week he throws an interesting side-light on radio in Italy.

**W**HEN I arrived here in Italy the other day, I found several copies of the Official Programme waiting to greet me. After I had unpacked my kit and had a bathe, I looked through them.

I looked at the pictures first, as I always do. The pictures were mostly photographs. In the three copies there were nearly a hundred photographs.

There were faces of broadcasters. I had heard practically all of them at one time or another. Some I had heard many times.

**Broadcasting—and Beauty.**

I had formed my judgment of their merits as broadcasters; and now I looked into their faces. And I came to this rather amusing conclusion—that the success of your broadcasting is in inverse proportion to the success of your face!

Please do not misunderstand me. They were all good faces. Whether they were long or short, broad or narrow, square or round, regular or irregular, they were all good faces. Some of them very good faces.

But what I mean is, if you made a composite photograph of the faces of successful broadcasters, you would get a face which any woman might fall in love with, or

and 24th—the first being a relay to National listeners of the Presidential Address by General Smuts at the British Association Meeting at the Central Hall, Westminster, and the second, a talk by Mr. H. G. Wells, which starts the new series entitled, "If I Were World Dictator."

**The Faraday Centenary.**

I am also able to announce that speeches and an orchestral concert will be relayed from the Queen's Hall on Monday, September 21st, in connection with the Faraday Commemorative Meeting which marks the centenary of the scientist's greatest electrical discovery. The opening ceremony of the Faraday Centenary Exhibition at the Albert Hall will also be broadcast on Wednesday, September 23rd.

**Coming Radio Comedies.**

The Productions Department at Savoy Hill is looking for more radio comedies of the type of "The Romantic Young Lady" by the Spanish writer, Sierra, which is to be broadcast on Monday and Tuesday, August 31st and September 1st.

It seems strange that playwrights, and particularly those with ambitions, should be so neglectful of the opportunities offered by the microphone, but there are signs that more are turning their attention to what is one of the best methods of achieving wide-spread fame.

After all, it should not be difficult for mature writers to do as well, as the Eton schoolboy (whose photograph is reproduced on this page) recently showed is possible, by an intelligent examination of the technique required for turning out a successful radio play or sketch.

which any man would be willing to trust with a blank cheque, but it would not be a face which would come very close to the measurements and proportions of Apollo Belvedere.

**Are You Good Looking?**

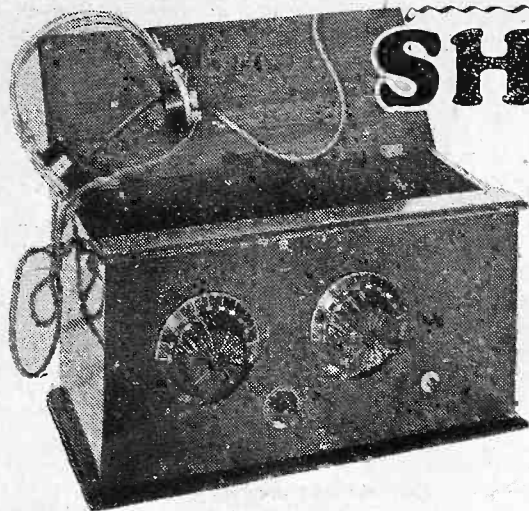
It is rather important to know this. If, for example, you yourself have the itch to become a broadcaster, and wish to know whether you would be likely to make a success of it, there is no need for you to go to the expense of consulting an astrologer or a phrenologist or a palmist. You need only to look in a mirror.

If you fancy what you see there very much, and if there are solid, mathematical grounds for your fancy, the chances are that the microphone is not for you, and you may as well save your bus-fare to Savoy Hill to seek an audition. If, on the other hand, you find yourself turning quickly away from the mirror with a sigh or a shudder or a scream of terror, then my advice to you is to be bold and back yourself for a winner.

Indeed, I should not be surprised, now that this discovery has been made by me

(Continued on page 782.)

# SHORT-WAVE REMINISCENCES



"Below 100 metres! Why, however was one going to get down to that?" Thus writes our correspondent in describing his adventures of the days when Trans-Atlantic telephony was first being accomplished on short waves.

had arranged to listen in spells of one hour each, so that we could manage to get a little sleep alternately.

I picked up the spare pair of 'phones and glued them to my ears. Sure enough someone was talking, but for a while fading made it impossible to catch anything intelligible.

Eventually, however, modulation became steadier, and to our intense delight we distinctly heard an announcer say, "This is K D K A Westinghouse Electric at Pittsburgh: the pioneer broadcasting station of the world." A talk followed, but we were too excited to pay much attention to it, and for days after all we could converse on was K D K A, until everyone to whom we spoke must have leached the name.

Then came those two wonderful stations at Schenectady, 2 X A D and 2 X A F, which worked on wave-lengths of about 22

perfectly good for reception on, say, 400 metres, might be hopeless on 25 metres.

I can recollect the day I first became acquainted with 2 X A D as if it were yesterday. The time was somewhere round 5.30 p.m. and I was turning the dials without expecting to hear much, when I suddenly heard a very strong carrier wave.

### From Across "The Pond."

I resolved it into a dance tune: "My Blue Heaven." Who could this be, I wondered—some new high-powered continental? I was soon enlightened.

The music ceased, and then came the announcement: "This is 2 X A D, the experimental short-wave station of the General Electric Company, at Schenectady, New York, on a wave-length of 21.96 metres."

Reception was wonderfully clear with no fading, and I could hardly believe this

THOSE "veterans" who can proudly claim to have been owners of radio receivers, say, eight years ago, would undoubtedly be able to reveal some thrilling episodes, but how much more stirring would be the tales that the short-wave experimenters of the "dark ages" could unfold if they really got going!

I well remember the day when a friend rushed excitedly to me with the news that a station in the U.S.A. called K D K A was going to put out test programmes below 100 metres for the benefit of far-distant listeners. Until my friend showed me the article I could hardly credit it.

### A Bold Attempt.

Below 100 metres! Why, however was one going to get down to that? I had already tried to obtain oscillation on about 120 metres without result. I foresaw, therefore, that this new American transmitter was likely to prove a severe tax on our skill as successful set builders.

Nevertheless, my pal and I started on the job enthusiastically. We entirely demolished our two-valver, and rebuilt it on approved ultra low-loss lines; even to the extent of cradling the valves upside down on pieces of cotton wool, and soldering the leads direct to the legs. The coils were self-supporting and held together between turns by slices of thin rubber.

What excitement when we came to test the set out! Would it oscillate? It did; although only on the upper portion of the tuning dial, and we seemed unable to get any feedback below 60 degrees or so, try as we might.

Then my friend had an inspiration! Perhaps a power valve would work better in the det. stage, he suggested, owing to it possessing a lower impedance. No sooner said than tried, and to our joy we found we could now get oscillation over the whole dial by suitably varying the aerial coupling.

### Nearing "Zero Hour."

The time for the great trial arrived, when K D K A was scheduled to be operating on the 80-metre band again. Literally shaking with excitement we connected up, and ranged over the wave-band covered by the grid coil. Incidentally, we had no idea what this range was, as all we had heard so far had been ships' Morse and a few harmonics of the broadcast stations.

It must have been two o'clock in the morning when my chum woke me to say he had heard an American speaking. We

and 32 metres respectively. What snags we struck in attempting to drop down to 20 metres!

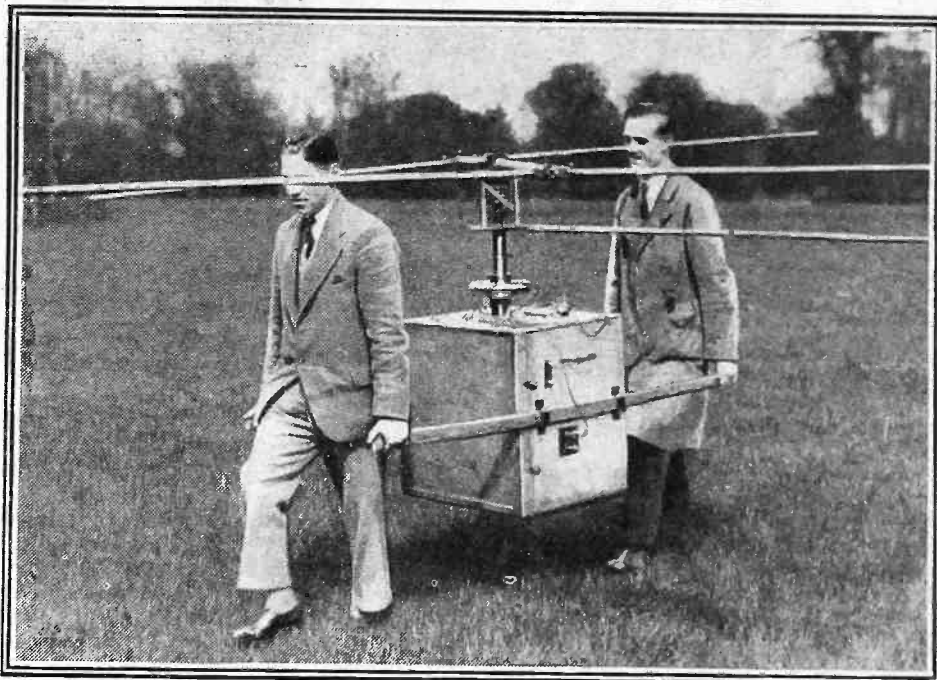
It took us weeks before we hit on a satisfactory circuit, and we must have tested dozens of valves in order to find a detector that would oscillate on this then amazing wave-band. I am afraid the radio dealer who allowed us to test his stock of valves thought we were mad.

Short waves were Greek to him, and he could not understand why a valve that was

transmission was emanating from the other side of the "pond." Several other records followed, and then the announcer signed off, after intimating that the station would be on the air again at 6 p.m., Eastern Day-light-Saving Time, when the regular evening programme of W G Y would be radiated.

Since then, whenever I hear "My Blue Heaven," my mind instinctively bridges the years to that summer afternoon when with bated breath I received my first taste of 20 metres transatlantic telephony.

## "FIRST AID" FOR "X" FIGHTERS



The war against atmospherics, usually known as "X's," is as old as radio itself, and this is a special short-wave direction-finder which enables the exact location of a thunderstorm to be projected on a map by a special cathode-ray oscillograph. It should prove helpful to scientists who are endeavouring to "exterminate" such interference.



## FROM THE TECHNICAL EDITOR'S NOTE BOOK.

# Tested and Found—?



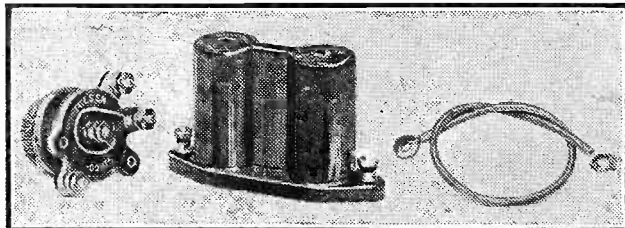
### THREE TELSEN COMPONENTS.

I HAVE just had a batch of the new Telsen components along, and a very nice bunch of stuff it looks.

I am unable to deal with every item in detail, for there wouldn't be room to do so on this page.

But I have chosen quite at random three of them, and the accompanying photo shows you what they are.

First of all there is the Telsen Differential Reaction Condenser, and I can find no fault with this at all. On the contrary, I have



The three Telsen components dealt with on this page.

no hesitation in saying that I consider it to be one of the best differentials I have come across.

Electrically, it reaches a high standard, and my sample tested out exactly to its specification in regard to maximum capacity, and not many "diffs." do that, I can assure you.

But what I particularly like about it is its chubby robustness—it is unusually compact, but its assembly exhibits a rigidity not, unhappily, universally found in such components.

Nevertheless, its action is quite smooth, and I can imagine that the keenest of "D.X." fans will find it perfectly to their liking.

### A FINE H.F. CHOKE.

Next we come to the Telsen H.F. Choke. This is built into a beautiful bakelite moulding, but we never take such things at their "face value" and this is no reflection on Messrs. Telsen—it is one of our quite invariable rules.

But initially I gave the component a "once over" on our choke tester, and it came through with flying colours. It is certainly a good H.F. Choke.

Subsequently I broke the casing and examined the "innards." And it was immediately apparent that these are just as carefully finished as the polished exterior.

There are moulded sectional formers,

and the wire is neatly and efficiently disposed upon them.

I do like clean "works," don't you? I feel that the policy of "what the eye doesn't see, etc.," can never really pay, and that a conscientious craftsman will always give just as much attention to the hidden parts of an article as he does to those which immediately come within the view of potential purchasers.

Well, Telsen's H.F. Choke is 100 per cent in this regard, and it would have extracted some admiration from me if it had been dud in operation. But it isn't—it is good, and when you come to think of it, that is a natural corollary to care in construction!

The third and last Telsen component with which I propose to deal on this occasion is a Spaghetti resistance. It is one of their least expensive lines, but will surely prove to be one of their best sellers.

There is little to be said about a Spaghetti—if it is good it will be up to specification and strong mechanically. I have no hesitation in saying that my Telsen Spaghetti is perfectly satisfactory, and if all its brothers are of equal standard, and there is no reason at all why they should not be, then you can use them wherever "Spags" are needed.

By way of a P.S. I can point out that a fourth of the new range of Telsen components figures in the "P.W." "Super Quad." This is the 1-7 L.F. Transformer, and its inclusion in that very special design is a clear indication of our opinions regarding it.

### JELECTRO ACCUMULATORS.

I have recently received a whole range of Jelectro accumulators. These are made by Jelectro Laboratories, of Bartholomew Close, London, E.C.1, and they are all of the unspillable type for the reason that they embody the substance after which they are named. Jelectro solidifies sulphuric acid without interfering with its normal action, and as the electrolyte ceases to be a fluid no very special design of cell container is necessary, with the result that the Jelectros attain abnormal capacities for their sizes, no small advantage where portable sets are concerned!

Additionally, it is claimed that every Jelectro accumulator contains a de-sulphating material which removes or prevents the formation of sulphate, hitherto one of the greatest bugbears to be met in accumulators.

A further point is that spraying and creeping cannot originate from the "solid" electrolyte, and thus terminal corrosion and sulphation are vastly reduced. Altogether these accumulators certainly command attention.

Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department, with the strictest of impartiality, under the personal supervision of the Technical Editor.

We should like to point out that we prefer to receive production samples picked from stock, and that we cannot in any circumstances guarantee their return as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are, therefore, framed up in a readily readable manner free from technicalities unnecessary for that immediate purpose.

At the present moment I have the whole range undergoing tests of various natures, and so far no faults have been discovered. All their capacities are as stated, and their directly measurable efficiencies well up to standard.

Obviously, it will take time to test for reliability, and I hope to be able to say a bit more about this in due course.

### JUNIT UNITS.

There is now available a folder describing Junit mains units, valve holders, etc., that is well worth sending for from the Junit Manufacturing Co., Ltd.

### AN ORIGINAL DESIGN.

The Rothermel Corporation, Ltd., recently sent me full details of the Columair receiver which they are handling. The Columair covers only a square foot of floor space, and is not unlike a tall grandfather clock in appearance.

As a matter of fact, there actually is a clock at the very top. No loud speaker grille, knobs, dials or anything at all are in evidence to show that the artistic column is a wireless set. The loud speaker directs the sound upwards for even distribution in the room. A remote control with an automatic station-selector can be provided. Certainly for those readers who can afford to pay the price for it, the Columair is a distinctly interesting proposition, indeed it is well worth going out of one's way merely to examine.



The big Telsen Radio factory, where, it is said, a quarter of a million components are being made per day.



# STATION FIXATION

**B**EFORE you proceed with the actual work of calibration, a word should be said on the choice of the tuned circuit to be dealt with.

If there is only one dial, you have, of course, no option, but if there are two or three, do not select that of the circuit coupled directly to the aerial. Should the circuit chosen incorporate reaction, all readings should be taken with the set just below the oscillation point.

Having prepared your chart, as described last week, tune in the London National station, whose reading we will suppose is 23 divisions. Run the point of your pencil upwards until you come to the horizontal line representing 23.

### Plotting the Points.

Now move quickly along to the right, till you come to the vertical line, which stands for 250 metres. Make the next step carefully. Go two small squares to the right and you are on the 260-metre mark. The wave-length of the London National is 261.3 metres. The width of each little square represents 5 metres. Move to the right the amount which you estimate represents 1.3 metres, and make a dot with the pencil point. Write in the station.

Next tune in the London Regional, whose wave-length is 356.3 metres and whose condenser setting we will suppose is 54. Mark in your dot in the same way just where the horizontal line halving the 54th and 55th squares crosses the vertical one representing 356.3 metres.

This imaginary vertical line is found in the same way as the previous one. Go across to the 350-metre line. One small square to the right gives you 355, then the amount equivalent to 1.3 metres must again be added.

### The First Curve.

Dot in the London Regional and deal in the same way with the Midland Regional and the Northern Regional. You have now four points marked in on your chart.

Lay a ruler on the chart, and you will probably find that its edge cannot be made to lie on all four points. Lay it across the London National and London Regional dots and join them with a straight line. Join also the London Regional and the

\*-----\*

**Recording the readings of your foreign stations—for which some excellent ideas were given last week—is made still more fascinating by means of the specially compact chart described here.**

**By R. W. HALLOWS, M.A.**

\*-----\*

Midland Regional, and the Midland Regional and the Northern Regional. Fig. 1 shows you what the chart looks like at this stage.

You have realised that the graph will eventually take the form of a very gentle curve, but for the present this combination of straight lines will do quite well. With the rough curve shown in Fig. 1 to help you, you will very quickly be able to pick up a number of other stations.

Hilversum, for example, is a powerfully received station working on a wave-length of 298.8 metres. Running up the 300-metre line you will find that it coincides with the graph at a point representing 35½ scale divisions. You will find Hilversum, then, somewhere very near this setting.

In any case, your search will be narrowed

down to not more than one scale division. Let us suppose that you find it at 35 exactly. Mark in a dot, which will lie slightly off the straight line, corresponding to this station. In the same way find and record the settings of, say, Gothenburg, Brussels No. 2, Strasbourg, Hamburg, Toulouse, Berlin, Witzleben, Rome, Bero-münster and Brussels No. 1.

### French Curve Substitutes.

If you cannot get all of these stations, you can get a good many of them with the help of your first rough curve, and you will probably find others as well. Mark them all in.

This having been done, you have a string of dots extending right across your paper. Mark out a new chart and very carefully transfer all the dots to it. If you possess a set of French curves or know a friend who has one, it is now a simple matter to rule in a line passing through or almost through every point.

Even if you have not French curves and are not good at freehand drawing, there is a way out of the difficulty. The pantry contains no doubt several oval dishes of different sizes. By laying these in turn face downwards on the paper you will probably be able to find one whose edge has just the right sweep for one part of the curve; another will come to your aid for another portion of the curve and in a very short time the thing is done. (See Fig. 2.)

### A Frequency Graph.

A frequency calibration is made exactly on the same lines, except that the bottom edge of the chart is marked off into kilocycles instead of metres. The vertical edge of each large square can well stand for 100 kilocycles. Thus you may start on the left with 1,200, the next heavy vertical line will be 1,100 (don't forget that kilocycles work backwards), the next 1,000, and so on until you come to 600.

Again make use of the four high-power British stations already mentioned. The London National is dotted in where the 23-division horizontal line crosses the 1,148 kilocycle line, the London Regional where the 54½-division horizontal line crosses the 842 kilocycle vertical line, and so on.

(Continued on next page.)

## THE LOUD ONES FIRST

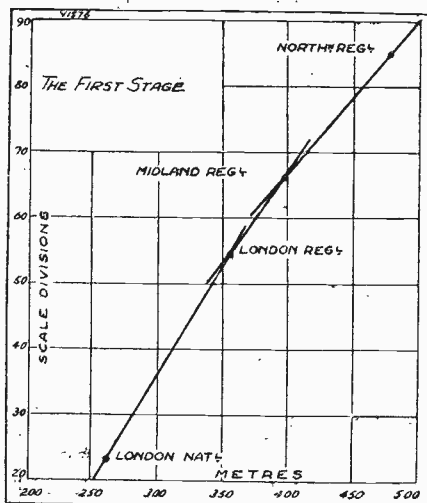


Fig. 1. You begin by putting in three or four easily received programmes, like the four shown here.



## STATION FIXATION.

(Continued from previous page.)

As before, join each pair of dots with a straight ruled line. Then find more stations with the aid of the rough graph and plot in their settings. When sufficient settings have been obtained draw the necessary gentle curve.

The small scale curves that we have been discussing will suffice for the needs of many listeners, but the man with a large set who likes to be able to bring in a big number of foreigners will find something rather more elaborate most useful.

Fig. 3 shows how on a sheet of paper measuring only 9 in. x 7 in. a tuning graph no less than 5 ft. in length can be made for the broadcast band. For this a sheet of paper ten large squares in width is required.

The depth of the sheet is the same as that used for the small-scale curve; it will depend of course upon whether the condenser has 0-100 divisions or 0-180 degrees. Here is how the "multum in parvo" chart is prepared.

### Preparing the Chart.

Rule rather heavy vertical lines in pencil at every ninth small square from the left-hand edge. This will give you eleven vertical lines including the two at the edges.

Each small square now represents 1 kilocycle and since the present Prague Plan is based on a 9-kilocycle separation, each of the vertical pencilled lines represents one channel—or rather, as we shall see in a moment, one set of channels. The large-scale chart is made from a small-scale frequency graph as soon as a fair number of stations has been identified and their positions plotted in.

The London National is a good one to begin with. Its frequency is 1,148 and five channels away there is Rennes, which you are almost certain to be able to tune in. If you cannot get Rennes, other stations on neighbouring channels which you will be able to receive when London is not working are Toulouse P T T, Horby, Leipzig, and Moravska-Ostrava.

### The Calibration Lines.

We will suppose, though, that Rennes is duly logged and inserted in the small-scale chart. We now make a dot representing the condenser setting of Rennes, on the 1,103 kilocycle vertical line of the large chart, draw a line joining the London National and Rennes dots, and continue it to the left.

The setting of Rennes we will suppose is 25½. A similar dot is made at the left-hand vertical edge which represents the same frequency as the right. To enable us to rule the next portion of the line we want some station with a frequency between 1,103 and 1,013 kilocycles.

The British relays can help us here and possibly Copenhagen may be logged. We will take it that the British relays are used and that their setting is found to be 32. A dot is made opposite this on the seventh vertical line from the left, which corresponds to 1,040 kilocycles.

The 1,103 kilocycle dot and the 1,040 are now joined and the line is produced to meet the right-hand margin, the vertical line here representing 1,013 kilocycles. As before, the condenser setting where this line cuts the right-hand edge is transferred back to the left-hand edge and we start the next portion of the graph.

### Many Good Points.

A little examination of the chart will show you that it has very many good points, besides the actual length of the tuning curve, which, of course, means that very

close readings can be taken. First of all, all channels fall upon the various vertical lines which means that once you have discovered the settings needed for, say, Witzleben and Rome, you can immediately ascertain those required for the stations in between.

### An Interesting Fact.

The 707 kilocycle channel belongs to Madrid and the tuning graph cuts this in the chart shown at 73. Belgrade is off his wave-length at the moment of writing. He should be on the 698 kc. channel, but he is actually working on 697, which is found with the condenser set at 74. On 689 kes. comes Stockholm, setting 75½.

## GETTING THE FINAL CURVE

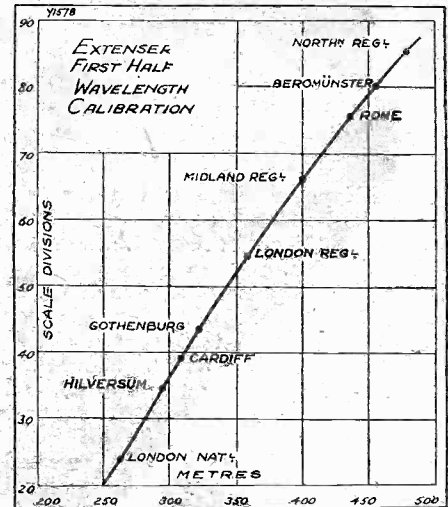


Fig. 2. As more and more readings are inserted the line connecting them becomes a gentle curve.

You can thus go straight on to the reading required for a station that you want to receive provided that it is working on its proper channel. Notice an interesting point in connection with the vertical lines which you will find very useful.

If you look you will see that starting from the bottom of any vertical line the hundreds go down whilst the tens go up and the units remain unchanged. Thus the line upon which the London National stands starts at 1,148, next above comes 1,058, above that 968, then 878, 788, and 698.

A similar large-scale chart can be made for a wave-length calibration on a piece of paper one large square wider. Here each section of the graph covers 100 metres. Each large square is made to represent 10 metres and each small square 1 metre.

### Wave-length As Well.

Since the paper is 10 large squares wide there are eleven heavy vertical lines, including those at the edges. If you start at 200 metres the vertical lines cutting the first portion of your graph will be marked 200, 210, 220, and so on up to 300 at the right-hand edge. Then you come back again to 300 on the left and go up to 400.

You can of course draw either wave-length or frequency graphs to a large-scale all-in-one piece instead of in this sectional way. But there is no advantage in doing so and there is the very distinct drawback that the calibration chart is of unwieldy size; also there is something much more fascinating in the use of one of these charts than in using an ordinary one.

## YOUR "TUNING CURVE" WILL BE NEARLY TWO YARDS LONG—AND ALL ON A 9" x 7" SHEET OF PAPER!

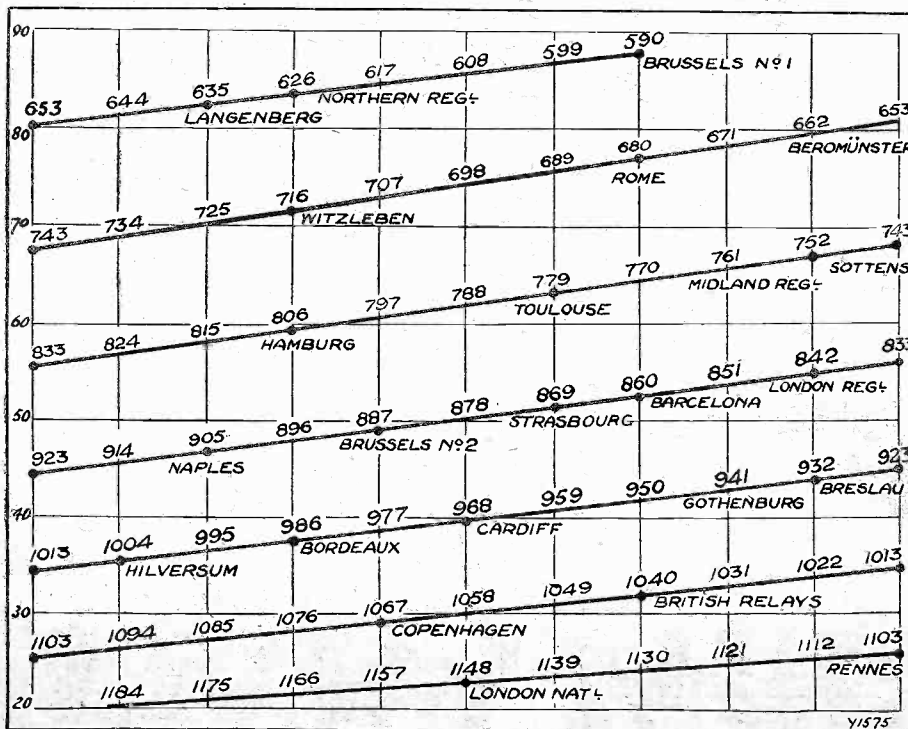


Fig. 3. This is a wonderful stunt. Read all about its many advantages, and the easy way in which this super-chart can be made, in the really practical article above.



# TUNGSRAM

**S.G.  
A.C.  
D.C.**

A complete new range of Tungram Barium Valves will shortly be announced, comprising General Purpose, Screened Grid, Multi Grid, High Power Output, Double Grid, Power Detector, and Power Valves, at prices from 5/6 to 19/-; built to the Tungram tradition of quality in the largest valve factory in Europe. Write to Dept. ST3 for full particulars. Tungram Photo Electric Cells, Nava "E." (for scientific measurement) £2:17:6; Nava "R," Red sensitive cell (for colour matching devices) £3:3:0; Nava "EH" (for public address work) £3:13:6. Tungram Electric Lamp Works (Gt. Britain) Ltd., Radio Dept., Commerce House, 72, Oxford Street, W.1. *Makers of the famous Tungram Electric Lamps.* Branches in Birmingham, Bristol, Glasgow, Leeds, Manchester, Newcastle, Nottingham, Southampton. Lamp, Valve and Glass Factories in Austria, Czecho-Slovakia, Hungary, Italy and Poland.

*I.F.S. Organisation, Tungram Lamps and Radio Ltd., 11, Burgh Quay, Dublin.*



# BARIUM VALVES



# CAPT. ECKERSLEY'S QUERY CORNER



**"FREAK" RECEPTION—UNBREAKABLE VALVES—IS SINE LAW A FICTION?**

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

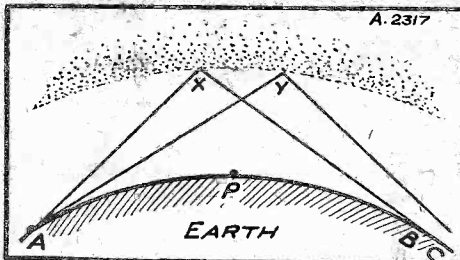
## "Freak" Reception.

G. A. (Hounslow).—"I have heard the term 'Skip Distance,' used with reference to freak reception sometimes obtained over long distances. What is the exact meaning of this term?"

The theory of the propagation of wireless waves postulates an electric roof over the world. I have drawn a section of the world, A P B, and above it you will see the electric roof.

This roof lets through heat and light—it consists, in fact, of tiny particles carrying

## REFLECTED WAVES



This gives a very clear impression of how radio waves sometimes "skip" many hundreds of miles before coming to earth again.

electricity, and it is called the Heavyside Layer.

A wireless station A radiates both along the surface of the earth and upwards. If the wave-length is short, the ray along the ground gets quickly tired, because it loses energy by coming into contact with matter on the ground.

But the upward rays A X, A Y. (see my picture) do not keep in contact with the ground, they fly upwards. They hit the underside of the electric roof at X and Y and are bent earthwards again, hitting the earth at B and C.

But at a typical point P the radiation has "skipped" over the head of an observer. There is nothing at P. All the rays are overhead.

The skip distance is thus roughly the distance A B, the distance from the station at which signals become loud after being very weak or negligible, even though the observer is nearer the point of radiation.

## Unbreakable Valves.

E. L. (Cardiff).—"Does glass possess qualities making it peculiarly suited for use in valve manufacture?"

"I used to think that a glass envelope was used so that one could see the 'works.' Now, however, the metallic coating on the inside of the valve envelopes makes it impossible to see the electrodes and it occurs to me that the valve would become a much less fragile component if the bulb were constructed of a more robust material.

"Is there any objection to enclosing the electrodes of a valve in, for instance, a steel cylinder which could not easily become broken with careless handling?"

Glass is peculiarly suited for holding in the vacuum for several reasons.

Firstly, it is easy to handle and the well-known past technique of lamp manufacture has been of great value to the valve manufacturer—glass is essential to the lamp and so convenient for the valve—much of the same machinery suffices.

It is, however, possible to make valves in a metal container, but the great difficulty is that metal, unless made very thin and extremely carefully handled, gives off fresh gas after the valve has been pumped.

Thus, metal valves might be inclined to soften after manufacture. The big, water-cooled transmitting valves are made of metal, of course, but it would be taking unnecessary risks and incurring the expense of special machinery and new research to go away from glass only for the reason that people sometimes drop a valve.

But have you remarked that a dropped valve seldom bursts, and that its the delicate inside 'works' which go awry? So there's no advantage really in the metal valve at all.

## Is Sine Law a Fiction?

"In reading 'radio' literature, one is always encountering the term 'sine wave.' Is the conception of a current or voltage varying according to a sine law purely a fiction?"

"As I understand the definition of a 'sine wave,' no such thing can exist. It would appear that, if a current varies *always* in accordance with a law governing its amplitude, frequency, etc., it must go on for ever. If a wave 'dies away' the amplitude must be decreasing and the law is not being obeyed.

"Since it would naturally be impossible for an oscillation to be maintained indefinitely, all 'sine waves' must, sooner or later, disobey their own sine law, and,

therefore, there cannot be such a thing as a current varying according to a sine law.

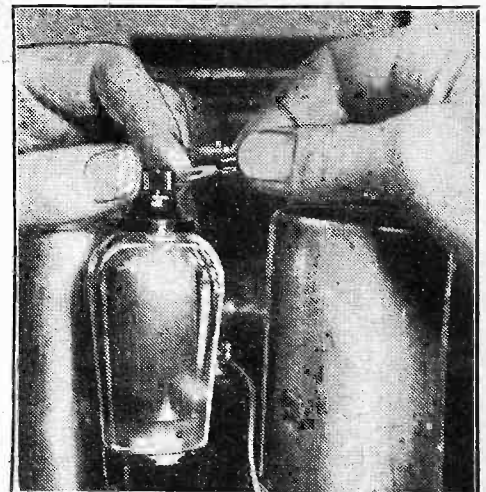
"What is wrong with this amateur attempt at philosophical speculation?"—G. McG. (Dundee).

Let me take the philosophic speculation under a modern reading lamp. That lamp is lit by alternating current varying (nearly in practice, perfectly in theory) sinusoidally.

If you keep the lamp switch on surely the lamp keeps alight as nearly for ever as makes no difference to *this* speculation.

A sinusoidal current does not die away if there is something to keep it going—coal in a boiler furnace with the reading lamp. If you set up a sinusoidal vibration in a resonant circuit by giving that circuit an

## THE VITAL LINK



An important connection, joining up the anode of the S.G. valve in the "P.W." "Super-Quad" to its filter unit.

electric kick and you remove all outside sources of energy, then the current dies away.

But keep up the little kicks and the sinusoidal circuit goes on drawing energy from something.

A pendulum vibrates sinusoidally. If you give a pendulum a tap it vibrates slowly and the vibrations die away. But the pendulum of a clock goes on for ever, because you supply it with energy.

A sinusoidal current can go on for ever if there's something to make it do so!

**You  
threw away  
5/- every time  
you scrapped  
a 10/-  
battery!**

**Now comes the  
DOUBLE EXCITANT giving  
87.9 % Active energy**

Five shillings flung in the dustbin—every time you scrapped an old "used-up" battery! Every battery user knows that chemical salts eat up the zinc cell walls long before the potential energy is exhausted.

Now comes Palaba to turn waste into Power! Palaba with a radically new chemical compound of seven salts forming a DOUBLE EXCITANT. The first excitant starts the discharge, leaving the zinc perfectly clean. As soon as the first excitant deteriorates, the second becomes active, and gives the battery new vigorous life.

Exhaustive tests prove that Palaba Batteries give an average of 87.9% active energy—37.9% more than the most powerful battery produced hereto.

*Palaba costs no more! 60-volt 8/-, 100-volt 13/-, 120-v. 15/6. Also super capacity, flash lamps, etc.*

**PALABA**

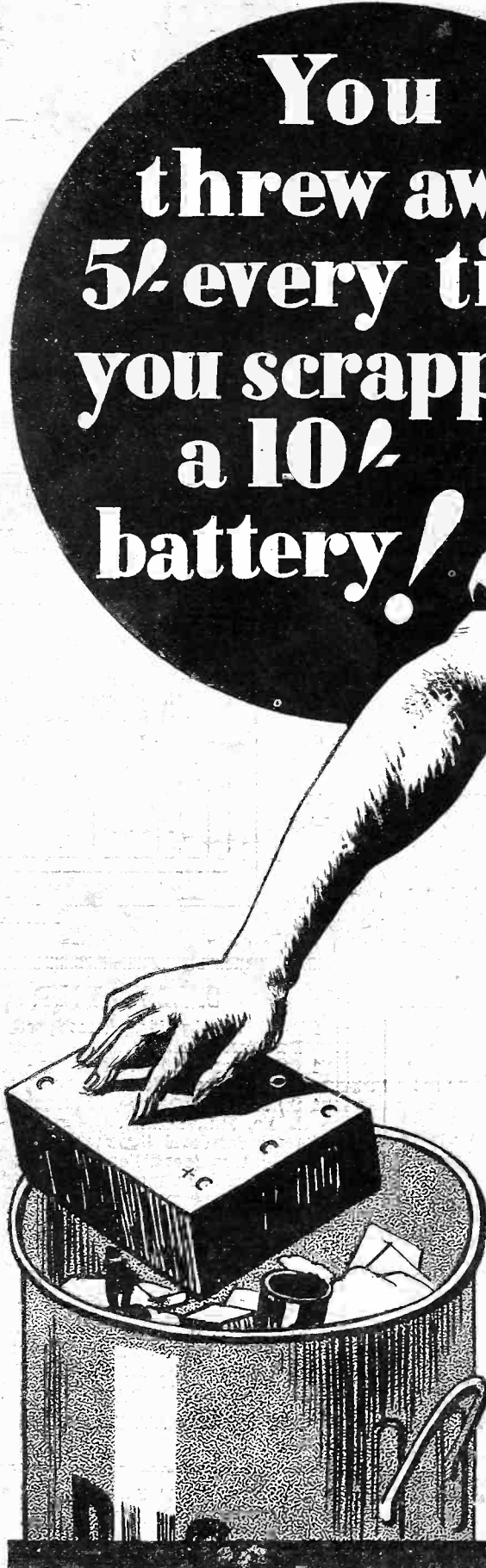
*Double Excitant*  
**BATTERIES**

**PALA BATTERY CO (LONDON) Ltd**

6-7, NEW WHARF RD., KING'S CROSS, N.1

Telegrams: Palabattery, Kinross, London

Telephone: North 5937.





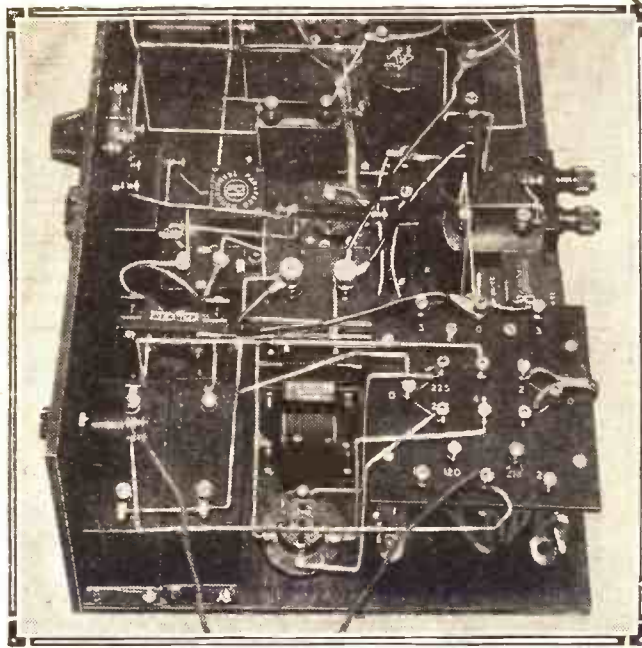
EVERYONE who has had the chance of making comparisons knows that a set running on the modern A.C. valves is far and away better than a similar set running on battery-fed valves.

A.C. valves mean more stations at better strength. There is no question about it. They are so much more efficient that the difference is plain to all.

**Better Valves.**

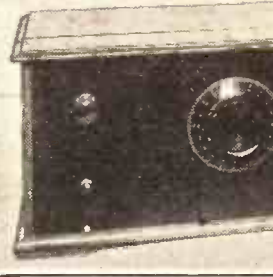
A curious thing to notice is that even without this extreme efficiency the new class of valve would have found a high place in popular favour. Its ease of upkeep equals that of an electric lamp, for all the attention that it requires from its owner is to be switched on or off as required.

Instead of requiring batteries it works direct from the mains, and all the trouble of an intermediate battery supply, with its bother of charging, is abolished. Add these advantages to the higher efficiency, and we



The "power" end of the receiver, showing (to the right) the wiring of the big mains transformer.

# AN A "POP-VOX"



DESIGNED AND DESCRIBED  
This mains version of a very popular set includes Extenser tuning, Selector Coil, and Radio-Gram switching.

This may seem a big claim to make, but just consider for a moment how well and truly it is based on fact. First and foremost, we have a completely battery-less set employing valves that represent the very last word in thermionic tube development.

**A Wonderful Set.**

These valves are not hooked up in the first method that suggested itself, but are incorporated into that latest combination of selectivity, power and quality known as the "Pop-Vox" circuit. Can you wonder that the result is a receiver of unique merit?

Let us get down to precise particulars, and enumerate just a few of the really telling points that make the A.C. "Pop-Vox" such an astoundingly good receiver.

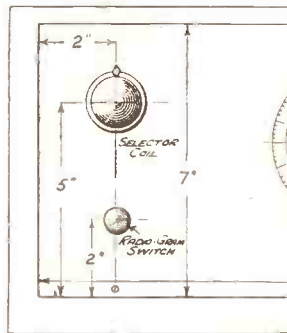
We have shown that the main conception

**THE VALVES TO USE.**

- For V1.—A.C. H.L. type (Cossor, Osram, Mazda, Eta, or Six-Sixty).
- For V2.—A.C. detector type (Six-Sixty), or A.C. H.L. type (Eta, Mazda, Cossor, Osram).
- For V3.—P.625 type (Osram, Mazda, Eta, Six-Sixty, or Cossor).
- For Rectifier—UU 60/250 type (Mazda, Osram, Cossor, Eta.)

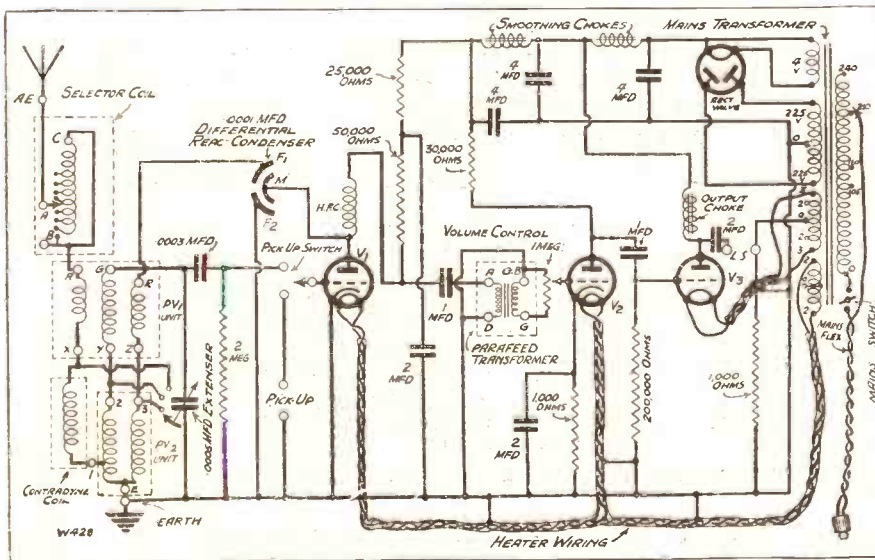
can easily see why A.C. valve sets are fast forging ahead in popularity!

And now we present the A.C. "Pop-Vox"—"P.W.'s" latest contribution to better radio reception. It is a set of superlative merits.



Here are

**A CIRCUIT WITH MANY EXCLUSIVE FEATURES**



There is a lot to look at in this diagram, including, as it does, the simplified wave-change system. Note the special symbol that denotes the Extenser for all-wave tuning. Valve rectification (full wave) is used, and ample de-coupling ensures complete freedom from hum.

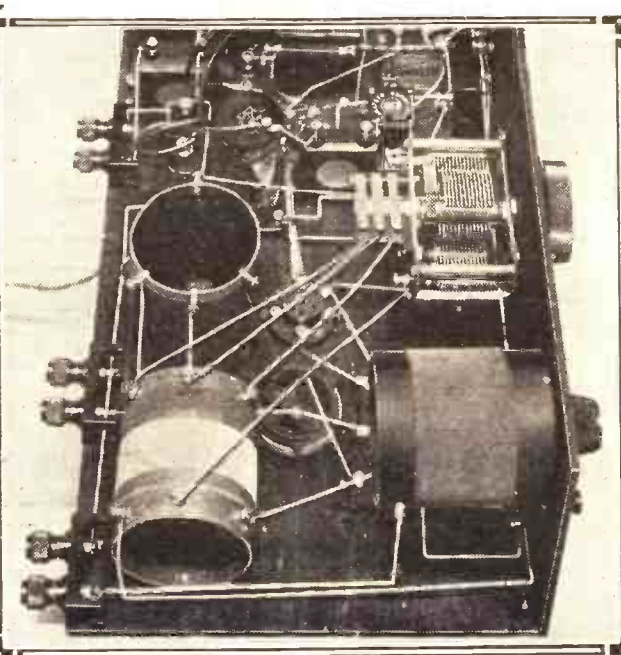


**SELECT YOUR COMPONENTS**

- 1 Panel 21 ins. by 7 ins. (Permcoll, or Peto-Scott, Goltone).
- 1 Cabinet with 10 in. deep base-board (Cameo, Pickett, Gilbert).
- 1 Selector Coil (Goltone, or Ready Radio, R.I., Formo).
- 1 Single Pole double throw push-pull switch (Wearite or Goltone, Igranic).
- 1 .0005 mfd. Extenser (Cyldon or Formo, Wavemaster).
- 1 .0001 mfd. or over differential reaction condenser (Ready Radio or Telsen, Lotus, S.B., Formo).
- 1 1-meg. Volume Control (A.E.D. or R.I.).
- 1 Mains Switch (Bulgin or Igranic).
- 1 P.V.1 and P.V.2 coils (Parex, or Ferranti, Leweos, R.I.).
- 1 Coil Quoit (Peto-Scott or Wearite, Goltone).

# A MAGNIFICENT





the tuning in any way. The coil units employed by this set are also famous, consisting of the "P.V.1" for ordinary wave reception, and its fellow, the "P.V.2" for long waves. The fact that these two in combination have now definitely become the favourite form of coupling is a sufficient guarantee of their great efficiency on both the wave-bands.

**The "P.V." Coils.**

Besides the "Selector" and the "P.V." Coils, we have also the "Contradyne," which knocks out that annoying old trouble of the local station "breaking through" at the bottom of the long-wave dial. There is none of that when using the A.C. "Pop-Vox."

We now come to what is undoubtedly the most important single item of all—the "Extenser." As you probably know, it is an ultra-efficient tuning component that does its own wave-band switching. The "Extenser" has revolutionised tuning.

DESCRIBED BY THE "P.W." RESEARCH DEPARTMENT. The famous "P.W." circuit bristles with fine features; it includes the Selector, Contradyne and P.V. coils, Automatic Grid Bias and Read all about this wonderful receiver with its simplified tuning and tremendous power.

Concentrated coil efficiency is ensured by the Selector (on the panel), backed up by the P.V.1 and P.V.2 units, and a Contradyne coil unit.

of the design takes advantage of the latest radio advances in technical development; what of the circuit details?

Even the reader who is not specially interested in circuit diagrams can appreciate some of the special features of the A.C. "Pop-Vox" design. For it incorporates items that have made names for themselves with the general public—names synonymous with simplified efficiency.

**Very Selective.**

In the aerial circuit, for instance, is the "P.W." Selector Coil, a device that achieves results of quite remarkable selectivity and increased power by enabling the aerial to be tuned to resonance for the reception of weak stations. It is simply invaluable to the searcher for long-distance programmes, and yet it does not complicate

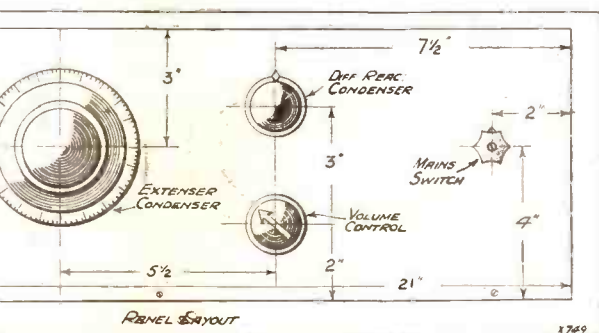
**RECOMMENDED LOUD SPEAKERS**

- British Blue Spot.
- British Thomson-Houston.
- Whiteley Electric.

It has a tuning dial covering 0—99 on one half, and 100—200 on the other. All the medium-wave stations come in as two-figure readings, and all three-figure readings are long-wavers. How's that for simplification?

There is, of course, no wave-change switch to alter. You don't have to twist

*(Continued on next page.)*

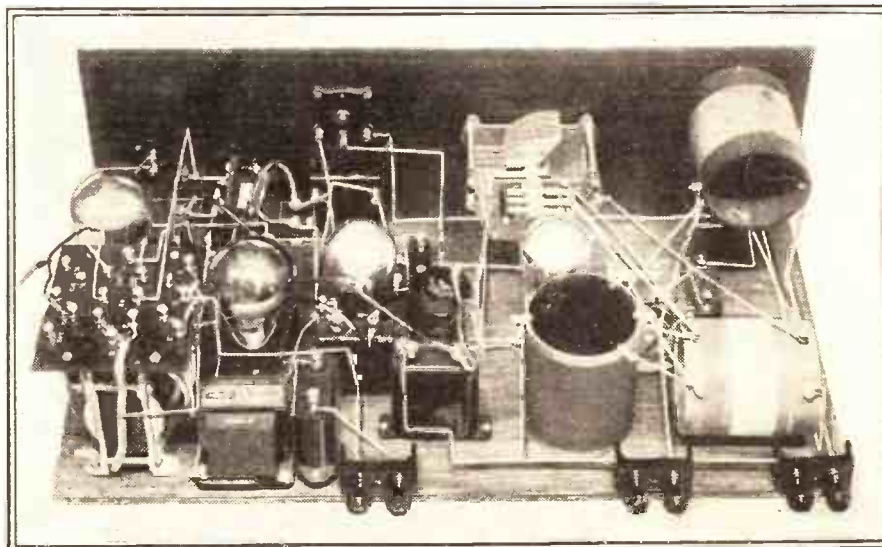


all the details you need for drilling the panel.

**COMPONENT MAKES FROM THIS LIST.**

- |   |  |
|---|--|
| 1 .0003 mfd. fixed condenser (Dubilier, Goltone or Ready Radio, Telsen).        | 1 50,000 ohm "Spaghetti" resistance (Ready Radio or Bulgin, Peto-Scott, Graham Farish, Sovereign, Telsen, Goltone, Igranic, Varley, Lissen.) |
| 1 2-meg. leak and holder (Lissen or Ediswan, Ferranti, Igranic, Telsen.)        | 1 25,000 ohm Spaghetti resistance (Lewcos or as above).  |
| 2 5-pin valve holders (Telsen or Lotus, Clix, Bulgin, Igranic, Wearite, Dario.) | 1 30,000 ohm Spaghetti resistance (Bulgin or as above).  |
| 2 4-pin valve holders (Telsen, etc.)  | 2 1,000 ohm Spaghetti resistances (Lewcos or as above).  |
| 1 H.F. Choke (Ley or Lewcos, Ready Radio).                                      | 1 200,000 ohm resistance (Graham Farish or Peto-Scott, Wearite).   |
| 2 1 mfd. (Lissen or T.C.C.).  | 1 Mains Transformer (Igranic Universal Type B.)  |
| 3 2 mfd. (Lissen or Ferranti, and Formo).                                       | 3 Terminal Blocks (Belling & Lee).   |
| 3 4 mfd. (Formo or T.C.C.).   | Copper Sheathed Cable for heater leads, Flex, Glazite, screws, wire for hank coil, etc.  |
| 1 Parafeed L.F. Transformer (R.I.).   |  |
| 1 Output Choke (R.I., or Bulgin, Lotus, Telsen).                                |  |
| 2 Smoothing Chokes (Wearite or Ferranti, Igranic, Varley).                      |  |

**HOW IT LOOKS WHEN THE WIRING IS DONE**



This shows the complete receiver with the valves in position. The rectifying valve is on the left, behind the mains transformer, with the power-valve next to it, and the detector on the right behind the Extenser. Note the three contacts on the latter, that make a wave-change switch a mere redundancy.

**T MAINS-DRIVEN RECEIVER**



# AN A.C. "POP-VOX"

(Continued from previous page.)

the dial half-way round, then pull a switch, and then turn the tuning back

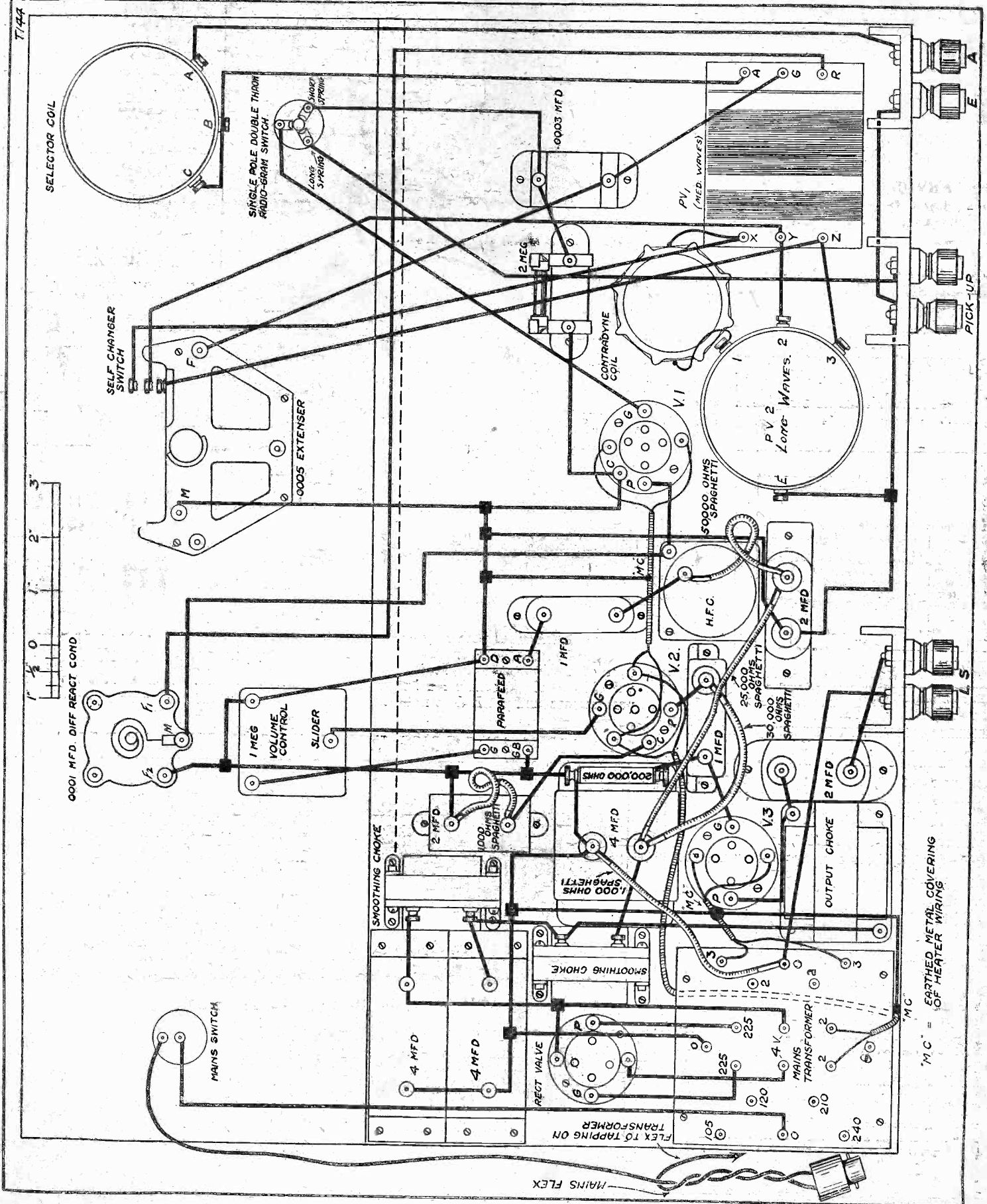
again, to cover long and medium waves. Oh, no! With an "Extenser," if you want to tune in a station, you simply tune it in.

No switching first, or afterwards. Readings over 100 for long-waves, less than 100 for medium waves—and the moving vanes never swing out into empty air, but

serve you through the whole revolution of the dial! You'll never beat that system.

But we must not linger over the description, much as we are tempted, for there are many other noteworthy features. And they can best be appreciated by a glance at the theoretical diagram.

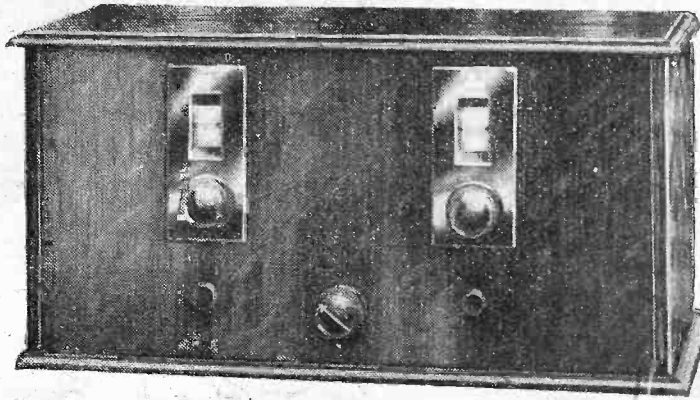
(Continued on page 784.)



# The SUPER KIT for the "SUPER-QUAD"

Four reasons why you should use a **READY RADIO KIT.**

- 1 JIFFILINX.** Simplify construction, give more certain degree of electrical efficiency, and eliminate the possibilities of poor reception.
- 2 SERVICE.** Free information and advice from the experts of the **READY RADIO Service Department.**
- 3 CHOSEN COMPONENTS.** Components chosen for their high efficiency and reliability. Your set will be the best of its kind.
- 4 SPECIFIED COMPONENTS.** With a **READY RADIO Kit** your set can be identical in appearance and performance to the original model.



## THE "SUPER-QUAD"

	£	s.	d.
1 Polished ebonite panel, 16" x 8" x 3/16", drilled to specification	5	4	
1 ReadRad polished oak cabinet with 10-inch deep baseboard	1	2	6
1 Jackson Bros. model D.2 gang condenser with drum drive	1	6	6
1 Jackson Bros. model D.1 "0005-mfd. condenser with drum drive	19	0	0
1 Varley square-peak coil	15	0	6
1 Set Lewcos super-het. coils to specification	1	17	6
1 Link resistance, 25,000 ohms	1	1	6
1 ReadRad 3-pt. push-pull switch	1	6	6
1 Sovereign 50,000-ohm potentiometer	4	6	6
5 Clix 4-pin valve holders	3	4	0
1 Clix 5-pin valve holder	1	0	8
2 T.C.C. 1-mfd. fixed condensers	5	8	
1 T.C.C. 2-mfd. fixed condenser	3	10	0
1 Dubilier .04 non-inductive fixed condenser	2	0	0
1 Grid leak, 1.5-megohm, with clips	1	6	6
1 T.C.C. "0002-mfd. fixed condenser	1	2	0
1 T.C.C. "001-mfd. fixed condensers	1	0	8
2 ReadRad "Hilo" H.F. chokes	4	6	6
1 Telsen L.F. transformer, ratio 7-1	12	6	6
1 ReadRad fuse and holder	1	3	8
1 Junit terminal block	8	6	6
2 Belling-Lee "R" terminals L.S., L.S.	1	8	6
1 Belling-Lee wander plugs "6 H.T. and 2 G.B.	1	4	3
2 Spade terminals	4	3	6
1 Aerial and earth block	2	6	6
1 "Packet" "Jiffilinx" for wiring	2	6	6
4 Valves to specification, Cossor 210 D.G., 21 5SG., Mazda HF240 and B.220A	3	2	0
Wire, flex, grid-bias clip, etc.	1	2	
<b>TOTAL (including valves and cabinet)</b>	<b>£12</b>	<b>1</b>	<b>6</b>

Any component can be bought separately.

## THE "SUPER-QUAD."

Completely assembled, with valves and cabinet, ready for use and aerial tested. Royalties included, **£14-1-6**  
Or 12 monthly payments of **25/9**

### Kit A

(less valves and cabinet) **£7-17-0**  
or twelve equal monthly payments of **14/3**

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(with valves less cabinet) **£10-19-0**  
or twelve equal monthly payments of **£1-0-0**

### Kit C

(with valves and cabinet) **£12-1-6**  
or twelve equal monthly payments of **£1-2-3**

**BE SURE YOUR KIT IS A GENUINE READY RADIO KIT**

### Recommended Accessories.

	£	s.	d.
1 Fuller S.W.X.7 Acc.	11	0	
1 Fuller 16-volt C.B. Batt.	2	10	
2 Fuller 60-volt Super-Cap. H.T. Batteries	1	7	0
1 Celestion D.10 Loud Speaker	3	0	0

### TO INLAND CUSTOMERS.

Your goods are despatched post free or carriage paid.

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Everything Radio can be supplied against cash. In case of doubt regarding the value of your order, a deposit of one third of the approximate value will be accepted and the balance collected by our Agent upon delivery of the goods. All goods are very carefully packed for export and insured: all charges forward.

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159, BOROUGH HIGH STREET, LONDON BRIDGE, S.E.1.

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Telegrams: READIRAD, SEDIST

## IMMEDIATE DESPATCH ORDER FORM

To **READY RADIO, 159, Borough High St., London Bridge, S.E.1**

**CASH ORDER.** Please despatch to me at once the goods specified for which I enclose payment in full of **£**..... Kit required.....  
**G.O.D. ORDER.** Please despatch to me at once goods specified for which I will pay in full the sum of **£**.....  
**EASY PAYMENT ORDER.** Please despatch my Easy Payment Order for the Goods specified for which I enclose first deposit of **£**.....

Name.....

Address.....

## A.C. "POP-VOX"

	£	s.	d.
1 Polished ebonite panel, 21 x 7 x 1/16 in. drilled to specification	6	0	
1 Oak cabinet to specification, with 10-in. deep baseboard	1	10	0
1 Wavemaster "0005-mfd. Extenser condenser	15	6	
1 ReadRad "0015 Differential reaction condenser	5	0	
1 Bulgin single-pole push-pull switch, type S.33	2	0	
1 Bulgin rotary mains switch, type S.85	1	9	
1 ReadRad Star Turn Selector Coil	12	6	
2 ReadRad "Pop-Vox" Coils, P.V.1 and P.V.2	8	6	
1 ReadRad Quoit Coil	2	6	
1 ReadRad "0903-mfd fixed condenser	10		
2 T.C.C. 1-mfd. fixed condensers	5	8	
3 T.C.C. 2-mfd. fixed condensers	11	6	
3 T.C.C. 4-mfd. fixed condensers, type 80	1	5	6
2 Clix 5-pin valve holders	2	0	0
2 Clix 4-pin valve holders	1	8	
1 R.I. 1-meg. volume control	5	6	
1 50,000-ohm spaghetti resistance	1	6	
1 25,000-ohm spaghetti resistance	1	6	
1 30,000-ohm spaghetti resistance	1	6	
2 1,000-ohm spaghetti resistances	1	6	
1 Graham-Farish 200,000 resistance Ohmite type	1	6	
1 ReadRad 2-meg. grid leak and holder	1	4	
1 ReadRad "Hilo" H.F. choke	4	6	
1 R.I. general purpose output choke	12	6	
2 R.I. Hypercore smoothing chokes	1	15	0
1 R.I. Parafeed L.F. transformer	8	6	
1 Igranic Universal Mains transformer, type B	1	19	6
3 Belling-Lee terminal blocks	2	0	
6 Belling-Lee "B" type terminals	3	0	
1 Packet "Jiffilinx" for wiring	2	6	
4 Valves to specification, 2 A.C. H.L., 1 P.625, D.W.2	2	18	6
Flex, twin braided copper-covered flex, plug adaptor and screws	1	3	

**TOTAL INCLUDING VALVES AND CABINET** £15 12 6

Any component can be obtained separately.

Kit "A."—£11.4.0, or 12 monthly instalments of £1.0.6

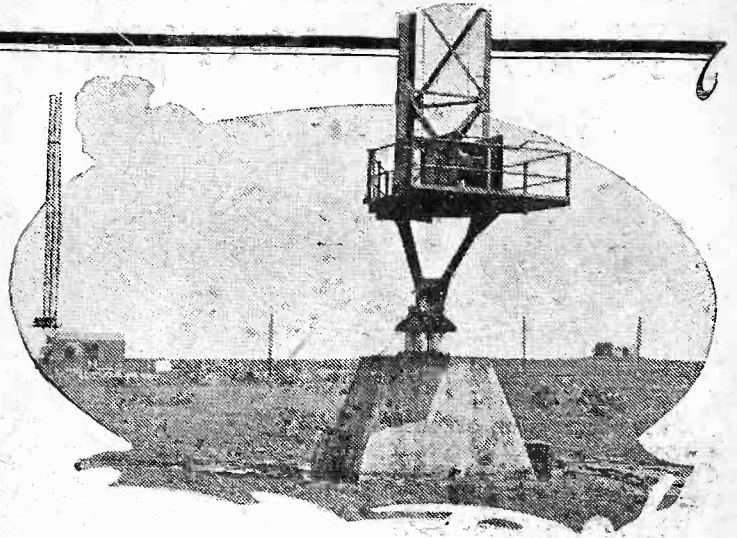
Kit "B."—£14.2.6, or 12 monthly instalments of £1.6.0

Kit "C."—£15.12.6, or 12 monthly instalments of £1.8.9.



# WITH THE B.B.C. in the NORTH

No. 8. The North's Radio "Junction"  
at Leeds.



THE recent Census shows that Leeds still lags behind Sheffield in population. Nevertheless, many Yorkshire activities have been centralised upon Leeds, and so far as broadcasting is concerned (and broadcasting exerts a weighty influence in such matters, whether the B.B.C. wishes it to or not), Leeds is now definitely the "capital" of Yorkshire, that vast county which encompasses a huge chunk of the service area of the North Regional station, which is populated by a million of the B.B.C.'s northern licence-holders, and which is expected to contribute richly in talent and interest to the North Regional station's programmes.

#### Serving Moorside Edge.

Upon Leeds, therefore, devolves a serious responsibility. To send up to Moorside Edge a steady supply of programmes representing the talent and activities of Yorkshire, a county covering an eighth of the area of England, a county of swarming industrial towns and spacious dales and moors, a county that includes several cathedral and university cities.

This is too big a job for one man, and when I tell you that the B.B.C. has only one programme representative in Yorkshire you must bear in mind that the programme organisers at the Regional headquarters at Manchester are constantly visiting Yorkshire in pursuit of fresh ideas, new talent, and new opportunities.

#### Close Contact.

Every Wednesday G. Philip Fox, the B.B.C.'s Yorkshire representative, goes over to Manchester to attend the Programme Board Meetings, and day by day the telephone lines between Leeds and Manchester are busy. Thus

Leeds is now the B.B.C.'s Yorkshire headquarters. It is also the "S.B." distribution centre for the North. In this article our contributor, Leslie W. A. Baily, describes what goes on at this important B.B.C. depot.

close contact is maintained between the regional headquarters and the subordinate Yorkshire headquarters at Leeds.

When the old studios at Hull and Sheffield were abolished and, more recently, when the local transmitters were suspended there were many people who feared that this meant the end of contributions from those parts of Yorkshire to the broadcast programmes.

I have the word of the North Regional Director, however, that the new system does not imply any favouritism towards

Leeds, that the centralisation of the B.B.C. administration in Yorkshire is merely a matter of convenience, and that the B.B.C. will draw more rather than less upon the resources of the towns and county districts in Yorkshire, provided that the material attains the high quality standard that is now imposed.

Outside broadcast plays an important part in Yorkshire's contributions to the North Regional programmes. It may be an organ recital from York Minster, a concert from a Yorkshire seaside resort, a relay from a Yorkshire theatre—hardly a week passes but there is an "O.B."

#### Just One Studio.

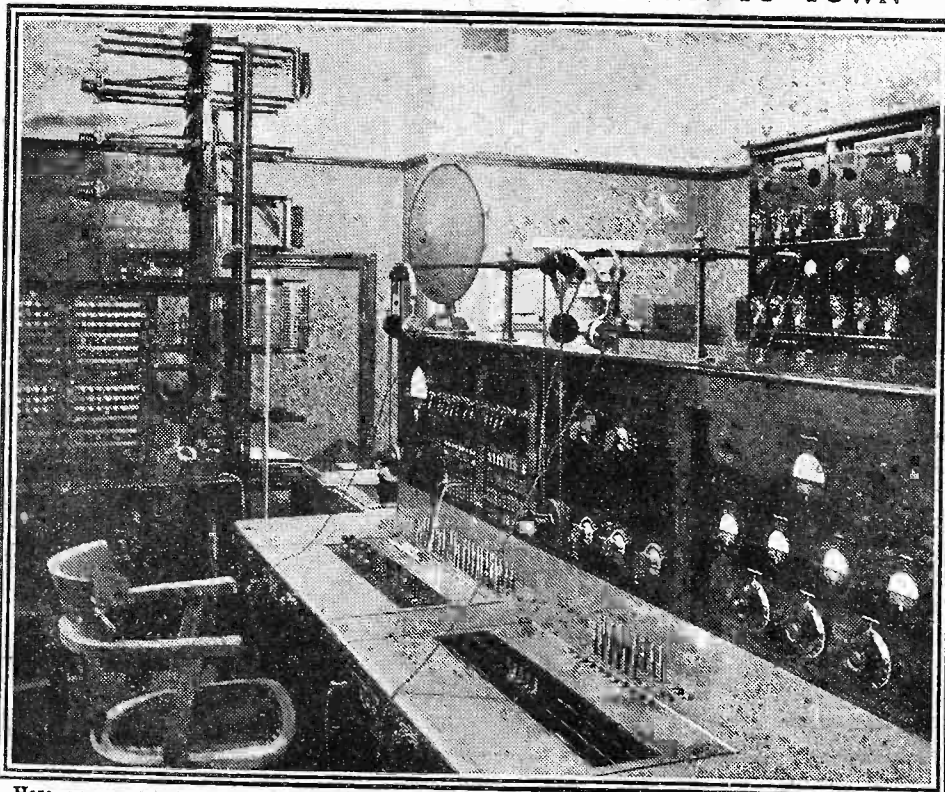
It is often a question, however, whether to bring Mahomet to the mountain or to send the mountain to Mahomet—thus, when the Sheffield police band broadcasts, a microphone is installed at the police headquarters at Sheffield, but single Sheffield artists or speakers usually travel to Leeds and broadcast from the studio there.

Now that this is the only studio in Yorkshire it ill-befits its responsibilities. When it was opened in 1924 the B.B.C. was proud of it, but now it must be ashamed. It is too small for a pukka concert, too big and bare for a talker's comfort, its acoustics are bad, and its ventilation worse. But the B.B.C. is taking over a large building in Carlton Hill, Leeds, which was formerly a Quaker meeting house.

#### S.B. Control.

The present studio and control room are on two high floors in Basinghall Street, Leeds, together with offices for Philip Fox, for G. W. Gibson, who has recently been appointed B.B.C. Education Officer for

## SHUNTING PROGRAMMES FROM TOWN TO TOWN



Here you see a B.B.C. S.B. control panel of the old type, which is situated at Gloucester. The installation at Leeds does not look so much like an ordinary telephone exchange, but has rows of switches and little lights reminiscent of a modern signal box.

(Continued on page 776.)

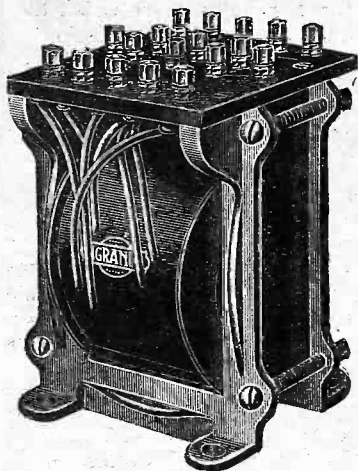
# IGRANIC "UNIVERSAL"

## Mains Transformer

Specified for the

# "A.C. POP-VOX"

## RECEIVER



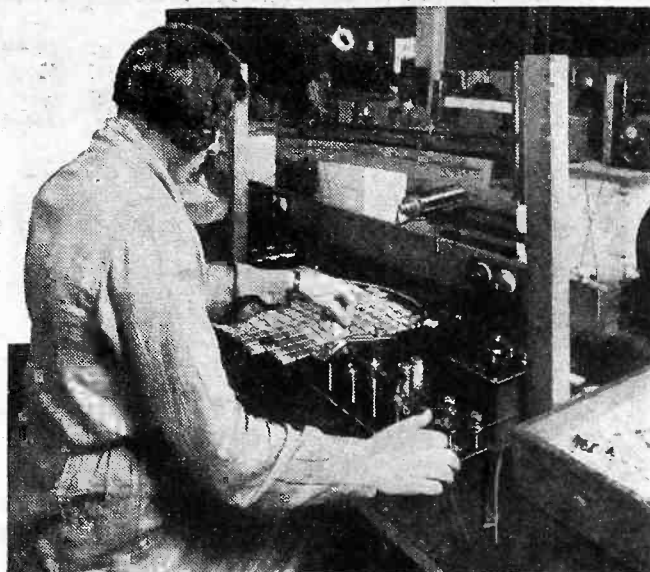
Provides for :—  
 High tension current. Filament heating current for valve rectifier. Heater current for indirectly heated cathode valves. Filament heating current for output power valves of either 4 or 6 volt type.

TYPE B  
 PRICE

**39'6**



May we send you a copy of our latest catalogue? Write to Dept. R.175.



and only  
 then... **O.K.!**

**W**HEN you buy a condenser you have to buy in good faith—to take much for granted—its capacity and working voltage. Then make sure you buy the condenser that has prestige and a reputation to maintain . . . . . buy T.C.C.!

Because of that high reputation, no T.C.C. can possibly find its way to you until, after repeated tests, we find it "O.K." Thus we maintain our reputation—and thus you are assured of a condenser of unquestionable accuracy and downright reliability.

# T.C.C.

## CONDENSERS

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Its pure, rich tone wins instant admiration

Every loud-speaker value is outclassed by this new wonder MoToR balanced armature unit. Clarity—tone—purity—power—by every standard of comparison it is a revelation, not only in performance, but also in its superb workmanship and more than reasonable price.

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 HARDMAN & Co., Ltd., The Baum, Yorkshire Street, Rochdale; 61, Bridge Street, Manchester; 12, Back Lord Street, Blackpool; 25, Trinity Street, Leeds.  
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Type S8  
 UNIT **23'6**

C88 Chassis, complete with Unit and Cone **43'6**  
 (as illustrated)



"THANKS to broadcasting, everyone can now hear the newest music for himself and form his own opinion of it—." That is an extract from an article in the official B.B.C. publication.

The statement is true in so far as it applies to loud-speaker music, for that began with broadcasting itself. But the writer meant to convey that radio affords its listeners opportunities to hear contemporary music as performed by contemporary musicians, whereas, in actual fact, it does nothing of the kind.

The processes of radio re-write the scores of orchestral constructions and censor the work of conductors. The notes of some instruments are entirely suppressed, the proportional volume of others varied, and the characteristics of all are changed.

#### Mangled Music.

This "mangling" starts at the microphone itself, and is continued through the whole electrical chain between the studio or concert hall and the loud speakers of listeners. And it is only fair to say that the last links are the weakest.

The average radio receiver is completely incapable of reproducing with any accuracy at all more than a mere "handful" of musical frequencies.

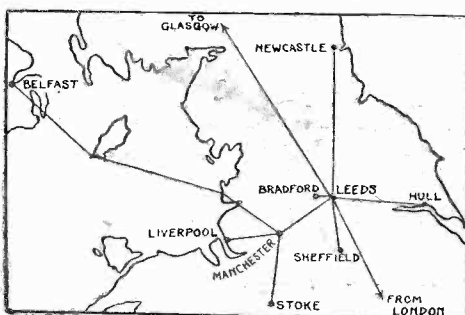
Nevertheless, a decidedly pleasing imitation of the real thing can, under good conditions, be heard on a loud speaker. But it won't be Sir Thomas Beecham's or Sir Hamilton Harty's or Sir Landon Ronald's

Yorkshire, and for their lady secretaries. Through these offices passes the routine organisation of all Yorkshire programmes.

Through the control-room pass all programmes travelling between London and North Britain, for Leeds is the "S.B." distribution centre for the North. It is the halfway house where programmes bound on their long land-line journeys are refreshed and then sent onwards. There are six engineers.

To Savoy Hill, Leeds is connected by underground land-lines, usually three, but more if required by programme arrangements. Sometimes there is a programme

#### "AS THEY WERE"



This is how the land-lines for northern stations were arranged a few weeks ago before the North Region station commenced work.

## "ELECTRIFIED" MUSIC

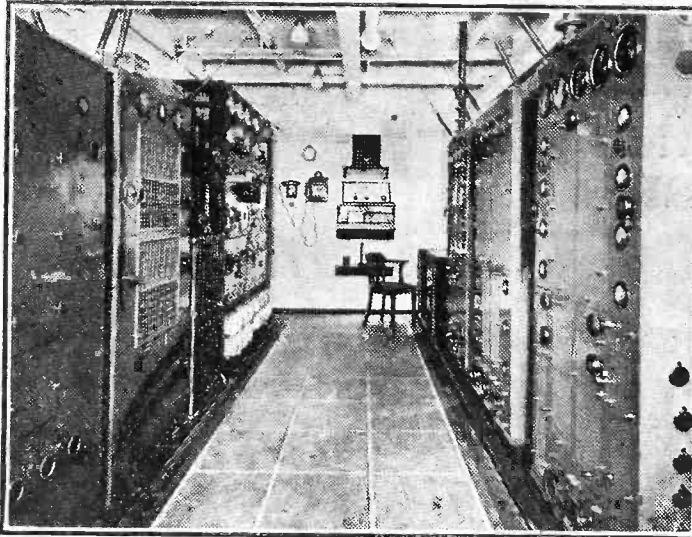
By H. A. R. BAXTER.

Who claims that broadcast music is a type in itself, differing from that directly heard in concert halls, etc.

rendering of the work of a Great Master; it won't even be the work of that Great Master! And it is high time these facts were fully appreciated.

The listening public is not being educated

### A SEA-GOING RADIO "SET"



This is not a general view of some broadcasting station but the radio installation on the new Canadian Pacific liner "Empress of Britain."

in the appreciation of "classical" music; it is being educated, or rather familiarised with "electrified" music.

This is the sort of thing that happens: A conductor chooses a piece of music and

serves out the "band parts" to the members of his orchestra. After a prolonged series of rehearsals he has all the instruments more or less perfectly balanced. Over-exuberant "strings" have been subdued to the proper level, the "brass" has been thoroughly drilled, and so on. He is completely satisfied that he is able to interpret every requirement of the composer. Then the huge transmitting valves glow with smug satisfaction and the broadcast commences—and so does the "mangling."

But the wireless waves carry a fairly good rendering through the ether; anyway, there is little missing at the listener's aerial except all the harmonics above about five thousand cycles!

But by the time the average loud speaker is reached, many notes have been dropped by the wayside. Those so-carefully-produced bass features of the orchestration will almost certainly have vanished.

It is true the listener might think he can hear something deeper-toned that ought to be a string bass or trombone at work, but in all probability that will merely be a few harmonics of these sombre instruments.

#### Adapting Music For Broadcasting.

On the other hand, the higher notes of violins and clarinets will be shorn of practically the whole of their harmonics; as a matter of fact not even the first harmonics of some violin notes manage to get into the ether around some broadcasting stations, let alone the second and third. And that is why in radio a flute or a piccolo is an excellent substitute for a Strad violin.

Realisation of these very elementary facts is steadily dawning on a few of the dance bands which are broadcast from without the B.B.C. organisation, and they are moulding their music to suit the limitations imposed upon it by broadcasting. Meanwhile, the B.B.C. itself continues to pursue impossible and unrealisable ideals. There are none so deaf as those who cannot hear their own ether-twisted voices!

## WITH THE B.B.C. IN THE NORTH

(Continued from page 774.)

travelling from some Northern source to London (for transmission, perhaps, from London Regional), as well as a programme coming northwards from London, and then the job of the engineers at Leeds becomes complicated.

This junction of land-line routes is the scene every night of a continuous shunting of programmes, and it is all controlled by a man sitting at a desk which, with its rows of switches and signal lights, is for all the world like a miniature railway signal-box.

#### Curing The Bumps.

The control-room equipment also includes a desk on which is mounted line-testing equipment for measuring the characteristics of the land-lines. Every line is tested regularly. A modern underground line, after suitable correction, should have a tolerably straight-line frequency characteristic from 50 to 7,000 cycles.

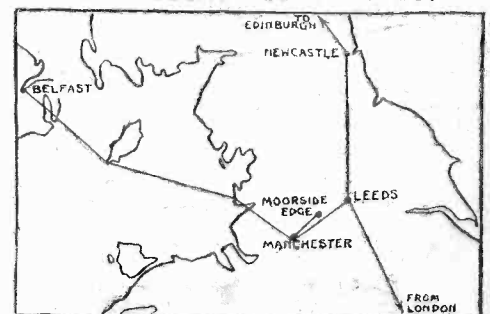
If for some reason a "bump" develops in the characteristic of a line, it is remedied

by adding a corrector circuit consisting of inductance, capacity or resistance to the line until the "bump" disappears.

Such circuits are provided at Leeds to be inserted in the lines as desired.

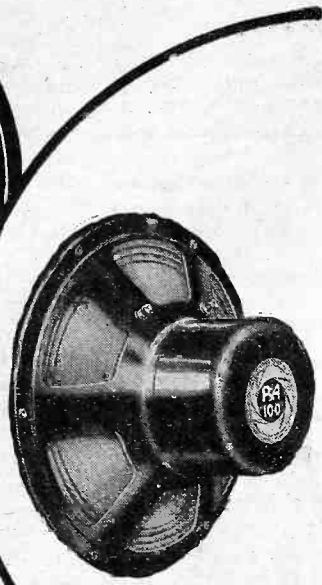
Due to developments in the Post Office trunk telephone system, a big alteration in the "S.B." system in the North is now being carried out. Figure One shows the system of land-lines used until a few weeks ago. Figure Two shows the new, simplified system. Programmes for Scotland will travel via Newcastle in the future, instead of via Glasgow.

#### SEE HOW THEY RUN



The system of land-lines is being considerably simplified, partly due to the closing down of certain stations. The lines are to be as indicated in this diagram.

The  
**R & A**  
"100"  
PERMANENT MAGNET  
MOVING COIL  
REPRODUCER



**45/-**

There is no high grade Permanent Magnet M.C. Speaker on the market at this phenomenal price; nor is there one at any price that can improve on its remarkable performance.

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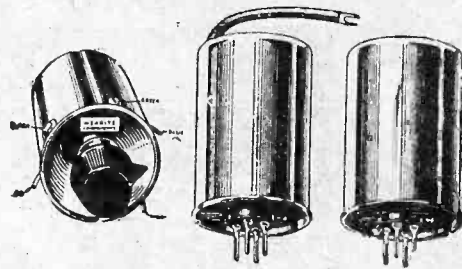
The reproduction of speech and music is as near perfection as has yet been attained by any type of speaker. The cobalt steel magnet is totally enclosed in a dust-proof cover. Speech coil resistance 8.5 ohms, requiring a suitable output transformer.

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WITH P.W. "SUPER-QUAD"**

The wonderful results obtained with the P.W. "Super-Quad" were made possible only by the introduction of "Wearite" Super-Het Coils. (British Pat. No. 349403.)



**WEARITE SUPER-HET COILS**

Three of the original "Wearite" Super-Het Coils (British Patent No. 349403) are used in the "Super Quad." 1 Oscillation Unit Type O.2, 1 Band Filter Unit with pig-tail, Type OT.1, and 1 Band Filter Unit, Type OT.2. The original coils are supplied only by the concessionaires, Wright & Weaire, Ltd. Price per set of three ... .. **37/6**

**WEARITE H.F. CHOKE**

A first-class component especially recommended for the P.W. "Super-Quad." It covers efficiently the remarkable range from 10 to 2,000 metres without any marked resonances. Self-capacity very low. Type **6/6** H.F.O.



**PAXOLIN PANELS**

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Supplied in all sizes.

**G.B. BATTERY CLIP**

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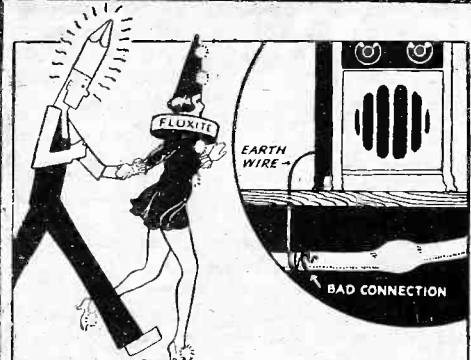
STAND 152

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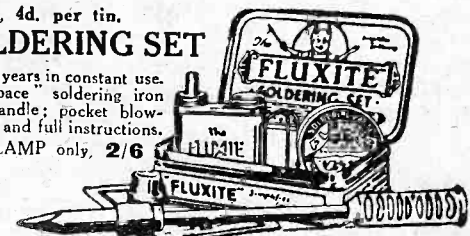
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ALL MECHANICS WILL HAVE  
**FLUXITE**  
IT SIMPLIFIES ALL SOLDERING





# 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 subject of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

## QUESTIONS AND ANSWERS

### MOUNTING A TUNING COIL.

M. R. S. (Luton).—"Can you state why my tuning coil and condenser, which used to give Budapest at the top of the scale, will now tune only up to Vienna at nearly 180 degrees. I can't go up higher, although using the same components as before."

"The only difference made in the set was to put a screen over the baseboard, and the coil stands down on this. Would that affect tuning?"

Yes, the presence of the screen would reduce the coil's inductive value. Stand it on a small block of wood, one inch or more above the screen, and it should be unaffected by the latter.

### PROS AND CONS OF SHUNT-FED L.F. COUPLING.

H. A. (No address).—"And while I am writing I should like to record my grouse against 'P.W.' It is about these shunt-fed L.F. transformers, which I have tried with no less than three different makes."

"In no case was I able to obtain better results than by the old method of connecting the primary straight in the plate circuit of the valve. Frankly I am surprised at 'P.W.' giving prominence to this idea, and I should

## "WHY IS IT SO NOISY TO-DAY?"

Perhaps the 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 an unrivalled service.

Full details, including scale 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.

like to know if you could suggest why in not one case that I tried was it possible to obtain better reception by this method?"

We cannot pretend to know why you failed to get good results when we do not know the values you used, nor the transformers in question. But we do

### "P.W." PANEL No. 34.—USING A POWER VALVE.

Correct H.T. and (especially) correct grid bias are vitally necessary to the power valve.

If the H.T. is allowed to drop quality is impaired. That is, unless grid bias can be reduced to correspond without restricting the valve's power-handling capabilities too far.

It is usual for a power-valve to get noticeably hot in operation.

know that although the method does not invariably give better results, it is quite capable of them.

In fact, in some instances it is definitely specified by the makers of the transformers, but of course, it must be remembered that it is necessary to use the correct values for the transformer in question, so that possibly your failure to do this was responsible for the results you obtained.

Note.—In this connection it is interesting to read the following letter to the Editor which happened to come in at the same time as the above:

The Editor, POPULAR WIRELESS.

Dear Sir,—The following may be of interest to you or your readers. Recently reading a back number of "P.W." (Nov. 8th, '30) I came across an article entitled "New Transformers for Old," in which you bring to readers' notice a method of using L.F. transformers.

You rather stress the fact that it is particularly suitable for old type transformers. My set is the 1930 "Magic" Four, and filled with a complacent feeling that my transformers were beyond reproach I nearly missed a good thing!

However the germ bit and I converted the first stage, using 100,000 ohms as the resistance and 0.25 mfd. as condenser value. Results were startling. While I could notice no gain in quality there was a very distinct gain in volume.

The experimenting fever being still on me I tried replacing the resistance by an L.F. choke, a Lissen, vintage about 1922, about the same size and shape as a modern H.F. choke. Results were amazing.

The volume control from being a luxury became a necessity to prevent overloading on most of the following stations, the carriers of which were louder than previously were the local 7 L O and those of the more powerful commercials.

Quality was excellent and that evening on a run-down H.T. battery, 95 volts instead of 120, I had 11 truly alternative programmes on a Blue Spot speaker: namely, Moscow, Nairobi, Vienna, Philadelphia, Zeesen, Eindhoven P C J, Chelmsford, Rome, Pittsburg, Paris, Schenectady. The improvement is almost comparable to that of adding another H.F. stage.

Why is this method not in universal use? I have not seen it mentioned in many circuits. One would have thought that manufacturers would have made transformers to include the appropriate condenser and choke (or resistance).

Anyway, I very strongly recommend it to the notice of all who wish to get the most out of their sets—and who does not?

You very truly remark in your article that "Hearing is believing," but that is too modest.

Yours faithfully,  
Bugondo, Uganda., S.E.A. F. H. KNIGHT.

### AN UNSATISFACTORY SET.

T. G. A. (Old Ford, Bow, E.3.).—"I recently bought a two-valve H.F. and Det. receiver. When I bought this I had in mind a set that could be exclusively used for earphones alone.

"The reason for this was not because I dislike loudspeakers, but because certain reasons would not allow me to have one, but I also wanted to hear continental stations. The set I have bought will only get one foreigner.

"The real trouble, I think, lies in the reaction circuit, which is so unstable that the set is either screaming and howling, or dead altogether. I do not know much about wireless and I have been recommended to change the H.F. to a screened-grid valve.

"Before I take this step I should like to know if you can recommend it to improve my set?"

We are afraid you are going to find it rather difficult, for the set which you have is evidently in a pretty bad way. The correct thing to do is to get into touch with the makers, telling them of the difficulties you are having, or else to talk it over with the dealer from whom the set was bought.

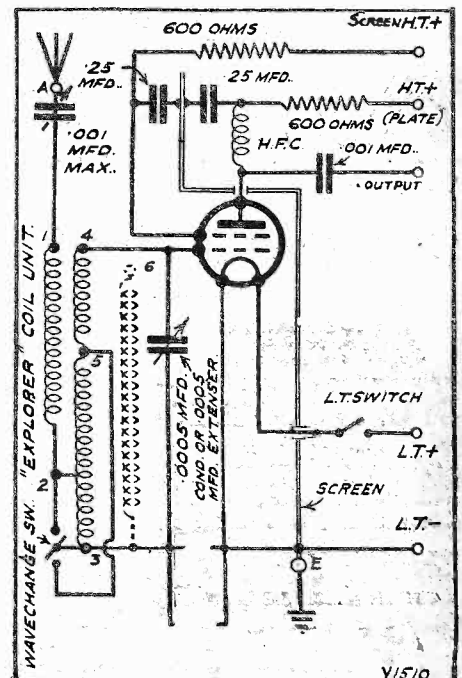
Apparently it needs overhauling by an expert, and the right people to do this job are the makers. You are evidently not skilled enough to tackle the overhaul yourself, and therefore we certainly cannot recommend you to change the H.F. into an S.G. valve, for it is quite likely that the original fault would remain, and you would be just as badly off as now.

We suggest the best way would be to get some one with some real experience who understands that class of work to look at the set for you, and to tell

you where the fault lies. Failing that you could pull the set to pieces and build up another on more modern lines, using as many of the parts as are suitable.

(Continued on page 780.)

### MISSING LINKS, No. 15 'AN S.G., H.F. UNIT.



This is the circuit of a wave-change H.F. amplifier for adding to any ordinary receiver. Can you fit in the two components that have been specially omitted? You will find the solution in next week's issue.

For Real Value for Money  
get the September

# WIRELESS CONSTRUCTOR

On Sale Everywhere—Sixpence

If you are looking for a fine long-range loud-speaker set consider

## THE "EXTENSER" FIVE

— a Victor King design —  
representing the last word in quality,  
selectivity and power.

ALSO

## THE "GANGSTER"

A Screened-grid H.F., Det. & L.F. that puts up a really  
wonderful performance.

THE MONTH ON SHORT WAVES  
QUEER QUERIES SAVOY HILL NEWS

ROUND THE DIALS  
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How to Make an  
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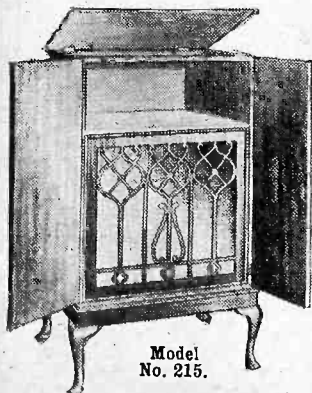
are among the other fine features in the

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Model  
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## OSBORN

Ready-to-Assemble RADIO CABINETS  
There is an Osborn Cabinet for every set on  
the market.

Model No. 215 specified for the "Popular  
Wireless" Comet Two.

4ft. high, 2ft. 2ins. wide, 1ft. 6ins. deep.  
Size of baffle board behind fret is 22ins. by  
24ins. Metallic Fabric for the fret front is  
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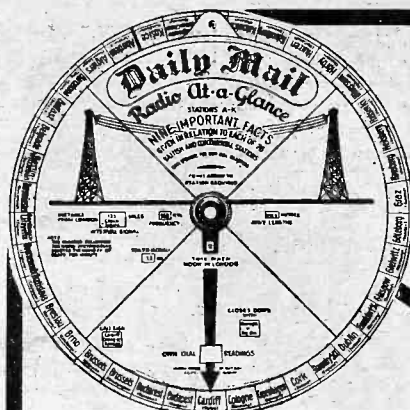
PRICES:  
Machined, Ready to Assemble: Oak, 60/-;  
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100/-; Mahogany, 115/-; Walnut, 130/-. All  
Models carriage paid.

For 5/- extra cabinet made four inches higher  
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Send 3d. in stamps for 66-page illustrated catalogue.

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And at 21, ESSEX ROAD, ISLINGTON,  
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NATIONAL RADIO EXHIBITION,  
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9½ ins.

1/-  
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BRITISH AND CONTINENTAL STATIONS  
With 9 important facts about each, and  
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in locating and identifying all principal  
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QUALITY AND QUANTITY

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Player's  
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THE FULL VALUE CIGARETTE



## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 778.)

This, of course, is a very drastic step to have to take, but we are afraid it is the only way, unless you can get the makers or some qualified person to overhaul it and let you know what is really wrong with it.

### SETTING OUT THE DIAL READINGS.

J. L. (Ashford, Kent).—"I am very interested in the method of spreading out the dial readings which was introduced by W. L. S. in Short Wave Notes. I mean the method of using a condenser of small capacity connected in parallel with the other condenser, and tuning over a certain part of the wave-range with this.

"Could the method be applied to an ordinary broadcast receiver, so the dial readings for a given part of the tuning range would spread from 0 to 100 degrees on, say, a .0001 mfd. ? If so, what would be the best way of doing this ?"

The method is quite applicable to ordinary wavelengths, as well as to short waves, and there is really no difference in the procedure for such a change. All you have to do is to clip a pair of short flexible leads to the moving and fixed vanes of your tuning condenser, and join them to the (rigidly mounted) extra condenser, of smaller capacity.

Then to explore that part of the dial say between London National and London Regional you would set your new tuning dial to 0 and adjust the main tuning dial so that London National was sharply tuned in there. Then proceed to tune not on the main dial, but on the new dial, which even at the full-scale reading will take you up only to somewhere in the vicinity of the Regional station.

You will thus get the advantage of "spread out" dial readings over this portion of the scale, but of course, there is always the difficulty that the slightest variation in the setting of the main condenser will throw out your reading on the smaller condenser, so that they cannot easily be repeated from a prepared calibration chart.

### USING THREE L.F. STAGES.

A. E. (Wandsworth, London, S.W.18).—"I have just completed the Unipower Amplifier

from "P.W." I find it makes a noise as if it is not earthed.

"On making enquiries I find I have already got two L.F. stages in my set, which is a four-valver. Is there any other way in which I could use the amplifier?"

It is a great pity you built it without taking notice that it was intended only to be used with a set employing one stage of low-frequency amplification. Broadly speaking it is not possible to use three L.F. amplifying stages, so that we are afraid there is no way of working it with your present set.

### TESTING FIXED CONDENSERS.

T. G. G. (Hamilton).—"Is it possible to test a condenser leakage by means of a sensitive voltmeter?"

Yes, in conjunction with a battery. If one side of the voltmeter is connected to one side of the battery and then the other voltmeter and the other battery leads are connected to opposite sides of the

### YOUR BIT TOWARDS ECONOMY

Have you ever thought how difficult it is for a newsagent to order just the right number of copies of any particular paper each week? You can make his task much easier if you place a regular order with him. You will not only help him to order correctly and avoid waste, but will make sure of getting your copy regularly each week.

condenser, the voltmeter needle will flick over as the charging current flows, and will then drop to zero again if the insulation of the condenser is perfect. If, however, there is a leak a slight deflection will be noted, and, of course, if the condenser is shorted altogether the full value of the battery will show on the voltmeter.

### WHAT IS AN EXTENSER?

"SAILOR BOY" (Cambridge).—"I am employed on a boat which makes two trips a year to the Far East, and although I get some

of the 'P.W.'s sent to me, I miss quite a number of them when abroad.

"Since returning this time, I have been greatly interested in the Extenser. What is the difference between an ordinary variable condenser and a switch compared with an Extenser?"

There is all the difference in the world. It is true that the Extenser combines the functions performed by an ordinary .0005-mfd. condenser and those of a wave-change switch, but there are many advantages in addition with the Extenser.

(a) It ensures the use of exactly the right kind of switch, for this is integral with the tuning, and not purchased as a separate component which may be faulty or unsuitable.

(b) It eliminates all the wiring between switch and tuning circuit—which, in these days of high efficiency tuned circuits, is very important indeed.

(c) It completely revolutionises tuning by doing away with double dial readings (whereby different programmes were received at the same setting after an alteration in the wave-change switching).

(d) It enables one calibration chart to be prepared with progressive straight-line readings, from the lowest to the longest stations.

(e) It gives two-figure readings for all the low-wave stations, and three-figure readings (over 100) for all the long-wave stations.

There are other advantages as well, but we think the foregoing are quite sufficient to show the versatility and importance of the Extenser.

### WHEN THE VALVE RINGS.

M. G. (Bayswater).—"Twice lately I have come across cases of valves 'ringing,' or being what I believe is known as microphonic.

"I have never seen it stated what is the actual cause of this. Can you give me any details about it?"

You know that when the filament is heated it emits electrons, which form the plate current. This plate current is controlled by minute electrical charges on the grid of the valve, and the grid is always carefully placed close to the filament in such a position that it is enabled to modify the plate current, in accordance with the speech or music being reproduced.

The relative positions of the grid, anode and the filament—that is to say, the exact distances between them—is important. So that it should not vary, these

(Continued on next page.)

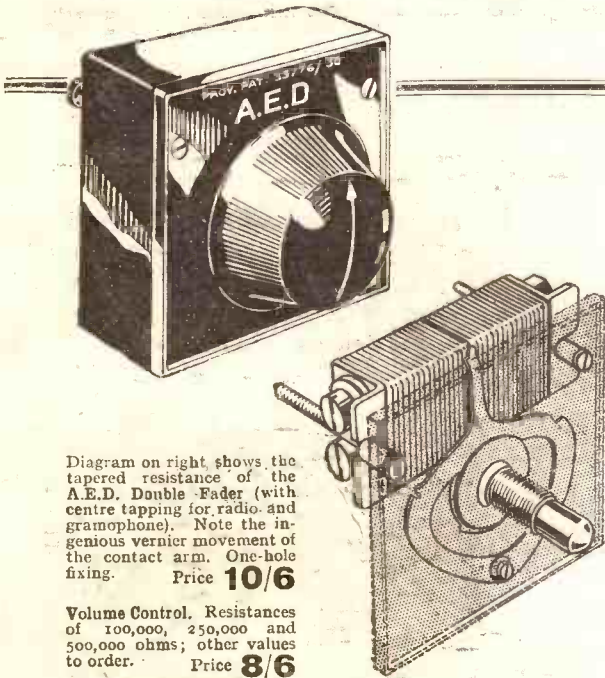


Diagram on right shows the tapered resistance of the A.E.D. Double-Fader (with centre tapping for radio and gramophone). Note the ingenious vernier movement of the contact arm. One-hole fixing. Price 10/6

Volume Control. Resistances of 100,000, 250,000 and 500,000 ohms; other values to order. Price 8/6

Another  
Honour  
for



The A.C. "POP-VOX" described in this issue of POPULAR WIRELESS employs the A.E.D. Log-Law Volume Control and an A.E.D. Double-Fader is used in the POPULAR WIRELESS "Selectivity Three."

THESE A.E.D. Components have been chosen by many of the leading experts for their latest designs, and have definitely proved by their performance that they have no equal for smooth and stable control, combined with neat, compact and robust construction. Ask your radio dealer to show you these A.E.D. products.



Write for particulars of the A.E.D. Gramophone Pick-up—the golden-toned reproducer, which will give volume to fill a hall with only a two-valve amplifier!

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## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

electrodes are firmly suspended inside the valve by metal supports.

Unfortunately, if these happen to be "springy," they may have a tendency to vibrate very slightly. This is fatal.

The slightest movement of them will always disturb the normal working of the valve by momentarily altering the relative positions of the electrodes, and when such a displacement occurs the valve will "ring."

With such a valve in use, any sort of shock absorber is helpful. It is for this reason that the anti-microphonic valve holders are successful, for in them the base into which the pins of the valve fit is cushioned by springs, and consequently external shocks either do not reach the filament at all, or they are very greatly reduced.

Remember that such microphonic effects are most noticeable when you attempt to use the valve in question as a detector. And also that not only will mechanical vibration cause the trouble, but it may be started acoustically by pointing the loudspeaker to the set, so that the valve is shaken by the sound waves.

For this reason, moving the loudspeaker from the set will often help to cure the trouble.

### REVERSING THE LOUD-SPEAKER CONNECTIONS.

G. L. (Aston, Birmingham).—"I do not know if you can throw any light on the following rather curious fact, but I have proved it to be a stunt well worth trying.

I discovered it with my 'Magic' Three, when quite by accident one day I reversed the

## TECHNICAL TWISTERS

### No. 76.—PREFIXES.

#### CAN YOU FILL IN THE MISSING WORDS?

When big numbers have to be frequently employed, it is often easier to express them by the aid of suitable prefixes, denoting so many thousands, or so many . . . . .

To denote numbers 1,000 times greater than unity the prefix . . . . . is used, and thus 1,000 cycles is referred to as 1 . . . . .-cycle, or 1,000 watts as 1 . . . . .-watt.

To denote numbers one million times greater than unity we use the prefix mega (or meg.), and thus a "2- . . . . . leak" means a grid leak with a resistance of . . . . . ohms.

Last week's missing words (in order) were: Small. Milli, Milli. Milli, Milli.

leads to the loudspeaker and got far better reception, which fell off when I joined them back again.

"Having proved how distinct the difference was, I put it on several other sets I have come in contact with at various times, and although it does not always work, it certainly does mostly meet with improved reception. Why is it?"

The explanation is simple enough. The operation of most loudspeaker units depends upon the magnetic effect of the current flowing through the speaker windings, in combination with a permanent magnet.

The direction of those magnetic effects, caused by the current flowing through it, will depend upon the way in which the speaker is connected round in the circuit. So important is this that many loudspeaker makers always mark one side of the speaker + and the other side -, to indicate that one terminal must be connected towards the H.T. battery positive and the other towards the plate of the valve (-of the H.T. supply).

Although there are certain other loudspeakers which are constructed so that the effect is not important, as in others, the majority of speakers have a right and a wrong way of connecting them in circuit.

So in cases where no output filter circuit is used, it is always necessary to examine the speaker terminals, or its leads, to see if one (generally coloured red, or marked +) should be connected towards H.T. +.

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DARIO SUPER H.F. BIVOLT - 5/6  
DARIO SUPER POWER BIVOLT 7/6  
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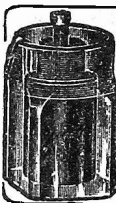
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## FOR THE LISTENER

(Continued from page 762.)

and exclusively announced in "P.W.," to find that in future the audition committee will proceed on this simpler plan. They will not require you to recite "Casabianca" before them, or to play your favourite piece on the fiddle, or to read the MS. of your pet theory; they will just look at you; and one look may be enough.

They will say, "Obviously, you have gifts, Mr. MacGregor, but we regret to see that you are much too aquiline. We congratulate you on your personal appearance; but our rule is 'Handsome does who handsome is not.' Sorry you've been troubled." Or, on the contrary, "Sir, you have a nubby face; you have a rugged face; parts of it look as if they had been put on hot; we like it; consider yourself engaged."

### Selecting Your Programme.

Take my own case. In the matter of faces, I am an outsize and an outsider. As I never lose an opportunity of telling you, I once broadcasted with a fair success, and imagined that it was due to my merits. I now realise that it may have had more to do with my nose, a shameless retroussé—which is no merit in me, but an original gift.

Some time ago, going home by train one night, I bought an evening paper. I turned to the broadcasting page. It was decorated by a photograph. I do not, as a rule, lay much store by photographs in evening papers. Usually they do a man less than justice.

They are often misleading smudges. This one was smudgy enough. It looked as if it might have been transmitted to London from Valparaiso, by television, and had crashed on the way. I said to myself, "Now, that man will broadcast well." So, when I got home, I listened to him.

I was right. He was very good indeed. My theory about faces was confirmed. I made a note of his name. On the following evening, an apology appeared in the paper. By some unaccountable error, the photographs had got mixed up; and the one I had seen was meant to be a basket of Pekinese puppies going to the Dog Show!

### The Picture Guide.

My view now is that the official programmes should print a photograph with each item; so that listeners, seeking an evening's good enjoyment, may study the alternatives offered them. Not the alternative items, but the alternative faces. You can go wrong over an alternative item; but you can scarcely ever go wrong over an alternative face. Beware of the Apollos. Bank on the nubby ones.

You will observe that, in expounding this theory, I have spoken only in the masculine gender. This is because, as you know well, I am no fool.

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## TECHNICAL NOTES

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

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

### Doing Without a Choke.

REFERRING to the question of high-frequency chokes, you will remember that I said something about this in these Notes a few weeks back, and several readers have raised the question as to whether a choke is always worth while.

A high-frequency choke of good make is not a particularly inexpensive item, and furthermore, chokes are rather peculiar components and are apt to exhibit little idiosyncrasies which cannot always be readily accounted for.

You will sometimes find that in a certain circuit you can use one make of choke, whereas as soon as you substitute another make the results are not nearly as good, although apparently, according to specification, the two chokes would act equally well.

The H.F. choke connected between the anode of the detector and its coupling—L.F. transformer or otherwise—is not always worth while and can sometimes be dispensed with.

In some cases a resistance in the grid-lead of the next valve will give equally good results, and, of course, at lower cost. This is a method which is quite often used, and in those cases where it is applicable it is also perfectly reliable.

### Valve Improvements.

There are now so many valves on the market, and new ones keep coming along so often, especially screened-grid valves, that the amateur is often bewildered in making a choice.

You may have your receiver working quite satisfactorily, when you read the description and specification of a new type of valve and think it might be worth getting the valve and substituting it for one in the present set.

Perhaps you go to this expense, only to find that the results are inferior, or at any rate no better, and you jump to the conclusion that you have been "had" on the valve and wish that you had not spent your money.

All this kind of thing only emphasises what has been so often said before, and that is that the working of a receiver depends not merely upon the merits of the valves, or upon the merits of the other components, but upon these in relation to one another.

It is, generally speaking, impossible to say that one valve is "better" than another valve; it depends so very greatly upon the purposes for which it is intended and the conditions in which it is to be used.

### Important Conditions.

So before attempting to go in for a new type of valve, make sure whether the present one suits the case reasonably well, and whether the new one is likely to suit it any better.

(Continued on next page.)

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## TECHNICAL NOTES

(Continued from previous page.)

You may easily go in for newly designed valves which may be superior to your present ones, in the sense that they are of more recent design and incorporate corresponding improvements, but which nevertheless may not be as suitable in your particular set as the one you already have there.

In fact, the substitution of new valves for old ones sometimes produces not only inferior results, but actually runs you into a whole lot of oscillation and other troubles, and may put paid to the selectivity of the set altogether.

### A Push-Pull Trouble.

A reader sends me an account of some trouble he had with a push-pull output stage which—although I am, of course, obliged to him for his letter—is not nearly so uncommon as he appears to think.

To tell you the end of the story first, the trouble was found to be due to the two halves of the transformer giving unequal voltage outputs, although it apparently took him some time to find this out. The effect of this was that the quality was bad, although the volume was all right.

Apparently the trouble was got over by connecting a very high resistance (one megohm) across the half of the transformer which was giving the higher voltage. I have sometimes seen improved results obtained in a case like this by connecting, say, half a megohm across each of the two halves of the transformer.

### Equalising Voltages.

This method, however, although it is sometimes used, is obviously only a makeshift, and if you want to do the job properly you should test out the voltages of the two halves of the transformer (preferably by means of a valve voltmeter, by the way) and then add windings to the lower half until the output voltages are equal. But this is a job which is outside the scope of the ordinary amateur.

In point of fact, push-pull transformers are often not tested for equality on the two halves as carefully as they should be, and although the push-pull arrangement appears to be a perfectly easy one, you see from the above that it is not always quite so simple as it looks.

### Detector Reaction.

With a valve detector which provides both detection and reaction effects, as is so often the arrangement, it frequently happens that, in the process of getting smooth reaction, the efficiency of the valve as a detector is lessened.

In order to get the desired reaction effects the grid-leak is often connected to the negative low-tension, and, so far as the detecting is concerned, this may be an unsatisfactory arrangement. For the maximum sensitivity the grid often has to be biased by connecting the grid leak to the positive terminal of the filament.

A good deal depends upon the nature of the circuit, and it is impossible to state any hard-and-fast rule. What I want to point out, however, is the desirability of using a potentiometer across the filament circuit, as

(Continued on next page.)

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## TECHNICAL NOTES

(Continued from previous page.)

this gives a satisfactory reaction arrangement without the disadvantages mentioned above.

Once the best position for the tapping (it need not be a slider) on the potentiometer has been found, there is no need to adjust this afterwards, and consequently the potentiometer does not need to be provided with any panel control. It can be set inside the receiver once for all and left in the best position.

### Choosing Your Valves.

Beginners in radio are often very much puzzled to know how to judge the qualities of a valve or its suitability for a particular purpose from the characteristic curves supplied with the valve. The commonest form of characteristic curve indicates the manner of variation of the anode current with variations in the grid voltage.

This curve then indicates the voltage amplification and the slope of the curves (assuming that different curves to be compared are drawn on the same scale) gives an immediate visual indication of the relative magnification factors for different valves.

I mention particularly that the curves should be drawn on the same scale, because if you are comparing two similar curves and in one case the horizontal scale representing the grid volts is drawn out to twice as much as in the other case, then the slope of the curves in the second case, other things being equal, will be reduced *apparently* to half what it was in the first case. So

that if you are comparing different curves you want to keep this point in mind.

As a rule, however, you are not so much concerned with comparing curves as with examining those of a particular valve, in order to see whether this valve will be suitable for the special purpose to which you intend to apply it.

In this case you have to notice the amount of variation in plate current which is produced by a given variation in grid voltage, this, of course, for (or rather around) the particular value of H.T. voltage which you intend to use.

This gives a measure of the magnification factor of the valve which is sometimes referred to as the slope of the curve. Do not confuse the slope of the anode current/grid volts curve with the "slope" of the valve.

### The Amplification Factor.

The slope of the valve is really most important, and this is the ratio of the magnification factor to the impedance.

Now what you have got to consider is how the impedance of the valve will suit your particular conditions, bearing in mind the amplification factor. Suppose, for instance, you have two valves with the same amplification factor and one has an impedance of twice as much as the other; then it may be in your particular conditions the one with the lower impedance will give you much better results than the other.

This is generally the case with valves intended as low-frequency amplifiers, particularly for the final or output stage, although here again it is not safe to state a hard and fast rule.

What you want then for high amplification per stage is a valve having a steep

slope, the slope, as I say, being the magnification factor/impedance ratio.

### Dodging Distortion.

There is another important point which has to be kept in view as well, and that is the grid swing which the valve is capable of handling. You may have a valve which has a very steep slope and is therefore capable of giving a large magnification per stage and yet this valve may not be capable of handling sufficient power for your purpose.

This again is a point to be borne in mind, particularly for a valve in the output stage where heavy power has to be handled with consequently large grid swings.

The usual way to judge this is to look at the characteristic curve and to see how many volts of swing from zero you have to give before you begin to get from the straight part to the curved part of the characteristic curve.

In actual practice you cannot usually allow so much as this, because distortion will begin to set in before you reach the really curved part.

## AN A.C. "POP-VOX"

(Continued from page 772.)

You will see that the grid of the detector valve ( $V_1$ ) can be switched over to "pick-up" if desired. So if you have a gramophone you can do your own electrical reproduction via the loud speaker, with all the attendant advantages of increased purity and volume.

Coupling the detector to  $V_2$  we have a *shunt-fed* L.F. transformer of the latest nickel-iron type, complete with volume control. There is no doubt about the up-to-date-ness of the A.C. "Pop-Vox"! The final stage is R.C. coupled, and the set has a standard arrangement of output filter and valve rectifier, with suitable smoothing and simplified decoupling.

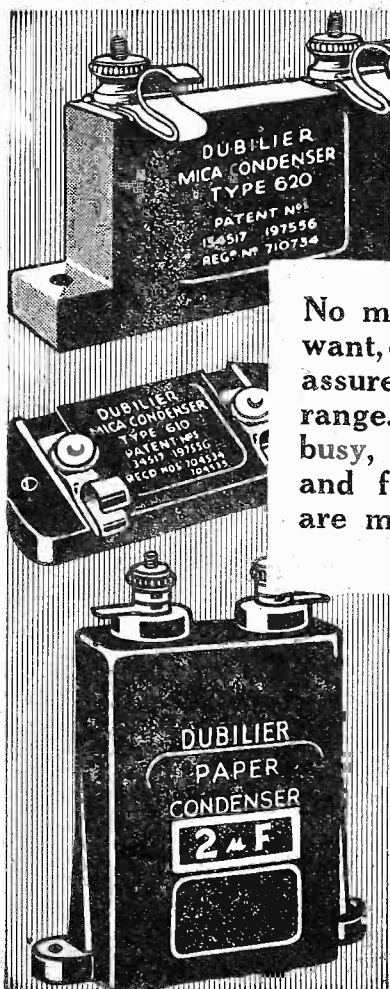
In addition "free grid bias" is provided, so that G.B. batteries are not needed. It will be seen that the output valve is directly—and the two preceding valves indirectly—heated, the supply circuits being conveniently obtained from one single mains transformer.

### Coil Particulars.

Both the "Selector" coil and the "Contradyno" may be constructed at home quite easily, if desired, and particulars of the actual methods of winding the "Selector" coil were given in the May 23rd issue of "P.W." Similarly, the more experienced constructor may like to make his own "P.V." coils, the details of these having appeared in "P.W." dated July 11th.

The "Contradyno" coil will hardly take you any time to make, it is simply 60 turns of No. 24 D.S.C. wire, wound on a standard Coil Quoit. The ends of this winding are taken out to "X" and to "No. 1" respectively, as shown in the accompanying diagrams.

This week we have not space to deal with further construction (which, by the way, is not at all difficult), so details of this will be given in our next issue. But a full list of the required components is appended, and the wily constructor will be well advised to get his order forward, for there is sure to be a big demand for the parts for the A.C. "Pop-Vox."



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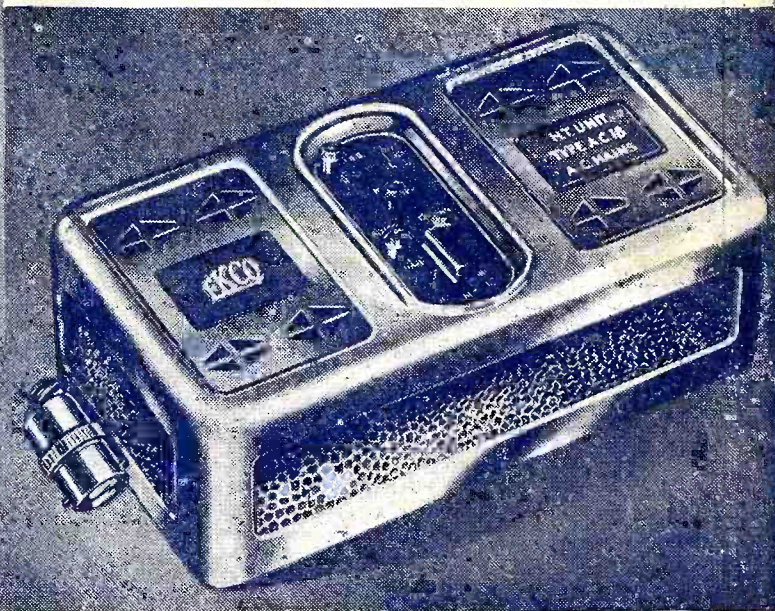
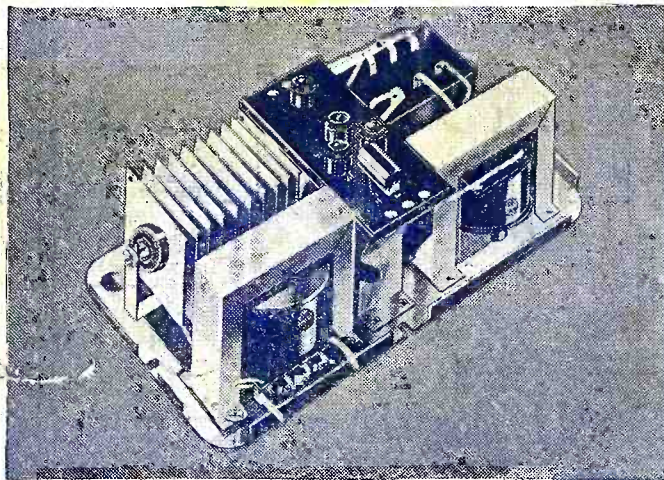
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