

**FEATURED  
INSIDE—****LOUDSPEAKERS—By Capt. Eckersley** (See Page 239)

# Popular Wireless

Every Thursday  
PRICE  
**3d.**

No. 518. Vol. XXI.

INCORPORATING "WIRELESS"

May 7th, 1932.

## A NEW "P.W." PORTABLE

*See  
Inside!*

### ALSO THIS WEEK—

Lt.-Commr. The Hon. J. M.  
KENWORTHY, R.N., writes onThe **INVASION** of  
ENGLANDRADIOGRAM  
REMINDERSWIRELESS IN  
WAR-TIMEMore exciting extracts from the log of  
a wireless operator.MODERN  
MAINS VALVESREADERS'  
RESULTS on the  
"COSMIC"

-ETC., ETC., ETC.

**RELIABLE RADIO from READY**

See Page 253

EASTNOR HOUSE, BLACKHEATH,  
LONDON, S.E.3.**RADIO**

Adv.



# "ARIEL'S" RUNNING COMMENTARY ON RADIO (Continued)

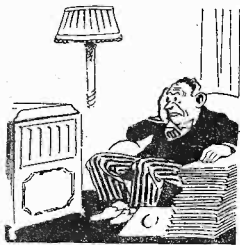
## Good for Sweden.

I READ that Swedish financiers and business firms have been expressing fears that the investigations which have been made into the affairs of the late Mr. Kreuger may cause doubts as to the probity of the Swedish nation. Nonsense! Is there any nation which has not in its archives the records of men who flew too high, lost their heads, and crashed?

Why, it is recorded that at the close of 1931 no less than 89.5 per cent of the Swedish people had paid for wireless licences. That's a good testimonial, surely!

## Do Old Needles Ever Die?

FROM Switzerland comes the latest and longest-lived pattern of gramophone needle, called the "Dynamic Super Power Permanent." This needle is said to be capable of being played 50,000 times. Phew! 50,000 record "sides": over 4,000 symphonies of average length; they ought to supply a slate for users to record the number of times the needle has



played. The reproduction is done through a special alloy wire wound on a spool which is fitted with a milled knob for the control of volume by shortening or lengthening the wire. The needle is priced 7s. 6d.

## The League's Radio Station.

LIKE the League of Nations itself, the League's radio station near Geneva is of an international character, though I think it is just to say that Britain's contribution, a Marconi short-wave transmitter and aerial, with telephone terminal gear by Standard Telephones is the most important. A French company supplied another transmitter; the Germans were responsible for receivers and aerials; Holland supplied valves, and most of the power gear is Swiss.

## Prospectus Par Excellence.

ONCE upon a time, children, a radio set was described as so many "turns" of wire, a sliding contact, a bit of some crystalline substance and various plain condensers. Now—in America—the latest *cri* is said to possess: Super-het. circuit; rubber chassis mounting; continuous variable micro-tone control; impregnated condenser, laboratory sealed; noise-eliminating



power transformer and tone-tested audio-transformer; super control valves; three-point shielding; acoustic synchronisation between chassis and cabinet; electrodynamic type speaker, stethoscope-tested; and pentode for reserve power. What a pity that no epithets are applied to the acid in the accumulators which this set does not need!

## D.F. in Atlantic Venture.

THIS spring two heroic souls are to attempt to cross the Atlantic in a small boat, the "Enterprise," which will carry direction-finding wireless gear. The boss of the show, a Canadian named C. P. Barber, who in the space of 29 days crossed from New York to Plymouth in a cockle-shell last year, has already proved how invaluable the D.F. apparatus is and now "swears by it." He hopes to travel via the Canary Islands, Trinidad, British Honduras, Cuba, and Miami to New York.

## Explanation from Grimsby.

AN obliging reader sends me a note of the argument adduced by the Grimsby Town Council in support of its claim that radio "mains users" should pay four shillings a year for that privilege. He says that the town supply is to be changed from D.C. to A.C. at a cost of

## "SHORT WAVES"

Complaint is made that a B.B.C. rendering of "The Ancient Mariner" was overpowered by the orchestral accompaniment. "The listener-in, he cursed the din, for he heard the loud bassoon."—"Punch."

"I suppose you are enjoying your wireless now."—"Answers."

## SUGGESTIONS FOR BRIGHTER BROADCASTING.

1. Giggle and Gag.—Brain-waves from two of the most entertaining comedians since Marcus Aurelius.
2. Readings from the Worst Poets.—By One of Them.
3. Competition Results.—Winner of the Disappointing Dialects Orgy.
4. A Debate on "Should Broadcasting be Broader?"

## TRUTH IN ADVERTISING.

"Battery Trouble Free."—Radio Advt. We shall decline the offer."—"Punch."

## BROUGHT UP ON WIRELESS.

Sir Hamilton Harty tells a story of two children who were disappointed with their first concert, after being "brought up on wireless."

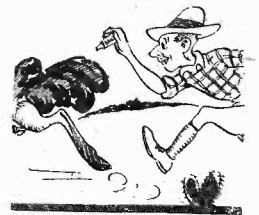
"It did not sound right," they said. "The tone was wrong."—"Daily Sketch."

kind of flower. Oh, Hertz! Oh, Marconi! Did you not think of all this?

## New Attack on "Ariel."

MY goodness! I wish I were an agent for the sale of Dutch cheeses, or an ostrich-catcher. In my present position I am little more than a target.

When the iron bedstead man and the bee-breeder hibernated I thought that I could count on peace till June at least: but here is someone (J. T., of illegible) who, having cast my horoscope, declares that I am going to be involved with a man who holds a mortgage on a snake farm in Florida. Cast the horoscope away, there's a nice fellow. Can't you cast something without mortgages and snakes?



## The Queen's Hall "Proms."

THE famous Promenade concerts at the Queen's Hall will begin on August 6th and continue for eight weeks, thus concluding on October 1st. Sir Henry Wood is the conductor, of course; for the 38th year in succession.

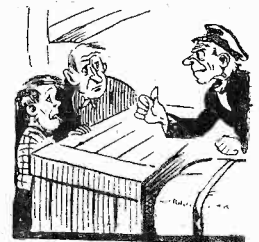
Was there ever a record like that? Were there ever such magical concerts? If you have never attended one of them do try to do so this year, for it will be a fine and unforgettable experience.

But pick a night when music which you think you can enjoy is to be played—and book your seats early. You cannot promenade at a Prom. Packed!

## Wireless Prevents Unusual Risk.

IN Salford Police Court, recently, it was revealed how radio helped a shipping company to avoid a risk of a heavy monetary loss. Two stowaways were found aboard the s.s.

Trongate, Antwerp to Buenos Aires. Had the men been kept aboard till the vessel docked at Buenos Aires the authorities there would have demanded a £250 bond, to be forfeited if the men escaped from the ship. The Master sent a radio message to his owners and on their instructions asked another ship of the same line, bound to England, to take the culprits over, which was done.



## Thank You!

A COLLECTIVE "Thanks" to all who wrote to me about O.K.N. Lots of the answers were different, but the goodwill is mighty warming.

Strange, how potent is a common hobby to keep the milk of human kindness fresh and creamy. Really, men are O.K.; it's the politicians and financiers who spoil things—what with wars and all.

ARIEL.

## The Iron Bedstead is Sold.

THANK the stars! The iron bedstead fellow has got up and sold it. At a "roup," which I take to be Scots for "auction."

My sole prayer is now that he will not join forces with the bee bloke, who attributes the reduction in saccharine in honey to the London Regional. My private opinion is that bees don't care, but this bee fellow evidently thinks that bees' antennae are distracted by the Regional programmes and thus do not guide their wearers to the best

# THESE RADIO COMPONENTS

# A COMPLETE AND CRITICAL REVIEW

by  
Capt. P. P. Eckersley  
M.I.E.E.

I SUPPOSE we know less about microphones and loudspeakers than about any other component in the long chain between original and reproduced sound.

What constitutes a good loudspeaker may, therefore, facily be summed up as a loudspeaker which makes a pleasing noise.

But there are other qualities which require a good deal of consideration. Firstly, what of the characteristic of the set? May one not say quite easily, "Yes, I like that," and then on taking the speaker home to your set say "Um! now I don't like that." Secondly, what of the efficiency of the speaker? - A point frequently missed. Thirdly, what of the loudspeaker's quality to continue to please? At first blush one may, for instance, revel in the deep bass "oomp" but may one not soon get very tired of a resonant bass?

Let us take these points in order. First, then, the question of the set with which the speaker is to be used. I have heard speakers on a straight-line input which were definitely deficient in bass. Put them on a good old peak tuned circuit and the result may well be better because the excess of bass in the input may compensate for the lack of bass in the reproducer. Nearly every speaker lacks true bass in some degree.

## Showing up the Peaks.

The moving-coil designer, however, "puts in" lots of bass by making the whole diaphragm resonate around the 100-cycle mark. We all remember the early moving coils which went oomp—ssh—; very dreadful they were. If they were connected to a peak tuned set they "oomped" more dreadfully than ever. Then, again, moving-coil speakers frequently possess a high resonance peak among the 5 or 6 thousands.

A set with a moderately straight-line input characteristic allows this resonance full play. The 4, 5 to 6 thousand gamut is a band of frequencies which comprise the background frying noise which comes in when the station received is weak.

I once did the following experiment.

I took a set with a moderately straight-line characteristic. I tuned into 5 G B (in daylight) in London. I used a moving-

## LOUDSPEAKERS

In this third article of his special new series, our Chief Radio Consultant has some particularly outspoken comments to make regarding loudspeakers. But above all he is eminently practical and his words constitute constructively helpful criticism which should assist many readers in their endeavours to achieve satisfying radio reception.

coil speaker. The frying noise was awful. I could hardly hear the music through it. I changed the set to a detector and two-note mag. and forced reaction. The hiss died down a lot, but the "comp" was awful. I then took the "straight-line" set and connected it to a moving-iron speaker with a characteristic which fell fairly rapidly after 5,000 cycles. The results were fair, but the bass was thin and there was still a little hiss.

## Quite a Different Effect.

I then tried the detector and two L.F. with the moving-iron speaker and eliminated all frying, and put in a very satisfactory bass. So with a given set and given speaker I got a worth-while result, but it was a theoretically bad characteristic set and a theoretically bad characteristic loudspeaker. *The moving-coil and straight-line characteristic set was not acceptable.*

This is an illustration of the fact that you cannot, with things as they are, just talk about a good or bad loudspeaker. It is set plus loudspeaker which produces the final result. So when buying a new speaker test the speaker on the set you are to use.

Secondly, on the question of efficiency. I have frequently heard people say "Oh, but the X speaker is much more sensitive than the Y." The remark is as misleading as that which says "that lamp is much brighter than this one." Each time the question of efficiency is left out. A 200-volt 60-watt lamp is much brighter than a 200-volt 20-watt lamp, but obviously the 60-watt lamp takes much more power from the mains and so costs you more to

run. Similarly the X speaker may make a far louder noise than the Y speaker, but perhaps the X speaker is much more greedy and absorbs more power.

Now, it's true you don't exactly pay for power directly, and provided your last valve will give the power it is quite allowable to use the apparently most sensitive speaker. You must be sure, however, that in fact the speaker is not so greedy as to overload your output and so produce distortion. As a sort of guide, but a very imperfect one, you should be aware of the D.C. resistance of the speaker.

## Not an Obvious Point.

This is usually around 1,000 ohms. If a given speaker sounds much louder on a given output than another, verify the relative resistances. You may find one is only louder because it has a lower resistance. If you can get a 2,000-ohm loudspeaker, for example, to be as loud as a 1,000-ohm speaker, then you will know you've got something really efficient in the 2,000-ohm speaker.

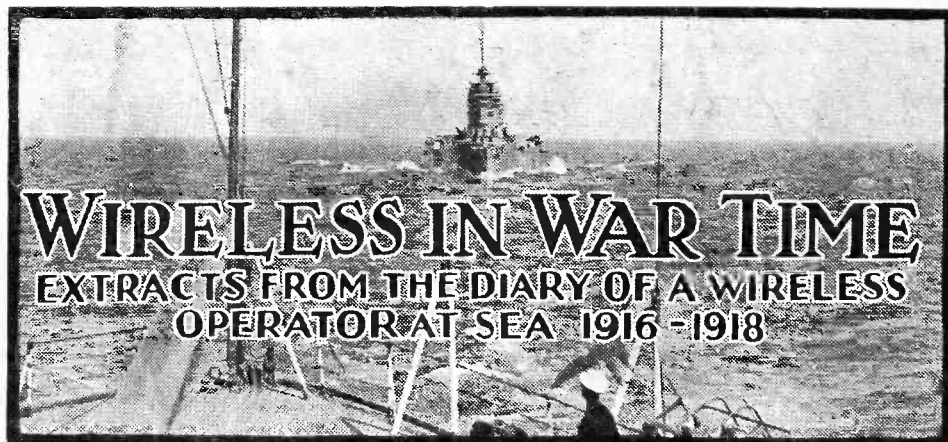
Lastly, as to quality itself. Walk into a shop, hear a speaker playing lunch-time music of the slow, swoopy and sentimental type—how lovely! How the bass comes out and what sweet music! You buy the speaker—quick, like that—you take it home. There's a harsh-voiced man talking about the salient characteristics of the lesser lepidoptera—that speaker? Do you like it so well? Wouldn't you like to remove some of the plums from the speaker's mouth?

## Listen to Some Speech.

Never buy a speaker on a music test, always try both music and speech. Try jerky music, too, hot jazz (if the B.B.C. will let you in these days of sweet Hall), try attack by brass in a symphony orchestra in the studio, or the piano. Particularly try speech in comparison with music for "pleasingness."

We have at present no measure more accurate than our ears. So it really remains for you to choose, bearing in mind to test on your own set, to verify reasonable efficiency, and to make extended tests on all sorts of different items.

**"P.P.E." WRITES TECHNICAL ARTICLES ONLY FOR "P.W." and "M.W."**



DECEMBER 25TH, 1916.—Christmas Day. It's rather a strange experience to celebrate Christmas with the mercury at 72 deg. in the shade. The heat was so intense in the saloon to-day that we were unable to do justice to our Christmas dinner, although the menu included soup, fish, turkey, duck, ham, vegetables, plum pudding, mince pies, biscuits, cheese, nuts and fruit, coffee, ale, beer, whisky, port, etc. Last night I picked up a message sent by Rockefeller in Palm Beach to a lady in Baltimore wishing her a Merry Christmas. We are now in the Gulf Stream, and we hope to reach Key West by to-morrow evening.

#### The Gulf of Mexico.

DECEMBER 26TH.—We passed Palm Beach late last night, the great society resort of wealthy Americans. All we could see was a blaze of light on the horizon.

DECEMBER 27TH.—10 p.m. It is a little cooler. From below the sound of the steady beat of the engines keeps time to the loud choruses which some of the deck-hands are singing. "Where Was Robinson Crusoe with Friday on Saturday Night?" is the latest, but "My Old Kentucky Home" is a good second. Four days more and we arrive in Port Arthur. We can now hear the radio station at Miami (WST) quite distinctly.

DECEMBER 30TH.—Sighted the harbour mouth of Port Arthur early this morning. On our way up the little river leading to the port we passed the hamlet of Sabine, which consists of a church, half-a-dozen houses, two pubs and a railway siding. The land is as flat as a pancake and is covered with long grass, with pools of dirty water dotted about. Seems an ideal breeding place for mosquitoes and fever. Port Arthur consists of oil tanks and machinery, wharves and store yards. It is rather a dismal haunt, and stinks indescribably of oil.

#### An Amusing Incident.

DECEMBER 31ST.—Went into town to-day with the Third Officer. We tramped back about 5 o'clock, having missed the last tram. Owing to the fact that the Third Officer had got a touch of malaria, he was pretty well raving by the time we got back to the ship, and old T—, thinking he was drunk, handled him pretty severely.

JANUARY 3RD, 1917.—The Captain came aboard about 5.30 with a fresh crew, all three parts drunk. One had the astounding nerve to go to the Bridge and demand that the Captain take his bed down to the fo'c'sle for him. However, he came down quicker than he went up. For the rest of

the night this particular specimen prowled the ship on rather unsteady legs. He happened in his perambulations to bang into old T—.

"Hey!" he cried. "Be you the Mate?"

"I am the Mate," says old T—, very quietly.

Mr. "Topsy" evidently didn't catch the warning note, for he continued as before. "If—hic—if my bed—hic—isn't—isn't taken to the fo'c'sle—hic—I shan't gonna watch. You take my—hic—bed to the fo'c'sle, or I'll—hic—"

"Here, Lazarus," cut in old T—, "you take up your own bed and walk, my lad. And don't come aft again."

JANUARY 5TH.—A large pelican in an exhausted condition came to rest on the ship to-day. The Captain had him caught,

the ship, the engineers and, finally, the whole business of navigation as a means of earning a living.

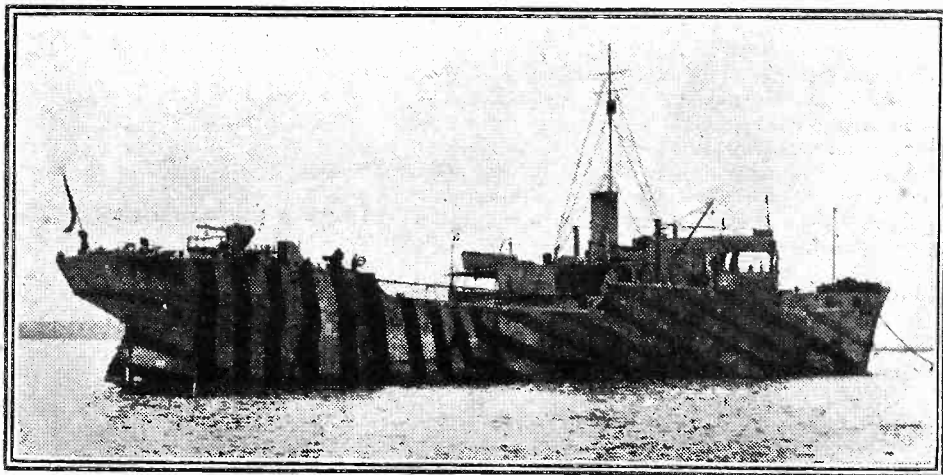
Before long he had an admiring audience, but as some of his remarks were personal, the group quickly faded away. There is a little betting going on as to whether old T— repeated himself, but the odds are slightly in his favour. Passed a steamer sailing from Key West, Florida, to Havana, Cuba, to-day, also saw dozens of porpoises.

JANUARY 9TH.—All the navigation lights of Cuba, Jamaica, Tobago, and the British ports in the West Indies are extinguished, owing to the fact that our friend the German raider is still at large. Of course, everybody on this ship is wondering what's happened to the British Navy, and why some small cruiser can't be spared to chase this armed merchantman. It is these isolated raiders, which probably have a base in some part of South America, according to the Captain, that do all the damage. Witness the "Emden."

#### Some Interesting News.

We covered 262 miles yesterday and hope to reach Norfolk, Virginia, again on Friday. The news to-day includes a paragraph stating that General Carranza, the Mexican leader, has secured a sweeping victory over Villa, and that the latter has fled to Dubago. Our Captain was in El Paso a little while ago, and he describes the Mexican rebels as being the dirtiest and the most frightful blackguards he has ever seen in his life. There appears to be a Colonel for every ten men, and a General

### A CLEVERLY "CAMOUFLAGED" MERCHANTMAN



A reminder of the days when all ocean-going ships were "camouflaged" to make them less easily seen by submarines or enemy raiders. Our contributor started his sea life in a vessel of the same type as the "War Master" above.

and the bird is now eating frozen fish. It has a beak nearly eighteen inches long, and looks like a gargoyle, or something out of a first-class nightmare.

JANUARY 6TH.—Had the Bradfield Insulator down this morning, as we have a bad fault somewhere. The sea is like glass and it is very hot. The engines broke down for about an hour to-day.

JANUARY 7TH.—The Captain let the pelican fly away to-day, as our supply of fish is evidently not to its liking. This afternoon the engines broke down again, and we had to lie to for a couple of hours while they were repaired. Apparently this was the last straw for old T—. He sat down on the after hatch and patiently explained his exact sentiments concerning

for every twenty. The officers wear long swords and go strutting about the streets like prize peacocks.

JANUARY 10TH.—Much cooler to-day, but still fine weather.

*To be continued.*

Look out for a further instalment of this fascinating series—

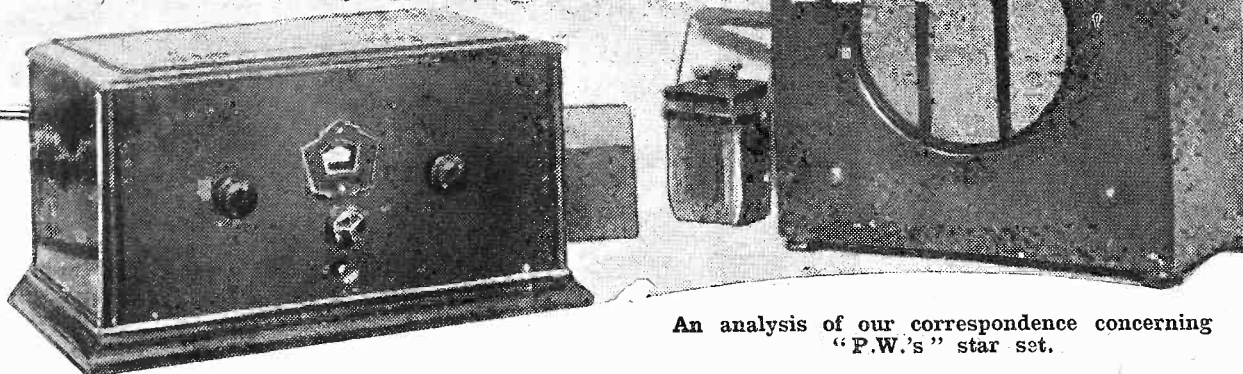
**NEXT WEEK.**

Make sure of your "P.W." by placing a regular order.

Every Thursday. "P.W." Price 3d.



# READERS RESULTS ON THE "COSMIC"



An analysis of our correspondence concerning  
"P.W.'s" star set.

FROM an exceptionally large "Cosmic" post bag we have selected a number of letters recording the most spectacular performances, and have published them in "P.W." as opportunities occurred.

But although the remainder of appreciations will not find their way into print, we assure their writers that we are grateful to them for letting us know how they fared "on air" with their "Cosmics."

Their letters and postcards make very pleasant reading for us, and not only gratifyingly prove that our confidence in the "Cosmic" was not ill-placed, but will serve to spur us on in an endeavour to accomplish even better things in the future—if that is possible, and it seems as though it is hardly so at present!

Anyway, our constructor readers can be certain that we shall not enter lightly into the task of producing a three to displace the "Cosmic." At the present moment we do not mind admitting that we have no immediate intention of trying to do so.

But let us pause a few moments and survey the "Cosmic" from the view-point of a few of our satisfied readers.

And remember, all the following remarks are perfectly spontaneous expressions of appreciation—not inspired or solicited!

## NEVER HEARD SO MANY STATIONS BEFORE.

LONDON, BARNSBURY, N.7.

S. G.: "Never heard before so many stations on a three-valver of the Det. 2 L.F. type."

## SELECTIVITY EXCEPTIONALLY GOOD.

MUTHILL, PERTSHIRE.

ALEXANDER CROSS has carried out exhaustive tests and experiments, and is "extremely well pleased with the results. On the medium and long waves the volume and selectivity are exceptionally good." Mr. Cross tuned-in a medium-wave South American station with his "Cosmic," and on the short-waves has had programmes from Costa Rica, Porto Rico, Malay Straits, U.S.A., Java, Canada, Dutch E. Indies, and nearly every European country.

## FOREIGNERS GALORE.

BRADFORD.

E. BESWICK built the "Cosmic" for a friend, and they and "everybody that has

heard it agrees it is absolutely the best three-valve set yet heard." Mr. Beswick says he can easily cut out Moorside Edge (which is quite close) and tune-in "foreigners galore" at "full loudspeaker strength." He adds that the moderator is "like adding a couple of valves to the set when you operate it."

## MORE EUROPEANS THAN HE THOUGHT POSSIBLE.

WICKEN.

STANLEY J. GRANFIELD: "I logged more European stations than I had believed possible."

## THE BEST THREE-VALVER.

WEST EWELL, SURREY.

J. NASH: "Cannot speak too highly of it, I think it is the best three-valve set that I have heard. . . . I do not think there is a set to touch it."

## PRAISE FROM AN EXPERT.

THORNBURY, near BRISTOL.

W. J. BLIZZARD: "I cannot too highly praise your 'Cosmic' receiver. It is the best I have tested out as yet." Mr. Blizzard is a wireless engineer.

## PERFECT SELECTIVITY—NO "BREAK THROUGH."

SKIPTON, YORKS.

E. WRATHALL: "All you claim it to be; it is just perfect in tone and selectivity . . . there are 'short-wave' stations at every turn of the dial." Mr. Wrathall says he can listen to the long waves "without a sign of the North Reg. breaking through."

## SIXTY-FOUR STATIONS.

LONDON, KENSINGTON.

E. J. BANON has logged 64 stations on the loudspeaker. They comprise 6 long, 23 medium, and 35 short-wavers.

## SEVENTY STATIONS!

COVENTRY.

H. B. BURTON logged 44 medium-wavers, 12 long-wavers, and 14 short-wavers, thus achieving a total of 70 without including a number of stations heard only on telephones. Mr. Burton says: "The selectivity is remarkable. . . . I can receive London Regional, Stuttgart and Algiers without background."

## EIGHTY STATIONS!

HALE.

D. C. LUCY: "On the first night, with a low 20 ft. aerial, I got about 25 stations. The list has gradually grown until now I can get about 80 stations all at good entertainment strength on the loudspeaker. These are practically all long and medium wavers!"

## ONE HUNDRED AND FORTY STATIONS!

LONDON, HAMPSTEAD.

P. M. CARMENT: "I am a 'Cosmic' enthusiast. A friend of mine has built it and up to date has identified about 140 stations on it."

Well, all our claims for the "Cosmic" are more than substantiated by the above impartial comments. Indeed, if you go back to our articles and re-read them, you will see that in no case have we ventured to suggest the certainty of such exceedingly fine performances as some of the above represent.

And we do not refer only to lists of stations, for other things are demanded of a modern set than high sensitivity.

But you will note that the "Cosmic" is "perfect in tone," "the selectivity is remarkable," the volume "exceptionally good," etc., etc.

A big "log" of stations is fine evidence of a set's capabilities, so long as it is not taken too literally. For instance, it is probable that Mr. Banon's 64 stations in London actually represents a finer performance than, say, Mr. Lucy's 80 in Hale.

Nevertheless, it must be admitted that both are magnificent indications of the merits of the "Cosmic," which, remember, is no complicated "super-het." or costly S.G. multi-valver, but an inexpensive "three" of the trouble-free, easy-to-operate Det. 2 L.F. variety.

But it is no standard text-book circuit faked up in new component dresses, but embodies original circuit conceptions. And when you come to think about it, that applies to all "P.W." "star" sets.

We may be setting a rather unnecessarily high standard, but, on the other hand, when we are able to earn letters of the nature of the above, the effort does seem very much worth while.



## MODERN MAINS VALVES

(Continued from previous page.)

I refer to the necessity of providing a series mains resistance to limit the voltage applied across the heaters of the valves. This means a very considerable waste of energy, for with, say, a couple of .5 amp. valves we need a voltage across them of only 12 or 14 volts, and we have to dissipate the rest of the total pressure of the mains in heat. In other words, though the wattage of the valve heaters is only a total of 7, we have to use a wattage from the mains of 100 in the case of a 200-volt supply, and 120 in the case of a 240-volt supply.

### Small Smoothing.

The new Ostar-Ganz valves from Austria are so designed that they are placed with their heaters right across the full mains voltage, and as their heater consumption is between .03 and .05 amp. the wattage dissipation in total is only a matter of some 5 or 6 watts. The heater current is arranged to decrease from .05 in the case of the 110-volt valves to .03 in the 220-volt valves.

So far no screened-grid or pentode valves are available in these types, but the mutual conductances of the detector and L.F. valves available are pretty good, being

to have far-reaching effects on the radio industry. It stands to reason that if these valves can be made as efficient and as robust as the present D.C. valves—and there does not appear to be any reason why they should not be—then the present wasteful method of providing D.C. sets with energy will be superseded. There is obviously no reason why a wastage of something like 13 to 14 times the energy usefully employed should be continued, when by means of the high-voltage valve the full consumption of energy can be turned to good account.

The drawback at present is, of course, that the valves are not made in this country, but I understand that negotiations regarding the patent situation are being made with a view to the production of the Ostar-Ganz valve in England. Whether it will be made by one of the present "ring" valve firms under licence, or whether a similar type of British valve will appear, cannot be stated at the moment, but I think we can expect some very interesting developments in the high-voltage D.C. valve in the near future.

### The Twelve Types.

For those who are interested in the technical data of the Ostar valves, the following details will be appreciated. There are twelve valves available, in groups of three mains voltages. (These will be increased very shortly to fill up the gaps left at present.)

Thus we have valves for 110–120, 150–

with an impedance between the two. The remaining valves are the "U" and the "L" types. These have impedances of 3,700 and 1,850, with amplification factors of 11 and 6.5 respectively.

So we have in these latter valves some useful L.F. amplifiers which could well be used in the average radio receiver. The lack of a screened-grid valve is a pity, but this type of valve will probably be forthcoming in the near future.

Altogether the high-voltage D.C. valve is a most interesting development, and it will be watched very closely by all radio enthusiasts throughout the world.

### Interesting Additions.

But we have rather neglected the claims to distinction of the A.C. valve, to which class there have been some very interesting additions during the last few months.

For instance, there is the variable-mu screened-grid valve which has been specially introduced to help overcome the trouble known as cross-modulation, an annoying phenomenon that is associated with the screened-grid valve's liking to act sometimes as a rectifier when it is treated to a powerful radio input.

The variable-mu valve enables the mutual conductance of the valve to be varied by means of variation of the grid bias applied to the control grid of the valve. This naturally controls the stage magnification obtained.

The variable-mu valve has also been introduced into the ranks of the battery class, but with these valves we are not at the moment concerned. Volume control by means of the variable conductance valve is perhaps the best type of pre-detector control that can be obtained, as it has no noticeable effect upon the tuning of the grid or anode circuits, and also it does not upset the characteristics of the valve in the way that a voltage control of the screening grid of the ordinary S.G. valve does.

Another mains valve of special interest to super-het. enthusiasts is the Cossor double grid A.C. valve. This is known as the M.D.G. valve, and is of the metallised type specially constructed to act as a rectifier and oscillator in one. It acts, of course, in the same way as the battery double-grid valve, and is of the indirectly-heated cathode variety.

### Pentodes for H.F.

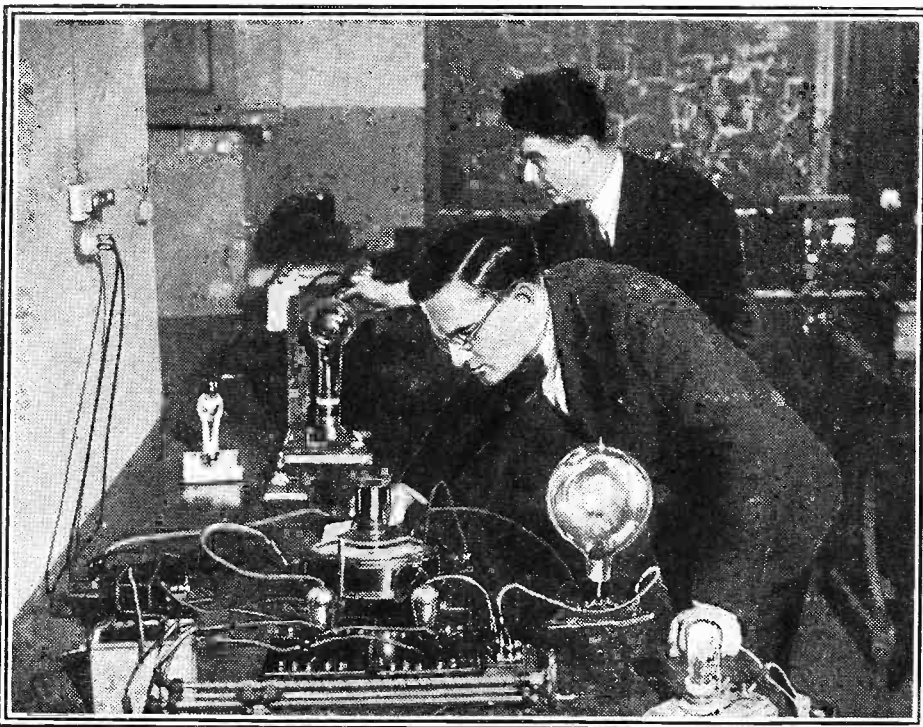
The H.F. mains pentode valve also has made a tentative appearance, though it is not yet certain that it will become a general addition to the standard valve lists.

The trend of valve design still seems to be to get as much as possible out of each valve, and the result is that we are getting the market flooded with all sorts of types, which are not at all clearly classified and which do not vary sufficiently between types to justify their existence.

(Whether or not it is better in the case of mains valves to try and get the most out of one stage, or to use two or more stages of lower amplification, is a point that I will not discuss here. I hold strong opinions on the subject myself, and deplore the race for supremacy in the valve world.)

It is rumoured that a really useful standardisation is being prepared, and that it will come into force in some twelve months' time. It is long overdue, and when, and if, it comes it will do a great deal to clear up the terrible mess that the multitudinous lists of valves have created.

## TESTING THE "ELECTRIC EYE" IN ITALY



Testing some large photo-electric cells in the television laboratories at Milan, where continuous experiment in that branch of radio is in progress.

round about the 3 mark in the L.F. output valve.

The heaters do not need much attention as regards the smoothing of their supply, a small choke and a few microfarads being all that is necessary to obtain hum-free reproduction.

### Far-Reaching Developments.

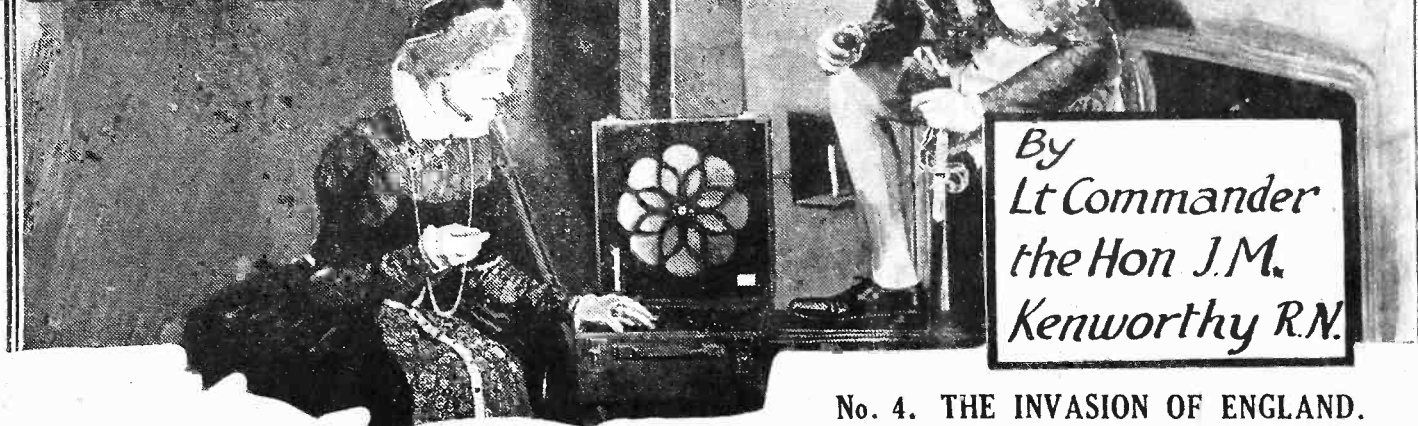
Naturally, the H.T. side of the set has to be smoothed in the usual way, but the development of this type of valve is bound

160, and 220–230 volts. In addition, indirectly-heated rectifier valves for A.C. are available for use with A.C. sets.

Returning to the D.C. valves, we have a rather peculiar range of impedances. The "A" type of valve has an impedance of 8,800 ohms with an amplification factor of 22, while the "W" valve has an impedance of 31,000 ohms and a factor of 32. This is rather high for detector purposes, and for a detector the "A" valve would be on the low side. Here, then, is room for a further model



# HOW WIRELESS WOULD HAVE ALTERED HISTORY



By  
Lt Commander  
the Hon J.M.  
Kenworthy R.N.

## No. 4. THE INVASION OF ENGLAND.

**A**FTER his narrow escape from the English and the frustration of his Eastern plans of invasion by Admiral Nelson, Bonaparte rose to the position of Dictator of the Continent of Europe. But he was determined to be revenged on England. He must humble the proud Islanders, or sooner or later they would be the cause of his downfall.

### Preparations For War.

The Peace of Amiens, signed in October, 1801, was only a truce. War was declared again in May, 1803. Napoleon Bonaparte at once commenced preparations for the invasion of these Islands. At all the ports and places of embarkation along the French side of the Channel, camps were established, troops and artillery concentrated, and boats and barges got ready.

The harbour of Boulogne was deepened, enlarged and fortified to give shelter to the vessels to carry over the soldiers. At Ostend, Dunkirk, Calais and other ports similar preparations were made. A vast fleet of 2,300 vessels was specially constructed for the crossing.

Many of these had stalls for 50 cavalry horses, and all were heavily armed and numerous manned. Inland the country was one huge camp with over 150,000 troops, a gigantic army for those days, who were kept busy drilling and practising embarkation and landing.

### The "Second Conqueror."

No wonder there was panic and apprehension in Britain. So perfect were the arrangements, so admirably were the soldiers drilled and organised that only two tides were needed to get clear of the ports into the open sea. Bonaparte reckoned that if only he could be master of the Narrow Seas for six hours the very existence of England would be ended. The first Emperor of the French began to see himself as the Second Conqueror of England, the emulator of the invasion of William of Normandy.

But how to obtain the six hours mastery?

What would have happened to England if Napoleon had had access to an efficient network of wireless stations? It is fairly certain that the French Dictator would have stood a good chance of achieving his life's ambition, and that he might have become King of England. There is little doubt that his failure successfully to invade our shores was due to the relatively slow means of communication at his disposal.

The British fleet was stronger than the French. Even if more warships could be built, the English had the advantage in the

## THE EVE OF TRAFALGAR



This is a reproduction from a painting depicting Nelson in his cabin on board the "Victory" on the eve of the Battle of Trafalgar.

quality of their officers and seamen. Bonaparte's Spanish allies were not to be depended upon. The British fleet must be avoided, not fought.

The plan was conceived, therefore, of drawing away our ships on a false errand; combining the French and Spanish Fleets, concentrating them in the English Channel and then pouring his thousands of seasoned troops upon the English shore.

### When He Needed Radio.

But the plan failed because of the absence of a sure and swift system of communication. Bonaparte was thwarted in two ways through not having wireless. He could not concentrate his scattered squadrons lying in harbour at Brest, Ferrol, Cadiz, Cartagena and Toulon, even when he induced the English to chase across the Atlantic in defence of our threatened West Indian possessions; because he had no means of intercommunication between them except by horse-messengers on land or slow-sailing dispatch vessels at sea. And he had no means of knowing where the main British fleet was, or what it was doing.

Thus, when Nelson, for the second time in his career, dashed off to Egypt, suspecting the French squadron that had slipped out of having gone there, Bonaparte did not know this in time or he could have made his grand concentration at once.

### England Saved.

And again, when Nelson and his fleet chased away to the West Indies, the news reached Bonaparte too late for him to act. It is true that the lack of wireless hampered the English Admirals also. But Bonaparte only needed a six hours clear run of the Channel for his fell purposes. Yet, first, he must concentrate his scattered warships. The uncertainty, therefore, favoured the English.

And it was this uncertainty which saved England from invasion. England, safe, was able to encourage her

(Continued on next page.)



## HOW WIRELESS WOULD HAVE ALTERED HISTORY

(Continued from previous page.)

allies on the Continent. And finally Bonaparte and his forces were worn down and defeated.

The First Emperor of the French would gaze on the white cliffs of England on clear days and long for some sure means of knowing what the dreaded English three-deckers were doing and where they were. It took days for him to learn whether his own ships had sailed. Opportunity after opportunity was lost. And the greatest soldier of his day never set foot on English soil.

Let us see how the affair worked out.

### Blockading the Ports.

Wherever a detachment of French or Spanish ships was lying in harbour there was a blockading squadron of our men-of-war. But gales drove off our watching ships from time to time, darkness or thick

sailed for Alexandria, only to find that port empty.

In the meantime the Toulon squadron had been driven back to port by another gale, but sailed once more on March 30th. Five days later, Nelson, then in the Gulf of Palmas, heard of it and, still believing it would make for Egypt, waited off Sicily.

But on April 8th the Toulon squadron was passing Gibraltar, and not till eight days afterwards did Nelson receive the news. Admiral Villeneuve, who commanded the Toulon forces, in the meantime arrived at Cadiz, drove off the English blockading ships, picked up six Spanish three-deckers and sailed, on April 10th, for the West Indies. Thither, on May 11th, Nelson started in pursuit, one month behind, and with a weaker squadron.

### The Battle of Trafalgar.

So far, Bonaparte's plan had succeeded. Nelson was fruitlessly cruising in the West Indies seeking Villeneuve, and that Admiral was on his way back to Europe. Villeneuve reached Ferrol after a sharp fight with the watching English ships under Admiral Calder. There he gathered more warships and sailed for the western Channel.

But the French Commander-in-Chief was

from the West Indies to England. And when news, travelling slowly, that Villeneuve was waiting in uncertainty at Cadiz, reached London, Nelson was instantly dispatched with the available British forces to hold the combined French and Spanish fleets in check.

### What Would Have Happened.

Yet, if Bonaparte had only had the means of long-distance signalling, in other words wireless, he would have diverted Villeneuve at sea on his way to Ferrol from the West Indies to make his rendezvous with the Brest squadron in the English Channel, and so cover the great flotilla and army of invasion for the precious six hours needed for the descent on the British coasts.

But Bonaparte had no means of signalling to his over-cautious Admiral. When messengers on horse-back reached him with the news that Villeneuve and his great fleet were still at Cadiz the Emperor was furious. Immediately dispatch riders were sent with orders to Villeneuve to proceed to sea and to carry out the plan of invasion. It was too late. Nelson was already sailing across the Bay of Biscay. And when Villeneuve finally sailed from Cadiz with 33 ships-of-the-line in order of battle, Nelson's advanced scouts were in the offing to observe and report his movements.

### It Might Have Been.

Villeneuve was headed to the south, away from England; and two days later, the rival fleets never having lost touch with each other, the great battle of Trafalgar was fought and the combined French and Spanish Fleets beaten.

Bonaparte's hope of invasion was dashed by this defeat. The vast camps were deserted, the thousands of flat-boats left to rot on the shores, the specially constructed harbours gradually filled up with mud, the batteries for their defence were dismantled.

The "Army of England" was dispersed to other theatres of war and Bonaparte abandoned all further plans for the subjection of England by invasion. So ended the threat to this country conceived by the great strategist. And the plan failed because of lack of means of swift signalling over a distance. If Bonaparte had had wireless at his disposal Britain might now be a French province.

## SHORT WAVES FOR MAINS SETS.

An Interesting Tip.

SHORT-WAVE adaptors that make it unnecessary to build a special set for receiving on this interesting band are very popular at the present, but so are all-mains sets with A.C. or unsmoothed D.C. on the filaments of the valves. Unfortunately, these sorts of current are not usually suitable in the ordinary way for an adaptor, which gets its filament current from the set via a plug that goes into the detector valve socket.

This does not mean that the owner of such a set must have a complete and separate multi-valve set for short-wave work. Most mains sets have provision for a pick-up, and a single valve set for short-waves with its own batteries can easily be arranged to "plug in" instead of the pick-up.

The output from the single-valve goes to the primary of an L.F. transformer, and the secondary goes across a suitable plug for the pick-up socket.

A. S. C.

## THE DEATH OF ENGLAND'S HERO



The scene when Nelson was fatally wounded by a bullet from one of the French ships at Trafalgar.

weather gave opportunities for the ships in harbour to elude those at sea.

The trouble was that once the French and Spanish ships, seeking to escape and join forces, were out of sight of land their further movements were unknown to the great strategist who sought to combine them.

### Off to the West Indies.

In the early days of 1805 the first movements of the would-be invaders began. The French ships stole out of Rochefort and made for the West Indies. Admiral Cochrane started in pursuit. Six days later, while Nelson was sheltering from a gale, the French squadron in Toulon escaped. Nelson supposed it had gone to Egypt and

uncertain of the whereabouts of Nelson. Bonaparte knew Nelson had gone to the West Indies through reports from dispatch vessels, but he had no means of informing Villeneuve, who had now 29 ships-of-the-line. If Villeneuve had sailed straight for the English Channel, picking up the Brest fleet and the Allied ships of Spain at Cadiz, the great plan for the invasion of England could have succeeded.

In the event, Villeneuve lost time and finally, through a false report that Nelson was near him, retreated into Cadiz. And there he waited, losing the precious days until ordered out to sea by Bonaparte, only to meet his fate at the battle of Trafalgar.

For, in the meantime, Nelson had returned



**FOR LONGER  
RANGE**

**FOR BIGGER  
VOLUME**

**FOR LIVELIER  
DETECTION**



**LISSEN POWER PENTODE**

The Lissen Power Pentode Valve—P.T.225—puts new power into your loudspeaker, and new brilliance of tone, too. Use it instead of a power valve and at once you get a tremendous step-up in volume. Ask for Lissen P.T.225.

Price

**12/6**

**NEW LISSEN METALLISED  
SCREENED GRID VALVE**

will give you much higher amplification without instability. Lissen research has succeeded in reducing the inter-electrode capacity of this Screened Grid Valve to the minute figure of .001 micro-microfarads. (Inter-electrode capacity causes instability and howling). The magnification figure of this valve has been increased to 1000. To get immensely increased range, ask for Lissen S.G.215, Price

**12/6**

**LISSEN DETECTOR VALVE**

H.L.210—liven up your tuning, gives you greater sensitivity, passes a crisper, more powerful signal on to the L.F. stage of your receiver, and you get louder, clearer radio altogether.

Price

**5/6**

**LISSEN LIMITED, WORPLE ROAD, ISLEWORTH, MIDDLESEX.**

## FROM THE TECHNICAL EDITOR'S NOTE BOOK.

# Tested and Found-?



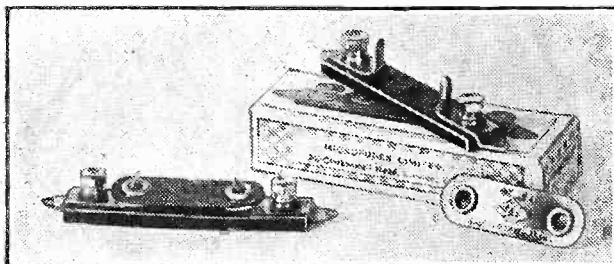
## SAFEGUARDING YOUR SET.

ONE of the most important items in any electrical installation is the fuse. A wireless set is an electrical installation, but of a low-power order. Nevertheless, even a battery set can with advantage employ a fuse.

The usual plan is to insert a fuse in the negative feed from the H.T. supply in order to protect the valves against an accidental application of H.T. voltage.

It needs to be a fuse which will quickly "blow" at the relatively small current which represents the safety limit of a valve

## GOLD-FILM FUSES



The Microfuse elements are incorrodible.

filament and which will not deteriorate with time.

The "Microfuse," a product of Microfuses, Ltd., appears to me to fulfil these conditions adequately.

It embodies a thin, gold film which, of course, cannot depreciate, and it "blows" at a speed which does not give a valve filament even time to start warming up!

A condenser discharge will burn it out, as I have discovered myself in tests.

Microfuses are available in a wide range of types and ratings, from one which is designed to carry only 3 milliamperes up to  $\frac{3}{4}$ -ampere types suitable for mains sets.

## A FIRST-CLASS "GANG."

The problems of variable condenser design are largely of a mechanical nature, especially with the ganged models. Successful ganging demands much more than a mere linking of similarly shaped groups of vanes.

The slightest "looseness" or whip is liable to drop the efficiency of the set in which the component is operating to a surprising extent—surprising, that is, to those unacquainted with the effect.

But there are no such faults in the "Lotus" gang, a two-section model of

which is shown in the accompanying photograph.

Indeed, its construction is very robust and it has heavy vanes, strong spindles, and precision bearings. The slow-motion drive is as good as any we have encountered.

The screening is complete, and each section is shielded from the other. In spite of all this, however, the component is rather smaller than the average.

Dial illumination is arranged for, and the condenser can be obtained either with drum or dial drive in 2-, 3-, and 4-gang types.

I have also had the opportunity of testing the new "Lotus" Dual-Wave Coil, which can be obtained with or without shielding at 7s 6d, and 5s. 6d. respectively.

It is a good coil, and its performance on long waves equals that which it gives on medium waves.

A third "Lotus" component is an inexpensive output choke designed for the smaller kinds of sets. It maintains an inductance of just under twenty henries when a current of 12 milliamperes flows through it.

It retails at 5s. 6d., and

should sell well among those constructors whose sets come within the implied limitation, although the possibility of a larger power

valve being employed at a future date should always be remembered, in which case a somewhat "larger" choke (in an electrical sense, that is) would be needed.

However, at its price and for its purpose, this new "Lotus" choke is a good proposition.

## A USEFUL LIST.

Messrs. The Watmel Wireless Co., Ltd., have published a new list concerning their complete range of fixed and variable resistances and their new T3 Volume Controls.

Incidentally, this list contains a page of diagrams on "How to Connect Volume Controls," which the constructor should find of interest and value.

## "AERIALITE."

I like an outdoor aerial above all other forms of radio antenna. It may not be aesthetic in the eyes of some

people, but for me there's no finer sight than a row of tiny houses each with its individual aerial.

They are the visible evidences of an entertainment and intellectual advancement. And don't they bring in the stations when they've got good little sets on the ends of them? All of which is by way of an

## PLEASE NOTE.

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, undertake to return them, as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

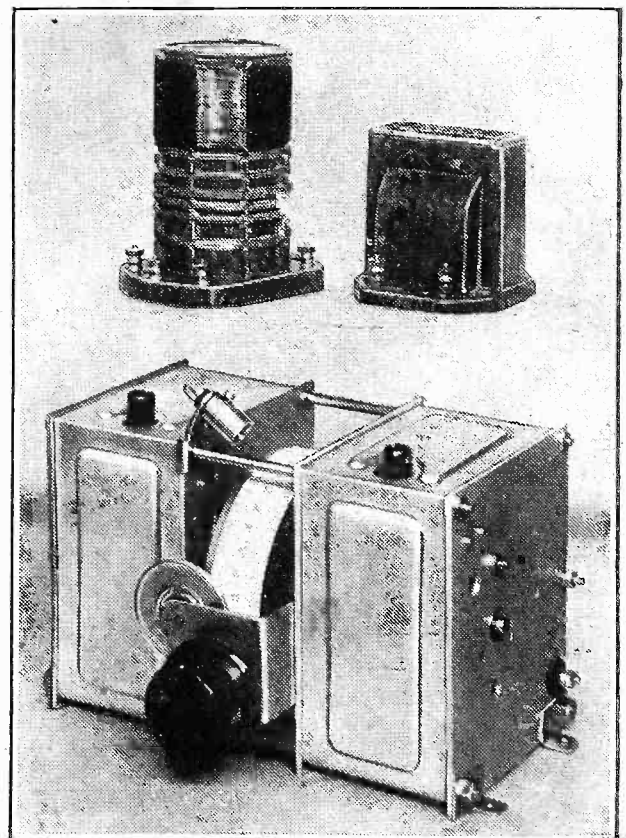
And readers should note that the subsequent reports appearing on this page are intended as guides to buyers and are, therefore, framed up in a readily readable manner, free from technicalities unnecessary for that immediate purpose.

introduction to "Aerialite," a product of the Aerialite Co., of Manchester, which should command big sales.

"Aerialite" is an insulated aerial wire, and it is, in my opinion, an excellent material. There are 7 good strands of copper enclosed within a tough, weather-proof insulating covering.

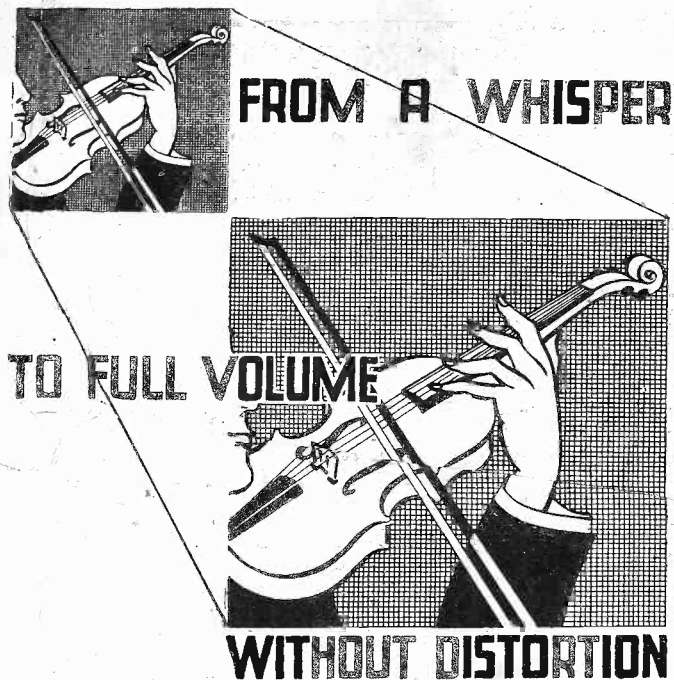
It ought to last for years and give good service even without insulation.

## THREE "LOTUS" COMPONENTS



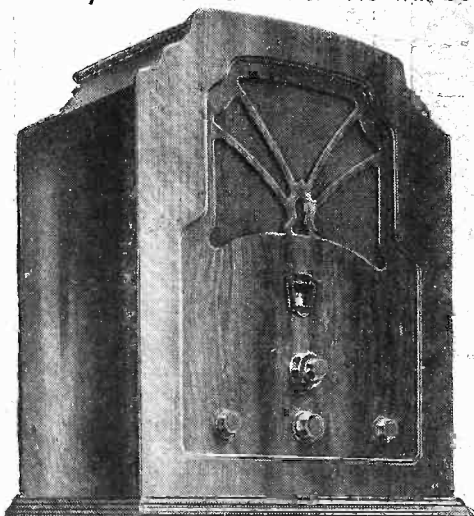
The "Lotus" Two-Gang Condenser, Dual-Wave Coil and Output Choke.





Regentone built this magnificent all-electric receiver; Regentone, who have specialised in all-electric radio for over seven years. It is the receiver of truthful tone—from a whisper to full volume without distortion. It has a specially designed, engineer built modern circuit, built into a distinctive dual-tone walnut cabinet, and operating entirely from your electric light. It has a built-in moving coil speaker. Super-selective tuning. Only one switch for mains supply, medium and long waves, and gramophone pick-up. Illuminated tuning dial marked in wave-lengths. Completely self-contained.

Study its advantages for yourself, in your own home, or at your usual dealer's. He will be glad to arrange it. Or write to us for full details of this and other Regentone products.



**16 GUINEAS**  
Or 39/6 down  
including B.V.A. valves and royalties.  
For A.C. Mains 200/250 volts, 40/60 cycles.  
SPECIAL 25-CYCLE MODEL 14/- EXTRA.

Write for full particulars and hire purchase terms of this and other Regentone products.  
Mains Units from 7'6 down.



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Irish Free State Distributors: Kelly & Shiel, Ltd., 47, Fleet Street, Dublin.

# The SHERLOCK HOLMES of RADIO



Even the novice can trace any Radio fault in a few minutes with this marvellous instrument

Solve any radio problem with a Pifco "All-in-One" Radiometer. Distortion, weakness, or even a complete fade-out—whatever the trouble, this marvellous instrument shows the cause in a few minutes. It is invaluable to every radio owner—novice or expert. Saves its first cost over and over again. No other instrument in the world like it.

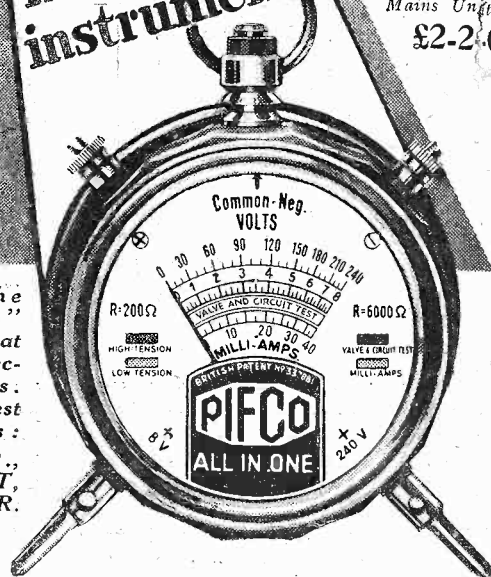
Standard Model for Battery Sets only,

**12'6**

De Luxe High Resistance Model for Electric Receivers and Mains Units,

**£2-2-0**

Ask to see the "All-in-One" Radiometer at your radio or electrical dealers. Leaflet on request from Patentees: PIFCO LTD., HIGH STREET, MANCHESTER.



PIFCO **ALL IN ONE** RADIOMETER

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# CAPT. ECKERSLEY'S QUERY CORNER



Under the above title, week by week, our Chief Radio Consultant comments upon radio queries submitted by "P.W." readers.

Don't address your letters direct to Capt. Eckersley; a selection of those received by the Query Department in the ordinary way will be answered by him.

## Should Screens be Soldered?

C. W. (Winchester).—I am building a set consisting of an S.G., detector and I.L.F. stage. The H.F. stage is mounted in a copper box, but it has been necessary for me to extend the screening on one side of this box. This additional screening merely takes the form of a piece of copper bolted to the side of the box.

"Will merely bolting this copper to the box be satisfactory, or would it be advisable to solder the two together so as to make perfect metallic contact?"

Bolted screening is not perfect screening unless it brings the surfaces into really good contact all the way, when, of course, it is the same as soldered screening. But perfect screening is not always necessary.

If you have a high gain per stage, if it is necessary to keep circuits very accurately matched (or ganged), then screening plays a very important part.

I know of a set where the lid is bolted on by means of a great many small screws. The designer found this necessary because performance was altered before he fitted these many screws simply by leaning on the top of the box.

In other designs, rough screening is quite satisfactory. There is no hard-and-fast rule. If you want to be sure, solder or bolt with lots and lots of bolts.

\* \* \*

## The Big Noise—A Very Interesting Question.

A. A. C. (Chigwell).—"I cannot understand why it is not possible to design a set employing ten or twelve valves, and, by so doing, increase the sensitivity to such a point that every station in the world will come in at full loudspeaker volume."

"Surely, if the addition of a single H.F. valve gives greater range and volume, there is no reason why one should not go on adding three or even four S.G. valves with the object of obtaining super-range and super-volume."

What would happen if you tried to hear a community singing concert in Hyde Park if you were in Regent's Park, a mile away? You wouldn't hear it!

But suppose you got a microphone and a ten-valve amplifier, and magnified your Regent's Park sensitivity 10,000 times?

You might hear the community singing but I should be sorry for you if a taxi tooted twenty yards from that microphone. And the roar of London! And a

local sparrow or a cat sneezing on a local roof! What a row there'd be! Not much pleasure listening to that singing—it would all be drowned by the other noises!

No! The excellence of communication is determined by one simple ratio, the ratio of the intensity of the sounds you want to hear to the intensity of the sounds you don't want to hear.

If a station is weak, but there are no atmospherics or local trams or refrigerators or lifts, then you can magnify that station to full volume: if a station is very, very weak, but stronger than the interference, then your own set starts making a noise in itself, and you will get a roar drowning the very, very weak station.

If the station is strong but the interference strong, too, you must magnify

sound, by telegraph, by broadcasting, by anything, is only determined by the signal to noise ratio.

\* \* \*

## Removing the Grid Leaks.

B. N. (Eltham).—"In my receiver, which has two resistance-coupled stages of I.F. amplification, I have noticed a peculiar effect. If I switch the set on and tune in a loud station no difference in results can be observed when the grid leak in the first resistance coupling unit is removed."

"On the other hand, if the grid leak in the second unit (this is the one connected to the correct negative grid bias for the power valve) is removed, signals fade and become very distorted after a short interval. Does this behaviour indicate a defect, or, if not, what is the cause of this apparent contradiction?"

If you have a highish mag. valve requiring a small negative bias, you may for a time remove the grid leak, when either the grid holds its charge or stores it up as in leaky-grid rectification, and then this does not produce apparently awful effects.

Where you do the same nasty trick with a power valve wanting much more negative on the grid, the charge is not held, the current through the valve enormously increases, the power output is enormously reduced, and so on. The symptoms you describe are quite normal and you need not worry.

\* \* \*

## The Best Form of Aerial.

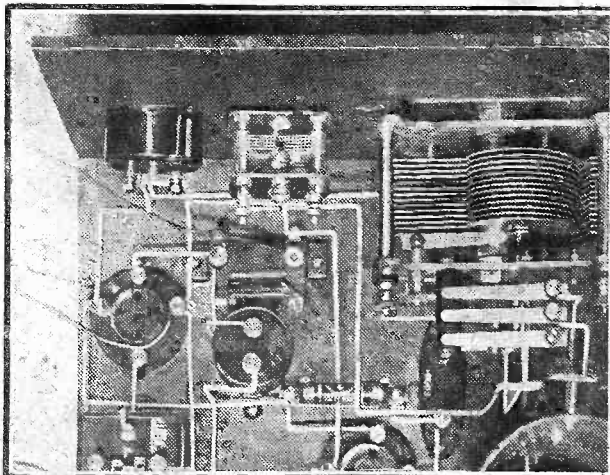
J. E. (Romford).—"My receiver is operated on the upper floor of a two-storied house. The aerial is in the loft, and consists of a single wire stretched from one end of the loft to the other, with a down-lead from the centre thereof. The down-lead comes through the ceiling direct to the set."

"Can you suggest any way of improving the aerial, as I do not think it is very efficient?"

It sounds to me to be a very good aerial. I used one just like it way back in 1921, when signals were pretty weak, and it did me very well.

You should be sure that it doesn't run too close to any water-pipes or cisterns in the attic, and if you have a good (damp) earth as well, I think your aerial arrangements should be first-class. Of course, I am suspecting that your house is brick-built, and is not damp at all. Sometimes, with an aerial completely inside a house, a rainstorm shields signals completely.

## RATIONALISED SWITCHING



One reason for the high efficiency of modern sets as compared with their predecessors is the rationalised switching scheme now in vogue. Note how this Extender, for instance, automatically does its own circuit changing in a strategic position between the coil and the condenser vanes.

interference and station together. You can never separate them.

Short-wave technique in communicating with the Antipodes is only successful because the atmospherics are very weak with short waves. No other reason at all.

The excellence of a communication by

## ONLY IN "P.W."

can you read Capt. Eckersley's replies to listeners' own problems.

## AND REMEMBER—

Captain Eckersley's technical articles appear only in

"POPULAR WIRELESS"

and "MODERN WIRELESS."





# A NEW "P.W." PORTABLE

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

This week we are able to give the preliminary details of the "OUTDOOR" Three—just the set we feel sure many constructors have been waiting for. It is an up-to-the-minute portable set, which is inexpensive and simple in both construction and operation. Embodying a completely modern technique of design, it is an instrument capable of giving real service under the most exacting conditions.

I WANT to make it quite clear at the outset that this portable set is not a seasonal or "time-table" production. As I explained in a previous article, we do not work to a schedule, and I am entirely unable to say whether, for instance, there will be any set at all described in any one particular month, even in the near future.

I freely admit that there was a time when we ran set designs almost weekly. But that was when radio was younger, and when there were more new things to chronicle. But we have to face the fact that the pace of progress has slowed down into an even tempo.

Not that we are reaching an end of the road. There is not the slightest sign of that. There will be continued progress throughout the whole of our lifetimes: nothing is subject for safer prediction.

And if we have lost a tumultuous speed of development, it must not be forgotten that we have gained stability. We know where we are these days, and to-morrows aren't a nightmare of flux, swirls and eddies of new this's and that's.

Which means a lot to the constructor. For one thing, it means that he can invest at decent intervals in a new set with the assurance that it won't be made a back-number almost before he has connected up the final wire of it.

## A Splendid Example.

Take the "Cosmic" Three as an example. It was introduced some months ago. It still stands as the foremost "Three-band" three, and no rivals to its supremacy have yet appeared. I don't think they will for quite a while yet.

Certain it is that "P.W." is not feverishly scratching its metaphorical and corporate head for a "stunt" which will render the "Cosmic" obsolescent. Nevertheless, the Research Department is hard at work all day, every day, at its legitimate job of testing out a whole catalogue of ideas.

One could take the "Cosmic" circuit, change the first L.F. coupling, put in an output filter, shuffle the controls round, bring in a pretty cabinet idea and serve the whole up as the wonderful new "Colossal" Three, or something like that.

But it wouldn't give better results than the "Cosmic," wouldn't be easier and cheaper to build, and wouldn't have

superior operating qualities. In short, it would be a fake.

Forgive me for labouring the point, but it is one which we of "P.W." feel very strongly about.

And it has a distinct bearing upon this new "P.W." Portable, which it is my purpose to introduce to you this week.

## Result of Requests.

As I have said, this receiver is not a time-table or seasonal production. It is directly the result of many requests from readers themselves. "In which number of 'P.W.' can I obtain details of the construction of a portable set?" has been the theme of a considerable proportion of our correspondence during the past few months.

And we have been unable to refer these enquirers to any back number of "P.W." which would give them the required information. For one thing, there aren't usually many back numbers of "P.W." in

existence, as "P.W." sells out too often for that.

And, in any case, we haven't given you a portable for nearly a year. And there have been quite a few developments in technique during that period of time. Not revolutionary developments, but little "spots of progress" here and there which, though perhaps insignificant individually, are important in the aggregate.

We ourselves have gained experience. It may interest readers to learn that the Research Department has built, and experimented with, no less than four entirely different portables during the past few months as a part of its routine duties. (Mr. Rogers and his staff do our lot of work which has only an indirect bearing upon our published designs, for example, our trade friends may be interested in certain tests we have carried out with high-voltage mains valves.)

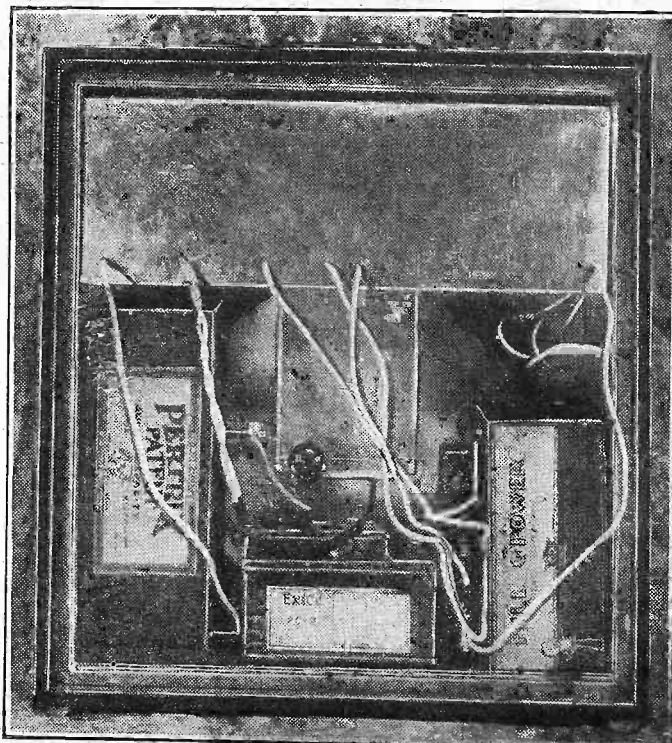
We claim nothing much in the way of circuit originality with our new "P.W." portable, but we do insist that it represents 1932 technique at its best. And that is saying quite a lot when you remember what the average portable of 1930 comprised.

## The "Ramp" Year.

Some 1930 portables were, of course, quite excellent pieces of work for their time, but others—! But 1930 was the portable "ramp" year, and some of the instruments offered to, and purchased by the poor public, were simply scandalously "done," in both conception and construction.

No wonder the portable has to some considerable extent lost favour with listeners. And no wonder so many ordinary types of sets were built and sold during 1931! A great deal of the (Continued on next page.)

## A SCIENTIFICALLY "CLEAN" ASSEMBLY



Our new "P.W." Portable is a complete breakaway from the old-fashioned open layout type of design, where merely an ordinary baseboard and panel construction is slipped into a portable cabinet.

## A NEW "P.W." PORTABLE

(Continued from previous page.)

overwhelming success of the radio industry during the last twelve months is due, in my opinion, to the public scrapping millions of inefficient 1930 portables.

You know the things. You could buy them at fantastically low prices at the "junk" merchants last year. Indeed, I believe tens of thousands were scrapped as absolutely unsaleable.

Let us extend our sympathies to those few firms who turned out what were first-class jobs for their time, and leap back once more into the present.

This new "P.W." portable is a tried and tested proposition which will give reliable service. It is not an expensive job, and it is not complicated.

### Good Reproduction.

It gives quite good quality, and will provide you with at least a pair of programmes wherever you may be in the country. Many will pick up a whole heap of stations on it, but we are not guaranteeing everyone everywhere that they will find it possible to pick and choose among scores of programmes.

But I don't think they would expect, or want to do that. Our belief is that they would rather have a portable of a robust character that is capable of standing up to hard work, and

which is not critical or temperamental or heavy on juice, and which is always ready at a moment's notice and without trouble.

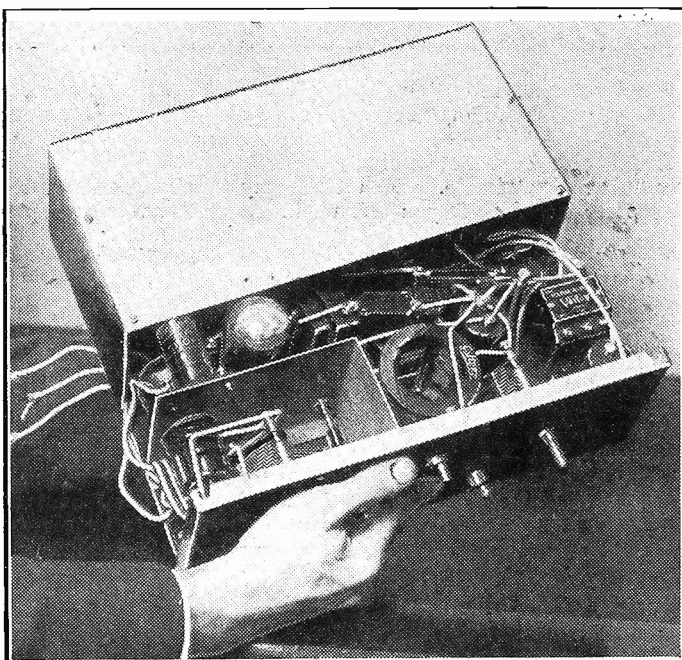
Not that this new "P.W." portable has had limitations imposed upon it for sake of robustness. It is a very lively outfit, and its performance is above that given by some "fours," and quite a few "fives" of a year or so ago.

It has the advantage of newer and better components and valves for one thing.

### Incorporates Many Improvements.

Also, it has the advantage of our greater knowledge of portable-set layout. Layout you know, plays a far greater part in the functioning of a portable than in any other kind of set. You see, all the batteries and components and the loudspeaker have to be compacted within a space surrounded by

## COMPLETE CHASSIS SCREENING



All the "works" are built into a completely screened unit. Nevertheless, the assembly is perfectly straightforward, and the metal chassis is available ready drilled at a price which is competitive with the more usual but less efficient panel and baseboard arrangement.

the necessarily small frame aerial, and that introduces all kinds of problems.

### An Unusually Compact Design.

Many of the problems have, in this instance, been solved by the introduction of complete chassis screening. And the admitted losses due to shielding are amply compensated for by the greater stability achieved. That allows us to run the valves closer to the theoretical limits of their amplification than would otherwise be possible. And it hasn't been necessary to introduce artificial and wasteful damping methods.

It is going the wrong way to work, as is now plainly to be seen, to whack up the magnification in an attempt to make the most of the small aerial's restricted pick-up, and then have to "damp" down in order to prevent the whole circuit from "spilling over."

Well, we have successfully compacted the set into an unusually small case, and are able to present a set which is handy for transportation, and neat and unobtrusive for indoor use. If you examine the accompanying photos you will see that no space has been wasted in the interior of the set, and that it is a pleasant, even handsome instrument so far as externals go.

### Home-Assembled Loudspeaker.

It is not a difficult set to build either. No doubt many of you may think that it looks rather complicated from the appearance of the various photographs, but as long as the job is tackled systematically even the novice should not experience the slightest difficulty.

For it is a real constructor's proposition with its home-assembled loudspeaker and intriguing layout. I think those of you who are attracted to it will find it interesting to build.

And I have no doubts at all as to your verdict when you switch on for the first time!

Next week Mr. Randall will take up the pen, and he will deal with the actual constructional details. So now I will leave you, but not before wishing you good luck with your new "P.W." Portable.

## THE PARTS YOU WILL NEED FOR THE "OUTDOOR" THREE

- 1 Aluminium box, screen, and baseboard (Magnum).
- 1 Portable case (Cameo Carrier).
- 2 .0005-mfd. variable condensers (Formo mid-log line).
- 1 .0003-mfd. differential reaction solid-dielectric condenser (Polar, Ready Radio, Telsen).
- 1 On-off snap switch (Bulgin, B.A.T.).
- 1 2-gang on-off push-pull switch (Cordo).
- 1 H.F. choke (Sovereign Super, Ready Radio, Lissen Wearite).
- 2 .0003-mfd. fixed condensers (Formo Mikadensator, and Dubilier 670, or small T.C.C., Igranie).
- 2 Horizontal valve holders (Parex and W.B., Lissen).
- 1 Standard valve holder (Lissen, W.B., Graham Farish, Wearite, Bulgin, Telsen, Lotus).
- 1 2-meg. grid leak with terminals or tags (Graham Farish "Ohmite," Lissen, Igranie, Dubilier).
- 2 20,000-ohm resistances as above (Graham Farish "Ohmite," etc.).

- 1 15,000-ohm resistance as above (Graham Farish, etc.).

Note.—These resistances can be of spaghetti type if desired (Lissen, Bulgin, Varley, Leweos, Tunewell, Telsen, Sovereign).

- 1 .01-mfd. fixed condenser (Lissen, T.C.C., Dubilier, Ferranti).
- 1 .001-mfd. fixed condenser (Dubilier 670, T.C.C., Lissen, Sovereign, Ready Radio, Telsen, Ferranti, Graham Farish, Formo).
- 1 L.F. transformer (Lissen Hypernik, R.I. Hypermite, Varley Niclet, Igranie Midget, Lotus).
- 2 2-mfd. condensers (Dubilier type 9200).
- 1 Output choke (Varley Pentode Nichoke).
- 1 Cosmic dual-range coil (Goltone, Wearite, Telsen, Ready Radio, Sovereign, Peto-Scott).
- 2 2½-in. tuning dials (Ormond).
- 12 feet 18-gauge tinned-copper wire, and sleeving (Wearite), or Glazite, Soldawyre, Quickwyre, Jiffilinx.
- Flex, screws, etc.
- 1 Sheet Kraft paper.
- 2 ozs. 24 D.C.C. Wire.
- 2 ozs. 32 D.S.C. Wire.

### ACCESSORIES.

LOUDSPEAKER UNIT.—Blue Spot type 66K.

VALVES.—1 S.G.: Mullard P.M.12a, or P.M.12, Mazda S.215, Marconi S.22, Osram S.22, Tungram S.210, Lissen S.G.215, Cossor 215S.G., Six-Sixty S.S. 215 S.G.

Det.: Marconi H.2, Cossor H.L.210, Mullard P.M.1H.L., Six-Sixty S.S. 210H.L. (Note.—Many valves will not go into the set owing to their height.)

Pentode: Mazda Pen. 220, Lissen P.T. 225, Marconi and Osram P.T. 2.

BATTERIES.—H.T.: 2 of Drydex Blue Triangle 63 v., Ever Ready Popular P. Portable 63 v., Siemens H. 1 60 v., Pertrix 237 60 v.

G.B.: 3 volts for 120 v. H.T.

ACCUMULATOR.—2 volts (Exide PC2, Oldham JLV4, or other small portable type).

MAINS UNIT.—(Should be small and give 120 to 150 volts 15 m.a. max.) (Heayberd D. Minor, Atlas, R.I., Tunewell, Regentone, Formo, Tannoy, Ekco).



# Get it from READY RADIO

Thousands of "Popular Wireless" readers buy their Kits, Receivers and Equipment from Ready Radio. There is no need to wait for the apparatus you want. You can order it at once and pay for it by small monthly instalments.

## COSMIC STAR

The Cosmic Star covers all wavelengths—short, medium and long. It will bring you programmes from America, Australia, Africa and Asia with the same ease with which you tune in a Continental Station.

### KIT "A"

Complete Kit of Components together with panel (ready cut and drilled), baseboard, Jiffylinx for easy non-soldering wiring and free blue print.

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OR BY EASY PAYMENTS  
10/3 down and 9 monthly payments of 10/3

### KIT "B" KIT "C"

Complete Kit of Components as Kit "A" together with specified Mullard valves and free blue print.

Complete Kit of Components as Kit "B" together with beautiful Table Cabinet and free blue print.

£5:12:3 £6:13:3

OR BY EASY PAYMENTS

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TO INLAND CUSTOMERS.—Your goods are dispatched post free or carriage paid.

TO OVERSEAS CUSTOMERS.—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.

## The OUTDOOR-3

A really up-to-date portable that will more than satisfy the outdoor listener. Wonderfully simple in design and operation, it will give first-class performance under the most exacting conditions.

KIT A Complete Kit of components, less valves and cabinet.

£4:11:0

OR BY EASY PAYMENTS

8/6 down and 11 monthly payments of 8:6

KIT B with valves less cabinet

£6:12:0

KIT C with valves and cabinet

£8:7:0

OR BY EASY PAYMENTS

12/3 down and 11 monthly payments of 12:3

15/6 down and 11 monthly payments of 15:6

### RECOMMENDED ACCESSORIES

	£	s.	d.
2 Pertrix No. 237 60v. H.T. Batteries @ 8/- each	16	0	
1 Exide Accumulator Type P.C.2	14	0	
1 Pertrix Grid-Bias Battery	1	3	
Ready Radio Eliminator Type B.S. supplies H.T. and keeps the L.T. accumulator fully charged	5	17	6

# READY RADIO

## S.T. 300

The S.T. 300 is the finest screened-grid three ever designed. Its wonderful selectivity, sensitivity and power make station-finding the simplest of matters to the least experienced operator.

KIT "A" £3:18:6

less valves and cabinet. Free Blue Print.

OR BY EASY PAYMENTS

7/3 down and 11 monthly payments of 7/3.

KIT "B" £5:10:9

with valves less cabinet. Free Blue Print.

OR BY EASY PAYMENTS

10/3 down and 11 monthly payments of 10/3

KIT "C" £6:9:3

with valves and cabinet. Free Blue Print.

OR BY EASY PAYMENTS

12/- down and 11 monthly payments of 12/-

Head Offices:

EASTNOR HOUSE, BLACKHEATH, S.E.3.

'Phone: Lee Green 5678.

'Grams: Readirad, Blackoil.

Showrooms:

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

'Phone: Hop 3000.

### CASH or C.O.D. ORDER FORM

Please dispatch to me at once the following goods.....

for which (a) I enclose (cross out line) (b) I will pay on delivery (not applicable) £.....

Name.....

Address.....

P.W. 7/5/32.

To: READY RADIO, LTD.,  
Eastnor House,  
Blackheath, S.E.3.

To: READY RADIO, LTD.,  
Eastnor House,  
Blackheath, S.E.3.

Please dispatch to me the following goods.....

for which I enclose first deposit of £.....

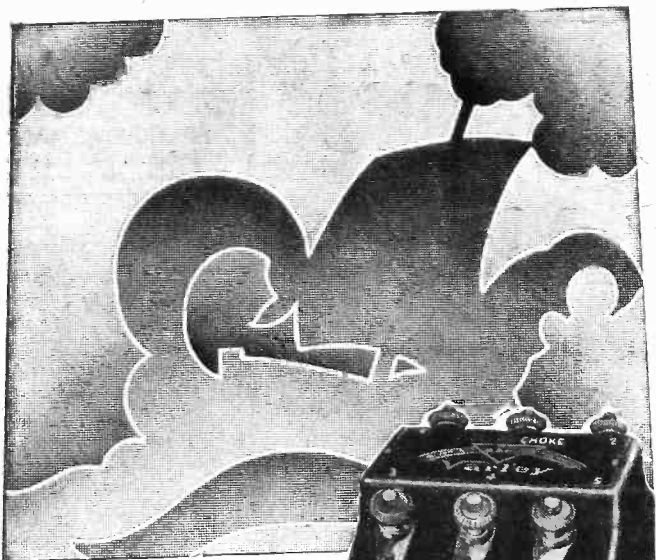
Name.....

Address.....

P.W. 7/5/32.

### EASY PAYMENT ORDER FORM

"P.W." OFFICIAL EXHIBITORS SELL READY RADIO KITS



## WHO

were **FIRST** to manufacture wire-wound resistances for radio—?

# Varley

## WHO

were **FIRST** with an L.F. component giving a straight line N.P.L. curve—?

# Varley

## WHO

made the **FIRST** bass-compensated gramophone pick-up—?

# Varley

## WHO

were **FIRST** with H.F. Chokes, constant inductance chokes, and impedance matching output Transformers—?

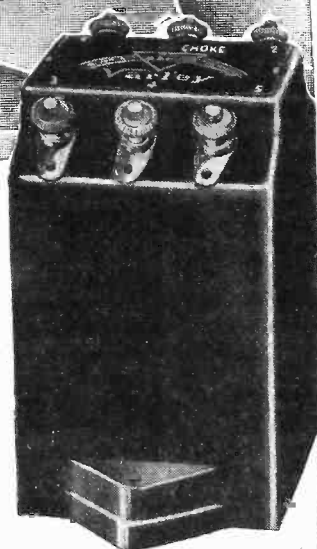
# Varley

## WHO

were **FIRST** with a band-pass tuner giving a square-topped peak and separation of 9 k.c. on **BOTH** wavebands—?

# Varley

Advt. of Oliver Pell Control Ltd., 163, Kingsway, W.C.



SPECIFIED FOR  
"P.W." "OUTDOOR  
THREE PORTABLE"

**VARLEY Pentode  
Nichoke.**

Inductance 45 Henries (no D.C.).

Ratios 2-1, 1-75-1 and 1-25-1.

List No. DP 24.

Price . . . **12/6**

Write for Section D  
of the Varley  
Catalogue.



## NOT MORE SETS BUT BETTER

## "OUTDOOR" 3

SOVEREIGN IS IN THIS TOO

SOVEREIGN  
SUCCESES  
INCLUDE  
SPECIFICATION  
IN

COMET SETS  
P.V. STAR  
ECKERSLEY II  
COSMIC III  
COSMIC III STAR  
SINGLE DIAL  
SUPER

and many others

In their "Quality, not quantity" Policy, "P.W." experts are concentrating more than ever on perfecting each circuit published—and still Sovereign Components are specified. Proof again of Sovereign quality. If you substitute the Sovereign H.F. Choke specified in the "Outdoor" 3 (Senior Type—3/6 from all good dealers) you run the risk of failure. If you use Sovereign as much as possible you are assured of success. Make this a Sovereign set too. The specification is your guarantee!

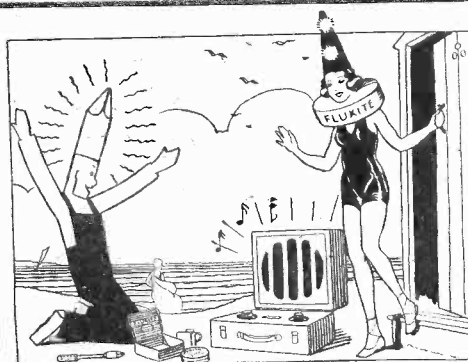
In other sets, constructors are already finding the Sovereign Vario-Choke invaluable. The latest contribution by Sovereign to Radio Progress costs only 3/6. Make certain you know about it before building your next H.F. or S.G. Set.



S.F.B.

## RADIO COMPONENTS

SOVEREIGN PRODUCTS LIMITED  
52/54, ROSEBERY AVENUE, LONDON, E.C.1



"We're Fluxite and Solder, the reliable pair, Famous for Soldering—known everywhere! See that we're with you—when out on that trip, Avoid disappointment—have that musical 'dip'!"

See that Fluxite and Solder are always by you—in the house, garage, workshop—anywhere where simple, speedy soldering is needed. They cost so little, but will make scores of everyday articles last years longer! For Pots, Pans, Silver, and Brassware; RADIO: odd jobs in the garage—there's always something useful for Fluxite and Solder to do.

All Hardware and Ironmongery  
Stores sell Fluxite in tins, 8d.,  
1/4 and 2/8.

ANOTHER USE FOR FLUXITE  
Hardening Tools and Case Hardening.  
Ask for Leaflet on improved method.

NEW "JUNIOR" SIZE, 4d. per tin.

## FLUXITE SOLDERING SET

Simple to use and lasts for years in constant use. Contains special "small space" soldering iron with non-heating metal handle; pocket blow-lamp, Fluxite, Solder, etc., and full instructions COMPLETE, 7/6, or LAMP only, 2/6.

FLUXITE LTD.

(Dept. 324),

ROTHERHITHE, S.E. 16

ALL MECHANICS WILL HAVE

# FLUXITE

IT SIMPLIFIES ALL SOLDERING



THE period of inconsistency on the part of foreign stations which was reported at the beginning of the latter half of April came happily to an end before it had lasted very long. It was followed by a period (still going strong!) in which foreign stations showed a big all-round improvement. There has been, in fact, a remarkable increase both in the number of stations receivable and in the volume obtainable from the majority of them.

Despite the rather unsettled weather which followed the long, cold spell, atmospherics have not been much of a nuisance. Only at odd times, in fact, have they been really noticeable at all. In the old days, when there was hardly a foreign station with an output greater than 2 or 3 kilowatts, the very mildest atmospherics were sufficient to ruin reception, since the strength of the incoming transmission was insufficient to drown them.

#### Drowning the Atmospherics.

But nowadays the big fellows on the Continent are so powerful that they are pretty useful in drowning any but the most violent atmospherics. So powerful, in fact, are many of them received in this country that recent measurements show,



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.

at ranges of several hundred miles, field strengths that would be considered adequate in a service area!

#### Less Spark Interference.

There has, I think, been rather less spark interference towards the lower end of the medium wave-band, and relief from this enables some very interesting long-distance work to be done in the region between 220 and 265 metres. This part of the band contains a good many stations that are quite excellent when only they have a chance of making themselves heard.

If you cannot hear any spark interference with the wave-change switch in the "medium" position and the tuning dials down near the zero mark, it is always worth while to try for stations such as Fécamp, Nurnberg, Trieste, Gleiwitz, Toulouse P.T.T., Horby, Leipzig, Moravska-Ostrava and Lille. All of these are capable of providing good loudspeaker reception.

At the top of the medium wave-band,

some recent occasions.

Witzleben is generally worth attention, though it is only on occasional nights that first-rate volume is obtainable from him. Belgrade is better heard now than he has been for a long time past, and I recommend him to your notice. Katowice, Sottens, Frankfurt, Toulouse, Lwow and Hamburg are all providing first-rate reception.

#### Some Good Stations.

Barcelona E A J I has strengthened up considerably, though there are evenings when he is not quite up to the mark. Strasbourg shows great improvement and Brno is at most times as good a station as you could desire. Brussels No. 2 is at the moment rather more powerfully received than his elder brother, No. 1.

Milan has not failed to provide good reception for some little time, and Breslau is just as good. Göteborg is generally to be found at good speaker strength.

I HAVE so many letters and queries of general interest on hand that this must take the form of an "Answers to Correspondents" section just for this week. Next week we will revert to more technical matters.

First, "H. L. C." (Reading) passes into the H.A.C. Club with a good list of stations. Incidentally, he says that "L. M. V.'s" station on 21 metres is probably W 2 X B J, not W 2 X C J.

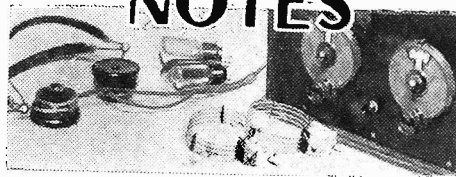
Shoals of letters deal with the two Italians on 42.9 and 44 metres, but I cleared them up in last week's notes as Coltano and Tripoli. It appears now, however, that the lower of the two is Rome himself, on a new wave-length.

#### How to Learn Morse.

"H. T. N." of Trowbridge badly wants to learn Morse, in order to identify the numerous signals that come in on his "S.G." Four without conveying anything at all to him! I have often said that the only way to learn Morse, in my opinion, is to read through the alphabet first, trying to memorise it, and then amusing oneself on a buzzer for a week or so. By that time you should begin to recognise the letters by sound sufficiently well to pick up stray letters and words from some of the slow commercial stations. After that it is just a matter of patience and perseverance.

Of course, a friend with plenty of spare time and a similar desire to learn is a great help, especially for buzzer-practice.

## SHORT-WAVE NOTES



News and views regarding an exciting and fascinating wave-band.

By W. L. S.

"E. C." writes from Port Elizabeth, South Africa, and gives an interesting log of short-wave signals. "British is best," says he, when it comes to short-wave receivers, although he is connected with an American firm!

"R. H. D." (Rhondda) is very pleased with his combination of a "Comet" Three and a short-wave adaptor. By the way, his list also gives him "H.A.C." and is very complete.

#### The "Bitza" Adaptor.

His adaptor is described as a "Bitza" set! I presume that he means that it is constructed from "Bitza this" and "Bitza that." Yes, "R. H. D." sets of that kind usually work extraordinarily well. He claims to be the youngest "H.A.C." member, being 15 years old, but I fancy

our friend J. R. B. of Edinburgh has him beaten.

Our third "H.A.C." aspirant is "W. J. P." (Redditch), who makes two guesses at my identity without getting very near it. I have told both the gentlemen involved, and made myself scarce!

The "S.G." Four has now enhanced its "international" reputation by starting up in the Canary Islands, under the guiding hand of "O. N." This gentleman breaks one short-wave record by saying that he is in a spot that is "ideal for short-wave work."

Most people like to belittle their location and to point to the receiver as the reason for good reception, but "O. N." is more honest! He puts the Canaries as "No. 1" for DX reception, after having listened in several parts of Europe.

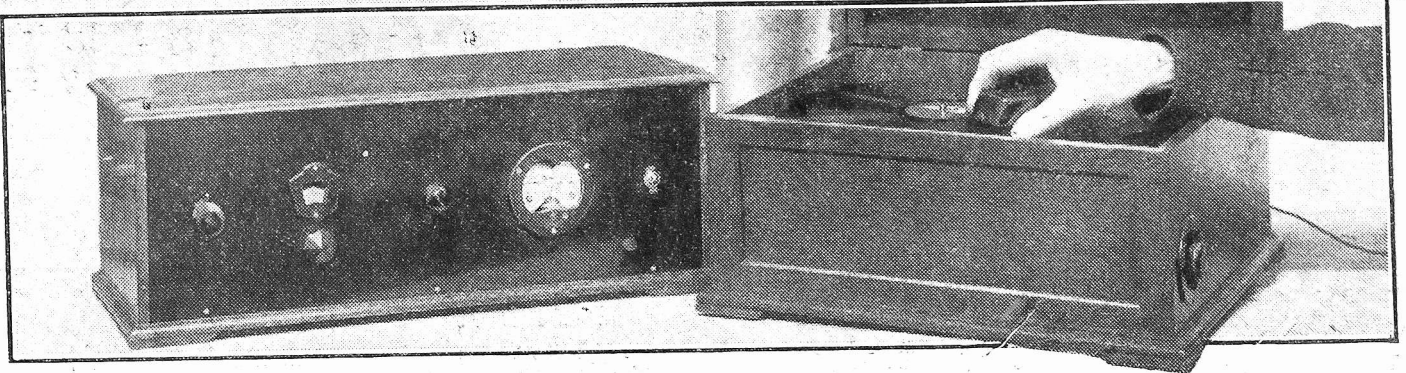
#### A Peculiarity of G5SW.

He mentions an interesting effect on G5SW. Normally Chelmsford vanishes after dark between November and March—owing to the usual "skip" effect. When, however, there is a strong S.E. wind, the station comes in well right up to "closing time." Doubtless there is some other local effect that goes hand in hand with a S.E. wind; I cannot believe that the wind alone can cause such variations in signals.

"O. N." winds up by remarking that W2XAD is always poor, and W2XAF better, but both are bad now that they have pointed their aerials towards South America (on behalf of the sales department!).



# RADIOGRAM REMINDERS



I HAVE received a number of letters from readers concerning the various points I have raised in this "reminders" page and I want to deal with two of them this week.

The first takes me to task regarding something I said in the first notes concerning the difficulties which beset the constructor who wants to run a radiogramophone from batteries.

My correspondent points out that he gets very good results from H.T. accumulators, which he has charged regularly at the local charging station. I agree with him that excellent results can be obtained from such a source of H.T. But the majority do not want to be troubled with a battery of that nature, and it was with these in mind that I wrote the remarks to which he takes exception.

## Two Alterations.

But there is a way of getting over the need for high H.T. voltage where battery H.T. is employed, and I was going to discuss that next time. As this reader has brought the point up, however, I will briefly state what I had in mind.

With the somewhat small power handling capabilities of most of the 150-volt H.T. valves there are two ways that can be employed to make the most of a battery-driven radiogram. The use of one or other of the new pentodes, such as the Mazda Pen 220a, or else the employment of push-pull amplification.

The use of dry H.T. supply having a voltage of more than 150 volts is an expensive matter, but excellent 150-volt high capacity batteries can be obtained, and with these and a good pentode (the one I have mentioned will give an undistorted output of something like 1,000 milliwatts), or with push-pull one can get an adequate output for really fine radiogram reproduction. But more of this later; I have mentioned it earlier than I intended because it has been raised by my correspondent.

## A Fine Instrument.

The second letter asks a question that I cannot answer in these columns. It is blandly: Which is the best commercial radiogram, irrespective of price?

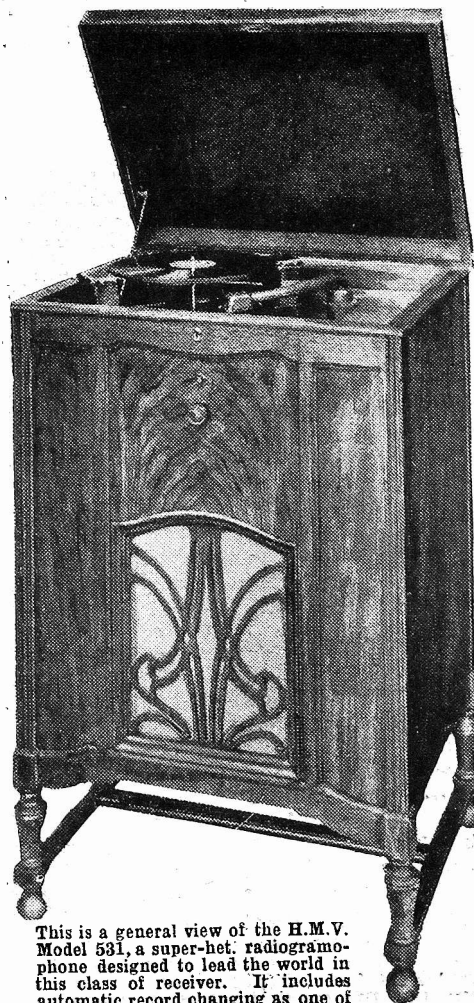
Obviously, that is impossible to answer, because it all depends from what point of view you look at the matter. But if my correspondent means which is the most

\* Battery radiogram operation is discussed in this article of our "reminder" series, and some interesting details of one of the finest commercial all-electric 'grams are given. \*

up-to-date, the most powerful instrument, I should feel inclined to draw his attention to the de luxe H.M.V. machine, the super-het. model 531.

In fact this is such an interesting

## LEADING THE WORLD



This is a general view of the H.M.V. Model 531, a super-het. radiogramophone designed to lead the world in this class of receiver. It includes automatic record changing as one of its many outstanding features.

instrument that I feel I shall be well advised to give a brief description of it here and now. So here goes:

The photograph shows what the 531 looks like, and a very handsome instrument it is. But the inside is full of the most ingenious examples of set design, though it is so carefully carried out that the instrument is a paragon of accessibility.

The main part consists of a six-valve super-heterodyne receiver mounted on a chassis at the top of the cabinet, directly under the electric motor. This is controlled by a multi-gang condenser which, with one knob, tunes a number of band-pass circuits.

A combination switch allows the set to be switched on or off and from radio to gramophone; it also provides a "local" and "distant" control which affects the sensitivity of the super-het. when radio is being received.

Below the super-het. chassis is a three-valve push-pull amplifier which acts as the gramophone amplifier, besides being in action on radio. Both it and the radio side of the set are mounted in block form on metal chassis so that they can be removed as units if required for servicing, and they are mounted on Sorbo rubber to absorb vibration that might cause trouble.

## The Last Word.

In addition to the handsome walnut cabinet, and the powerful radio and gramophone set, model 531 is fitted with the H.M.V. automatic record changing device that allows up to eight, ten or twelve-inch records to be played without any attention to the machine.

The undistorted output power is of the order of 4 watts and the input that is needed from the electric power supply, even when the gramophone is operating, is only about 100 watts.

It is available for all voltages of A.C., and though it is only designed for use with A.C. mains it can be used on D.C. by means of a small rotary converter which turns the D.C. into A.C.

The 531 is a real de-luxe outfit, and is capable of bringing in something like 80 or 90 stations at full loudspeaker strength with only a small outdoor or indoor aerial. The price is 70 guineas, and the receiver represents the very last word in radiogramophone design, a design that does justice to the energies of what is recognised as one of the finest research laboratories in the country.



## Specified in the "OUTDOOR" THREE

### MAGNUM ALUMINIUM BOX, SCREEN AND BASEBOARD

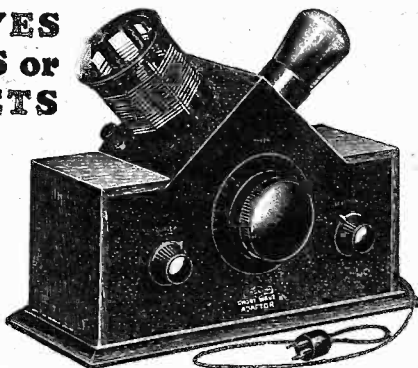
The "Outdoor" Three is available ready wired and tested. Send for lists including particulars of the latest "Stenode" and a list of Short-Wave Stations right up to date—Free on request.

Complete  
**8/6**

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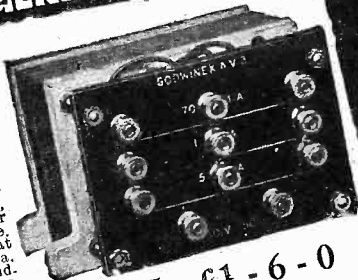


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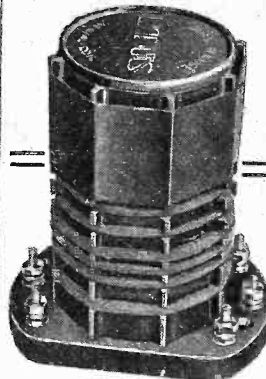


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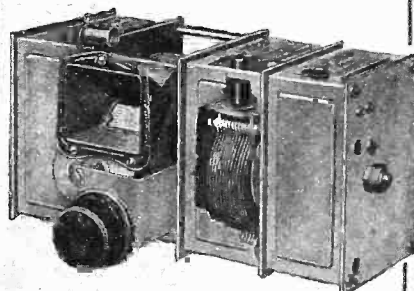
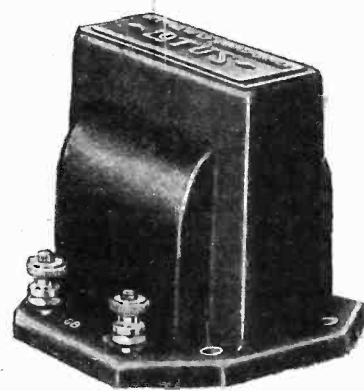
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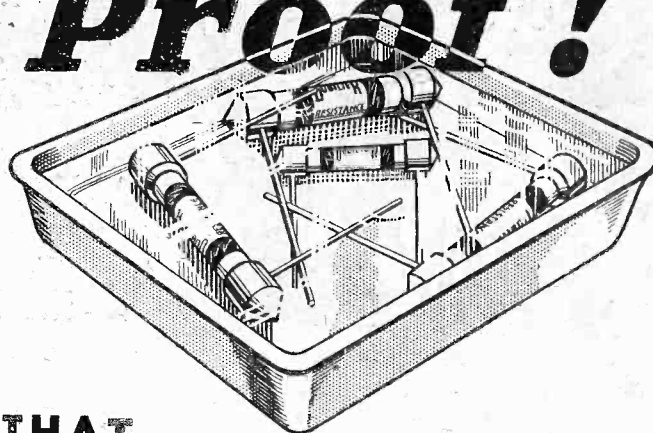
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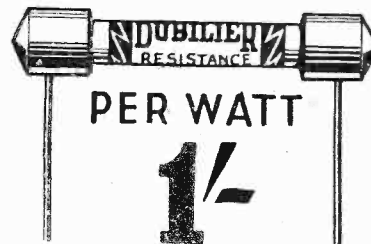
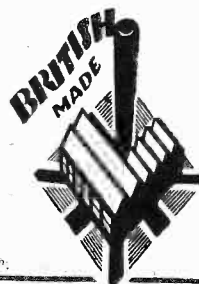
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P.W. 7/5/32

## TECHNICAL NOTES

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

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

### Transformer Breakdown.

INTER-VALVE and power transformers are so well made nowadays—that is, the good ones, at any rate—that a breakdown is really a very rare occurrence. It is only a matter of two or three years ago, however, that transformer breakdown was by no means uncommon, and many reasons were ascribed for it.

It was commonly put forward that there was some corrosion taking place in the wire, or some soldering flux or acid of some kind had got on to the insulation and gradually eaten it away. I doubt whether breakdown is due to this cause nearly so often as to the vibration of the laminations of the transformer and of the windings themselves.

If you come to think of it, the laminations are in almost precisely the same situation electrically as the armature of a loudspeaker, that is to say, they are situated in a strong alternating or varying magnetic field and are subject to forces which set them (or tend to set them) into vibration.

### Core Vibrations.

If by any chance the bolts which keep the laminations together should have worked loose or should not have been properly tightened up in the first instance—this happens more often than you might think—one or more of the laminations will be free to vibrate and may quite well cause chafing of a lead-in wire from the coils, if one happens to touch the core.

As regards the coils themselves, I have seen cases in which these were so loose at some part that a few turns could vibrate. You will often notice that a transformer, at any rate a power transformer, will give a constant and quite audible hum which must be due to actual mechanical vibration of the parts, especially the laminations.

If you have a loudly humming transformer you should give it a thorough overhaul and tighten up all the bolts and make sure that the possible vibration is reduced to the absolute minimum.

### Loudspeaker Experiments.

My remarks recently on different types of loudspeaker movements have brought me a number of letters from readers, and one letter in particular, which I have before me, gives some interesting comparisons between different types of speakers.

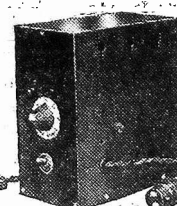
My correspondent says that he has been comparing the performance of some well-known moving-coil and balanced-armature units, these being all priced about 50s. complete—this is an important point to bear in mind with regard to the moving-coil speakers tested.

The points particularly considered were (1) the ability to reproduce transients correctly and (2) the ability to reproduce the lower musical frequencies. The tests showed that the low-note response of the balanced-armature units was limited to some extent

(Continued on next page.)

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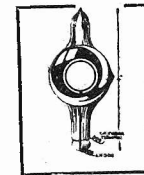
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## TECHNICAL NOTES

(Continued from previous page.)

by rectification, according to the letter.

In three of the moving-coil units tried the flexible cone suspension was absent, the cone being relatively firmly fixed at its circumference. Consequently the coil was only capable of comparatively small movement and the bass response was definitely inferior in these cases to that of the balanced-armature type.

Furthermore, the reproduction was blurred and generally lacking in "attack."

### Sensitivity of Moving Coil.

My correspondent considers that in the case of the comparatively cheap moving-coil speakers, in which a small magnet is

## TECHNICAL TWISTERS

### No. 112.—CONTROL OF LOUDSPEAKER VOLUME CAN YOU FILL IN THE MISSING LETTERS?

The usual method of reducing volume at the loudspeaker—as distinct from the set itself—is to use a . . . . . for this purpose.

It is possible to connect this in several ways, and the most popular is to use it as a . . . . . owing to the comparatively slight effect of this method on quality.

The ends of the resistance are connected across the L.S. leads, and the . . . . . to one side of the loudspeaker, the other side of which is joined to one of the ends.

Usually the resistance is . . . . . or . . . . . times the value of the loudspeaker's impedance.

Last week's missing words (in order) were: Resistance, Series, Tuning, Large, Screen, Calibrate.

used in an attempt to build the moving-coil speaker down to a price, the sensitivity was definitely below that of the balanced-armature type. Bear in mind, as I mentioned above, that this does not apply to moving-coil speakers in general, but only to the relatively low-priced speakers which were used in these comparative tests.

The letter goes on to say that the writer uses a balanced-armature unit, and sees no reason why this should not have as good a frequency-response as the moving coil.

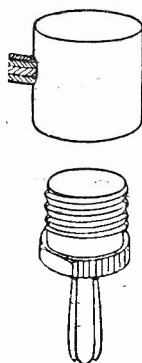
Everyone is entitled to his own opinion on the relative merits of different types of loudspeaker, and there is as great a diversity of opinion as there is of speaker types. I could be interested to have other readers' views on these points.

(Continued on next page.)



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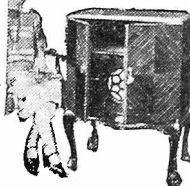
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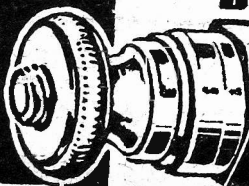
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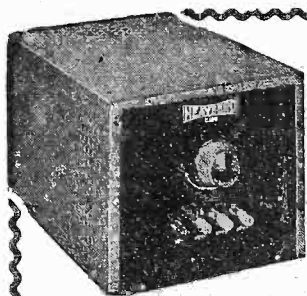


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## TECHNICAL NOTES

(Continued from previous page.)

### Choke Characteristics.

I was talking in these Notes a little time back—or in an article in "P.W."—about chokes with an air-gap in the core, and about the relative efficiency of chokes of this kind. The air-gap has the effect of maintaining the inductance at a high value, notwithstanding the relatively heavy current in the windings.

If the air-gap is made extremely large, obviously the inductance will be virtually independent of the value of the anode current, but this is not really what we want; or rather, I should say this is what we want, but we do not want to achieve the result in this particular way, because it involves at the same time a very low inductance or a very high D.C. resistance.

It is necessary to have a low D.C. resistance and a reasonably high inductance, and this is where the cleverness in design comes in, because the design of the choke generally, and in particular the dimensions of the air-gap in relation to the rest of the design, have a very important influence upon the inductance and resistance.

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From A SPECIAL CORRESPONDENT.

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"It is manifestly most desirable that the resources of modern scientific attainments, such as broadcasting, should be utilised to the full to enable the world at large to participate actually, and not in the spirit only, in the inspiring religious ceremonies of the Congress."

## NEXT WEEK

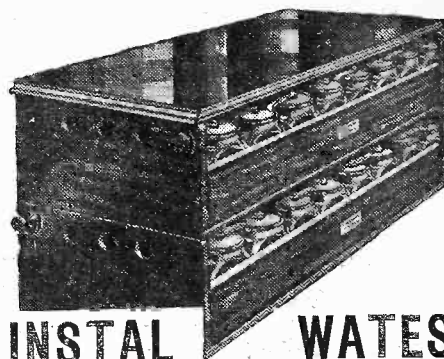
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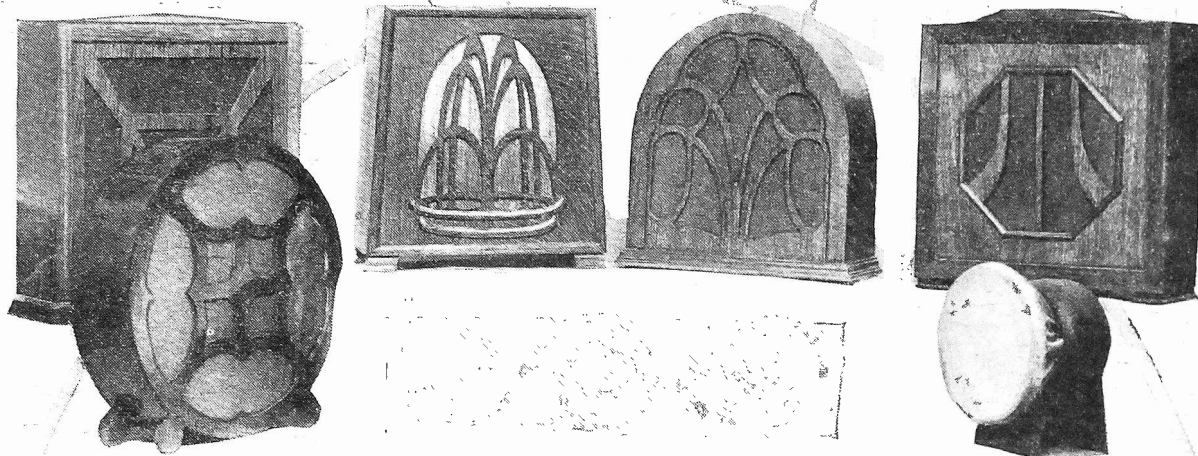
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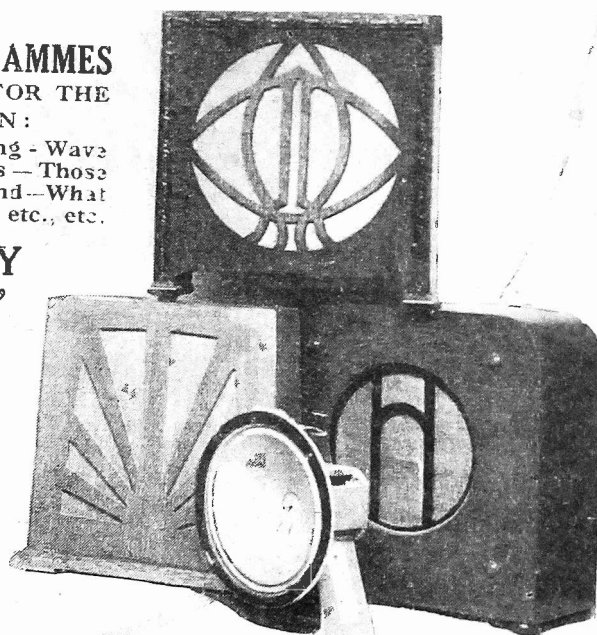
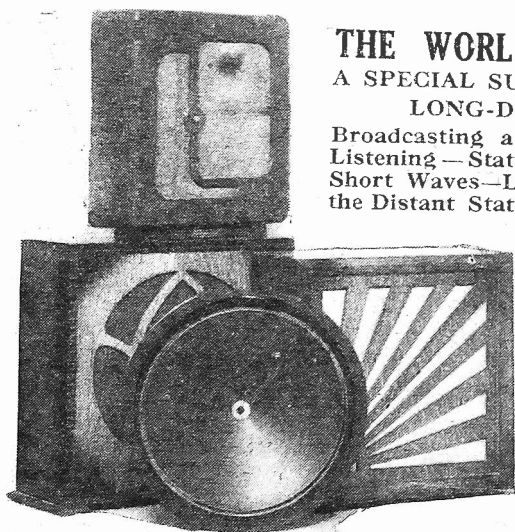
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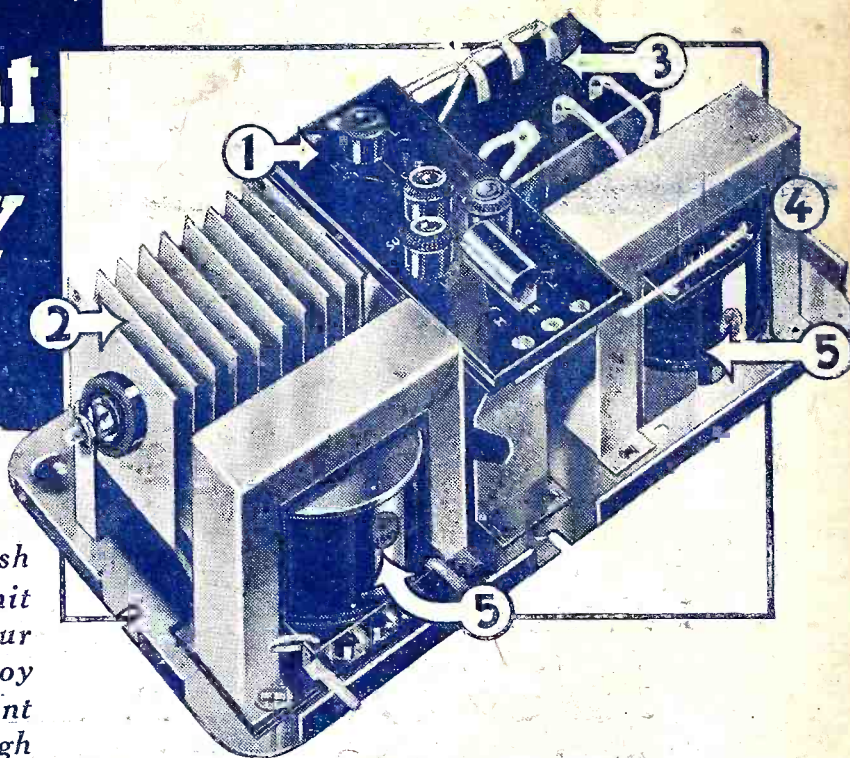
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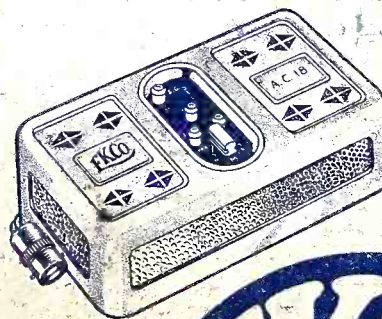
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