

A VISIT TO THE NEW RADIO-PARIS (See Page 900)

Popular Wireless

Every Thursday
PRICE
3d.

No. 497, Vol. XX.

INCORPORATING "WIRELESS"

December 12th, 1931.

ANOTHER VALVE FOR
"S-Q" STAR
AND

*Other Special
Articles:*

**MY RADIO
MEMORIES**

By Sir Oliver Lodge.

**THE
ECKERSLEY
TUNER**

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

**AFTER
FIVE YEARS**

A second instalment
of O.H.M.'s B.B.C.
revelations.

The **"DEX-PEN"**

This Week



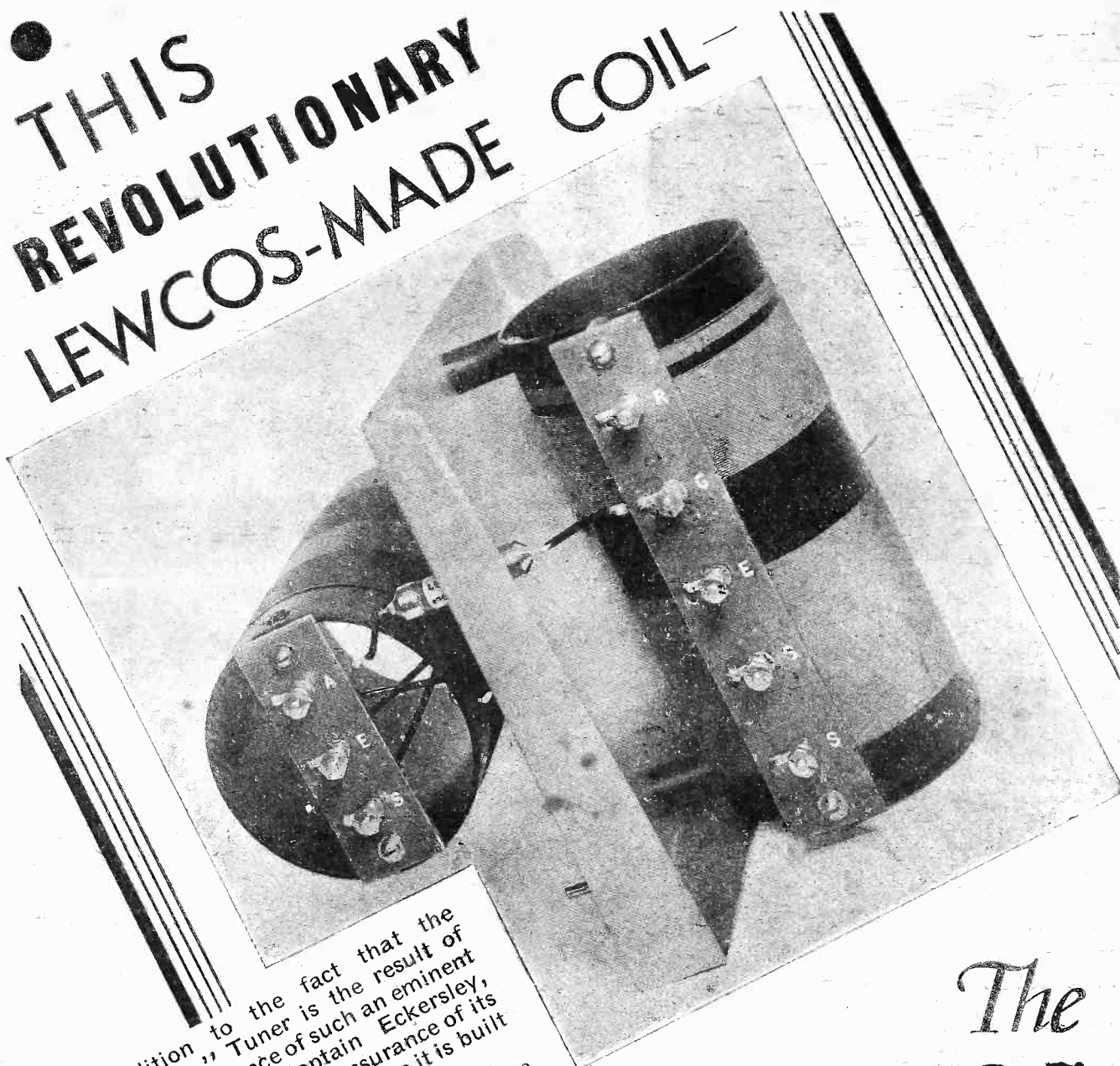
It's here!

METEOR III

SEE PAGES

899 & 901

THIS REVOLUTIONARY LEWCOS-MADE COIL—



In addition to the fact that the "Eckersley" Tuner is the result of the vast experience of such an eminent experimenter as Captain Eckersley, there is now a further assurance of its perfect performance because it is built by "LEWCOS."

"LEWCOS" unparalleled experience in the manufacture of wire, and as constructors of Wireless Components, ensures that this product will live up to its inventor's reputation. The "LEWCOS" "Eckersley" Tuner is the essence of simplicity to fit and operate, and is made of British materials and by British labour throughout. Ask your dealer about it, or write to-day for full particulars.

**THE "ECKERSLEY" TUNER IS
DESCRIBED ON PAGES 875 & 876**

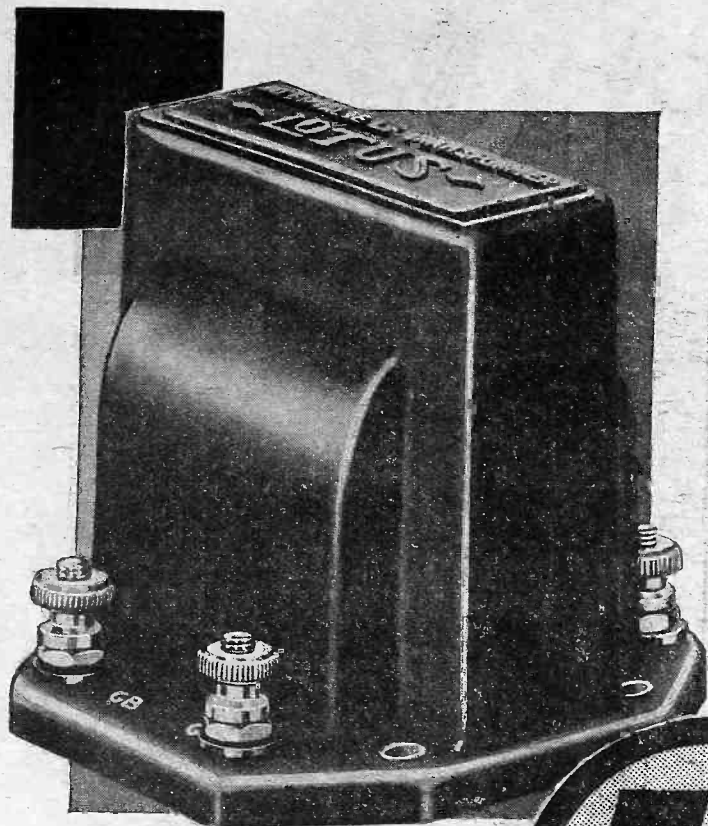
The **LEWCOS** **ECKERSLEY TUNER**

Price 15/6

is, despite its simple appearance, nothing short of miraculous in performance

LEWCOS RADIO PRODUCTS FOR BETTER RECEPTION

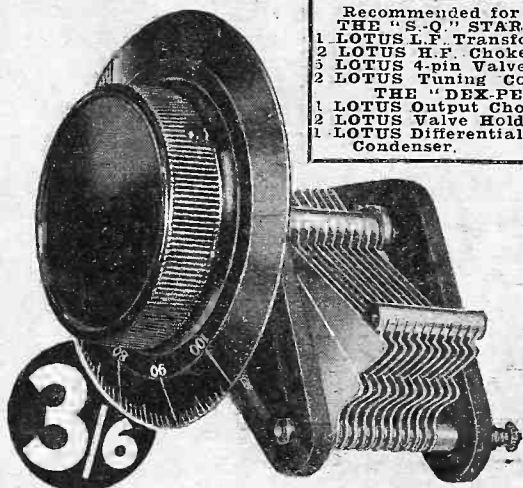
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not a cheap transformer but a sound instrument

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1 LOTUS L.F. Transformer.
2 LOTUS H.F. Chokes.
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2 LOTUS Tuning Condensers.
THE "DEX-PEN."
1 LOTUS Output Choke.
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THE LOTUS RIGID DRIVE LOG CONDENSER

A cheap, small, but highly efficient condenser with heavy-gauge aluminium vanes. The endplates are high-grade bakelite mouldings, and the special method of assembly ensures accurate spacing. One-hole fixing is employed and the highly finished Knob Dial, engraved 0/100, is supplied in either Black or Mottled Brown finish.

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Please send me Free Component Catalogue describing the complete Lotus range.

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Address.....

P.W. - 2/12

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This new LOTUS Audio Transformer No. 1 is a particular triumph of value and its performance is equal to many at twice the price. It is designed specially for the use of the home constructor. While small in size, specially designed windings and core give high efficiency, good reproduction and an exceptional straight-line amplification curve.

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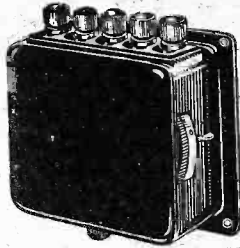
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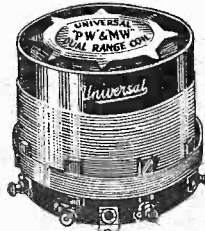
This new Gecophone device is an effective means of improving the selectivity of any set, even in the most difficult situation alternative programmes may be received clearly and without interference. Ideal for separating stations under the Regional scheme. List price, 18/6. Our price, 3/6 each.



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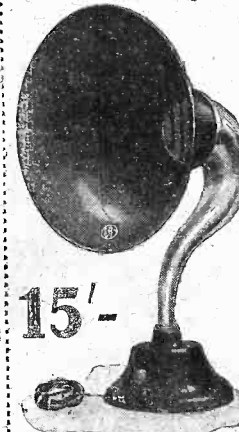
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**C2 LOUD
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ALL-MAINS RADIO FOR BATTERY SETS AT ONLY 1d. PER WEEK.



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BATTERY ELIMINATOR

For only 10/6 down
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NO DRY NO TROUBLE
BATTERIES H.T. and L.T.

"MULTIVO"

H.T. Output—25 m/A
1 Variable tapping 0/100 volts
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Trickle Charger for 2, 4 and
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Cash Price £5 5 0

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H.T. only
H.T. Output—120 volts at 20 m/A
1 Tapping .. 50/90 volts
1 Tapping .. 90/100 "
1 Tapping .. 120/150 "
Housed in attractive metal box with
coloured laces. Fits any portable set.

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For indirectly heated valves.
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(Raw A.C.)

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See also page 508.

100% EFFICIENT



"The Sherlock Holmes of Radio."

An absolute necessity to every owner of a battery-operated radio set—the PIFCO "All-in-One" Radiometer puts a definite end to guesswork. With this instrument you can test valves, batteries, speaker and other components—tracing the most obscure trouble to its source instantly and easily. The "All-in-One" Radiometer enables even the novice to service his own set and eliminates the need for expensive expert assistance. It is the short cut to perfect radio performance.

Attractively finished in hand-
some maroon Bakelite case,
complete with leads. Price
Also De Luxe Model for Mains
Units, Electric Receivers and
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Ask to see either model of the PIFCO "All-in-One" Radiometer at any Store or good-class Radio dealers.

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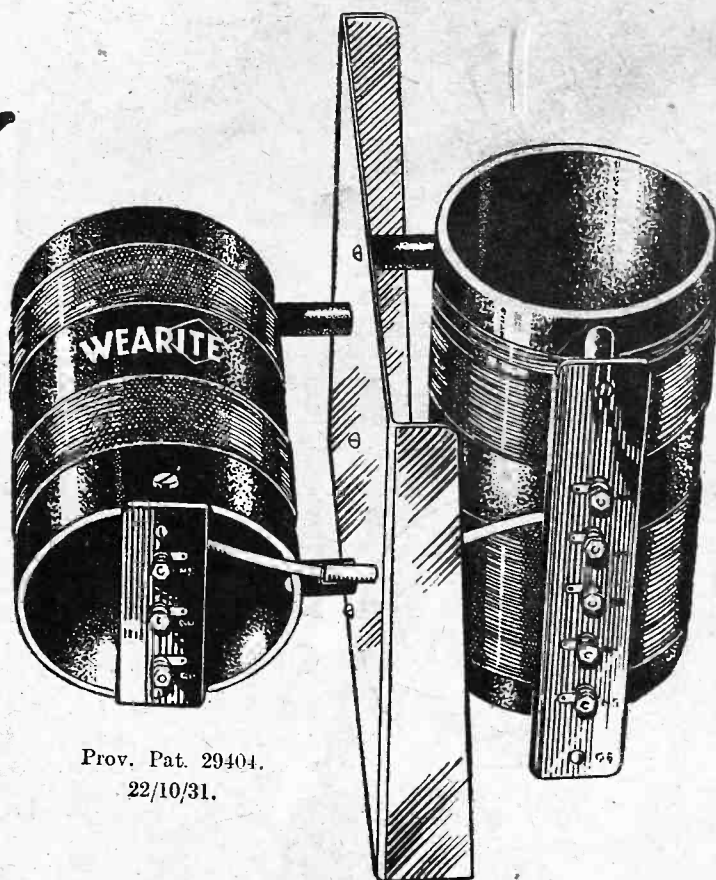
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A-1 IN ONE
RADIOMETER

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PLEASING IN ITS APPEARANCE
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SMALL IN ITS COST AND
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As produced by a firm with over twelve years' Radio component manufacturing experience—strictly made to specification and approved by Capt. P. P. Eckersley, R. E. H. Carpenter (Joint Patentees) and the research dept. of "M.W."



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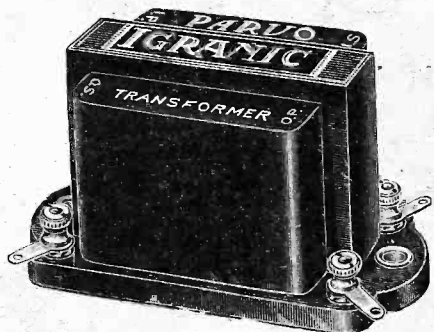
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IGRANIC "PARVO"
TRANSFORMER
For Parallel Feed Circuits

Weight only 4 oz.
Size $2\frac{1}{2}" \times 1\frac{1}{2}" \times 1\frac{1}{2}"$

PRICE 7/6

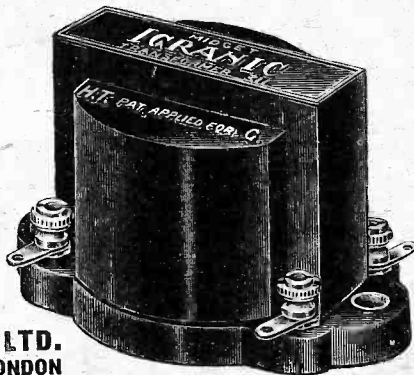
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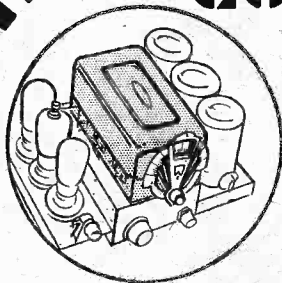
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will send C.O.D.

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THE MODERN CONDENSER



for
modern
circuits

Absolutely rigid and steady,
with no losses between
ganging.

2-Gang 18/-

Dustproof cover 3/-

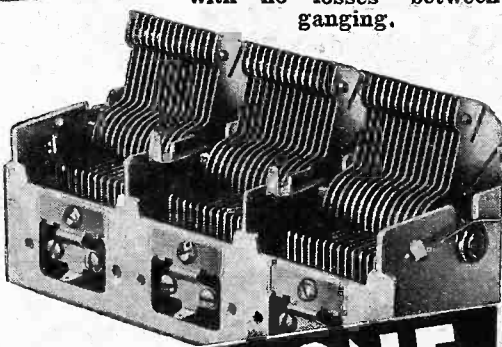
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Dustproof cover 3/6

4-Gang 38/-

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Oxidised Silver
Escutcheon and
Drive Assembly
with pilot lamp
attachment - 5/-



RADIOPHONE GANGED CONDENSERS

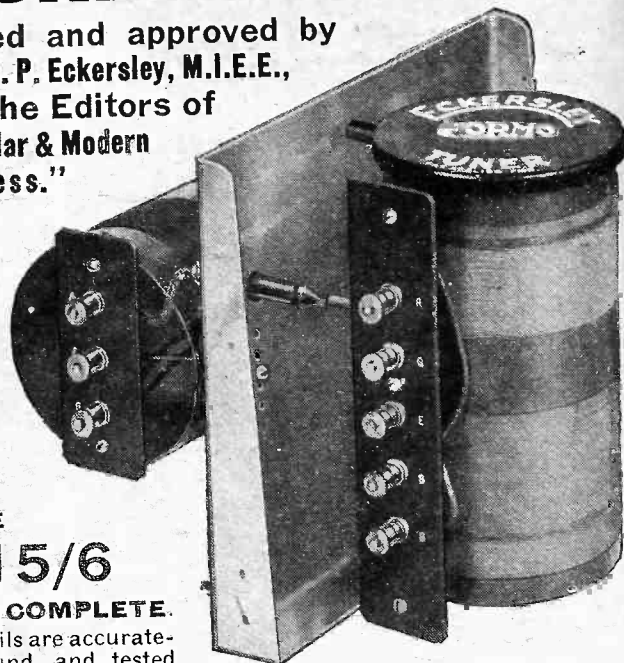
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THE BRITISH RADIOPHONE LTD., Aldwych House, ALDWYCH, W.C.2

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ARTHUR PREEN & CO. LTD.

"ECKERSLEY COIL"

Tested and approved by
Capt. P. P. Eckersley, M.I.E.E.,
and the Editors of
"Popular & Modern
Wireless."



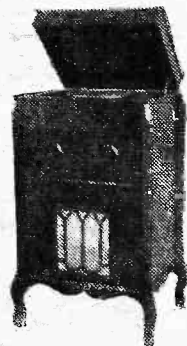
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COMPLETE.

The Coils are accurately wound and tested before despatch. Use the Formo Eckersley Coil and be certain of obtaining the wonderful results claimed for this new coil.

Obtainable from all Radio dealers. Complete Catalogue of all Formo Products from:
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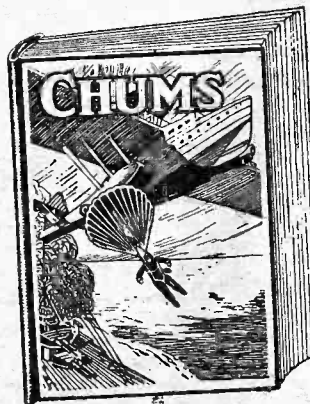
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Gramophone 3 1/2" CLEAR FOR PICK-UP
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Speaker 20" x 15" x 14" allowing ample room for speaker and batteries.
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NEW P.W. SETS.***You pay the Postman. We pay all Post-charges.***“S-Q” STAR**

1 Lewcos Ext. Osc. 126	12	6
2 Lewcos Intermediate Frequency trans- formers (one with pigtail)	1	1 0
2 Polar .0005 mfd. Var. Condensers	13	0
1 Peto-Scott Cabinet	16	6
4 Valves as specified	3	2 0

DUAL-RANGER

2 Telsen .0005 mfd. Condensers with slow- motion dials	14	0
Coil Equipment comprising “P.W.” Dual Range Coil, Peto-Scott ready wound Coil Quoit and P.J.3 Coil	14	6
3 Valves as specified	1	19 0
1 Cabinet as specified	17	6

ANOTHER VALVE FOR “S-Q” STAR

2 H.F. Chokes, R.I. Quad Astactic and Telsen	5	6
1 T.C.C. Type M. .0003 fixed condenser	1	0
1 Lissen .002 fixed condenser	1	6
1 Graham Farish 4-pin valveholder	1	6
1 Wearite 10-ohm Fil. rheostat	1	6
1 Valve S.23	1	0 0
Cash or C.O.D.	£1	10 0

**NEW “ECKERSLEY”
TUNER CASH OR C.O.D. 15/6****“S-Q” STAR**

Described in last week's issue.

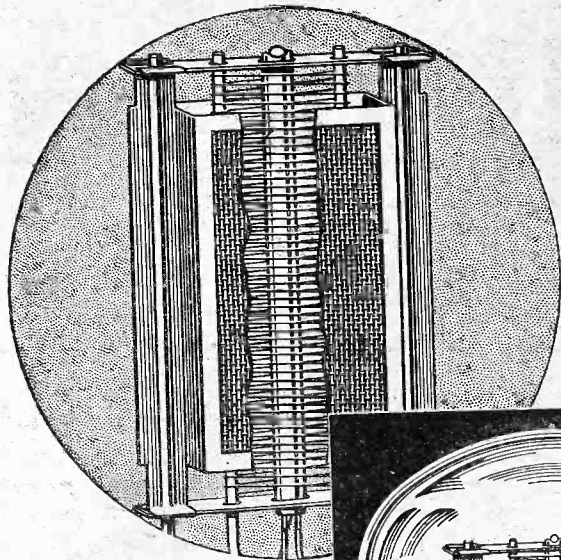
**KIT “A” Author's Kit less
Valves and Cabinet****CASH or £4.14.4
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Cabinet and Valves. Aerial Tested. Royalties
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SETS. Any parts supplied separately. If value over 10/- sent carriage paid or C.O.D.—
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& Cabinet. CASH or C.O.D. £4.5.5**
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THE MILLION**Screened-grid, Detector and Power. With valves, less
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and 11 monthly payments of 10/10 DOWN
FINISHED INSTRUMENT. With Valves and Cabi-
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11 monthly payments of 10/10.**COSSOR 234 EMPIRE
MELODY MAKER**Screened-Grid, Detector, and Power. With
valves and cabinet. **CASH PRICE £6.15.0. 10/-**
Balance in 11 monthly payments of 12/6.
Finished Instrument. Royalties paid.
£7.10.0 Cash, or £2 deposit and 11
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SP-AKER P.M.3. Send 4/10**Complete with 3-ratio input trans-
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Detector, Power Tappings. 25 m/a. **Send 4/9**
Cash Price £1:15:0. Balance in 7
monthly payments of 4/9. only**EXPRESS ORDER FORM**To PETO-SCOTT CO. LTD.,
Please send me C.O.D., CASH/H.P.for which I enclose
Cash/H.P. Deposit £ s. d.

Name.....

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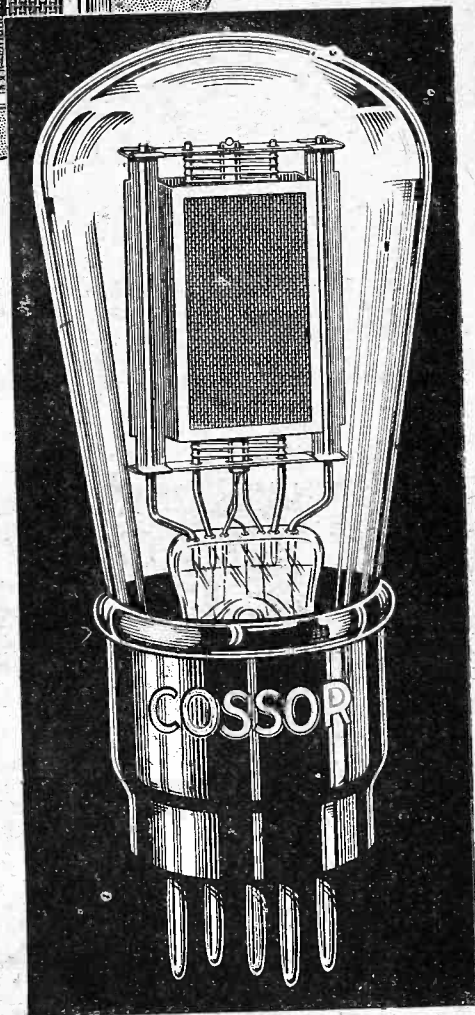
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Mica Bridge Mounting

Above is shown the method of applying Mica Bridge Mounting to Cossor A.C. Mains Valves. Note the two Mica Bridges—one at the top, one at the bottom—which lock the elements rigidly in position.



Maximum performance

—long life

—reliability

ensured by Cossor
Mica Bridge Mounting

THE employment of Mica Bridge Mounting in Cossor A.C. Mains Valves ensures microscopic accuracy in the assembly of the electrode system. As a result every valve possesses characteristics identical with the original design developed in the laboratory. Variation is impossible. The performance of each valve is safeguarded — Mica Bridge Mounting is a virtual guarantee of performance and reliability.

In addition, this exclusive Cossor system of construction ensures maximum length of life. It imparts great mechanical strength to the internal structure of the valve thereby rendering it proof against accidental damage.

A new edition of the Cossor Station Chart is now available price 2d. Ask your Dealer for a copy of this useful novelty or write to us enclosing 2d. stamp.

COSSOR

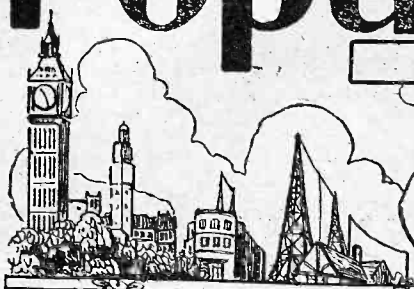
ALL BRITISH

A.C. MAINS VALVES

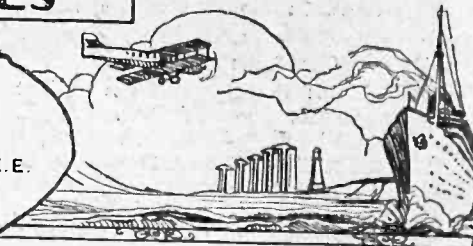
To Messrs. A. C. COSSOR LTD., Melody Dept., Highbury Grove, London, N.5.
Please send me, free of charge, a copy of the 72-page Cossor Valve and Wireless Book, B12.
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Popular Wireless

LARGEST NET SALES



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ALL DRESSED UP
"UNCLE REX"
WIRE-LESS AERIAL
OUR MYSTERY

RADIO NOTES & NEWS

SOCIETY DANCE
GEM FROM CEYLON
NOTHING NEW?
LIKE LIGHT

Dressed for Christmas.

EVEN the penurious journalist cannot fail to be attracted by the shop windows which, with devilish cunning, the professional window-dressers have arranged for Christmas. And by no means the least attractive are the radio shops, especially when one remembers what a poor show that trade made only a few years ago—with sprigs of holly stuck into condensers, etc. Now, the latest types of components in their serried ranks tempt the "screwdriver and gluepot" demon which is latent in the soul of every real man and boy—same thing!

The Supreme Achievement.

TALKING of radio attractiveness recalls to my mind that an enterprising feller in Australia, seeking a change from carved and varnished wood and sprayed metal for receiver cabinets, hit upon the idea of getting shark skins and clothing his radio sets herein. The idea "went" with a bang, and later he tried crocodile hide, which made an excellent job, for the hind feet just fitted the squat front legs of his cabinets. But the idea of skinning a shark and making money out of it ought to be enshrined as an ideal for the financiers of the world!

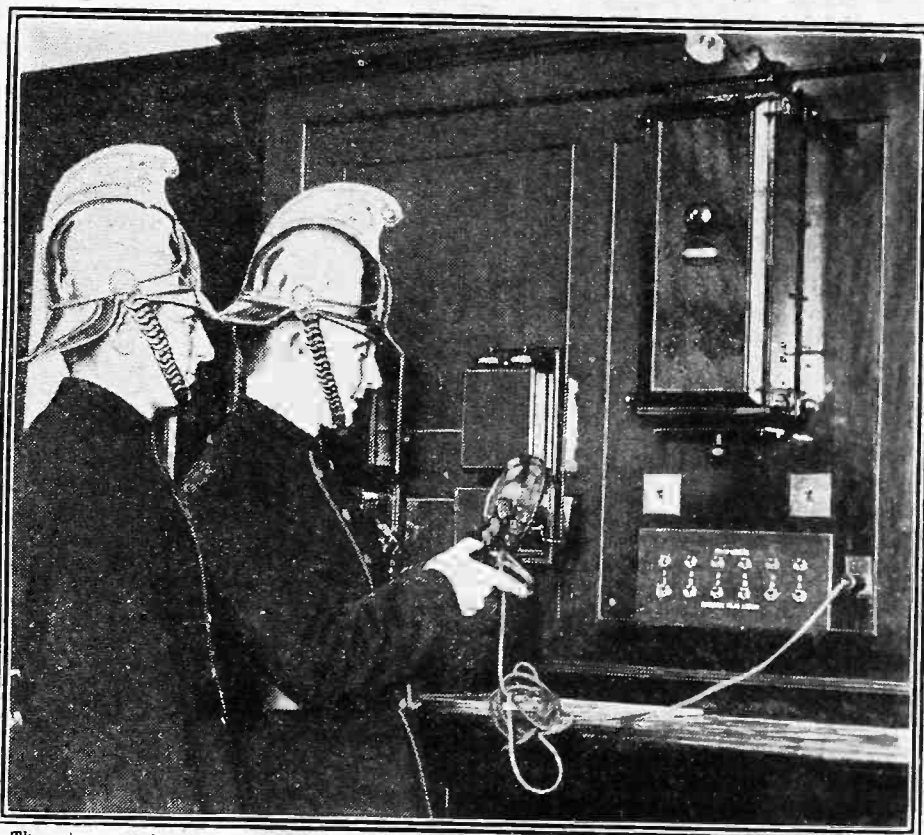
Hear Rex Palmer.

If you liked "Uncle" Rex Palmer when he used to work for the B.B.C. you will be glad to hear that he is to present concerts of H.M.V. records which are to

be broadcast from Radio-Paris every Sunday afternoon from 3 to 4. The first concert was given on November 29th. The programmes will be arranged to suit as many tastes as possible. The power of Radio-Paris having been increased to 85 kw., reception should be as easy as breaking a record, and the Gramophone

Dubilier Condenser Company, whose chief engineer he has been for some years. Mr. Coursey is a quiet man, but extraordinarily effective, and what he does not know about condensers would worry nobody. The amateur movement, perhaps quite unconscious of the fact, owes him a lot, and his books about wireless are models of practical usefulness and almost Teutonic thoroughness. We wish him the best of luck.

"WHERE'S THE FIRE?"



These two members of the West Ham Fire Brigade are tickled to death by the loudspeaker equipment which has just been installed at the Plaistow Fire Station. It broadcasts the alarm to every room in the building.

Company will welcome reports addressed to "His Master's Voice," 363, Oxford Street, London.

A Radio Pioneer.

I WAS glad to see that Mr. P. R. Coursey, B.Sc., F.Inst.P., M.I.E.E., has been promoted to be Technical Director of the

to be operated by Station CKAC, Montreal, the operators being the La Presse Publishing Company. Here is another dot for you to add to your "M.W." radio map—if you succeeded in getting one. It would seem that television receivers must be cheaper, or television better over there

(Continued on next page.)

A Wire-less Aerial.

THE new transmitter of station WABC, New Jersey, has a 665 ft. high tower weighing 340 tons, which is its aerial. It rests on a porcelain base which insulates it, and although its steel base is only 18 in. in diameter, the tower at its widest part, 280 ft. up, measures 27 ft. across. Energy is radiated from this unusual antenna on a half-wave system. The tower cost £20,000 and represents an attempt to stabilise reception.

Another Television Station.

THE Western Television Corporation, of Chicago, is reported to be building Canada's first television station. This station, which will operate on 500 watts at 2050 kilocycles is

NEWS—VIEWS—AND INTERVIEWS (Continued)

than over here, for television here, so far as transmission is concerned, reminds me strongly of what radio broadcasting was in 1922.

Our Mystery Story.

NOW this is the story of the gallant corporal of the R.A.O.C., to wit, R. H. W., of Basingstoke, who might be termed also The Potential Purchaser. It came to pass that



a certain radio firm advertised hugely, so hugely that the advertising agents of Great Britain bought new golf clubs and gave their wives bunches of violets. Now, the Corporal, seeing the ads., assumed, rightly or wrongly, as the case might be, that the aforesaid firm desired to sell goods. Whereupon he wrote, saying, "Prithee, send thou me thy list." And the answer was silence. Thrice he wrote thus, yet was he vouchsafed nothing but silence. Perchance he should have bumped his brow thrice upon the ground—but Corporals don't care! Who is the firm? Let them search their hearts (books) and amend their ways!

A Society Dance.

THE Sunbury and District Radio Society is arranging a Dance at the Parish Hall, Green Street, on December 12th. Tickets 1s. 6d., to be obtained from the Hon. Sec., Mr. F. W. Diamond, 21, Rookmead Road, Sunbury, Middlesex. I hope that there will be a good big crowd there and that the function will lead, as is desired, to an increased membership of the society. These chaps are trying to make a success of the society, and are giving time and money to it. Lend 'em a hand! Visitors always welcome (alternative Fridays) and are under no obligation to join.

A Gem from Ceylon.

TALK about Bach! If you live in Ceylon this is the sort of thing you have to try to escape. I take it from the programme of July 28th. "Dhammachakka



Sutra chanted by the Revs. N. Seelawimala and D. Sugathapala of Isipathanaramaya, under the auspices of Gruhastha Paritrana Desana Sabha of Negombo." And about 100 yards more like it. Very glad to have P. R. C.'s letter from Colombo and to know how wonderful he finds the "Magic" Three. He gives me a poser about a station which he heard; I will attempt to solve it, and if I succeed will refer to it in these notes.

Nothing New, Eh?

WELL, if you think that the design of radio sets has come to a full-stop I recommend you to invest a tanner

in this month's "Wireless Constructor." Therein you will find full constructional details of the "Duo-Vise" Two, and the "Midget" Three. The first is for the family man, for it is designed to deliver "Reg." or "Nat." as reliably as the old tap over the scullery sink delivers water. Any member of the family, from three-year-old Tommy to dear old granny, can work it as well as Marconi himself. The "Midget," is a Det.-2 L.F. with Extensor tuning and differential reaction; detector decoupled and filter output, and the panel is 12 in. by 7 in.—a midget indeed, so far as dimensions go. But—the results!—Gigantic!

"Quasi-Optical" Telephony.

I AM sure that you will be interested to know what Marconi is doing nowadays. As a matter of fact, he has lately been

SHORT WAVES.

The "biggest loudspeaker in the country" was heard clearly across the Thames at Victoria Embankment recently. This raises the question: Is the Thames wide enough? "Punch."

We understand that some of the B.B.C. staff have made themselves heard in regard to reductions in salaries. They probably had to speak much louder than they do on the wireless.

HINTS ON TUNING.

"Seize the first knob you can find and give it several vigorous twists. Unearthly sounds may arise from neighbouring houses—but you must take no notice."

"Continuing to twist the knob backwards and forwards, you will hear in quick succession a woman singing in Stuttgart, a concert from Madrid, a weather forecast from Timbuctoo, and a talk on field mice from London. You can choose whichever programme you dislike least."—(Local paper.)

"The — Chorus will now sing 'Come Back to Erin,' followed by 'A Peculiar Man.'" — Wireless Announcer.

Our cook, Bridget, retails a similar experience on the Holyhead boat.

At the annual banquet of the Radio Manufacturers' Association, Sir John Reith is reported to have said that broadcasting is more than a noise and more than an entertainment.

Various versions of this statement have been heard before, of course—but not always in quite such diplomatic terms.

"Would you mind calling round and looking at that new wireless set I bought from here? I seem to be always getting Whipsnade."—"Punch."

very busy in Italy demonstrating his new "quasi-optical, ultra-short-wave radio-telephone system." He was experimenting with waves only 20 centimetres long as early as 1896, but somehow commercial necessities tended towards the use of longer waves. He returned to his old love, short waves, after the war, and produced his famous "Beam" system, which the Post Office adopted for their Imperial services.

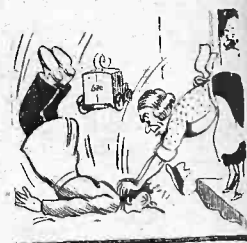
Like Light.

MARCONI'S latest demonstrations, on a wave-length of 50 centimetres, took place recently between Santa Margherita Ligure and Levanto, some 25 miles,

with radio-telephone gear. The short waves used are called "quasi-optical" because they behave very much like waves of visible light. The useful range which, without the use of relay, these waves are expected to give, is about 100 miles. The application of this new system is expected to reduce the costs of radio telephone stations for short distances, and their running costs.

"Dahn wiv the Van."

LETTER from indignant Briton who feels that his liberties are threatened by the P.O. Mobile Scotland Yard Van. Addressed to a sub-postmaster. "Dear sir. Hearing that your peeping tom of a van is roundabout this part you needn't let your clarks come knocking here for I paid you 10 shgs. only April. My wife says she'll rub his nose in the dust if he comes inquiring and she means well. Why don't you keep books so as to know I got lieuns and what about all these dogs are they paid for hardly at all if ever. Yours, etc."



Preparations in India.

WIRELESS communication between important railway centres is to be set up in India, and the Government Railway Board has ordered four sets of short-wave apparatus already. These sets will cover long distances and are expected to be reliable alternatives to the normal channels—if telegraph lines are cut, for example. The slow old British governmental machine rumbles and groans along, but it has the makings of the correct notions. The U.S.A. would have had India cross-quartered with radio ten years ago. Money? There are pots of it! When the Empire dies, "procedure" will be found—choking it.

Signals from on High.

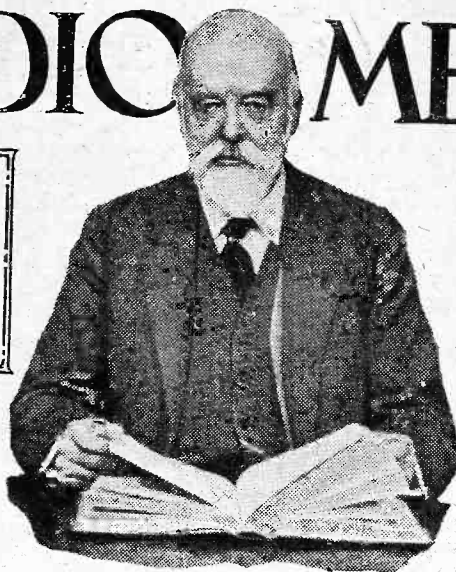
I TELL you this now so that you will have something to live for. Early next summer Messrs. E. Short and O. Short, of Short Bros., a firm not unknown to the world of aviation, will, they hope, go up in a special balloon and collar the height record from Prof. Piccard, who reached ten miles. These gentlemen intend to carry with them a short-wave transmitter and to broadcast therewith scientific reports. It is hoped that the B.B.C. will broadcast reports based on messages picked up from the balloon. Letters of introduction to the man in the moon from Bernard Shaw and Gillie Potter may or may not be carried as the case may be.



ARIEL.

MY RADIO MEMORIES

Few men can look back on a life so packed with vital accomplishment as the life of Sir Oliver Lodge has been. And in this article the great scientist tells us, in his own inimitable style, how the great events of the past grouped themselves, how the discoveries were born, and how they were handled.



by
**SIR OLIVER
LODGE**
F.R.S.

MAXWELL'S book was published in 1873. The President of Section A of the British Association called attention to it, and we young people were all agog to understand this theory better, and if possible to verify it by actually producing ether waves electro-magnetically. That was what set FitzGerald to work, and I have given you an indication of his results.

I also set to work experimentally, and tried to produce the waves by the discharge of Leyden jars. No doubt I did produce them, that was easy enough; the thing was to detect them.

The eye is useless for waves measured in metres; it can only deal with the excessively rapid vibrations that constitute light.

Hertzian Waves.

We needed what Lord Kelvin called "an electric eye." We worked mainly with closed condensers, that is to say, things of which the opposite plates were near together, and tried to see if there was any sign of waves running along wires which were attached to such discharging condensers.

In 1887 or '88 I got the evidence in the form of nodes and loops characteristic of ether waves, reflected back on themselves at the terminal of the wire.

But Heinrich Hertz, in Germany, though not himself seeking to verify Maxwell's theory, which hadn't attracted much

Our distinguished contributor, in this second article of an exclusive "P.W." series, recalls the stirring events following the publication of Maxwell's revolutionary theory that light was an electromagnetic phenomenon.

attention on the Continent, but making experiments on the way in which electric force streamed out from a discharging conductor, arrived at a sensational result.

He did not work with closed circuits. He took two plates, like the two coats of a Leyden jar, separated from one another as far as possible, and joined by a wire; in fact, he made what we now call a Hertz vibrator.

It can hardly be called a condenser, but still it has capacity and self-induction, that is the two ingredients necessary for an oscillation, and when the two surfaces were charged oppositely and sparked into one another, oscillations were set up, and waves were generated, as FitzGerald had perceived they would be.

They were generated in space, however, because the electric field was spread out in space as well as the magnetic.

They had such energy, these waves, that when they fell upon a conductor they caused it to emit little sparks. Such a thing as that we experimenters had not imagined possible.

Rapid Advances.

We had never thought that a luminous field would be strong enough to excite sparks when absorbed. FitzGerald might have thought of it if he had interpreted his expression in terms of energy numerically.

He hadn't done that, none of us had done that, but he perceived the strength and beauty of Hertz's result, and in 1888, at the British Association meeting in Bath, he called the world's attention to the fact that Maxwell's electromagnetic waves had at last been produced; not only produced, but detected, and detected by their extraordinary amount of energy sufficient to emit sparks.

After that progress was rapid. Hertz's discovery was first understood and made notorious in this country. It never caught the ear of the public, it wasn't taken up

by the newspapers, but it could not fail to arouse attention through the whole of the scientific world.

Hertz showed that Maxwell's theory would account for his radiation in every detail; he made a map of the process by which the radiation was generated in an electric oscillator, that is, he mapped out the lines of force during every phase of an oscillation—the beginning, the quarter of an oscillation, half of an oscillation, three-quarters, the complete—and these maps of lines of force were published in "Nature," when I translated his paper into that journal in February, 1889 (see vol. 39, page 451). They could be shown in action on a kinematograph.

Improving the Detector

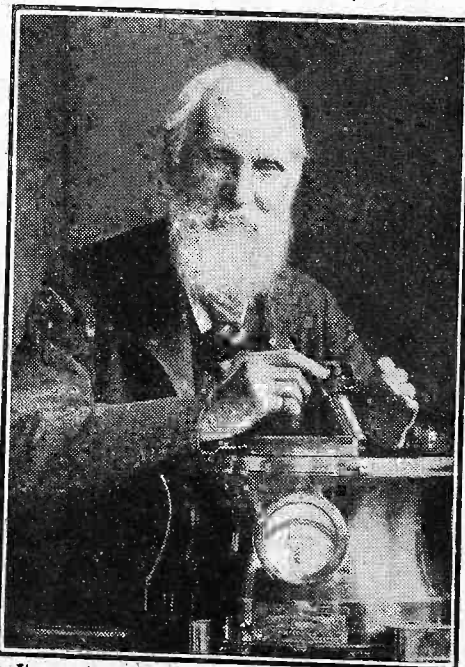
The only method of detecting them at first was the scintillæ which they produced. I found another means of detecting them by two knobs in loose contact in the circuit of a battery and galvanometer, or again in any form of loose joint and a telephone.

This was the coherer principle, subsequently made more practicable by Branly, in France, who found that the resistance of the metal coating smeared on paper, or a tube of iron filings, fell suddenly when a spark was taken in its neighbourhood.

Now the era of scientific discovery was

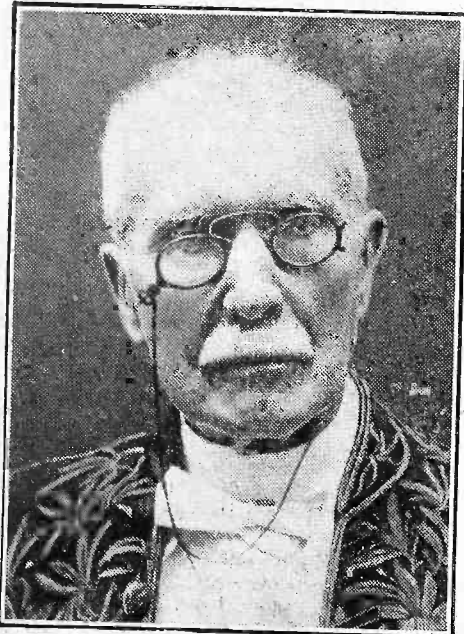
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LORD KELVIN



It was to a paper by Sir William Thomson—later to become Lord Kelvin—that Sir Oliver Lodge traces his early interest in the electric oscillations on which radio depends.

DESIGNED THE DETECTOR



This is Edouard Branly the French scientist, whose coherer was, at one time, the last word in sensitive detectors.

MY RADIO MEMORIES.

(Continued from previous page.)

nearly complete. The rest was what happens when any application is made of science on an extensive scale. A multitude of ingenious inventors combined their ingenuity and experience to apply the process on an engineering scale and to improve it out of all recognition.

In 1894 I showed that Hertz's waves, combined with a Franly detector, could be used for sending and receiving messages in the Morse code by the emission and detection of waves from an electric oscillator, a signal, or series of waves, being emitted and detected at every spark.

Righi and Marconi.

About the same time, or soon after, Prof. Righi, in Italy, took the matter up, and Senatore Marconi began applying the same process privately in his father's garden. In 1896 he came over to this country with an introduction to Sir William Preece, chief engineer to the Post Office, aroused his interest and enthusiasm for this method of signalling, and secured his co-operation.

No doubt he encountered many difficulties, not only scientific and engineering, but also financial; but he persevered and won through, and to him must be attributed the great achievement of practical wireless telegraphy.

Before his patent was published, I perceived that something more would be wanted; that as stations multiplied there

would have to be selection, and that tuning was necessary, not only to give selection, but also to give sufficient sensitiveness. One station could be worked up on its own wave-length, by a receiver with capacity and self-induction attuned to that rate of vibration. Such a receiver would be very sensitive to one length of wave, and would exclude all other waves.

A Valuable Patent.

This was patented in 1897, and was regarded afterwards by the Courts as the bottom patent for Tuning; it was extended by Lord Parker for a total period of 21 years, and for the last seven years was purchased by the Marconi Company.

Other improvements were made, too numerous to go into. Marconi's special kind of radiator was an elevated aerial connected through a spark gap to the earth. He was thus able to reach great distances, because the waves oscillated in a vertical plane, so that the electrical vibrations were not wiped out, as they might have been if they had been horizontal, by the resistance of the earth and the sea-water over which they went.

Then came a striking discovery,

which must be credited to Mr. Marconi, working with unexampled energy on an extensive scale. He arranged for a large sending station in Cornwall, and travelled across to America to see if he could hear the signals in Newfoundland.

I imagine that the scientific world must have been against him in this enterprise, since the waves could not penetrate the substance of the earth, and could not, apparently, travel round it to reach America.

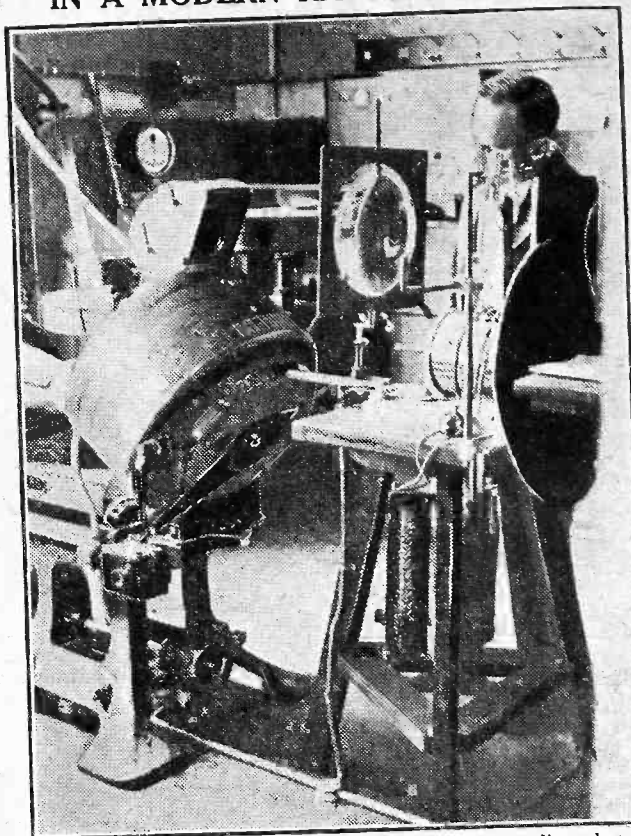
The Letter "S."

They would, apparently, travel in straight lines. But enterprise was rewarded, and the signals were heard: only three dots signifying the letter S; that was the arranged thing to be sent. It was enough: it began the series of Transatlantic communication.

There was something in the earth's atmosphere, an upper layer postulated by Heaviside as an effect due to

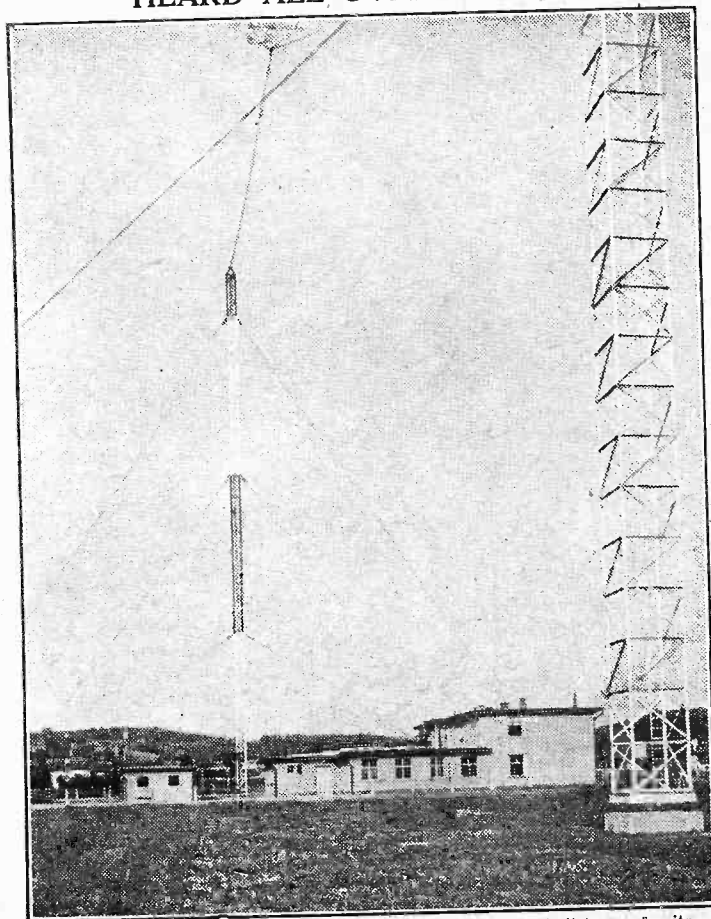
the solar radiation in ionising the upper air, which caused the upper air to act

IN A MODERN RADIO STATION



This view was taken at Königswusterhausen, near Berlin, where Television apparatus, Morse tickers, giant coils, and a forest of aerials pay spectacular tribute to the progress of radio.

HEARD ALL OVER EUROPE



This is the Graz (Austria) station, well known to English listeners for its programmes on 352 metres.

as a kind of mirror, and make the whole earth into a whispering gallery, so that waves impinging on the layer no longer went straight, but curved round until they reached the Antipodes; so that waves sent out in this country could be heard ultimately all over the surface of the earth.

Waves in the Ether.

When I say "heard," the waves could not be heard; they make no impression on our senses until they are received by a suitable and attuned apparatus, when the high-frequency electrical disturbance is transmuted into the low frequency mechanical disturbance that we call sound.

No sound travels from the distant station to the receiver, nothing but ether waves which travel with the velocity of light; so that they reach the whole earth simultaneously. At the receiving station they are converted into sound energy, and then operate on a telephone.

So far all signalling had been of a spasmodic or discontinuous character. A short series of waves was emitted by each spark, and it was by a succession of sparks that messages were sent.

There was no continuity in the waves themselves. But many people perceived that it would be an improvement if, instead of generating a jerky series of independent trains of waves, we could generate a continuous wave at the sending station, so that the signals might consist of modifications, modulations in its amplitude, which modulations might recur with a frequency of their own after the fashion of group waves.

(To be continued.)

THE ECKERSLEY TUNER

BY G.V. Dowding ASSOCIATE I.E.E.

The inside story of the evolution of this season's most important radio component.



Capt. Eckersley watching his tuner being tested in the "P.W." Research Department.

CAPT. ECKERSLEY'S articles may have led many readers to believe that his tuner is the result of a happy brain wave—an idea that had no sooner occurred to mind than the feat of its concrete, practical existence was accomplished.

But this is very far from being the case. The Eckersley Tuner is the result of original thought *plus* weeks of cold, scientific reasoning and concentrated experiment. Capt. Eckersley the engineer and Capt. Eckersley the broadcaster of cheery talks and the writer of the most readable radio "journalism" are two entirely different personalities, and the public knows only, or at least mostly, the latter.

Our Chief Radio Consultant can still be human, cheerful, lovable when he is planning vast engineering enterprises (such as the British Broadcasting Regional Scheme) or attending momentous international conferences, but an incisive, determined, diamond-edged logic that reveals the keen and well-trained scientific brain is ever present to smash through fallacious arguments based on moth-eaten precedents.

Perhaps it is P.P.E.'s broad outlook and humanity that enable him to overcome really big obstacles and proffer solutions to the trickiest problems that arise. And maybe his wonderful sense of humour is the factor that gives him the strength to drive on and on where the hearts of other men fail.

First Steps.

The preliminary steps in the evolution of the "Eckersley" Tuner comprised a close examination into the fundamentals of accepted reception technique in the light of present-day ether conditions. It took Capt. Eckersley about two hours merely to outline to me his work in this direction. And he illustrated this with dozens of curves and intricate calculations

that must have taken him an enormous amount of time to prepare.

In passing, it might be mentioned that he successfully tackled analyses of certain transmission phenomena which, I believe, had hitherto been something of a mystery.

Anyway, Capt. Eckersley had ultimately come to the conclusion that there was no reason at all why everything in the way of clear-cut station separation should not be accomplished with simple receiving apparatus, without making any sacrifices at all in sensitivity.

In the Testing Stage.

His practical experience is so vast that it was quite unnecessary for him to fiddle about in the laboratory blindly trying this and trying that. He was able to get us in consultation and say, "I want you to wind a coil of so many turns on a former of so many inches in diameter. That will have an H.F. resistance of so many ohms at such and such a frequency. Then fix—etc., etc."

And then, after the initial minor adjustments had been made, he would wander round to the Research Dept. and spend an hour or two noting various meter readings and checking up his calculations.

Sometimes the work would run through the day and well into the evening, but I

cannot say any of us found it tiring—it was too interesting for that. Besides, when, subsequent to a somewhat monotonous series of substitution tests, you are suddenly presented with a 22-carat sample of pure Writtle—!

Well, eventually the "Eckersley" Tuner fully emerged from the theoretical stage, and became a practical component. And we built this first model into a detector and two L.F. three-valve set of the most straightforward kind.

Capt. Eckersley had aimed at a high degree of selectivity. He got it. That simple three-valver, without any H.F. stages, remember, handled like a super-het. You had to *search* for the local station! Candidly, I was amazed, I did not think it possible to achieve such a result with such apparatus.

Was there any loss in power? We very carefully measured the voltages developed in the grid circuit and found that they equalled these given by the flattest and most powerful tuner of an ordinary single circuit type. In the circumstances, it was possible to decrease the selectivity (think of that!) and step up the sensitivity until it exceeded that of the all-power-no-selectivity arrangement.

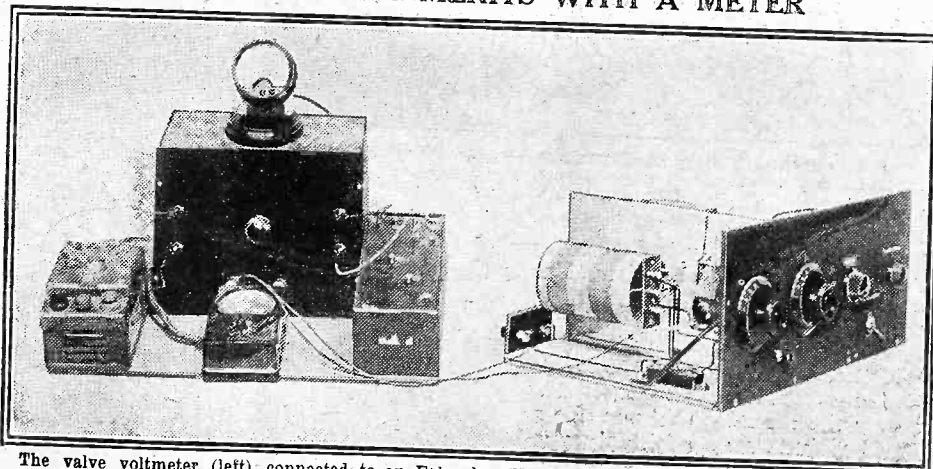
Finally, a balance of values was decided upon and the perfected design arrived at. And now the "Eckersley" Tuner can face a direct comparison with anything and beat most on the grounds of both selectivity and sensitivity.

Razor-Edged.

It is no exaggeration to say that a three-valver with no H.F. stage using an "Eckersley" Tuner is more selective than the average H.F. Det.

(Continued on next page)

MEASURING ITS MERITS WITH A METER



The valve voltmeter (left) connected to an Eckersley Tuner, in order to measure the H.F. voltages developed in it. Every test emphasised the marked superiority of the device over ordinary tuning methods.

THE ECKERSLEY TUNER.

(Continued from previous page.)

L.F. set employing a tuned H.F. coupling. We have made the direct comparison (with meters—not aurally alone) and proved it.

Trade visitors who have witnessed change-over tests of this nature in our laboratory have been amazed at the results.

You can take it from me that the Eckersley Tuner is no ordinary coil arrangement bearing a great name—it is a great tuner that would still be great if it were merely the Smith, Jones or Robinson tuner.

Surprise for the Sceptics.

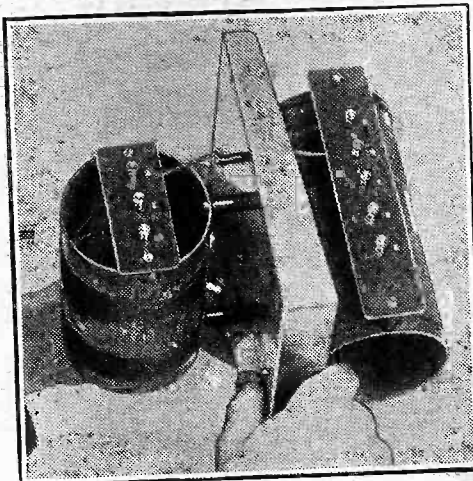
It looks simple, it is simple, but then that is one of its most attractive features. But without a personal knowledge of its capabilities or a full appreciation of the soundness of the engineering upon which it is based, you cannot possibly hope to be able to view it in its true perspective.

There are always sceptics, and some of these are due for a surprise when they meet the Eckersley Tuner in action!

And now for the benefit of those readers who are interested in the actual "make-up" of the tuner, I will briefly detail its technical specification.

The windings are disposed on two 3-inch diameter paxolin formers, and these I will

INTER-SCREEN COUPLING



The two sections of the Eckersley Tuner are electrically coupled by a non-inductive resistance which is fixed in an aperture in the dividing metal screen.

refer to as the aerial and grid sections. The aerial section ($4\frac{1}{2}$ in. long) comprises a medium-wave winding of 40 turns and a long-wave winding of 110 turns wound in opposite directions, separated by approximately 1 in.

There are three windings on the grid section, the former being $5\frac{1}{2}$ in. in length. The long-wave winding of 150 turns is wound in the opposite direction to the medium-wave winding of 48 turns. The reaction winding is split into two sections—one at each end of the former. It comprises 18 turns at the medium wave ($\frac{1}{2}$ in. separation) and 50 turns at the long wave end (almost touching).

Each section is wound in the same direction as its adjacent grid winding.

How the Coils are Mounted.

The coils are mounted at right angles on a dividing aluminium screen and are $\frac{1}{2}$ in. away from this. The screen itself measures $6\frac{1}{2}$ in. (height) by 7 in.

The coupling resistance is one of non-inductive construction, and is centrally fixed through a hole in the screen.

The wire used is No. 24 gauge D.S.C. for the two medium-wave windings, and No. 36 gauge D.S.C. for both long windings and for the reaction windings.

IS there such a thing as "microphone realism"? Is not the whole structure of broadcasting based on synthesis? When you listen to your radio set you are hearing sounds produced by electrical currents generated in the anode circuit of your output valve by varying voltages created on its grid.

These varying voltages are produced by reactions and interactions between various other parts of the receiver, and the whole train of processes is initiated by tiny electrical currents induced in your aerial system by the ether waves of the broadcasting station.

Did He Hit You?

These ether waves were set rippling by powerful electrical currents in the transmitting aerial of the broadcasting station, and these, in their turn, originated in gigantic valve oscillators, but were "modulated" by other electrical currents—amplified versions of much weaker currents influenced by those developed in the microphone circuit. These last bear the direct impress of the diaphragm variations due to the sound-waves generated by the broadcasting artiste or orchestra.

So you see how wrong it is to say that you hear Leonard Henry or the B.B.C.'s Symphony Orchestra when you listen to your set. What do you hear?

Supposing you were separated from a man by a row of one thousand skittles, and that man knocked over the skittle nearest him, and that skittle knocked over the second skittle, and the second skittle knocked over the third skittle, and so on until the skittle at the other end of the line, the skittle nearest you, fell over and gave you a

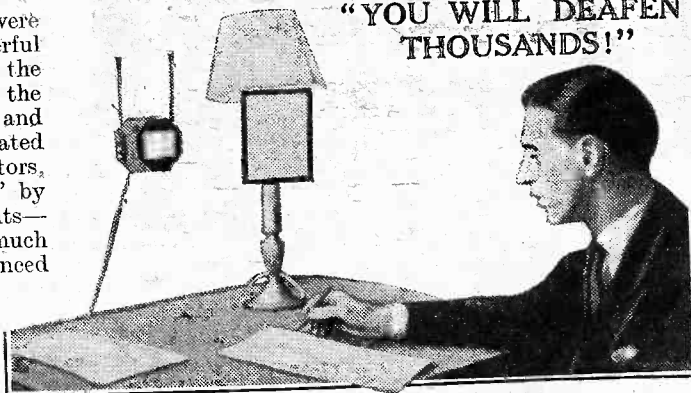
MICROPHONE REALISM.

By D. GLOVER.

nasty knock, would you say that the man had hit you?

All this is by way of illustrating what waste of time it is to argue about the strict interpretation of that term which forms the title of this article, and which has also com-

"YOU WILL DEAFEN THOUSANDS!"



Beside the "mike" in the London talks studio is a notice which implores speakers not to cough or rustle papers, as to do so might "deafen thousands of listeners."

prised the theme of quite a few articles and discussions in the past.

What Your Set Can't Do.

Realism is to represent things as they really are, and that is just what your radio set cannot do. Quite apart from the fact that no radio outfit is capable of producing a faithful copy of the sound-waves developed in a broadcasting studio, it should never be forgotten that the B.B.C. has control-rooms in which trained engineers sit and juggle

with the currents passed through to them by the microphone, for the sole purpose of modifying these to conform with the limitations of the transmitting apparatus.

To what extent they indulge their power of censorship is quite immaterial.

But if it is fitting that the B.B.C. should "control" the processes of sound—electricity—transformations, then it is clear that there can be no aesthetic loss in the listener controlling the processes at his end.

Control Your Volume.

It might so happen that at the very moment the B.B.C. control engineer decided to "step-up the amplification" on a speaker who has dropped his voice to a dramatic whisper, the listener operated his volume control in order to reduce the volume of sound from his loudspeaker, which has started to make the original whisper into a shout!

Which is all an argument very much in favour of the continual, but discriminate, use of volume controls as an aid to more enjoyable listening!

There is no need at all to leave yourself in the hands of the B.B.C. plus the amplification which your receiver may be giving at any one particular moment.

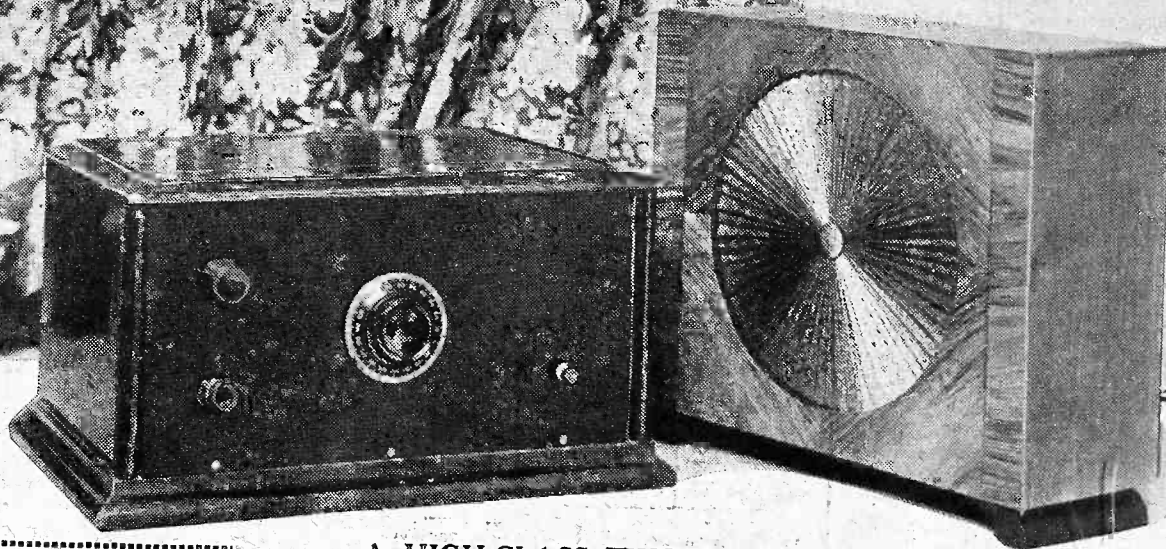
On the other hand, there is no good purpose served in the handling of a volume control as if it were the steering-wheel of a motor-car—rapid twists coinciding with practically every bar in a musical item!

Indeed, it is essential to preserve something of a stability in the volume or you will lose all the beauty in music and speech that is imparted to them by careful, sympathetic modulation on the part of their producers.

As was said recently by Mr. G.V. Dowding, you must have bases for your standards of comparison, and that applies most vitally to this question of volume.

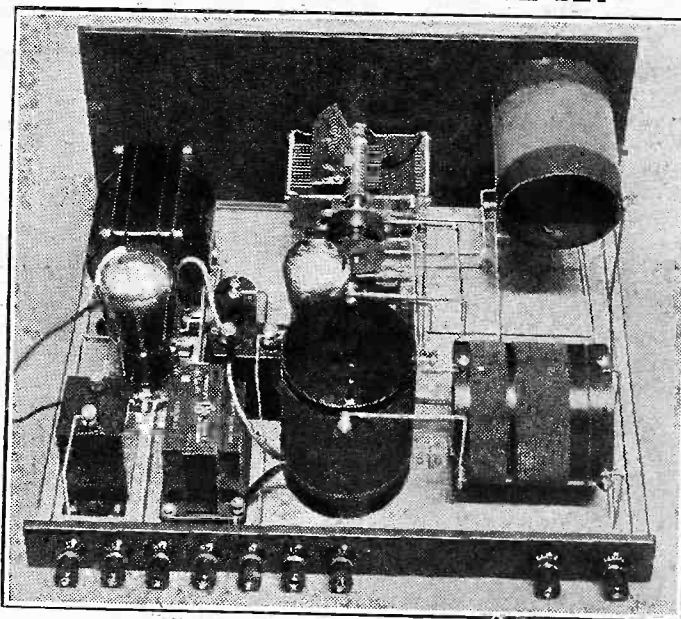
It all makes one wonder whether there is not an art in the handling of radio reception which has largely been overlooked during the past.

The "DEX-PEN"



A Pentode valve, "P.V." coils and Extenser tuning figure in this receiver. It is a particularly easy set to build and one which represents the very best that modern radio technique can offer in this class of instrument.

A HIGH-CLASS TWO-VALVE SET



The set was designed and built in the "P.W." Research and Construction Dept., and is described by T. B. Sanders, a member of "P.W.'s" Technical Staff.

SINCE the very earliest days of the home use of wireless there has probably been no more consistent trend in receiver design than the endeavour to use fewer valves in sets.

In pursuit of this ideal, the reflex set was introduced, although dismal croakings and groanings were often the poor recompense for the saving effected on valves. The cry for fewer valves, too, was undoubtedly responsible for the super-heterodyne lying dormant until just recently, when "P.W." discovered how to "super" with only four valves.

The urge is still with us, and designers still strive to make one valve do the work of two.

High Mag.

A very considerable measure of success has attended these efforts in the case of the pentode valve. The pentode, unlike most other valves used for the output stage, has a very high "amplification factor."

A valve is said to have a "high ampli-

fication factor" when a small signal voltage on the grid causes large changes to occur in the anode circuit, and, remember, large changes occurring in the anode circuit of the power valve cause the speaker to give large volume!

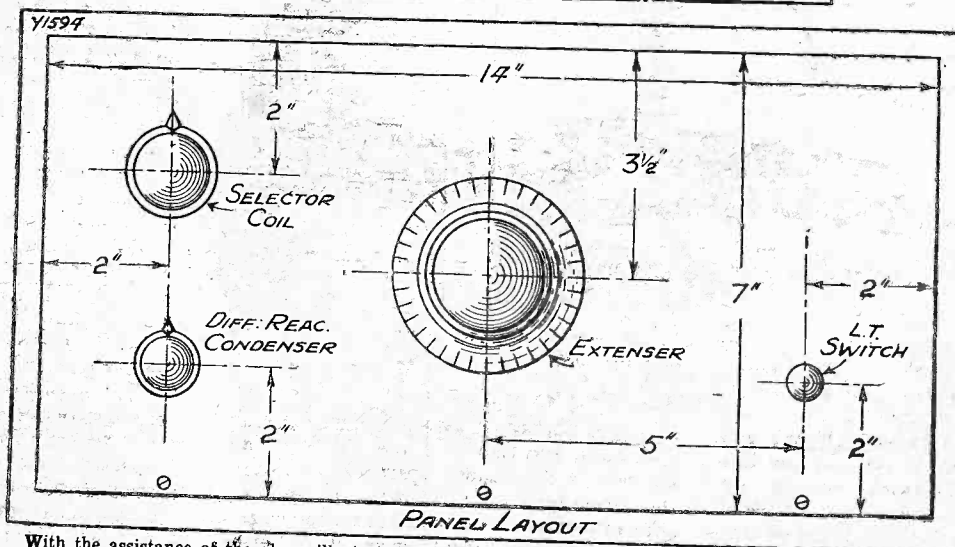
All ordinary three-electrode L.F. valves have, compared with the pentode, low "amplification factors," so that quite large signal voltages on their grids produce relatively small changes in the anode circuit.

Now all the valves in a set, except the detector and output valves, are there simply to ensure that the received signal is amplified sufficiently to satisfy the output valve's requirements for grid signal voltage.

Loudspeaking.

A valve like the pentode, then, which requires a small grid signal voltage, can be expected to need less valves in front of it to work the loudspeaker.

This is actually the case, so that a pentode in the
(Continued on next page.)



With the assistance of the above illustration you will be able to see at a glance what an attractive home-constructor design the "Dex-Pen" is, and how simple are its controls.

THE "DEX-PEN"

(Continued from previous page.)

output stage makes possible the elimination of all valves between it and the detector. In other words, using a pentode permits one to get almost det. and 2 L.F. results with a det. and one L.F. set.

A really excellent and economical set can, therefore, be achieved by preceding a pentode by a detector and tuning circuit of modern efficiency. Such a set is the one about to be described.

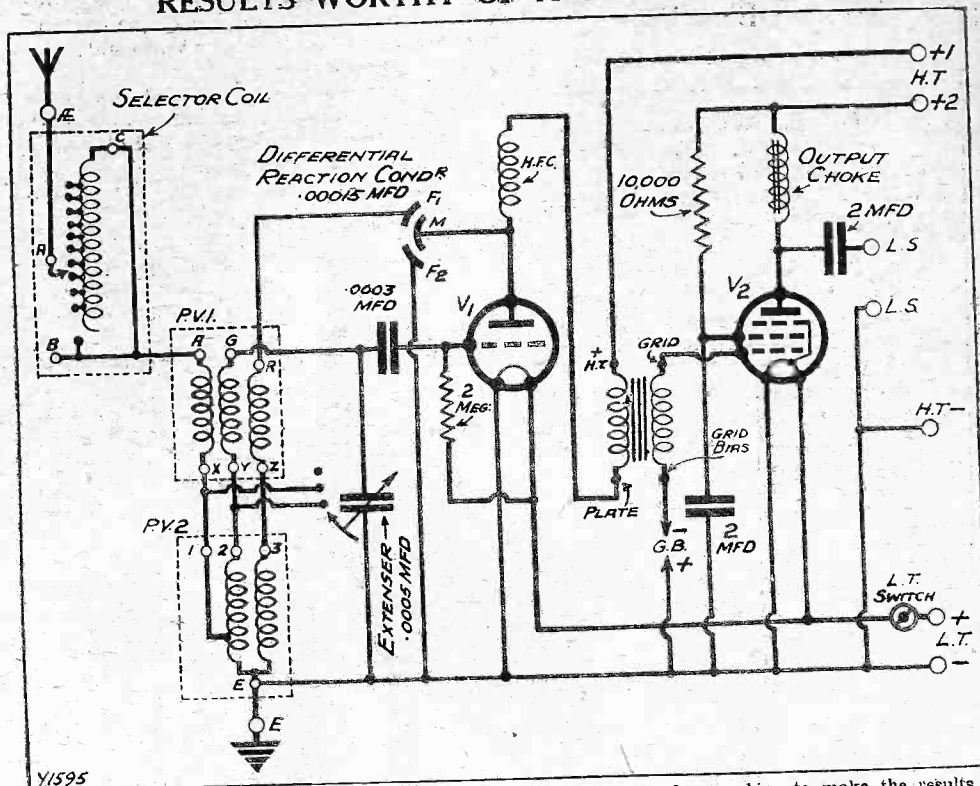
First of all, it must be remembered that although only two valves are employed, practically three-valve results are to be expected. Regular readers will not need to be told that a "P.W." three-valver does not lack sensitivity, and high sensitivity calls for good selectivity.

Selectivity without Complication.

The set is endowed with this essential quality by the design which includes the famous "P.W." selector coil. This device shows every sign of becoming a standard means of securing good selectivity without excessive complication, and it has been incorporated in so many recent sets that almost everyone must be conversant with its advantages.

Further avoidance of operating complications has been obtained by employing the Extenser system of tuning. This is a feature of the set which is really worth while, and to those who feel inclined to write to the Query Department asking for a method of

RESULTS WORTHY OF A THREE-VALVER!



Y/595

The big "P.V." coils, the "P.W." Selector, and a Pentode L.F. valve combine to make the results almost those of a three-valve set.

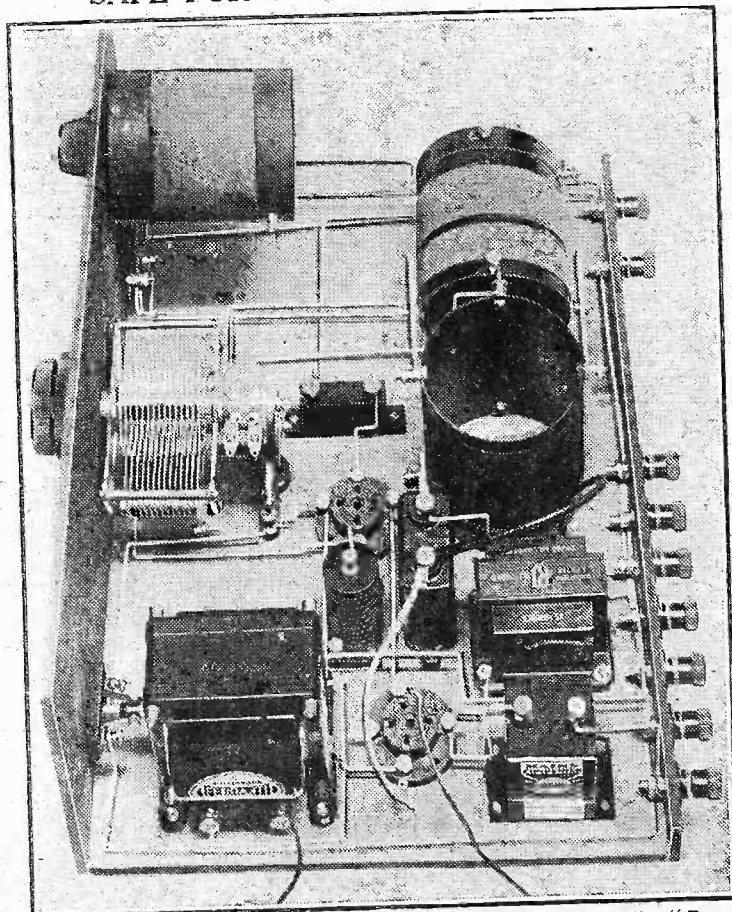
omitting the Extenser, the present writer would say "Don't."

The Extenser is now a standard tuning component, and one purchased for this

set will be an investment for any future sets. Really progressive features in receiver design come to stay, and the Extenser will

(Continued on next page.)

SAFE FOR H.T. MAINS WORKING



The provision of a choke-condenser loudspeaker output makes the "Dex-Pen" particularly suitable for use with an H.T. mains unit. And you can run long loudspeaker leads without risk of trouble occurring.

COMPONENTS WE RECOMMEND

- 1 Panel, 14 in. x 7 in. (Permcot, Peto-Scott, Wearite, Becol, Goltone, Parex).
- 1 Cabinet with baseboard, 10 in. deep to fit (Peto-Scott, Camco, Pickett, Gilbert, Osborn, Ready Radio).
- 1 .0005-mfd. Extenser (Wavemaster, Cyldon, Formo, J.B.).
- 1 Selector coil (Wearite, R.I., Peto-Scott, Parex, Goltone).
- 1 .00015-mfd. differential reaction condenser (Lotus, Telsen, Ready Radio, J.B., Polar, Cyldon, Graham Farish, Burton).
- 1 L.T. switch (Ready Radio, Telsen, Wearite, Lotus, Igranie, Bulgin, Lissen, Goltone, Graham Farish).
- 1 P.V.1 coil (Lewcos, Parex, Formo, Peto-Scott, Ready Radio, Sovereign, Goltone, Wearite).
- 1 P.V.2 coil (Lewcos, etc.).
- 1 .0003-mfd. fixed condenser (Dubilier, T.C.C., Telsen, Graham Farish, Lissen, Ferranti, Mullard, Ediswan, Watmel, Igranie).
- 2 2-mfd. fixed condensers (Dubilier, Formo, T.C.C., Telsen, Lissen, Igranie, Helsby, Ferranti).
- 2 Valve holders (Telsen, Lotus, Graham Farish, Burton, W.B. Igranie, Wearite, Clix, Bulgin).
- 1 2-meg. grid leak and holder (Graham Farish, Lissen, Igranie, Telsen, Ready Radio, Ferranti, Ediswan, Mullard, Loewe, Varley, Dubilier).
- 1 H.F. choke (Ready Radio, Telsen, Tunewell, Peto-Scott, Varley, Lewcos, R.I., Lotus, Graham Farish, Sovereign, Wearite, Dubilier, Parex, Atlas).
- 1 Output choke (R.I., Atlas, Telsen, Varley, Igranie, Ferranti, Lotus, Wearite, Bulgin, Graham Farish, Lissen).
- 1 10,000-ohm spaghetti resistance (Ready Radio, Varley, Telsen, Igranie, Bulgin, Peto-Scott, Sovereign, Lewcos, Graham Farish).
- 1 L.F. transformer, ratio 1-7 (Ferranti, Telsen, R.I.).
- 9 Terminals (Igranie, Elex, Belling & Lee, Clix, Goltone).
- 1 Terminal strip, 14 in. x 2 in.
- 2 G.B. plugs (Clix, Igranie, Belling & Lee, Elex).

Glazite, Lacoline, Quickwire, flex, screws, etc.

ACCESSORIES

LOUDSPEAKER. Undy, Graham Farish, Blue Spot, Celestion, B.T.H., Amplion, W.B., H.M.V.

VALVES. 1 detector H.L. or special det. type (Osram, Mazda, Mullard, Six-Sixty, Lissen, Cossor, Eta, Tungram, Dario, Marconi). 1 Pentode (Mullard, Mazda, Marconi, Osram, Cossor, Six-Sixty, Tungram, Lissen). The Pentode should be of the "small" type with an anode current consumption of not more than about 10 m.a.

BATTERIES. H.T., 100-120 volts,

double capacity (Drydex, Peritrix, Ediswan, Magnet, Lissen, Ever Ready, Columbia). G.B., 15-18 volts (to suit valve), as above.

ACCUMULATOR. To suit valves (Exide, Ediswan, Lissen, Peritrix, G.E.C.).

MAINS UNITS. Ekco, Tannoy, Atlas, R.I., Regentone, Lotus, Heyberd. State type of set and give details of mains when ordering. Unit should be capable of supplying at least 15 m.a.

(Continued from previous page.)

Associated with the Extenser in the tuning system are separate medium- and long-wave coils of high efficiency.

via the H.T.+1 terminal, which should receive between 60 and 80 volts, the exact figure being best arrived at by reference to smoothness of reaction control].

1:7 Transformer.

The detector is coupled to the pentode by transformer. As this is the only L.F. coupling component in the set, no ill-effects follow the use of a high-ratio instrument. One of 1/7 ratio was therefore employed in the original set and for good volume is, of course, much to be advocated.

For best quality with transformer coupling the detector valve should not pass too much anode current. An H.F. type of valve with an impedance of not less than 20,000 ohms (but not greater than 30,000 ohms) is best for the detector (V_1) position.

The pentode itself has been very carefully arranged to be free from the bad behaviour some constructors may previously have experienced when trying to work a pentode with nothing more to go on than the instruction slip issued by the makers.

The priming-grid is "de-coupled" by a 10,000-ohm resistance and 2-mfd. condenser. The value of the resistance has been chosen so that the priming-grid receives suitable H.T. with a "smallish" pentode in use.

No difficulty whatever should be experienced in making a faithful copy of the original receiver with the aid of the wiring diagrams and photographs which accompany this description.

With regard to the vexed question "to solder or not to solder," it will be noticed that the wiring diagram has been carefully set out so that connecting wires run from terminals of components to terminals on the

In constructing the set there are two points needing a little care.

A flex wire is shown on the wiring diagram connected to one terminal of the 2-mfd condenser and marked "flex to priming-grid of V_2 ." This should be connected to the terminal which is found on the side of *some* pentodes. Other pentodes have the priming-grid connected to a fifth pin on the valve placed in the centre of the other four pins.

(Continued on page 915)

[illegible]

The wiring is arranged so that there is no need at all to solder any of the leads.

THE PROGRESS OF BRITISH BROADCASTING

Some notes on the B.B.C. Year Book for 1932.

THE B.B.C. Year Book is always welcome because it is always full of interesting information about broadcasting. The 1932 edition is now on sale, and we recommend every listener to get a copy. It is not only a reference book—it is an interesting and, apparently, inexhaustible mine of stories about aspects of the B.B.C. which cannot have but aroused the curiosity of the listeners at one time or another.

For instance, the 1932 edition has a particularly interesting article by the architect of the new Broadcasting House—Lieut.-Col. G. Val Myer, F.R.I.B.A. In this article, he says:

"The planning of the studios had to be the key to the whole scheme. At the outset it was thought that the ideal arrangement would be to place all the studios on one floor and, as protection against inter-studio interference, to surround each by a complete circuit of brick-built corridor

Dealing with Extraneous Noises

As protection against extraneous noises the studios would be placed at the top of the building. The site of Broadcasting House, however, though picturesque in form, is irregular, which fact would have caused studios so grouped to be of awkward shape. Besides this, although the B.B.C. at that early stage contemplated fewer studios than have now been built, the system of individual insulation by corridors and walls would have been so extravagant that the areas left for studios would have been quite inadequate.

After exploring scores of different systems of planning, the problem of accommodating a large number of studios and their suites within the space available was quite suddenly solved. Instead of the studios being all on one floor or on two floors, they would be all in one tower, so that, given a good service of lifts, circulation would be actually easier than if they had been all on the same level and, of course, larger and more shapely studios could be provided.

How the Plan Proceeded.

Once this key idea had been found, the plan was rapidly developed. The evolution of the plan proceeded on simple lines which can best be expressed as follows:

"Studios must be insulated from sound. Put a thick brick wall round them, omitting the usual steel framework.

"Studios must be artificially ventilated, so need have no windows. Put them in the centre of the building, where there is least daylight to waste.

"Offices must have daylight. Put them all round the outside of the building, where plenty of daylight is available.

"Studios need to be sound insulated from one another. Put between them horizontal layers of rooms such as Music Libraries, Book Stores, etc., which neither create noise nor are disturbed by it.

"In this way, item by item, the plans were wrestled with and were slowly devel-

oped to their present form. Sometimes, as a result of much thought, whole features had to be discarded. Such was the fate of a huge parking garage, at one time accommodated in the basement."

Looks Bigger than it is.

Colonel Val Myer adds:

"Broadcasting House is said to look bigger than its actual dimensions. This is due to the scale and number of the windows, necessitated by the provision of an immense number of small offices. Endless flexibility of sub-division of offices was required by the Corporation, which, in fact, naturally weighed with me in preparing my design for the façade."

In designing the sculpture for the building, Mr. Eric Gill accepted a suggestion put forward by the B.B.C. that the "literary" subject of the carvings should be centred round the figure of Shakespeare's "Ariel."

FOR LONDONERS TO LOOK AT



A striking group, depicting national figures and representing radio, that appeared in the Lord Mayor's Show.

In the most important group of sculpture, which is to be placed in the niche above the main entrance of the building, Prospero is shown sending Ariel out into the world. Prospero has been interpreted as a draped and bearded figure, symbolic of wisdom and benevolence. Ariel is conceived as a child holding in his right hand the pipe on which he plays unearthly music. The figures are to be ten and seven feet high.

The Two Western Panels.

The two panels on the western front each represent Ariel between two angelic figures; the first between Wisdom and Gaiety; the second with his hand to his ear and upheld by figures of angels, listening to celestial music. The panel over the eastern entrance represents Ariel piping to children.

The problems of decorating the twenty-two studios are in the care of the two eminent architects, Colonel Val Myer and Mr. Raymond McGrath, the former being responsible for the Concert Hall, known as Studio 1, and the latter for the remaining twenty-one studios, the listening halls and the artistes' rooms. Mr. McGrath has worked in association with the B.B.C.'s Civil Engineer and a Decoration Committee and in addition has enlisted the help of a number of well-known architects and designers; for example, Mr. Edward Maufe, one of the five selected architects for the Guildford Cathedral Competition and the creator of St. Saviour's Church, Acton, is providing the scheme of decoration for the studio which is to be used for religious services. Mr. Wells Coates is responsible for the News and Effects Studios, and Mr. Chermayoff, the director of the Cambridge Theatre, is in charge of the Eighth Floor Group, the most important of which is the Military Band Studio.

Regarding the Epilogue

The Year Book contains detailed descriptions of all the studios and of their various purposes.

In the course of an exposition of the activities of broadcasting during the year and of the policy behind the construction of the programmes, comes an interesting reference to the broadcasting of the Epilogue at the close of the Sunday programmes. "The reading of the Epilogue," it is stated, "is a piece of anonymous service about which the B.B.C. does not encourage personal inquiries. Apart from members of the staff, it invites visiting readers from time to time. Some of these anonymous voices are those of quite distinguished people."

Technical Matters.

A section of the Year Book deals with technical matters and states that the building for the next and third of the Regional transmitters, at Westerly, near Falkirk, is now complete and some of the machinery installed. Thus possible delays due to bad weather during the winter have been avoided.

Preliminary work on the fourth and last of the Regional transmitters, at Washford Cross, which is to serve the populous districts of South Wales and the West of England, is also well in hand.

The rebuilding of Daventry 5 X X is also promised. "During the years that Daventry has been in regular service," says the Year Book, "great strides have been made in the design of transmitters, and there is no doubt that the design and performance of the present Daventry transmitter could now be greatly improved. The B.B.C., therefore, intends at the first possible opportunity to

(Continued on page 916.)

CLEAR CUT

Station Separation

With the

Laboratory Tested



ECKERSLEY TUNER

The amazing selectivity given by the Eckersley Tuner is due to the novel principle employed in the design. **RI** produced the original model for Captain Eckersley and the thousands of **RI** tuners, which are already being used, are equal in performance in every way to the original model.

*They are, however, mechanically improved by the use of beautiful bakelite mouldings for the terminal panels and coil supports which replace the temporary fittings used in the original model. Every **RI** Tuner is tested in an "Eckersley 3" circuit, as described in "Modern Wireless," on all broadcast wavelengths covered by the Tuner.*

RI have produced their model of the Eckersley Tuner to give satisfaction and not to merely sell on a name and price. Write for the Eckersley Tuner Technical Leaflet or ask your dealer for one.



List No. BY. 30
Provisional Patent
No. 29404. 22.10.31.

15/6

SPECIFY **RI** FOR GREATEST

SELECTIVITY

Advt. of Radio Instruments Ltd., Croydon, England. Telephone : Thornton Heath 3211 (5 lines).

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?



A W.B. LOUDSPEAKER.

JUDGING from my correspondence—and I get hundreds of letters a week—the idea that bass is impossible without a large-diameter cone is still very prevalent.

In actual fact, the required acoustic energy for good bass response can be obtained either by the relatively small displacement of a large cone or the relatively large displacement of a small cone diaphragm.

So do not take it for granted that a loudspeaker having a comparatively small diaphragm and moderately compact overall dimensions is unable to give its full quota of low notes.

It may even be better than the large ones, for there are definite advantages accruing to such methods of construction.

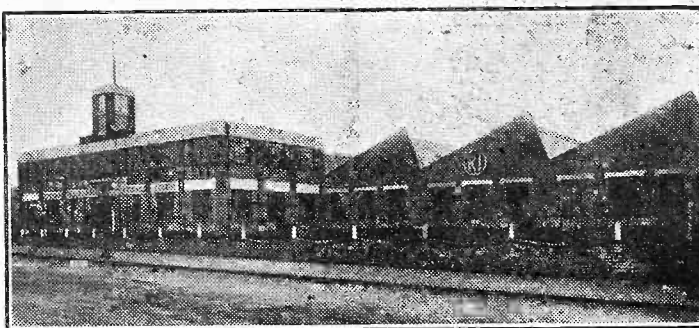
The W.B. P M 3 speaker, a permanent-

magnet model, is an excellent case in point.

This instrument is sufficiently compact to warrant the description "junior" if dimensions alone mattered (also its price merits a similar expression of smallness!), but in operation the W.B. P M 3 achieves the highest possible standard.

And I must say that the more I see of these W.B. moving-coil loudspeakers the more I like them. They can undoubtedly be numbered among both the soundest engineering productions and best value-for-money bargains existing.

PROOF OF PROGRESS AT PURLEY WAY



The three large bays to the right have recently been added to the R.I. factory, at Croydon, in an attempt to provide accommodation suited to the ever-growing needs of an enterprising and prosperous concern.

THE "SNAP" SPEAKER.

I like the name which has been given to the 21/- Graham Farish loudspeaker, for it suggests "attack"—that quality which is so sadly lacking in many of the less expensive instruments.

But it would have been a sad misnomer had the "Snap" been one of them!

However, as it so happens, it does possess a goodly modicum of "attack," and it definitely does get its notes "off its chest" and not eject them blanketed and muffled.

Indeed, it is undoubtedly an excellent little instrument, and one that should be heard by all potential purchasers of loudspeakers.

In appearance, it is also commendable in that its casing comprises a clean, tasteful moulding, having an artistic grille which does not impede the emission of sound.

A practical point of importance is that the adjustment screw is slotted and can easily be operated with a coin, after which the adjustment remains tightly "set."

THE TELSEN RADIOMAG.

A copy of No. 1 of Volume 1 of this new publication has reached my hands, and on behalf of all constructors I herewith extend a hearty welcome to this latest example of Telsen initiative and enterprise.

The Telsen Radiomag incorporates the full Telsen catalogues, all the Telsen cir-

cuits and building and operating details. It is an excellently produced publication both from printing and editorial points of view. There is a great deal of informative and interesting reading matter, and I would certainly advise all "P.W." readers to do their utmost to secure copies.

S.A. JOHN GELOSO L.F. TRANSFORMER.

This is an Italian product which is handled by Thomas A. Rowley, Ltd., of Birmingham. It is an L.F. transformer of very good design and construction. It also has a good primary inductance and can handle up to ten milliamperes of D.C.

Its performance is decidedly commendable, and I am bound to say that the results

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.

given by my particular sample are superior to those provided by many of the lower-priced British transformers.

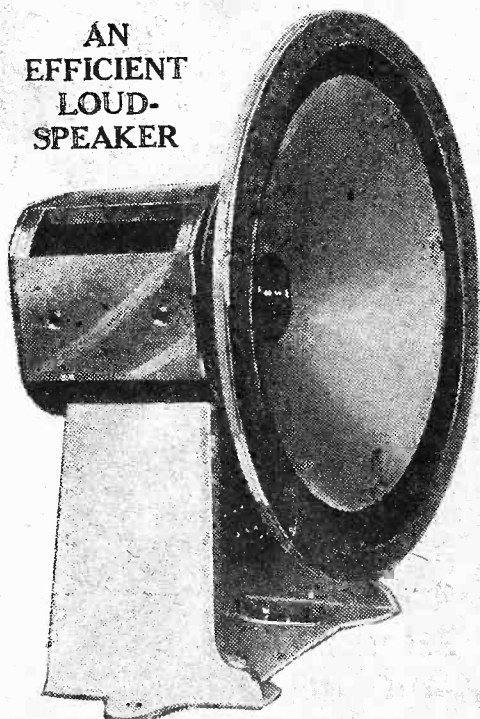
But it has no terminals. Instead, soldering tags are arranged at the base of the component, so that it is necessary for the wiring to be taken underneath the baseboard. I would suggest that constructors in general are not likely to take kindly to such a scheme, and that it would be distinctly advisable to arrange for accessible terminals to be fitted.

A BRIGHT "HOUSE" ORGAN



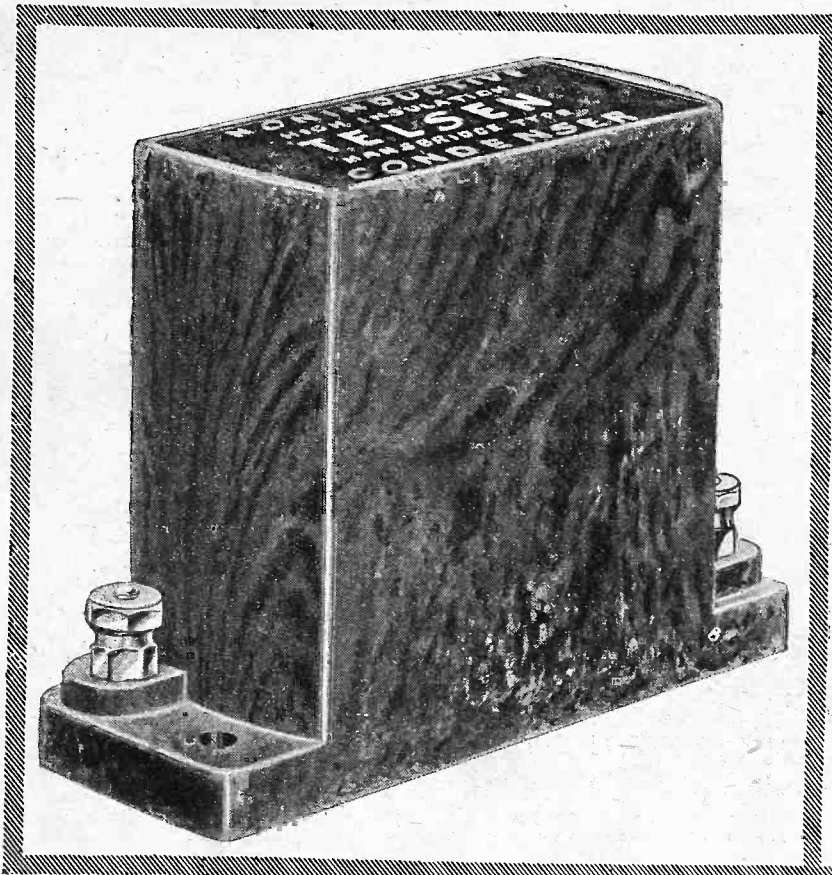
The cover of Telsen's New "Magazine-Catalogue."

AN EFFICIENT LOUD-SPEAKER



The W.B. P M 3 Permanent-Magnet Moving-Coil Speaker.

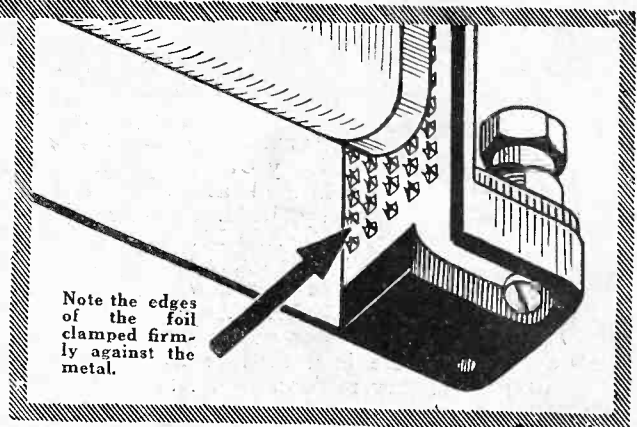
ABSOLUTELY NON-INDUCTIVE



TELSEN MANSBRIDGE TYPE CONDENSERS

It is essential for condensers used in radio work to be non-inductive to ensure negligible resistance to H.F. currents. Telsen Condensers are made by a special process which ensures *hundreds* of points of contact along the edge of each foil, thus preventing the possibility of any inductive effect.

The illustration below shows the base of a Telsen Condenser stripped to show the method of "Nutmeg-grater" contact.



EVERY

Telsen Condenser is completely non-inductive.

EVERY

Telsen Condenser is of the true Mansbridge self-sealing type, dehydrated in vacuo, impregnated and hermetically sealed.

EVERY

Telsen Condenser undergoes five laboratory tests before it is packed.

EVERY

Telsen Condenser is tested to the high insulation standards of the G.P.O.

EVERY

Telsen Condenser is 100 per cent British.

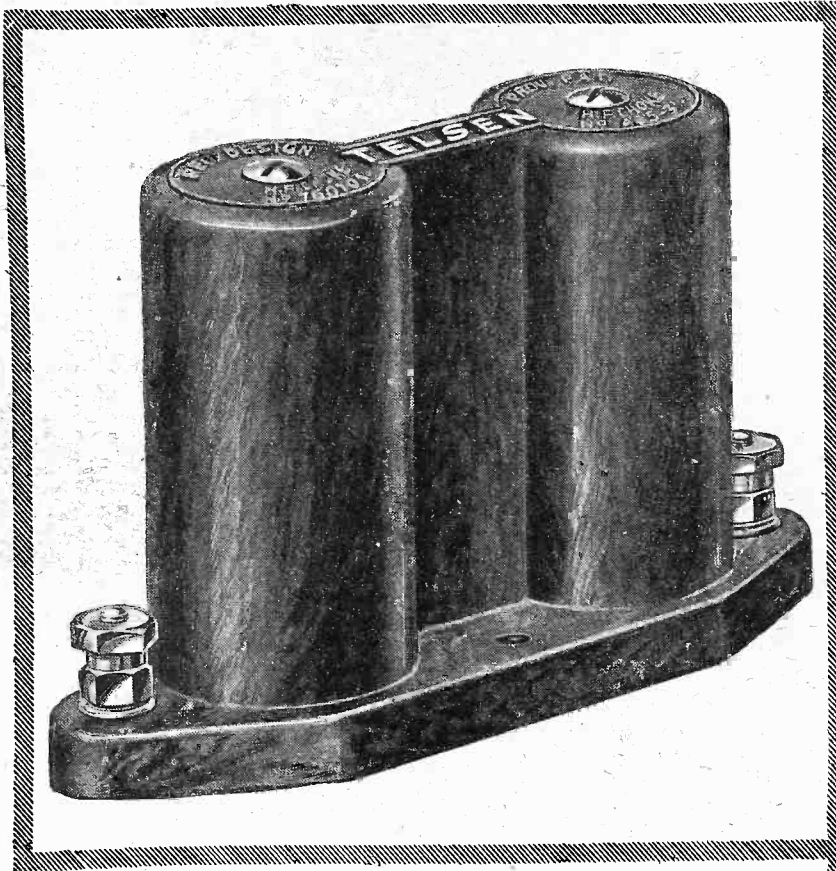
Telsen Mansbridge Type Condensers, made in capacities from .01 to 2.0 microfarad, from 1/8.

TELSEN

THE SECRET OF PERFECT RADIO RECEPTION

Send for the "Telsen Radio Catalogue" and book of "All-Telsen Circuits" to
The Telsen Electric Co., Ltd., Aston, Birmingham.

IMPEDANCE . . .



TELSEN BINOCULAR H.F. CHOKES

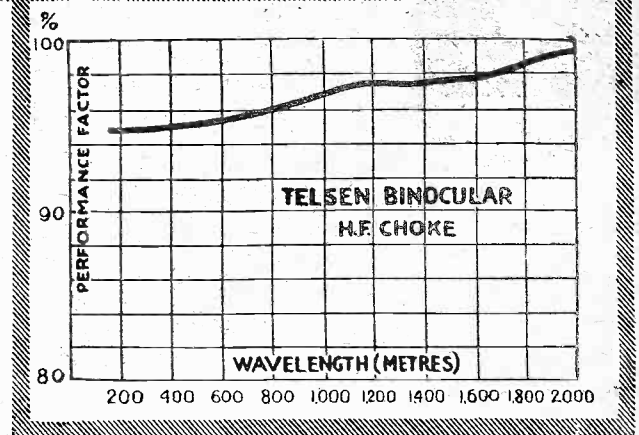
It is the function of an H.F. Choke to present the highest possible impedance to H.F. currents at all wave-lengths. Particularly does this apply to the popular tuned grid arrangement of screened-grid amplification, where the performance of the whole set is limited by the value of the impedance in the anode circuit of the screened-grid valve. It is equally important that this high efficiency should be maintained over the whole broadcast band.

Telsen Binocular H.F. Choke, Price 5/-
Telsen Standard H.F. Choke, Price 2/-

The Curve adjoining (published by courtesy of AMATEUR WIRELESS) represents the efficiency over the Broadcast Band, as measured at the Furzehill Laboratories by J. H. Reyner, B.Sc., A.C.G.I., D.I.C., A.M.I.E.E., M.I.R.E., who says: "This curve shows the fine performance of the new Telsen Binocular H.F. Choke. . . the performance factor exceeds 95 per cent at all points, and there is a distinct freedom from subsidiary resonances. . . . This Choke must be considered as taking its place with the best on the market."

Combined with its "fieldless" properties these figures show that where superlative performance is called for the choice must be the TELSEN Binocular H.F. Choke.

Send for the "Telsen Radio Catalogue" and book of "All-Telsen Circuits" to The Telsen Electric Co., Ltd., Aston, Birmingham.



TELSEN

100% BRITISH
RADIO COMPONENTS

AFTER FIVE YEARS

"O.H.M." SURVEYS THE B.B.C.

Continuing his authoritative and fascinating review of the B.B.C.'s organisation and recent achievements, our contributor this week discusses the B.B.C.'s musical programmes and personnel.

I WRITE this listening to a B.B.C. Symphony Concert of the new season relayed from Queen's Hall. One of my special favourites, the Brandenburg Concerto, No. 3, in G, for Strings (Bach) is being played more exactly and exquisitely than I have ever heard it. I have not seen this orchestra or its conductor, Adrian Boult; but let me say at once that to my personal knowledge none of the other great

LORD CLARENDON



The first chairman of the British Broadcasting Corporation.

orchestras of the world could have done the Brandenburg Concerto just to the perfection and nicety of this elegant performance.

Mark you, I am not in the hall. Here, at any rate, is a sure sign of decisive progress in the past five years. In 1926, B.B.C. symphonic work was creditable in parts, but patchy, and without steady purpose or confidence. Here is

something great, almost majestic, in power, purpose, and conception. I hope I may never earn the reputation of "carping critic" of the B.B.C., because this main achievement of orchestral eminence is worthy to cover a multitude of sins and shortcomings.

It Deserves a Better Name.

And now to turn to a more impersonal analysis. Even before I had heard the full B.B.C. Symphony Orchestra in all its glorious symmetry and balance, I had concluded that the general standard of performance of B.B.C. music had improved since I last analysed it in 1926. There was evidence of an assured competence, a quiet resourcefulness, a completeness of execution which were not there before.

Now the Symphony Orchestra is clearly unexcelled, but it passes my comprehension that it should not adorn some fitting title. "The B.B.C. Symphony Orchestra"—what a deplorably unimaginative and inadequate title for the most distinguished musical organisation in the world!

I am amazed that even an elementary sense of showmanship has not dictated

something much better. Why, for instance, is this not called The London Philharmonic (with the full concurrence and co-operation of that ancient Society) or simply "The London Orchestra," if the ancient Society were silly enough to stand out?

It is not only unnecessary but inartistic to put the ugly letters B.B.C. in the main title. The B.B.C. would gain far more prestige and credit by remaining in the background unassailably entrenched in the affections of many millions of admiring listeners the world over.

The Military Band.

Is it still too late to appeal to the B.B.C. to try once more, if indeed they tried before, to get an appropriate title for their wonderful Symphony Orchestra? And before I leave this subject let me say that there is more than ample evidence that in all the qualities which make for that rarest of combination, genius and talent, Dr. Adrian Boult is in my experience the exemplar.

My next impression is one of relief from the tedium and vexation of some of the atrocities which the B.B.C. used to dignify by titles of either "Modern" or "Chamber" music.

There was far too much of the indigestible variety of music in the old days.

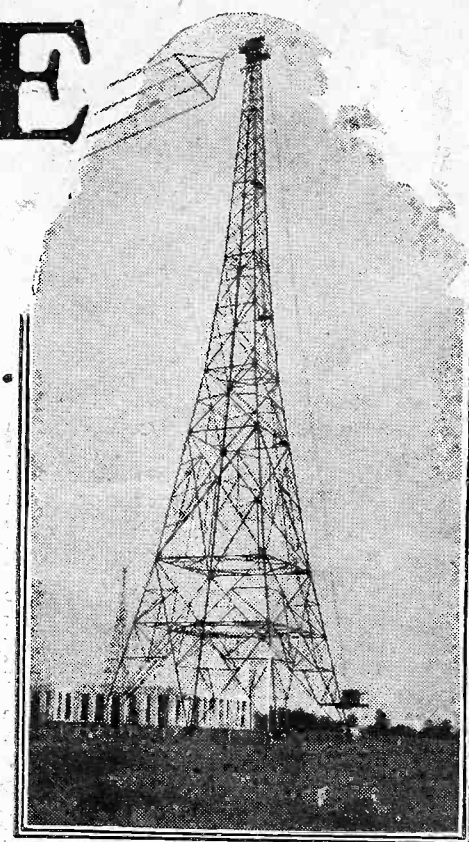
I hope that it is now realised that while, of course, it is one of the functions of the B.B.C. to give opportunity to new work and new composers, the listening public should not be made to suffer. Public performance, with cruelty to critics, by all means; but mercy to the public. So I hope to discover that the reform is real and abiding in this respect.

About a fortnight ago I had the really thrilling experience of being one of the party of very few to be privileged to be present as an audience at one of the ordinary programmes of the B.B.C. Military Band, conducted by B. Walton O'Donnell. As an

VISCOUNTESS SNOWDEN



The only woman B.B.C. Governor—she is a keen advocate of broadcast opera.



old cavalryman I take particular pride in the achievements of one whom we still regard as our own, although he subsequently endured the tedium of service in the Royal Marines. But I am glad to say that he had a sufficient reserve of strength and resilience to stave off the contagion of the Horse Marines!

Anyway, here he was, in supreme fettle and leading in inimitable fashion, the best military band which it has been my privilege to hear. Somehow, I feel that although, of course, the technical excellence of the instrumentalists is above reproach, the decisive element in the outstanding success of this band is the ability of its conductor to maintain elbow-room for his personality within the confines of even such an exacting organisation as the B.B.C. has become.

Handicapped By Policy.

I had a haunting feeling that perhaps Adrian Boult had some such personality, accounting for just the extra touch of excellence of the Symphony Orchestra. But with Walton O'Donnell there is nothing haunting or imaginary about this impression. It is the real thing. And once again I am grateful to the B.B.C.

On a recent Sunday, I heard the Theatre Orchestra do a light programme, conducted by Leslie Woodgate. I was not altogether pleased with the wood wind, although the strings certainly made a gallant effort to compensate. I was perplexed at the irregularity of balance, until I reflected that probably the B.B.C. general policy about Sunday programmes had so limited the range of selection that a very excellent small orchestra had been seriously handicapped. On investigation I found this to be the fact. I have yet to hear the Theatre Orchestra performing on a week-day; but I have no doubt that it will be an enjoyable experience.

(Continued on next page)

AFTER FIVE YEARS.

(Continued from previous page.)

What I have missed mostly in the past six months has been the sturdy Provincial Orchestras which were such a feature of the old days of the B.B.C. How well do I remember Featherstonhaugh at Bournemouth, Joe Lewis at Birmingham, Carruthers at Glasgow, Victor Smythe at Manchester, and a dozen others, each with a gallant band of hard-worked and competent musicians.

I do not suggest that the performance was anything like as elegant or finished as that of the metropolitan B.B.C. bands of to-day, but I am sure that no elegance or refinement could compensate or even emulate the *elan* and *esprit de corps* of those rugged artistic units of pioneering broadcasting.

I know that wave-length limitations make it impossible to revert to the original B.B.C.; what I am concerned about is that the new B.B.C. in its rationalisation and polished search for unvarying efficiency should not forget that there is still room for artistic and economic divergence within the frontiers of its limitations.

"Rank Heresy."

In other words, what I am concerned about is that there should be restored to the Regional Headquarters at Edinburgh, Manchester, Birmingham and Cardiff a competent general orchestra, capable not only of supporting the characteristic Regional Programmes, but also (and this is more important) of giving public performances as and when required in the regions concerned.

I know enough of current discussions in broadcasting circles to realise that I am speaking rank heresy. But I am undismayed on this account. It seems to me that economies at the expense of what is left of Regional organisation are more than ordinarily false economies.

I say this in no sense of attachment, personal or otherwise, to those concerned with broadcasting outside London. But I do say it in the earnest conviction that unless

the B.B.C. can discover something of its old character of diversity, within unity, it may well lose that confidence on the part of the public which has been its mainstay for the past eight years.

Make no mistake about it. There is no affection for the London Programme. Least of all in London, which is itself entirely impersonal. The bedrock of the B.B.C. is the simple regard of the artisan and the farm-labourer, and these can be secured only through the diligent and honest acceptance of local values efficiently interpreted through Regional organisation.

The writing is on the wall. Unless it is observed, the Parliamentary Committee of 1935 will rightly find the British Broadcasting Corporation wanting.

PROGRESS

Some curious facts concerning the development of radio.

By H. A. R. Baxter.

It would seem that there is no limit to the different ways in which radio components can be grouped, for every successive year has its very full complement of new circuits. And yet, curiously enough, the components themselves are not subject to revolutionary changes.

In general, the only difference between the components used ten or more years ago and those which figure in modern sets, is one of quality. There has been a gradual but marked increase both in electrical and mechanical efficiency—that is all.

An L.F. transformer of 1917 vintage could be popped into a 1931 receiver with the very greatest of ease, although there would be a noticeable loss in both amplification and fidelity.

But a fifteen-year-old variable condenser could be employed to-day without in any way affecting the effectiveness of a receiver, although it would be a clumsy alternative and the constructor would not find it so easy to handle.

Nevertheless, that old variable would be essentially the same as its modern prototype, the only difference between the two being that the ancient one would not have "compensated" vanes, and thus allow the stations to spread out for facilitated tuning, or smoothly manageable slow-motion dial.

On the other hand, it might suffer from certain electrical troubles which would bar it from the "low loss" category, but in ordinary aerial tuning circuits that would not result in an audible loss of volume.

In actual fact, the variable condenser goes back far beyond a mere fifteen years—it is indeed, as old as wireless itself. Are we to

KEEPING IN TOUCH



The radio operator at work on a large German aeroplane. It does not look as if he is very cramped for room, does it?

deduce from this that it has a permanent niche in radio development?

Maybe present models are destined to be entirely replaced by the extenser—but the extenser embodies, unchanged, the fundamental principles of the variable condenser.

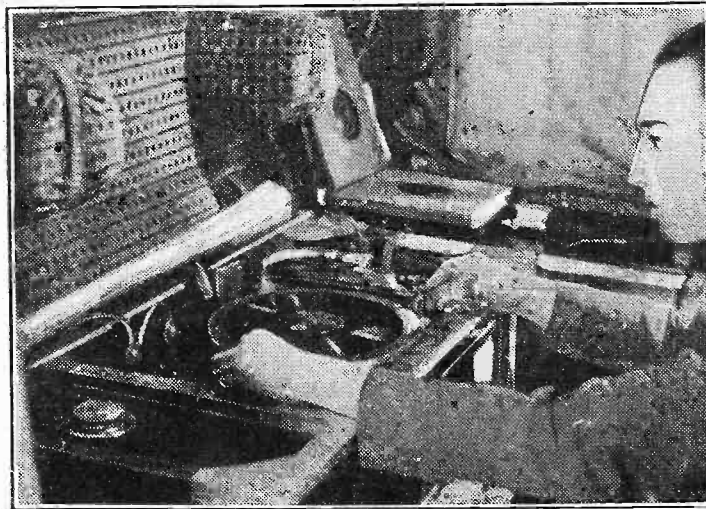
However, the point to note is that even when the extenser comes into universal use, that step will be but the second change of any note that is discernible in the history of the variable condenser, the first one being the introduction of vane compensation.

Sir Oliver Lodge's Method.

As far as we can see, there is very little possibility of any further drastic development in the design of this particular component. Two changes of form in thirty or forty years—and they talk about radio being in a constant state of flux!

Sir Oliver Lodge used variable condensers when he first invented tuning in the nineteenth century, and, to-day, when he addresses the microphone, he has the satisfaction of knowing that every one of his ten millions of listeners uses the same method!

HOME-MADE ALTERNATIVE PROGRAMMES

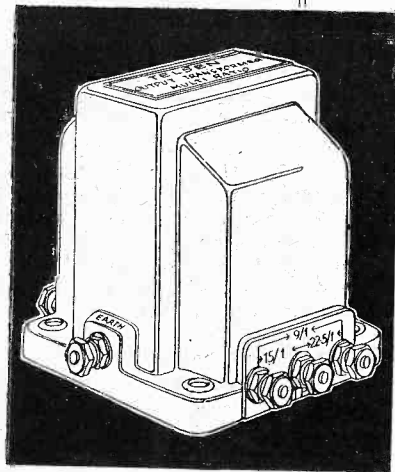
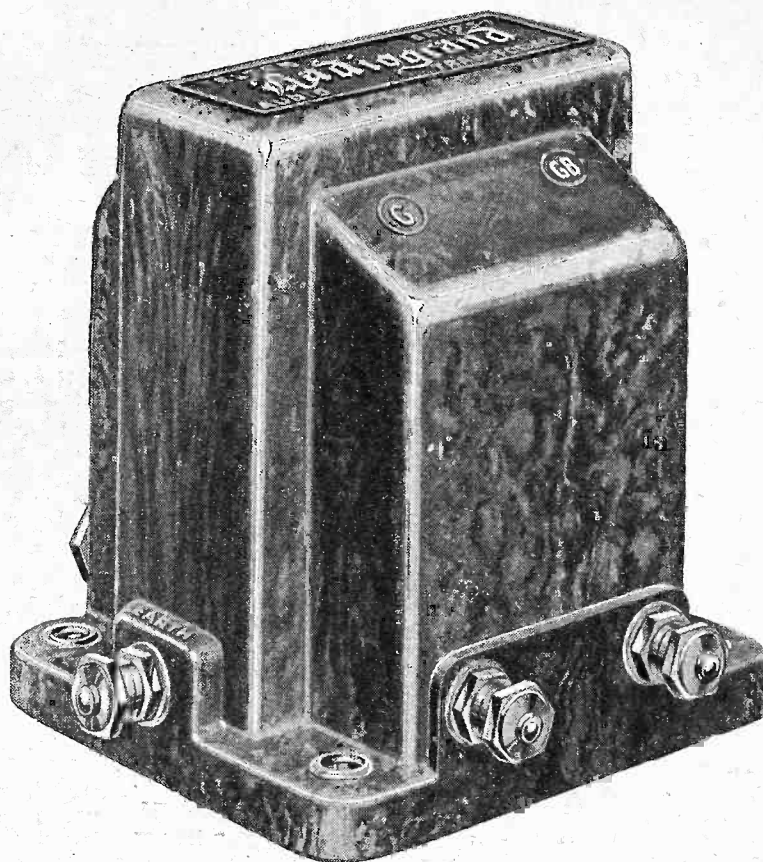


Practically any radio set can be coupled to any gramophone by a pick-up in order to reproduce records electrically, a point which Christmas present givers should bear in mind.

The enlarged Xmas number of
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Dec. issue **GET YOURS NOW!** One Shilling and Sixpence

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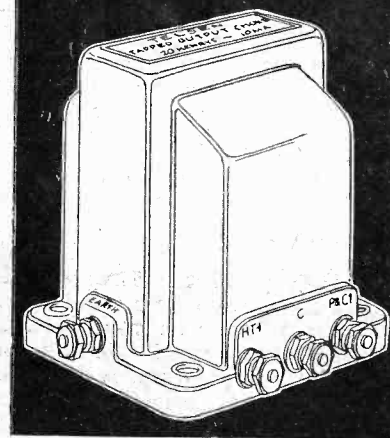
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- L.F. Intervalve Coupling Choke, 40 and 100 henrys .. . Price 5/-
- Heavy Duty Power Grid L.F. Choke, 40 henrys .. . Price 8/-

OUTPUT CHOKES

- Output Choke (Plain), 20 henrys .. . Price 8/-
- Output Choke (Tapped), 20 henrys .. . Price 8/6

RADIO-PARIS has at last increased his power, though he is still not using the full amount available. So far the worst fears have not been realised; he is not producing spread enough to cause interference with 5 X X, except possibly in a few localities in south-western England, where the Daventry National is normally rather weak and Radio-Paris surprisingly strong.

There has been no talk about any increase in the power of the Eiffel Tower, but I think that they must have been gingering the old transmitter up a bit lately for I notice a very distinct increase in the volume of the transmissions. I shouldn't be at all surprised if the Eiffel Tower does not go up considerably in power as a measure of self-defence, for Warsaw with 158 kilowatts is a pretty loud-voiced wireless neighbour.

Strange, But True!

It is queer, though, to notice that great output power does not always mean tremendous volume at moderate ranges. Zeesen, for instance, though nearly always well received hardly makes a noise like 75 kilowatts, whilst Huizen, with only 8.5 to his name, often provides considerably more volume.

Conditions on the medium wave-band

STATIONS WORTH HEARING

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

are particularly interesting just now. Quite a number of old friends are staging a "come-back," whilst there is now a splendid opportunity of filling up the blanks in your log by "bagging" stations that you have never yet heard.

Of the old-timers which disappeared for so long during nature's tragic attempt at a summer in 1931, Budapest has made a very welcome return. I find that I can now receive him with something like certainty from about 3 p.m. onwards.

Vienna, too, is showing something like the volume and the quality that we used to associate with the Rosenhugel station, and I can strongly recommend to you either his first evening programme which begins generally a little after 8 o'clock, or the second part which is to be found in full swing at round about 10 p.m.

Another reappearance is that of Bucharest on 394 metres, or just between the Midland Regional and Frankfurt. First-rate loud-speaker strength is now obtainable, and a good concert is usually transmitted at about 8 o'clock.

Katowice, Toulouse, Hamburg, Strasbourg, Goteburg, and Breslau.

If you want to make some worth-while additions to your log don't forget that wonderful time on Sunday evenings between 6 and 8 o'clock, when most of the B.B.C. stations are silent as a rule. Then is the time to go for some remarkably good transmissions which are apt to be swamped in the ordinary way.

Some Selected Stations.

Here are some selections for your Sunday list; the B.B.C. station in brackets is that normally responsible for the wipe-out of each of the groups mentioned, according to the area in which you live. (London National) Gleiwitz, Toulouse P.T.T., Horby, Leipzig, Moravska-Ostrava, Lille, Rennes. (North National) Tallinn, Hilversum. (Cardiff) Bordeaux, Zagreb, Marseilles. (London Regional) Barcelona, Graz, Stuttgart, Algiers. (Midland Regional) Frankfurt, Bucharest, Sottens, Katowice. (North Regional) Lyons, Langenberg, Prague, Trondjheim.

STRANGE to relate, there are two items of genuine news this week. First comes the information that Rome (12 R O) has shifted from 25.4 metres and settled down once more on 80 metres, where he is coming over consistently at great strength.

Second—and curiously contradictory to the first—is the fact that W 2 X A D has suddenly started coming over quite well during the early evenings. At 6.30 or 7 p.m. he may often be found at R8 or more.

Did You Read It?

I recently wrote an article for "P.W." entitled "Do We Need H.F.?" Even if you did not read the article, you should be able to gather what it was all about from the title. By a sheer coincidence, this has brought from "W.S." of Brakpan, Transvaal, the manuscript of a paper on the subject which he was to have read before the Pretoria Radio Club shortly after my few words appeared.

His views (written, of course, before he read mine) agree with my own in practically every detail. "Great minds—" (No, no!—Ed.)

"F. J. F." of Raynes Park, on whom I commented a fortnight ago in connection with bad receiving conditions, has come forward again with some strong views on hand-capacity.

In the main, I agree with him. For in-

SHORT-WAVE NOTES



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

By W. L. S.

stance, he says that often the earth wire is several times longer than the total length of wire in the inductance coil and the wiring itself. In such cases one may reasonably expect things to be made worse by the addition of an earth.

The "Earth" Question.

Naturally, many short-wave receivers work perfectly without an actual metallic earth connection, but one cannot describe them as working without an earth. The capacity of the wiring, batteries, screening, etc., to earth just happens to form a path of lower impedance than that provided by the actual wire.

"F. J. F." suggests the installation of short-wavers on a low stool, giving an earth lead of reasonable length, and assuming

that the set is on the ground floor. One may use an "earth plate" underneath the carpet to give a reasonably large capacity to earth with very little trouble. Sets treated in this way are generally docile, or, at all events, stable!

Two or three friends have taken me to task for daring to start my recent notes with the sentence, "The select circle of *we* who compare notes each week." As a matter of fact, the word I used was "us." Blame it on the printer if you like, but don't accuse me of perpetrating such grammar as that!

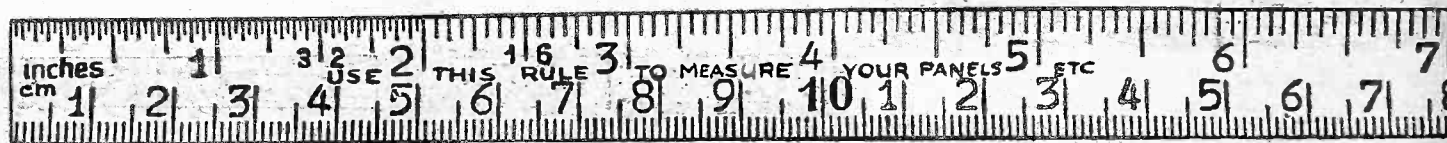
An Efficient Component.

A correspondent from Androssan, who writes to me privately, makes a remark that is, I think, of sufficient interest to be mentioned here.

He remarks on the excellence of the "Series Gap" type of condenser for short-wave work, and expresses surprise that I have so seldom mentioned it.

Do not think, from that, that I do not appreciate the advantages. I use one myself, and find it unbeatable as a quiet and efficient condenser. With no moving or rubbing contacts it is practically impossible to produce noises.

The only possible argument that could be introduced as a disadvantage is that the "series gap" type is necessarily slightly more expensive, and slightly larger than the normal design of condenser.



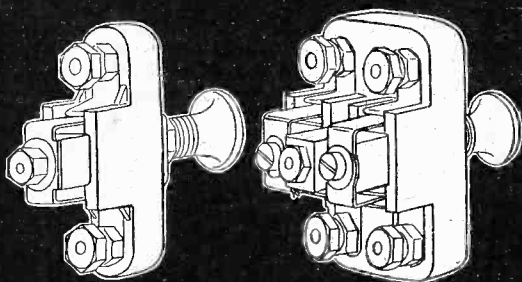
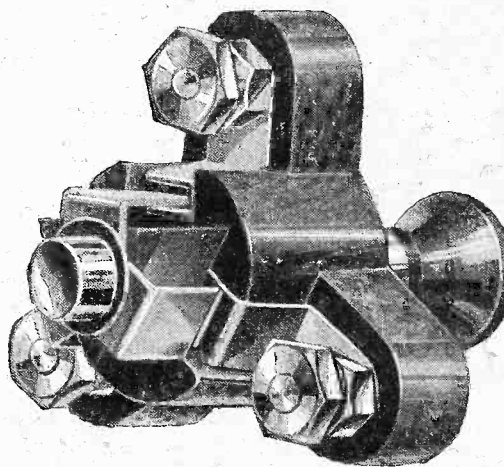
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PUSH-PULL SWITCHES

(Prov. Pat. No. 14125/31) .. From **1/-**

The Telsen Push-Pull Switches employ a proper electrical knife switch contact and are soundly constructed on engineering principles. The centre plunger is wedge-shaped, so that as it is pulled out it forces the inner fixed contacts outwards, tightly gripping the moving contacts. There is no fear of crackling with Telsen Push-Pull Switches. Their low self-capacity makes them suitable for use in H.F. circuits.

Two-point	Price 1/-
Three-point	Price 1/3
Four-point (2 pole)	Price 1/6



TELSEN SLOW-MOTION DIAL

The Telsen Slow-Motion Dial has an exceptionally smooth action with an approximate ratio of 8-1. There is no toothed gearing, so that it is impossible to strip the dial. The figures are clear and arranged to provide for right- and left-hand condensers.

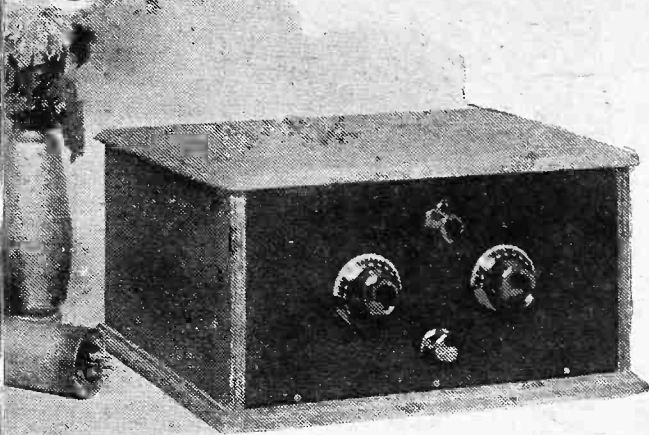
Slow-Motion Dial (Black or Brown) .. Price **2/6**

Send for the "Telsen Radio Catalogue" and book of "All-Telsen Circuits," to The Telsen Electric Co., Ltd., Aston, Birmingham.

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**100% BRITISH
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VALVE FOR "STAR"



GS
to apply the
W.'s "new-
-set."

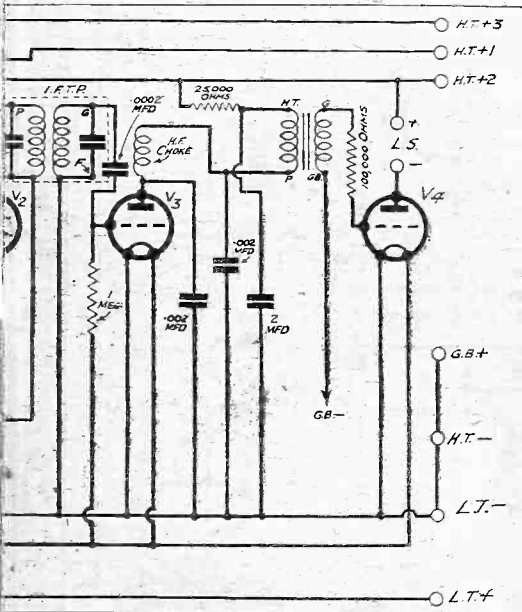
filament terminal on the valve holder.

The other filament terminal on the valve holder goes to one side of the filament resistance or volume control, and the other side of this rheostat to the left-hand front

terminal of the switch, looking at the front of the set. That completes the grid and filament circuits of the extra valve, which leaves us with the anode and S.G. circuits.

You will notice that an extra .002 mfd. fixed condenser is shown in the list of parts.

USEFUL EXTENSION



ates the simplicity of this extension of the circuit.

This should now be connected between the top end of the second detector's H.F. choke and filament of V4.

There now remain but few more leads to fix, these comprise one from the outside terminal of the second H.F. choke to the H.T. positive screw in the middle of the baseboard, and the other from the other choke terminal, that is, the one to which the small fixed condenser is secured, to the top of the S.G. valve. You will, of course, have to join a piece of flex on the anode terminal of the valve holder, which now becomes the screening electrode terminal, for connecting to the H.T. battery.

Straightforward Coupling.

If you refer to the original circuit diagram you'll see that when the set was a four-valver, the aerial was connected to a small aperiodic winding in the dual-range coil, which was loosely coupled to the tuned grid coil. Also, when receiving on the long waves, part of this winding was shunted by a small fixed condenser for stopping

"break through" from the medium band.

Now that the set has become a "five," this aperiodic winding is not used, the oscillations received from the H.F. stage being passed direct to the top end of the grid coil through a fixed condenser.

So now that this other condenser is not used, you may prefer to remove it, although we have not troubled to do so in the original model, but it is not included in this week's circuit diagrams. It happens that it is of the same capacity as the one we require to connect between the second H.F. choke and the first detector valveholder, so it could quite easily be used there.

An Important Point.

The "unwanted" .0003, however, is of a different type from the one that has been added, so if you make use of it, two connecting wires will be necessary.

There is one very important point I should like to impress on you all, and that concerns the pair of H.F. chokes. Whatever you do, stick to the specified makes and fix them in the exact positions shown. This is really most important, as when the extra stage

was first added the set showed a tendency to become unstable, and it was eventually traced to coupling between unsuitable chokes.

Not that all other makes are unsuitable, because no doubt some combinations might be quite O.K., but it is much better to be on the safe side and use the ones that are known to be all right when working together in a set of this description.

With the present arrangement it was utterly impossible to make the receiver misbehave in any circumstances. Even when using H.T. voltages around 200 volts

THE EXTRA COMPONENTS NEEDED

- 2 H.F. chokes (R.I. Quad Astatic, Telsen.)
- 1 .0003-mfd. fixed condenser. See text. (T.C.C., Telsen, Dubiller, Mullard, Sovereign, Graham Farish, Ferranti, Ediswan, Igranic, Formo, Lissen.)
- 1 .002-mfd. fixed condenser (Lissen, etc.).
- 1 4-pin valve holder (Graham Farish, Telsen, Lotus, Formo, Wearite, W.B., Igranic, Clix, Bulgin, Lissen).
- 1 10-ohm. fl. rheostat (Wearite, Colvern, Igranic, Ready Radio, Peto-Scott).

(120 volts is quite sufficient), and the most efficient valves, it was absolutely stable.

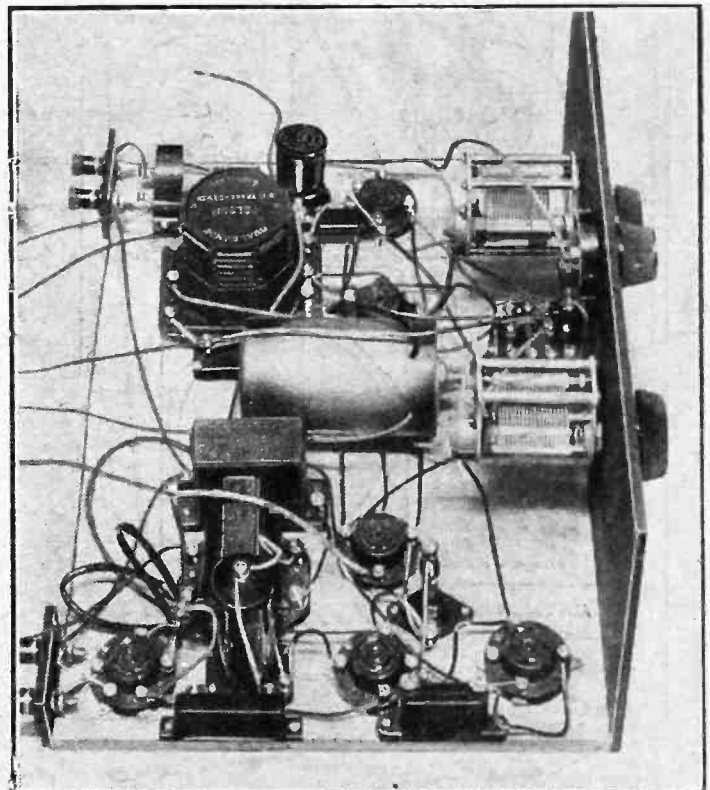
Well, you now have the "S.Q." Star in its final form, and I am sure that you will be thoroughly delighted with it. With all five valves working it is capable of the most amazing results, so powerful is it that nothing more than a small indoor aerial is really necessary.

Tiny Aerial Quite Effective.

Quite recently I tuned in Radio Toulouse at full loudspeaker strength, using an aerial which consisted of a length of stiff wire about three feet long, standing up vertically from the aerial terminal!

(Continued on next page.)

FEW ADDITIONAL PARTS



From the L.F. end of the set you can hardly see the few extra H.F. components on the baseboard! And yet the new valve pulls its weight in no uncertain manner.

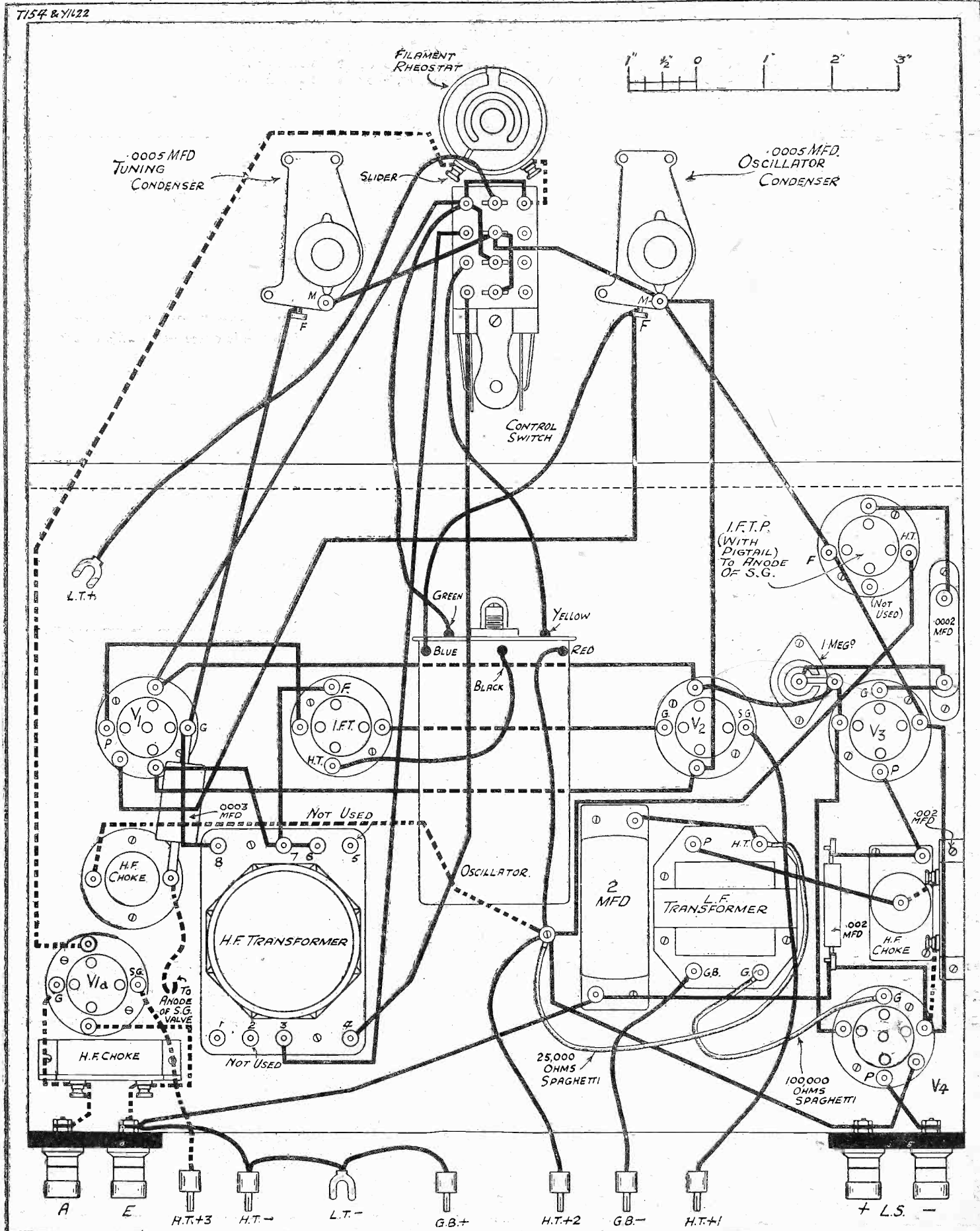
OR YOUR STAR SUPER

ANOTHER VALVE FOR "S-Q" STAR.

(Continued from previous page.)

If you do use an aerial much larger than about fifteen feet long the volume control needs handling with care. The reason for this is that all the valves would otherwise become hopelessly overloaded and the quality depreciate, for the set is extremely powerful.

In my own den I have rigged up a special aerial for this set, it runs across the room diagonally and is about nine feet long. On this short length of wire I can get almost any station in Europe, and a number from other continents as well.



Ready Radio

TESTED KITS

"S-Q" STAR

Components for adding a valve to the "S-Q" Star.

	£	s.	d.
1 T.C.C. '002 fixed condenser, type 34	1	10	
1 Junit Valve Holder		8	
1 R.I. Quadrastatic H.F. Choke		8	6
1 T.C.C. '0003 fixed condenser, type 34	1	6	
1 Wearite 15-ohm Rheostat		1	6
1 Mullard Valve P.M.12	1	0	0
Flex, Screws, etc.			6
	1	9	6

If ordered with Kit A add 9/6 to the cash price or 1/- to the monthly easy payment price. If ordered with Kit B or C add £1 9s. 6d. to the cash price or 2/9 to the monthly easy payment price.

THE ORIGINAL "S-Q" STAR

KIT "A" - £4.9.6

OR BY EASY PAYMENTS

8/3 and 11 monthly payments of 8/3

KIT "B" - £7.8.6

OR BY EASY PAYMENTS

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15/- and 11 monthly payments of 15/-

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1 ReadiRad "On/Off" Switch		10	
1 ReadiRad P.V.1. Coil	3	6	
1 ReadiRad P.V.2. Coil	3	6	
1 T.C.C. '0003 fixed condenser, type 34	1	6	
1 T.C.C. 2-mfd. fixed condenser type 50	3	10	
2 Junit Valve Holders	1	4	
1 ReadiRad 2-meg. Leak and Holder	1	5	
1 ReadiRad H.F. Choke	4	6	
1 R.I. Output Choke, type G.P.	12	6	
1 Lewcos 10,000-ohm spaghetti resistance	1	0	
1 R.I. Transformer, ratio 1-7, type G.P.	10	6	
9 Belling-Lee terminals, type R.	2	3	
1 Terminal strip, 14" x 2"	1	6	
2 Wander Plugs		4	
1 Pkt. Jiffilinx	2	6	
2 Valves as specified PM.2.DX, PM.22	1	8	6
Flex screws, etc.		10	
	£6	10	3

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You should also have a copy of the new Ready Radio Catalogue containing full details of all the most up-to-date radio equipment. Price 1/-, post free.

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KIT "A"

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£4.6.9

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8/- down and 11 monthly payments of 8/-

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(b) I will pay on delivery (not applicable)

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Address.....

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Blackheath, S.E.3.

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EASY PAYMENT ORDER FORM

THE MIRROR OF THE B.B.C.

By O.H.M.

B.B.C. AND TELEVISION

SONG PLUGGING—MISS HILDA MATHESON—A RADIO PANTOMIME.

THE curiously cryptic announcement made by the B.B.C. about television the other day has given rise to a lot of speculation in wireless circles. I am able now to disclose exclusively the facts of the position.

About a month ago Mr. Noel Ashbridge visited the Baird laboratories in Long Acre and watched a special demonstration. The Chief Engineer of the B.B.C. was considerably impressed by what he saw; so much so that he counselled the B.B.C. to become more active on their own in this matter of television.

After much deliberation it was decided definitely to begin next year the production of at least a one-hour programme weekly apart from the programmes provided by the Baird Company. Negotiations to this end are still in progress between the respective Boards of Directors.

The change in the attitude of the B.B.C. may make a considerable difference to the rate of progress of the development of television. Incidentally, if the B.B.C. plan matures, some stimulus may be given to the wireless trade to sell television apparatus for a new class of amateur experimenter that may arise.

Dame Madge Kendal and the B.B.C.

Dame Madge Kendal was recently cast for the part of Mrs. Siddons in an important radio production. All went smoothly until Dame Madge was told of the necessity for rehearsal under actual broadcasting conditions. Actually what happened then is uncertain, and Lady Tree was put in as a last-minute substitute in the leading part.

The B.B.C. gave no reason for the change. Dame Madge has not issued a public statement so far, but one is likely. I think the B.B.C. should be a little more careful to have their terms of rehearsal agreed before arranging such a cast and putting to inconvenience as distinguished an actress as Dame Madge Kendal.

Song Plugging.

Song plugging is again to the fore, and there are rumours of various kinds of drastic action. But nothing will come of them. Song plugging is now established as a matter of normal routine and will go on. Incidentally, it is a well-known fact that no bad dance tunes are plugged!

Miss Hilda Matheson.

I hear that Miss Hilda Matheson, who has been Talks Director of the B.B.C. for the past five years, has resigned and Savoy Hill will shortly know her no more. Miss Matheson has done remarkable work for the B.B.C. and the severance will be regretted by her large circle of influential friends. It is rumoured that Miss Matheson will undertake critical writing about the work of the B.B.C.

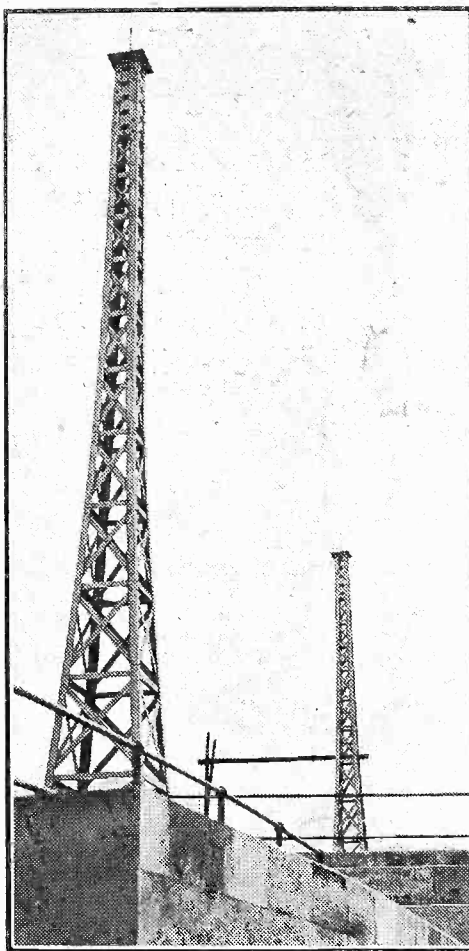
A Radio Pantomime.

There is still time to refer to the Christmas programmes and to amplify some of the points relating to the abundance of

seasonal fare to which I have already referred in previous issues.

Ernest Longstaffe has been entrusted with the preparation of the pantomime which is to be presented for National

"ALL HANDS ON DECK!"



At a glance you might think it was a view of a ship, but actually it is the roof of Broadcasting House, London, into which the B.B.C. is moving from Savoy Hill.

listeners on Christmas night and repeated as part of the Regional programme on Boxing Day.

This year's pantomime is "Aladdin," and it is the fifth Mr. Longstaffe has written for the microphone. The book, lyrics and music in every case are his own work entirely, and since Mr. Longstaffe also acts as his own producer there is nothing experimental about what should prove to be one of the most enjoyable items of the programmes.

Several broadcasting stars are in the cast of "Aladdin," including Harold Kimberley, who will play the name part; Leonard Henry, who will be "Wishy Washy"; Florence Marks (Widow Twanky); and Foster Richardson (Abanazer); Donald Davies, Cyril Nash and Philip Wade are also taking part.

Maggie Teyte as Cinderella, Miriam Licette as Prince Charming, Enid Cruickshank as the Mother, Joan Coxon as the Fairy, Kate Winter and Celinea Beauflis as the Ugly Sisters. Franklyn Kelsey as Pandolphe are the artistes in a concert version of "Cinderella," by Massenet, which will be given under the conductorship of Mr. Percy Pitt in the London Regional programme on Christmas Day.

Christmas Week Programmes.

The arrangements for special Christmas Week programmes from Provincial Stations, though perhaps less spectacular than those which will originate from the London Studios for the National and London and Midland Regional transmitters, are nevertheless interesting, and taken altogether one must readily admit that the B.B.C. intends to mark the festive season in the way that it deserves. Lack of space prevents me from elaborating all the Provincial Stations' plans, but I am setting out with a fair amount of detail the most important of the Christmas broadcasts as they have been fixed by the respective Regions.

Carol singing is always given a prominent place, and nowhere is it done better than in the North, where carols will be heard on Tuesday, Wednesday, and Thursday of Christmas week.

The Tuesday broadcast will be a relay from the Manchester Tuesday Mid-Day Society's Concert in which the Manchester Cathedral Choir is giving a recital, while the Wednesday programme, which takes place at 1.30 p.m., will be provided by the

(Continued on page 913.)

FOR THE LISTENER

By "PHILEMON."

The B.B.C. has always thought highly of its "educational" activities. Are they really of importance?

THE Bishop of Birmingham has never lacked courage. He believes in frontal attack. He also believes in attacking at the strong point. He has recently said that the educational value of the "teaching" side of the wireless programmes is practically negligible. That, indeed, is a blow on the heart!

The B.B.C. no doubt prides itself on all that it does. This is both wise and natural; for you are never likely to do much unless you believe that you are doing it better

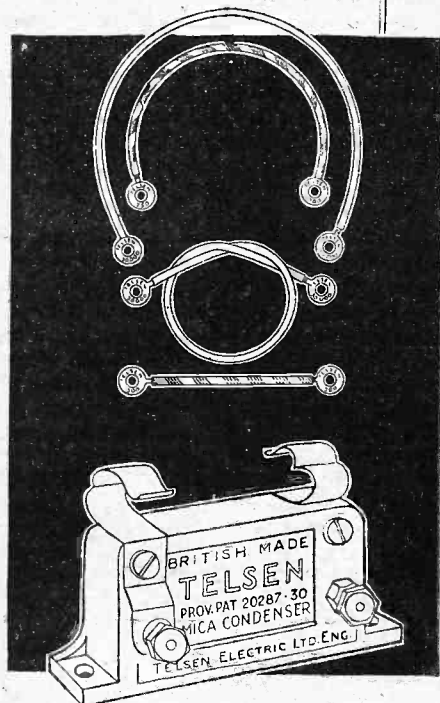
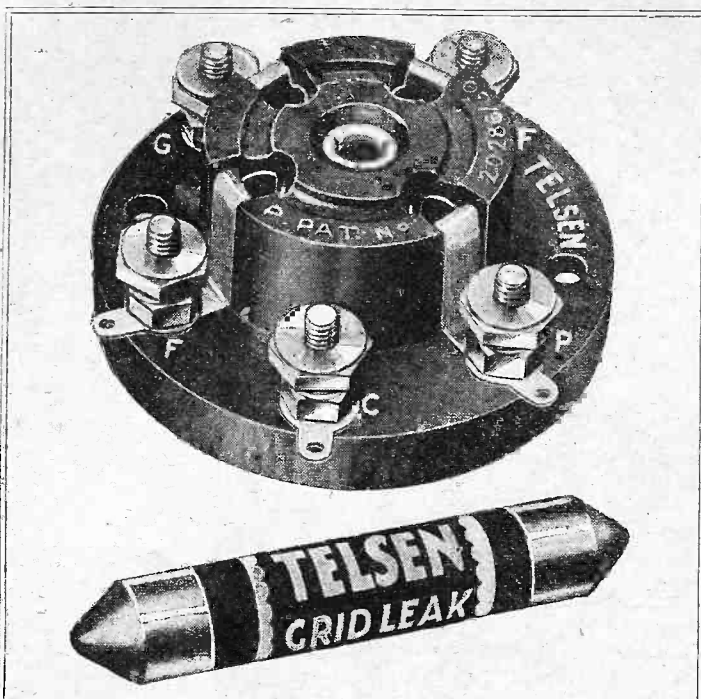
than anybody else could do it. You may be mistaken, but this faith in oneself—this superiority-complex, if you like—is an essential factor in success.

B.B.C. as an Entertainer.

The B.B.C. may have made private reservations in its own heart as to its value as an entertainer. In moments of candour it may have admitted to itself that this side of the business might be better done. But

(Continued on page 914.)

TELSEN RADIO COMPONENTS



SPAGHETTI FLEXIBLE RESISTANCES.

These are made in a range of values from 300—200,000 ohms with a maximum current varying from 42 m/a to 15 m/a. The terminal tags are firmly fixed to the wire and clearly marked with their respective resistance values; they are impregnated with special insulating compound which renders them proof against corrosion.

Telsen Spaghetti Flexible Resistances, from 6d.

FIXED CONDENSERS.

(Prov. Pat. No. 20287/30.)

Telsen Fixed Condensers are made in capacities from .0001 mfd. to .002 mfd. They can be mounted upright or flat, and the .0005 mfd. fixed condenser is supplied complete with patent grid leak clips to facilitate series or parallel connections. Price 6d.

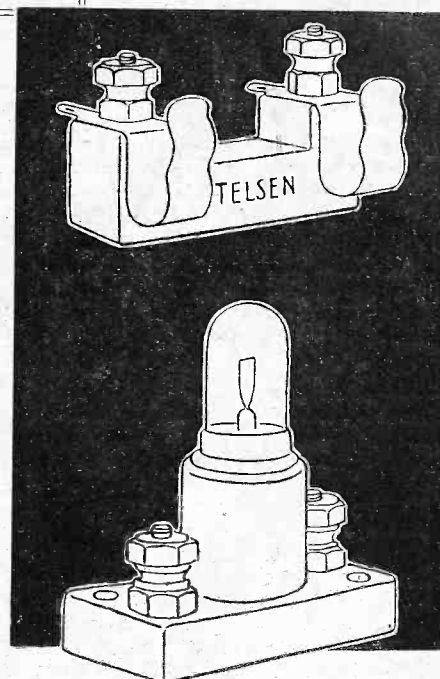
VALVE HOLDERS

(Prov. Pat. No. 20286/30)

The Telsen Four- and Five-pin Valve Holders embody patent metal spring contacts, which are designed to provide the most efficient contact with split and non-split valve legs, and are extended in one piece to form soldering tags. Low capacity and self-locating.

4-pin Valve Holder Price 6d.
5-pin Valve Holder Price 8d.

GRID LEAKS.—Telsen Grid leaks are absolutely silent and non-microphonic, and practically unbreakable. They cannot be burnt out, and are unaffected by atmospheric changes. Telsen Grid leaks are not wire wound and therefore there are no capacity effects. Their value is not affected by variation in the applied voltage. Made in values ranging from 1-5 megohms. Price 9d.



GRID-LEAK HOLDER.

Will hold firmly any standard size or type of grid leak. Ample clearance is provided between the terminal screw leads and the baseboard (underneath), preventing any surface leakage upsetting the value of the grid-leak. The terminals and fixing holes are accessible without removing the grid-leak.

Price 6d.

FUSE HOLDER.

This is a neat and inexpensive device which should be incorporated in every set as a precaution against burnt-out valves. The Telsen Fuse Holder firmly grips the standard radio fuse, giving a perfect contact. Price 6d.

TELSEN SCREENS

Price 2/- and 2/6

TELSEN

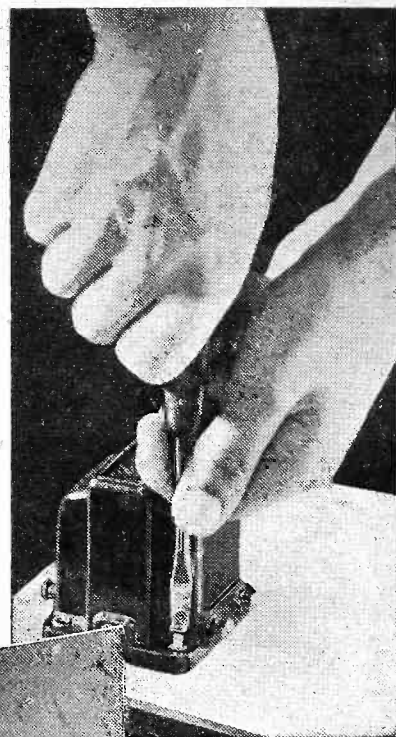
100% BRITISH
RADIO COMPONENTS

Send for the "Telsen Radio Catalogue" and book of "All-Telsen Circuits" to The Telsen Electric Co., Ltd., Aston, Birmingham.

MAKE YOURSELF A PRESENT OF

THE

TELSEN 3 KIT

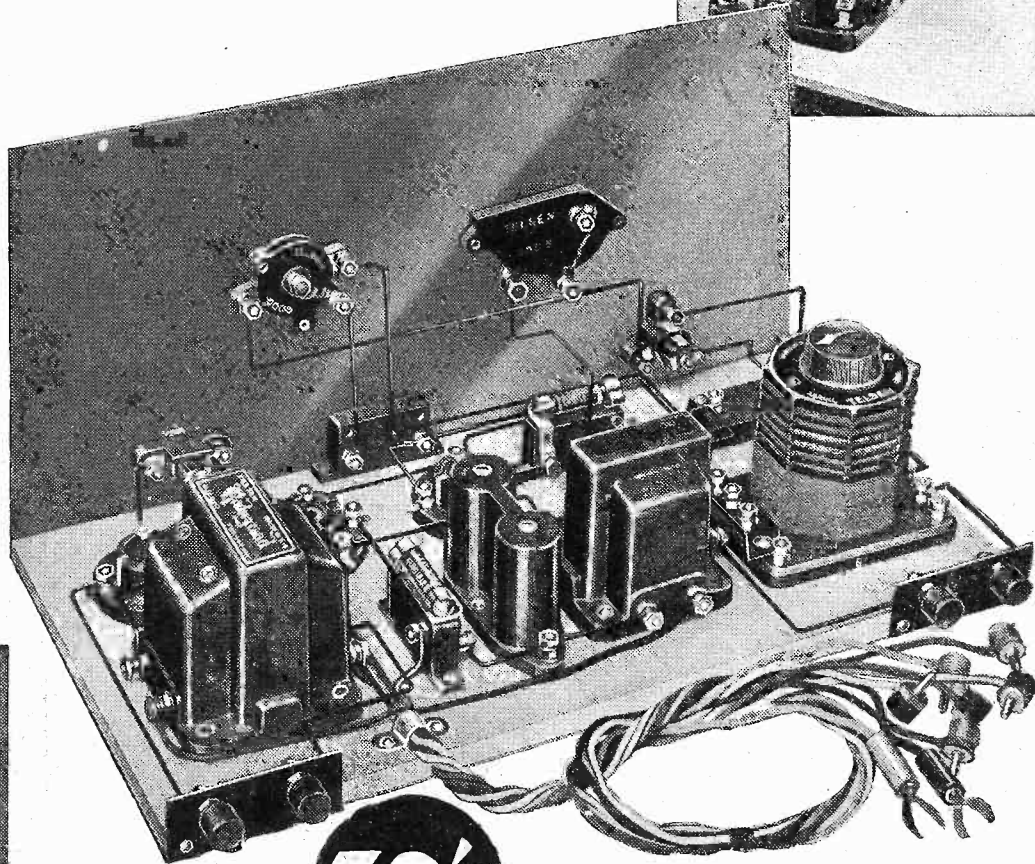


● Complete with all-British Telsen Components—panel, baseboard, battery, cord, battery plugs, terminals, connecting wire, terminal and escutcheon plates, full-size blue-print and point-to-point wiring chart, with full instructions etc., etc.

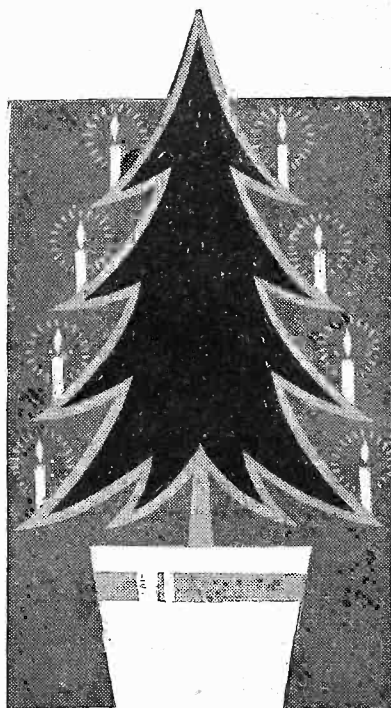
● Super 3-valve receiver, built entirely with all-British Telsen Components, matched for efficiency.

● Separation of Regional from National programmes guaranteed by incorporation of Telsen Dual Range Aerial Coil.

● Very simply built and simply operated. Full constructional details with every kit.



39⁶



Whether you make it yourself or as a present for someone else—in either event the building is easy and fascinating, and the results astonishingly good. The Telsen 3 is as simple to operate as it is to build. Have all the thrill this Xmas of listening-in to a radio receiver you have built yourself.

TELSEN

100% BRITISH
RADIO COMPONENTS

Send for illustrated folder of "The Telsen 3" Telson Electric Co., Ltd., Aston, Birmingham.



THE TELSEN

A kit set that deserves the constructor's closest consideration, both on account of its inexpensiveness and efficiency.

Described by a "P.W." Staff Technician.

3

OF the many thousands of constructors of POPULAR WIRELESS receivers there can be few who have not, at some time, incorporated in their sets components bearing the name "Telsen."

It is probably safe to say that considerations of economy have, in the first instance, usually prompted most set-builders to purchase "Telsen" components.

Possibly some readers have even been prepared to accept a slight deficiency in quality as a natural consequence of buying at such low prices. And just so many must have been agreeably surprised to discover what is an actual fact, that, despite their low price, Telsen components are very excellent productions.

A Popular Firm.

There is little doubt that the combination of good quality and low price which distinguishes Telsen components has resulted in many sets being built by people who could not otherwise have afforded to do so.

An even greater increase in set building must, therefore, be anticipated now that kits of Telsen components may be purchased. Such a kit is the Telsen Three. It costs thirty-nine shillings and sixpence! For this sum (and the writer has been asked nearly as much for a *single* component) a complete three-valve receiver can be bought.

When a request is made to pass an opinion on a receiver costing so little, it is impossible for the technical man to avoid taking the attitude that, in justice to readers, "snags" must be looked for and pointed out.

Our first endeavour was, therefore, to discover if the term "complete" could justifiably be used to describe the Three kit. The kit was found to be complete in every respect. It could be assembled on a desert island!

Efficient Design.

It was next thought that possibly the low price had been achieved by "paring down" the circuit design. The receiver is of the Det. and 2 L.F. type and, therefore, we imagined that the complete absence of any "de-coupling" had given us a clue to a possible "snag."

Inspection of the theoretical diagram, however, revealed that risk of L.F. instability had been obviated by a means quite as legitimate as expensive "de-coupling."

The detector is coupled to the first L.F. valve by means of a high inductance choke, while the coupling between the last two valves is by a low-ratio Telsen "Radio-

grand" transformer. Such a circuit arrangement of "mixed" couplings is well adapted to minimise any risk of "motor-boating."

Furthermore, the values chosen in the choke-coupled stage were such as to indicate greater possibilities of the set as a whole providing good quality reproduction than one would expect for an expenditure of less than two pounds.

At this stage it was decided that no theoretical fault could be found with the kit, so the work of assembly was embarked upon.

Suitable Valves.

Building the set is absurdly simple. The constructor works from a blue print, assisted by printed instructions which vie with the print itself in being easy to understand and follow.

The makers recommend employing Mazda valves of types H.L.2, L.2, and P220A. This is a combination admirably suited to the circuit requirements of the set, so we accordingly equipped our completed

The quality was *surprisingly* good, and even the use of a really high-grade moving-coil loudspeaker failed to show up any serious shortcomings in this respect. The set, in fact, does justice to a good speaker, and one can only express the pious hope that Telsen Three owners will one day be able to purchase, at Telsen price, a Telsen moving-coil loudspeaker!

Remarkable Results.

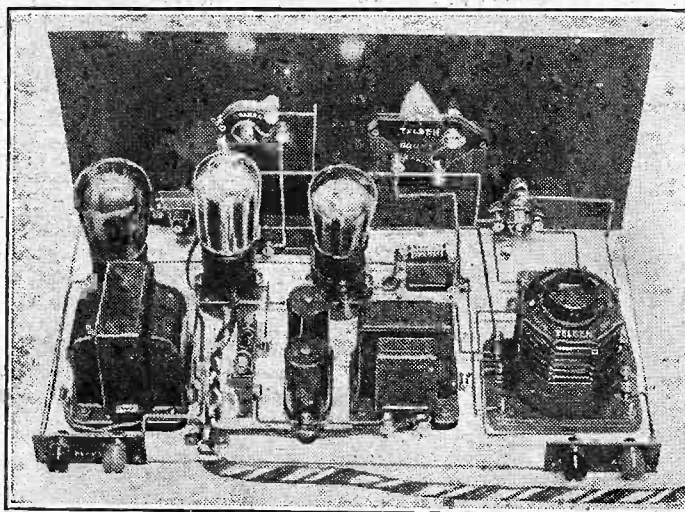
Under Regional reception conditions a receiver such as the Telsen Three is capable of providing excellently varied entertainment in addition to the Regional and National programmes provided by the B.B.C. The long wave-band can be relied upon, with a reasonably good aerial, to yield consistently satisfactory reception of various foreign transmissions, and both Radio Paris and Eiffel Tower were well received under the conditions mentioned above.

Reaction control is by differential condenser, and no POPULAR WIRELESS reader needs telling how valuable an aid to smooth reaction is this method of control. No difficulty was therefore experienced, when

testing the receiver, in picking up a good number of distant transmissions.

Actually, it was found that all those reliable medium-wave foreigners who have come to be regarded by listeners as possible alternatives to the local programmes could be well received. And by simple manipulation of the reaction control one can "tour the Continent" in comfort, dropping in on Rome for Opera, spending half-an-hour with Hamburg, or bringing in the Brussels programme with wonderful clarity and realism.

VERY EASY TO ASSEMBLE



Using the excellent diagram and printed instructions provided, the Telsen Three is remarkably easy to assemble.

version with these valves, a 120-volt H.T. battery, 2-volt accumulator, and 9-volt G.B. battery. Loudspeaker and aerial and earth were then connected up.

The makers state that the special selectivity device incorporated in the dual coil used enables them to *guarantee* separation of Regional from National programmes. In order to prove this contention our tests were conducted on a full 100-ft. aerial some dozen miles from Brookmans Park. Under such conditions both London's transmissions could be received entirely free from interference.

Positive Switching.

By the way, if any form of switch can be developed which is more reliable and positive in its action than the type adopted by Messrs. Telsen it will be an achievement!

To sum up, taking price into consideration, the Telsen Three kit probably represents the most complete value for money it has ever been possible to obtain in radio.

If any British home forgoes the pleasure of radio reception this year it will not be due to Messrs. Telsen's lack of true British enterprise.

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 questions direct to Capt. Eckersley; a selection of those received by the Query Department in the ordinary way will be answered by him.

"What About Those Guys?"

L. C. (Blackheath).—"I am about to erect a new mast for my wireless aerial. I have obtained a length of steel tubing, and in order to make a good job of it, it will be necessary to use three guy wires.

"Is it essential to break up these guys with insulators, or doesn't it matter? The aerial will only be employed for reception."

No! I don't think you will be greatly troubled if you earth the stays and make them continuous, but I won't be absolutely dogmatic on the subject.

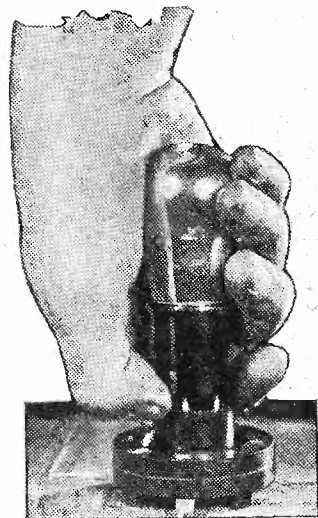
What I should do would be to try, and if reception seemed poor, just insulate the place where the stays join the ground. Your best plan is to erect the mast, not break up the stays, and if you are in trouble, insulate the stays.

If still in trouble—no! With a 30-foot mast and the aerial free end well away from the mast, you can't go wrong.

* * *

M.C. Pot Winding as a Smoothing Choke.

M. McG. (Dundee).—"It has been suggested to me that when a mains-driven moving-coil speaker is used with a large



THUMBS DOWN!

To pull out a valve by the bulb is to ask for trouble. It should be held as shown here. And if the thumb is kept on the anode pin when inserting a valve it helps to guide it into the holder easily.

mains receiver taking some 100 or more milliamps anode current, the field windings of the speaker could be inserted in the H.T. lead and there function as a smoothing choke.

"To this I have raised the objection that the magnet of the speaker is (or ought to be) fully saturated to make the speaker as efficient as possible, and could not, therefore, function as a choke. Is not my objection perfectly valid?"

Well, you know, even a saturated choke has some inductance. I imagine that the

ONLY IN "P.W."

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

AND REMEMBER—

Captain Eckersley's technical articles appear only in the "Big Three"—

"POPULAR WIRELESS,"
"MODERN WIRELESS," AND
"THE WIRELESS CONSTRUCTOR."

inductance of the windings of even a saturated choke would be greatly helpful in smoothing the rectifier impulses.

I speak with confidence, because I have seen designs where just this trick is resorted to. And, remember, the pot magnet has an air gap, and it isn't, therefore, so saturated as all that.

Anyhow, while it's not a perfect choke for a given copper and iron content, it's probably good enough as an economy, even though the smoothing condensers must be bigger than if a "good" choke were used.

* * *

What Caused the Flash?

J. L. (Ilford).—"I recently accidentally applied 4 volts to the filament of a small 2-volt power valve. This, of course, rendered the valve useless, and I decided to break the glass envelope to inspect the internal construction.

"It was dark, and I went into the garden and hit the glass with a piece of iron. It was quite hard to break, but an extra sharp tap broke the glass and there was a bright flash!

"I feel sure this flash actually occurred, as my brother happened to be watching me through a window, and he asked me what I now ask you, 'What caused the flash?'"

I really don't know! Was it that the iron hit something so hard that, as with a flint, it drew sparks. Flint and steel—which is important, the flint or the steel? And isn't glass as hard as flint?

Or was it that the chemicals (of getters) inside the valve coming in contact in the air flared up. I am not a chemist and I haven't the vaguest notion of what they put in valves.

Will any reader who knows come to the rescue of J. L., Ilford, to whom I offer my thanks for an interesting query, my apologies for my hesitations in what could hardly be called an answer!

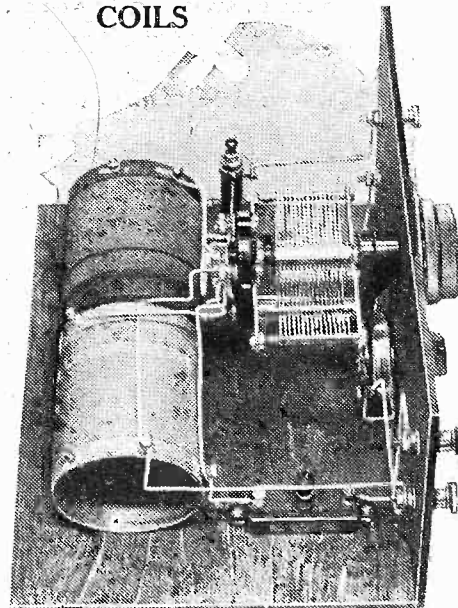
Super-Het. Interference.

R. L. K. (Monmouth).—"I am seriously troubled when receiving stations on long waves with my "super-het" by an almost continual background of a twittering noise. This does not seem to be Morse transmissions, but a friend has informed me that the trouble is due to interference from commercial stations which are working on a frequency close to the frequency of the intermediate amplifier.

"Is this the cause of the trouble, and is there any way of preventing this interference?"

Yes, your friend is right. The aerial is excited (shock) and, by various spurious couplings, the impulses of the jamming station may find their way to the intermediate stages and there be amplified, heterodying with your signals.

MOUNTING TUBULAR COILS



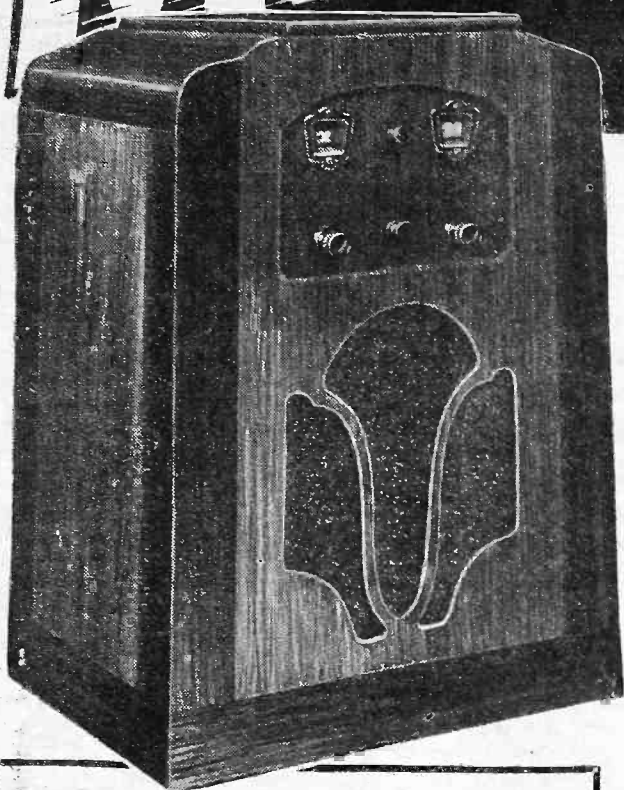
An easy method of mounting tubular coils on a baseboard is to make a hole through the end of the former and drive a screw into the baseboard from the inside of the former, providing a washer, if necessary, to prevent the former breaking.

Again, if the intermediate circuits are not very carefully screened they may easily pick up the long-wave stations direct. The cure is two-fold (a) make the circuits dealing with the frequencies of the stations you want highly selective, (b) screen the intermediate circuits very thoroughly.

A combination of these cures should do the trick, I think.

METEOR III

The new ALL-WAVE Quality Receiver



Equal in appearance to a 15 Gn. model

METEOR III KIT

Full set of Components with polished panel (cut and drilled), baseboard, Jiflinx, screws, etc.

PRICE 75/- or

9/- DOWN and 7 monthly payments of 10/6

METEOR STANDARD CABINET MODEL

Kit as above with Standard Cabinet

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METEOR CONSOLETTA CABINET MODEL

Kit as above, with Consolette Cabinet, as illustrated

PRICE £5:0:0 or

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The most interesting receiver ever designed! Possesses all the most attractive features of a modern 3-valver, plus a number of unique advantages.

SENSITIVE AND POWERFUL—so that you may be sure of a good choice of programmes from home and abroad at excellent strength.

ADJUSTABLE SELECTIVITY—so that each programme may be received free of interference even under the most difficult conditions.

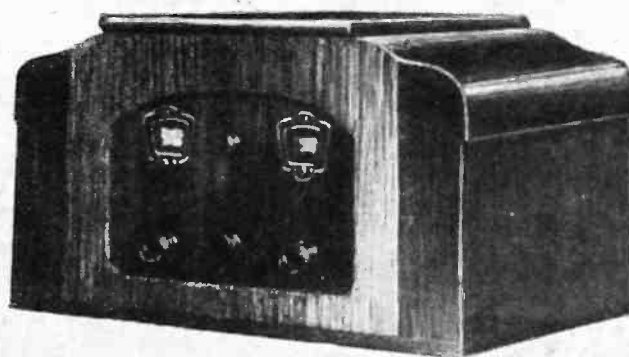
QUALITY—so good that you will *really* enjoy the programmes you receive.

EASY TO TUNE—single knob tuning with slow-motion control.

SLOW-MOTION REACTION—of wonderful advantage when tuning-in distant stations.

RADIO-GRAM SWITCHING—with connections for pick-up, *and in addition,*

ULTRA SHORT-WAVE TUNING, enabling you to enjoy the fascination of Short-Wave reception—AMERICA, AUSTRALIA, AFRICA, THE CONTINENT, etc.



The beautiful Meteor Consolette Cabinet, illustrated on left, in polished oak with figured panels, is designed to house the set, speaker and batteries. The standard cabinet, illustrated above, is of similar design, but contains the set only.

FOR FURTHER DETAILS SEE PAGE 901

ALL-BRITISH

READY RADIO

1/- Full size plan FREE

A Visit to the New RADIO PARIS



STRANGELY enough, although Paris is my business headquarters, I have never managed to visit the transmitter of the old C.F.R. station.

When one of the engineers of the Société Française Radioélectrique—the concern who built the new 120-kilowatt station—managed to get me a permit for an afternoon visit to the newcomer, I jumped at the chance.

On High Ground.

Saint Remy-l'Honore, the new station site, is a quiet provincial district just twenty-three miles south-east of Paris. I do not know what its geographical height above sea level is, but in the car I got the impression that the ground rises at the station, and at the actual site there is a view of several miles in one direction.

The three masts are visible for some long time before one gets to the station. They are of the parallel-side pillar type with dozens of guy wires. They give the impression of being about as high as those at Moorside Edge and, my guide told me, they are 600-ft. high.

An aerial of rather unusual shape is hung between the three masts and there is a lead-in of the "sausage" variety. The new station is in a plot of ground which the C.F.R. officials have specially taken over. From what I gather it was chosen chiefly because the site was readily available and at the right price. No engineers went down in advance to make sure that it was a good transmission centre.

No Radiation Tests.

It was too obvious that owing to the good height and the clear surroundings there would be no difficulty about radiation. Economic necessities made it essential, too, that the station should be on this south-east side of Paris.

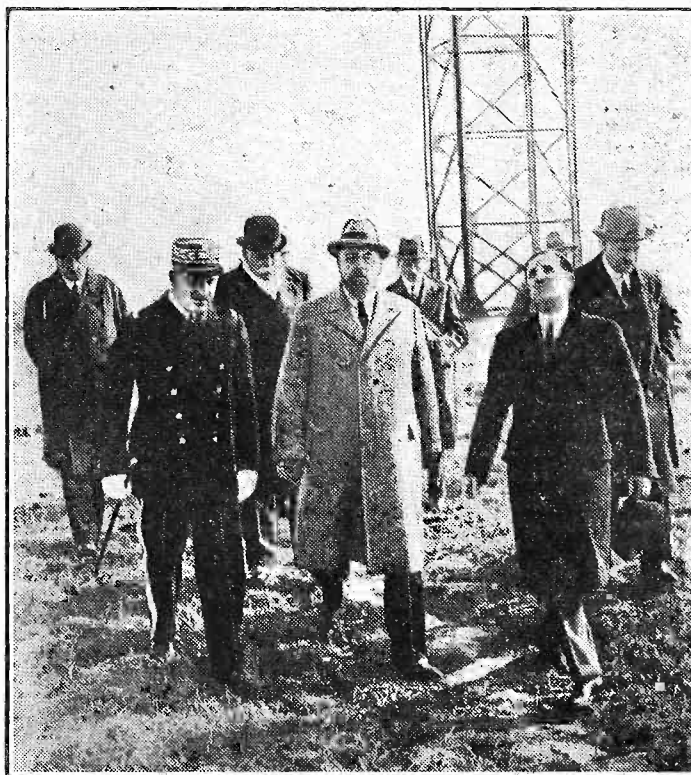
There was, as well, the all-important factor to be taken into consideration that A.C.

An account, exclusive to "Popular Wireless," of our Special Correspondent's visit to the new Radio Paris—the first British radio expert to make a personal visit.

power lines from a generating station just outside the capital ran reasonably close to the proposed site, and if—as was originally planned—there was any reason why they should not have Diesel engines and generators at the station, then here was a source of A.C. power waiting to be tapped.

The car dropped us at the entrance to the station plot—a field—and we walked up the newly-made path.

THE OPENING CEREMONY



M. Guernier, Minister of Posts, Telegraphs and Telephones, arriving at the new Paris station for the opening ceremony.

The station building appears, from the outside, to be a lofty affair, but there are only two floors, the main transmitter hall being a "double decker." There is no real reason for this, and the transmitter gear appears tiny in the middle of the spacious hall.

But there is a possibility that having risen in one bound from 17 kilowatts to 120 kilowatts, the station may need another power rectifier and H.F. output panel if the battle of the ether giants goes on! This much the engineer hinted!

We went straight in to the transmitter hall through glass doors. There is a control room and a small office in another part of the building, but one does not necessarily have to go through the office before seeing the engineers.

The lead-in—the end of the "sausage"—is anchored in a large block in the ground and a comparatively thin cable trails off through a little window, appearing to be of glass, but actually, I suppose, of silica, at the top of the transmitter hall. It comes down inside to the main H.F. panel carrying the big water-cooled valves.

Like Our B.B.C.

I should perhaps explain that the C.F.R. officials who run the station correspond to the B.B.C. C. F. R. stands for Compagnie Française Radiophone, a body acting under State control very much on the same lines as does the B.B.C. The C.F.R. does not deal with technical matters, and it puts out the contract for the new Radio Paris to the Société Française Radioélectrique, which incidentally is one of the leading French electrical manufacturing concerns.

I was introduced to the man at the control panel, and then we started on a tour of inspection.

The general arrangement is rather unusual; in fact, the new Radio Paris looks very much like
(Continued on next page.)

FREE FULL SIZE 1/- PLAN and complete building instructions

Go to any radio dealer. Ask him for your FREE copy of the Meteor Folder. Read all about this fascinating ALL-WAVE ALL-PURPOSE Receiver. The full-size plan will prove to you how easily and quickly the Meteor can be built. No cutting or drilling—the polished panel is all ready cut and drilled. No soldering—Jiffilinx of correct lengths are supplied ready to drop into position. A screwdriver and pliers are the only tools you need.

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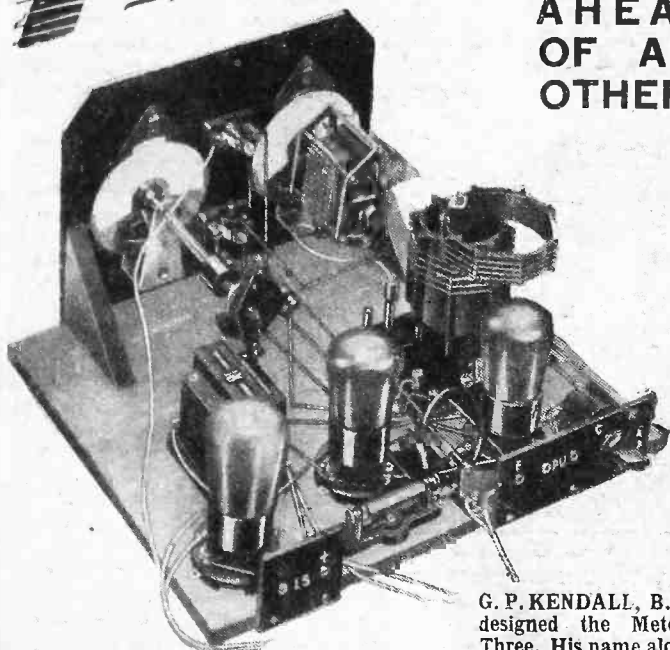
If any difficulty, post coupon at once.



The

METEOR III

**AHEAD
OF ALL
OTHERS**



*View of interior of Set with
Mullard Valves as specified
by the designer.*

G. P. KENDALL, B.Sc. designed the Meteor Three. His name alone is sufficient guarantee that the Meteor is a "Super" receiver in all except price.

The Meteor is not just an old circuit served up in a new form. It is really new and represents months of extensive research. It is a modern receiver for modern conditions. It is not just limited to the normal and high wave-bands, but also tunes in the ULTRA-SHORT WAVE STATIONS in all parts of the World. Over 70 Short-Wave Stations are listed in "World Radio"—think what you are missing by not hearing them.

No need for you to suffer the expense and inconvenience of a separate Short-Wave Set—build a Meteor and you have a receiver which covers ALL wavelengths, with single dial tuning.

It also acts as an electrical reproducer of your gramophone records, giving exceptional quality and full volume.

SPECIAL FEATURES:

J. B. Special Air-Spaced-Low-Loss Tuning Condenser.
18 to 1 Slow-Motion Tuning Control.

Anti-Capacity Extended Reaction Control with SLOW-MOTION DRIVE.

R.I. Transformer for quality amplification.
Condensers by T.C.C.

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Kendall Loose-coupled Air-Spaced Tuning Coils.

Adjustable Selectivity Device.

Radio-Gram. Switching.

ALL-WAVE TUNING.

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Showrooms: 159 BOROUGH HIGH ST., LONDON B.D.G.E., S.E.1

A VISIT TO THE NEW RADIO PARIS

(Continued from page 900.)

a German transmitter. Most of the panels are enclosed and there is a control desk in front of the four panels which carry the intermediary push-pull stages.

The control desk has three knobs (which, by means of an ingenious remote control system, regulate the rectifier panels), and twelve main high-tension meters, giving a rough idea of the voltages on the valve anodes and of the peak voltages when the transmitter is modulating. These meters are of the edge-on type that one sees in power stations.

Measuring the Modulation.

A large-scale circular meter in the centre is a virtual indicator of the depth of modulation, and the control engineer checks up the reading of this with that of the peak voltmeter on the panel of the L.F. amplifier in the control-room.

In the original design of the station the engineers had intended to copy Brookmans Park and have a big Diesel engine and a large A.C. generator. When they came to look into the cost, though, they found that it would be cheaper to take power from the local lines.

On the spot where the Diesel engine would have stood is an open rack carrying a bank of mercury arc rectifiers. The incoming supply is three-phase A.C., and the mercury arcs turn this into D.C.

Water-cooled valves are used in the final stages of the transmitter itself. There are fourteen water-cooled valves altogether.

There should not be complaints about the new Radio-Paris wandering on its wave-length. The station is master-oscillator driven. All the B.B.C. stations are master-oscillator driven. Radio Paris should now be as stable as 5 X X. The master oscillator is in a screened compartment and there is a "trap" valve between the oscillator valve and the first stage of the actual transmitter.

Push-Pull Valves.

Another way in which the French engineers have copied B.B.C. practice is in having push-pull stages. The sequence of the transmitter is this: master oscillator, trap valve, two 60-watt push-pull valves, two water-cooled push-pull valves and two banks of six water-cooled valves, each handling 10-kilowatts, in the last stage. The rectifier panels have four separate

sections, giving the H.T. voltages for each part of the transmitter.

The first push-pull valves—big glass-bottle jobs running very hot—have just over 1,000 volts on their anodes. The water-cooled valves take 12,000 volts!

There are no special arrangements for cooling the valves, the cooling water comes in from the mains via an impeller pump and trickles out down the drain when it has done its job. Three meters above one of the push-pull panels show the rate of flow of the cooling water.

The Quality Question.

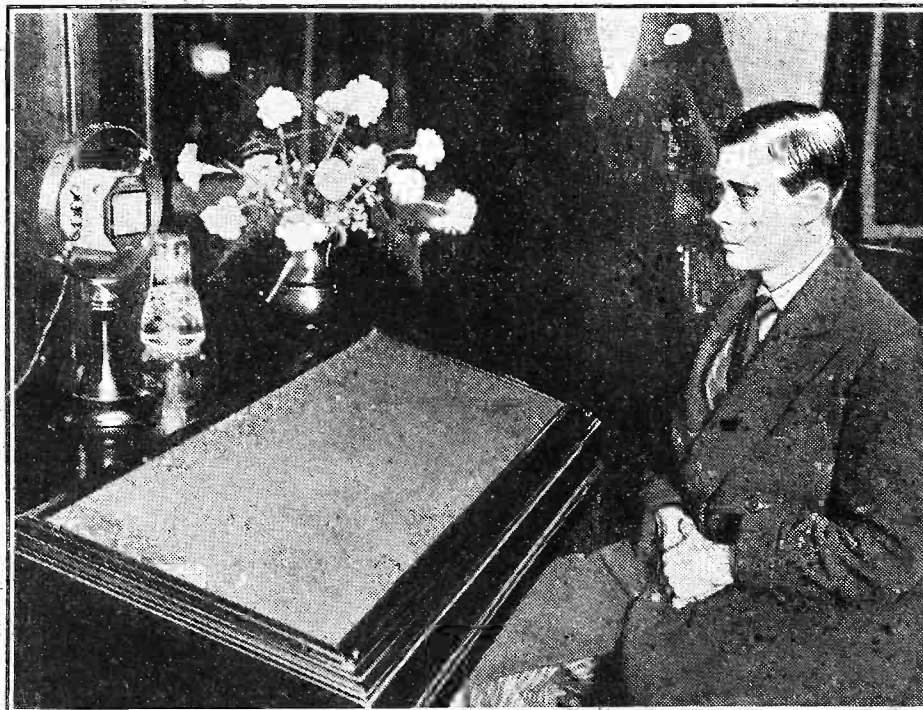
Parisien listeners have been very doubtful about the sort of quality they would get by moving the transmitter so far away from the studio. The engineers were doubtful, too. That is why there was so much delay in opening the station.

The French postal authorities were asked to put down a special cable, the cut-off limits of which would be 30 to 10,000 cycles.

An ordinary buried cable was tried, and it was found to cut off at 100 cycles! The Post Office Technical experts were called in, and they suggested enclosing the cable in an aluminium tube running the full length from Saint-Remy to Paris.

This is the final arrangement, and it seems to work well. It ends in the control-

"BUY BRITISH" BROADCAST FROM BIRMINGHAM



When the Prince of Wales recently inaugurated the "Buy British" campaign from the Birmingham studio, it was the first time he had addressed the whole nation from a provincial station. The Prince is here seen in front of the "talks" microphone.

room at the station and two L.F. amplifiers, transformer-coupled and standing on open racks, boost up the line signals before passing them on to the first modulating valve of the transmitter.

As we went back through the transmitter hall the plant was switched on. I happened to notice the large number of tapings in some of the H.F. circuits, and asked the reason why.

What I learned was that although the present working wave-length of Radio Paris is, of course, 1,725 metres, the master oscillator can be adjusted so that the final

wave-length can be varied several hundred metres each way. If ether congestion gets too serious before the forthcoming Madrid Conference, then the Radio Paris engineers will easily be able to take matters into their own hands and find a better wave-length position, not clashing, we hope, with 5XX!

WORTH NOTING! A Handy Year Book and the "P.W." Cabinet Scheme

USEFUL FOR DEALERS.

The 1932 edition of "The Wireless & Gramophone Trader Year Book & Diary" should prove of valuable assistance to manufacturers and retailers of wireless and gramophone goods every day throughout the year.

In this edition the feature entitled "Practical Service Methods" deals with the broad principles involved in the service work the dealer is normally called upon to perform. A further entirely new feature is a seven-page Directory of Mains Supply Voltages, covering Great Britain and Ireland, with selected towns in the British Empire.

All the wireless and gramophone technical data and broadcasting information has, of course, been revised to date. It is presented in a new form providing more convenient reference.

The Trade Directory portion include lists of Manufacturers, Manufacturers' Agents and Wholesale Factors—their addresses and telephone numbers; proprietary names of wireless and gramophone goods listed with the name of their suppliers.

"The Year Book" is as usual issued to subscribers to "Trader" journals at the special price of 3s. 6d. post free, the price to non-subscribers being 5s. 6d. post free. It is published by The Trader Publishing Co., Ltd., at St. Bride's House, Salisbury Square, Fleet Street, London, E.C.4.

IT HOLDS ANY SET.

The Editor.

POPULAR WIRELESS.

Sir,—Your new cabinet scheme is good. May I, however, point out an obvious fault—a cabinet will be of use for one set only. The controls of the next set may coincide, but that does not often happen nowadays. I have had a similar scheme in operation for the last four years, and my lower space in the cabinet measures 21 in. x 7 in. x 10 in. deep. Many "P.W." and "M.W." sets have graced its bosom. The front opening is rectangular, with corners rounded and rounded edges; and, of course, takes any set that can be contained in above sizes. The set slides in from the back in the conventional manner—loud speaker above, also filter circuit, L.S. remote control, tone control, Brookmans rejector, mains unit, and accumulator. I can add radio-gram on top if I so desire. Loudspeaker fret in front at top. Two doors closing entire rear.

The cabinet is trade made (I am in the cabinet trade) and, I believe, is a pioneer of this type of cabinet, although it looks quite up to date. If one of your people should happen to live in my neighbourhood, and cares to call in and see it, I should be pleased.

Yours truly,
ERNEST COOK.

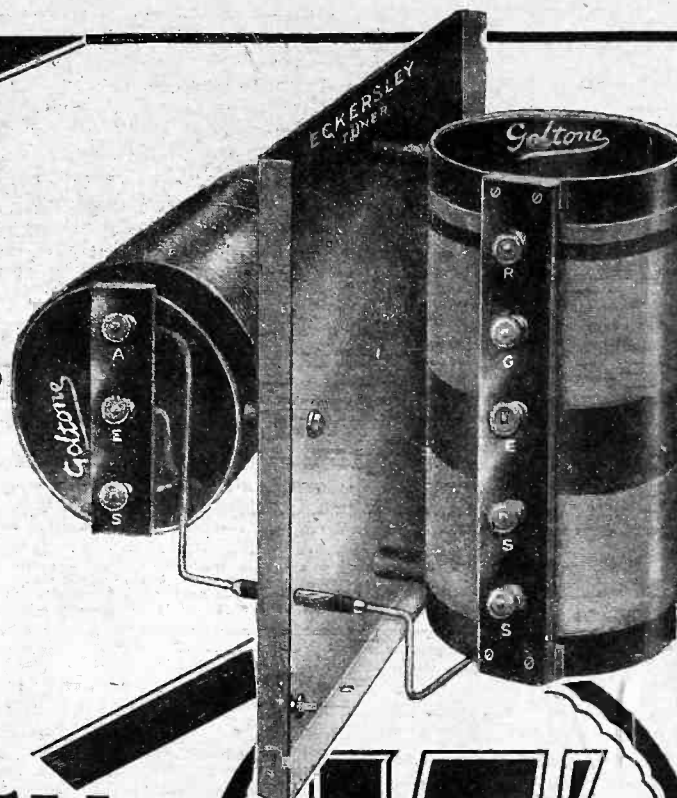
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The "GOLSTONE" ECKERSLEY TUNER represents an entirely new idea in Selectivity devices. Robustly constructed, and wound with best "GOLSTONE" Double Silk Covered Instrument Wire on High-Grade Formers.

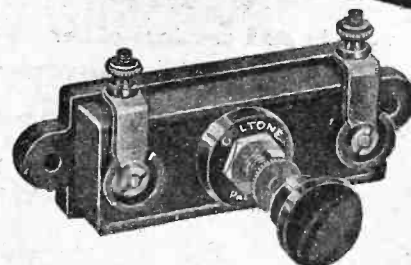
Fitted with nickelled terminals and soldering tags, and incorporating a Special Coupling Resistance. Strong Aluminium Screen.

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Obtainable from all first-class Radio Stores.
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A unique feature is that this Condenser can be mounted on the panel and adjusted from outside the set as with the ordinary controls.

Type "F" ('0001 to '000005)	} 1/- each.
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All Editorial communications should be addressed to the Editor, POPULAR WIRELESS, Tallis House, Tallis Street, London, E.C.4.

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

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

QUESTIONS AND ANSWERS

THE GRID ON THE BULB?

W. D. (Barking).—"I have obtained an American screened-grid valve, but am half afraid to use it because I am uncertain as to which connection corresponds to which. What would be the best way of finding out?"

It is an American practice to put the control grid terminal on the bulb itself in the same way that we

in this country put the anode terminal on the bulb itself. You can be pretty sure that this terminal then is the control grid, and you will have to find out by test which of the four pins correspond to outer grid, and to plate, and which two to filament.

The two which are connected together by the filament can easily be determined by a 1½-volt cell in series with a pair of telephones. You will then be able to switch on the valve and try it out, for the easier way to discover the remaining two will be under operating conditions.

Having got the filament connections O.K., and the control grid, you have merely to try different values of H.T. on the two remaining terminals to determine which should have more, this, of course, being the plate terminal. As both these unknown terminals will need H.T. you can safely make the trial connections with the rest of the circuit connected up.

FROM RADIO-PARIS.

"CURIOUS OLD-TIMER" (Littlehampton).—"Is it a fact that 'Uncle Rex'—Mr. Rex Palmer—is returning to the microphone? Personally I thought his Sunday evening renderings of 'Abide With Me,' and his easy and friendly way with his microphone audience, were one of the bright spots in B.B.C. programmes of the past."

Mr. Rex Palmer is not, so far as we are aware, likely to be broadcasting from a B.B.C. station, but probably what you have heard about his reappearance was due to the fact that he is now "on the air" from Radio-Paris, on Sunday afternoons.

When "Uncle Rex" left the B.B.C. he went over to The Gramophone Company (H.M.V.), and they

(Continued on page 906.)

WHAT'S WRONG WITH IT NOW?

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

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

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

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

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

Why this **BRITISH** machine-made dry battery lasts longest . . .

A dry battery loses efficiency the moment one of its component cells ceases to function at its full power. Therefore the best battery is the one in which each individual cell is made to the highest possible standard. In a Fuller 'Super' Battery each cell is machine-made and machine-tested. It is absolutely impossible for a cell which is nearly right to get into a battery. A machine which cannot make mistakes automatically rejects any cell which is not up to the stringent Fuller standard. Prolonged tests under all conditions have proved the Fuller 'Super' to be the finest wireless battery; and it is good to know the finest battery is British. Fit one on your wireless and it will take on a new lease of life.

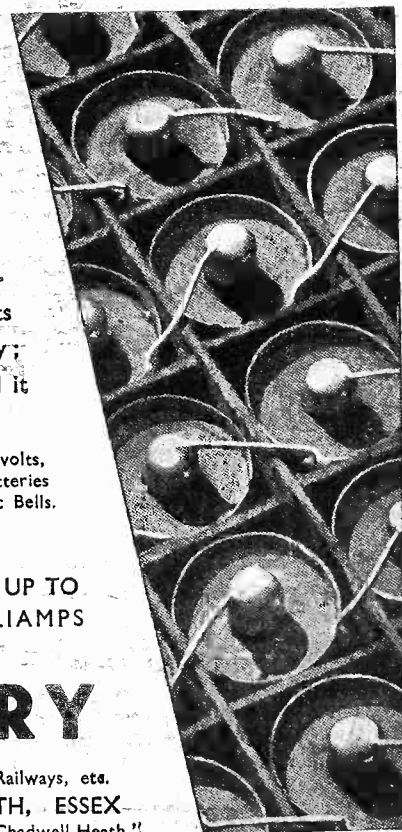
Fuller H.T. Dry Batteries are obtainable in all types and sizes 60-120 volts, prices ranging from 5/3 to 15/3. Also Portable, Triple and Grid Bias Batteries and a full range for Torches, Flashlamps, Cycle Lamps and Electric Bells. Write for list D3.

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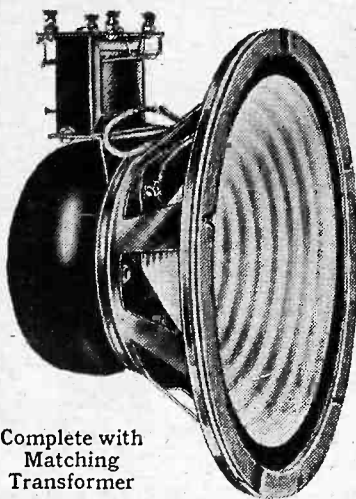
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M.C.6 UNIT. PERMANENT MAGNET

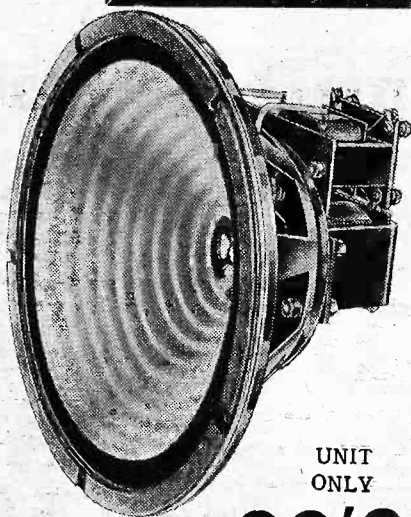
This famous Amplion M.C.6 Unit is acknowledged as the most efficient moving-coil speaker at its price. Its sensitivity and true reproduction are really remarkable, and it handles without distortion adequate volume for all normal requirements. It is as sensitive as a balanced armature speaker, and the universal transformer which is fitted enables the speaker to be correctly matched to either power, super-power or pentode output from standard 2-, 3-, or 4-valve receivers.

Complete with
Matching
Transformer

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THE E.M.644 UNIT. D.C. ENERGISED MODEL

Another of Amplion's successes is this D.C. Energised Model. Ideal for A.C. sets. Its perfect performance and reproduction has been proved by its inclusion in the famous "Amplion Six" receiver, which has reached record sales. Ideal for home constructors to incorporate in A.C. receivers and radio-grams. A most efficient unit for D.C. voltages 100/110, 200/240. Full details of alternative methods of operation supplied with each model.



UNIT
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UNIT WITH
MATCHING
TRANSFORMER

42/-

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The M.C.9 Unit is a permanent magnet, but is much larger and more powerful than the M.C.6. A suitable matching transformer for this model can be supplied at 15/- extra.

UNIT ONLY.
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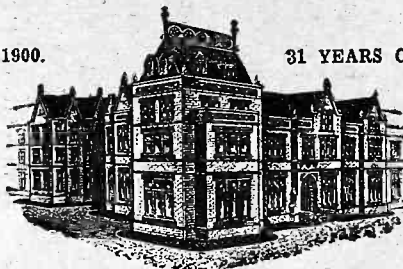
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RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 994.)

have arranged a series of gramophone-record concerts, announced by "Uncle Rex," to commence at 3 p.m. on Sundays, and to last till 4 p.m.

Radio Paris is increasing its power to 85 kw., so it should be easy to pick him up at good strength. The wavelength is 1725 metres.

THE WORLD'S STATIONS.

S. W. R. (Portsmouth).—"Ariel's" note about world call-signs, etc., reminds me that I did not get the complete list and map of world broadcasting stations recently published.

"Can this still be obtained, and if so, how much, and where?"

The only complete map of world broadcasting available to the public is that presented with the November issue of "Modern Wireless."

It is a 2s. 6d. map (printed in colours, with index), but so long as the back numbers of the issue in question are available it can be obtained for 1s. 3d. by ordering the November issue of "Modern Wireless," with which the map is given away.

If unobtainable locally this issue of "M.W." can be purchased from the publishers:

The Amalgamated Press, Ltd.,

Back Number Dept.,

Bear Alley,

Farringdon Street,

London, E.C.4.

Price 1s. 3d. per copy, post free.

HELPING A "P.W." PAL.

The Editor wishes to thank the many readers who so kindly volunteered to help a fellow-reader recently, in connection with a missing blue print he required: E. G. H. (Edgbaston), E. W. W. (Newport, Mon.), J. E. F. (Swanage), A. M. (Reigate), and C. P. A. (Dundee), who wrote specially to offer their assistance, are all most cordially thanked, both by the reader in question and by ourselves.

CONNECTING THE COIL QUIT.

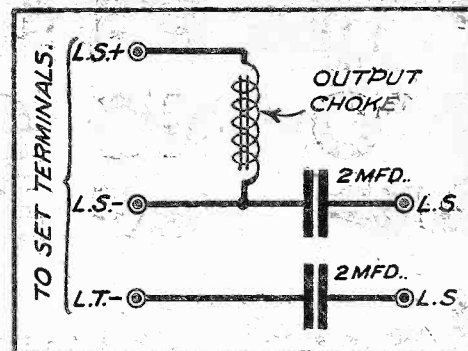
T. G. (Reading).—"I am stuck up in building the 'Dual-Ranger'—or at least I shall be at the end of this week, when the panel and baseboard arrive—because I do not understand how to connect up the Coil Quit.

"It is marked with the following letters: 'R', 'G', 'E', 'T1', 'T2'. These are not given on the 'P.W.' Blue Print No. 61, so please explain the connections from the Coil Quit itself to the P.J.3 coil and wave-change switch, etc."

It is important to get them all right, or otherwise all sorts of unexpected—and possibly unpleasant—results may arise.

However, so long as the distinctive markings on the Coil Quit are plain it is a perfectly simple matter to join them correctly in circuit, as you have only to follow the directions given below. But although it is only the work of a few minutes we would point out that all these connections are vitally important ones, and that they must, therefore, be made soundly—half-light terminals, whiskery connections, over-

MISSING LINKS, No. 23 AN OUTPUT FILTER.



This diagram gives the complete connections of the loudspeaker filter (or output filter), from which one of the "components" was purposely omitted last week.

A suitable minimum value for the choke is 20 henries, and sometimes a higher inductance is necessary for best results.

tightened nuts and stretched wires are specifically barred!

Taking the points one by one, we first tackle "E." This must be joined as shown on the Blue Print, where E goes by a flex lead to the moving vanes of the second '0005 tuning condenser (from whence it makes connection to the other wiring to filament terminals on valve holders, to on-off and wave-change switches, to screen, and to other points).

Having settled the "E" connection, turn to the "R" terminal (start of reaction coil), which must be joined to one place only, namely, to Z on the P.J.3 coil. (Green lead).

Next turn to "G" (end of grid coil), which goes to two points, viz. to "Y" on the P.J.3 coil (black lead) and to another of the contacts on the wave-change switch.

Finally we have the two tapping points to consider, "30 turns" (T1) and "60 turns" (T2).

(Continued on page 998.)

"P.W." PANEL. No. 49. Loss of Emission.

When a valve is getting near the end of its useful life it begins to "lose emission."

This means that its filament coating is failing, and even though correct L.T. and H.T. are applied, the anode current will fall below normal.

Reduced readings from a milliammeter in the plate circuit is the clearest indication of failing emission, but as it proceeds it causes distortion and a reduction of volume.

The only cure is a new valve.

A NEW TUNGSRAM HIGH-POWER OUTPUT VALVE



The new Tungram P460, one of the new Tungram range of High-Power Output Valves, is expressly designed for those who wish to construct gramophone amplifiers. Using this valve the undistorted output of the amplifier is 1500 milliwatts or more. The filament can be operated from a 4-volt accumulator, or from the secondary winding of a suitable transformer. It is designed for operation at an anode voltage of 220 volts, and the anode current consumed is 50 m.a.; the grid-bias voltage required is 35 volts. Price 16/-.

Write for further particulars of the complete new range to Department B. Prices from 5/6 to 19/-.

TUNGSRAM ELECTRIC LAMP WORKS (GT. BRITAIN) LTD., Radio Department, Commerce House, 72, Oxford Street, LONDON, W.1

Makers of the famous Tungram Electric Lamps.

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Branches in Birmingham, Bristol, Glasgow, Leeds, Manchester, Newcastle, Nottingham, Southampton.

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Photo-electric cells: Nava "E" (for scientific measurement) £2 17s. 6d.; Nava "R" Red sensitive cell (for colour matching devices) £3 3s. 0d.; Nava "EH" (for public address work) £3 13s. 6d.

P460

TUNGSRAM

3 NEW LISSEN SPEAKERS

bring fine quality reproduction within reach of everybody

DOES the set you are building now deserve something better than your old loudspeaker? Here is that something better—and at a price which you can afford to pay!

See the three new Lissen Cone Speakers illustrated. They all employ the same unit, capable of handling big volume without distortion or overloading, producing no artificial notes, but rendering faithfully the voice and instrumental frequencies coming from your set.

The low prices do not indicate cheapness; the huge Lissen scale of manufacture has brought the costs down. Never before have you been able to command anything like this quality of reproduction and fine finish at anything like these prices.

Your radio dealer will give you a demonstration of the three new Lissen Speakers without any obligation to you. Then you can compare the performance, the workmanship and the appearance with any speakers he has in stock.

NEW LISSEN CABINET CONE SPEAKER

In solid oak cabinet, naturally hand-polished. Distinctively simple in design, beautifully finished. The greatest value in Cabinet Speakers ever offered.

Price **22/6**

NEW LISSEN PLAQUE SPEAKER

For those who like the plaque design, here is a very handsome speaker to stand on a table or hang on the picture rail. It incorporates the new Lissen Cone Unit and gives fine full loudspeaker volume. With Metal Frame and two-colour spray finish.

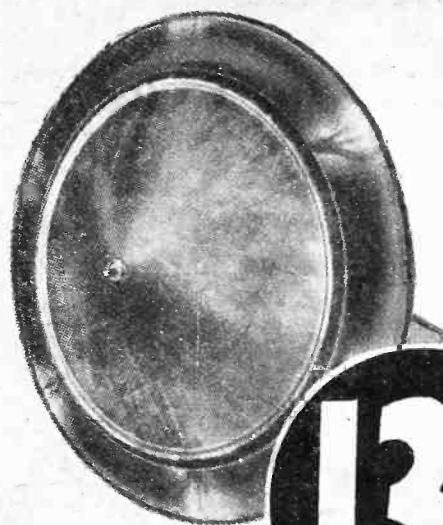
Price **13/6**

In Black Moulded Bakelite, finished silver.

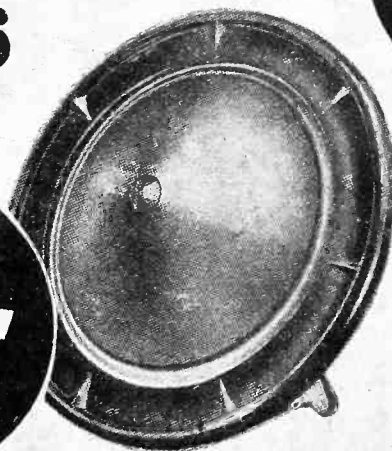
Price **15/-**



22/6



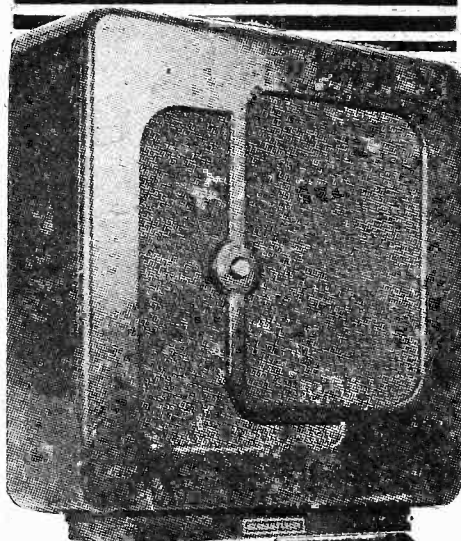
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Think of the pleasure you give with a "SNAP" Speaker! Nothing could be more welcome to a radio enthusiast. Better and purer reproduction—clear tone; undistorted volume—year in and year out! Know the satisfaction of giving something worth while? Adjustable Unit in handsome Bakelite Cabinet. In Walnut, Mahogany and Oak style.

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Give a GRAHAM FARISH 'SNAP' LOUDSPEAKER

Write for complete catalogue of Accessories and Components.

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TECHNICAL NOTES.

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

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

Making "Moving Coils."

A GOOD many amateurs who would like to go in for a moving-coil speaker are put off because they are a little bit afraid that they might not be able to make up the cone and moving-coil unit. As a matter of fact, it does require a certain amount of skill and a great deal of care to get this part of the speaker properly made, and unless it is properly made you will not get anything like the results of which the moving-coil type of speaker is capable.

The ordinary cone is a fairly straightforward matter, but the difficulty with the cone for the moving-coil speaker lies in the fact that you have to insert the "former" for the speech coil and then the "spider" for supporting and centring the cone and, finally, you have to get the speech coil in exact position in relation to the pole pieces of the magnet.

All this, as I say, requires a good deal of care; it is true you can get the thing together in such a way that it will work, but if you want to get really first-class results, and to avoid rattles and distortion due to irregular modes of vibration of the diaphragm, then you want to pay great attention to details.

The hole in the centre of the cone should be cut smaller than the size of the former for the speech coil, and the edges should then be slit so that a series of "tabs" are formed which will provide a method of attaching the speech-coil former to the cone.

The former for the speech coil may be made by winding a strip of paper of suitable width upon a metal or wooden former of the right diameter and putting on, say, two or three layers of the paper, just sufficient to give the necessary support to the speech coil. It is very important to avoid making this former any heavier than you can help as, of course, it forms part of the moving system.

Fitting the Speech Coil.

One of the most ticklish parts of the job is to get the axis of the speech-coil former coincident with the axis of the main cone, in other words, to get the little former symmetrically placed in relation to the cone itself. In actual practice this is never really right but so long as there is sufficient clearance for the speech coil when operating between the pole pieces it does not matter very much. Bear in mind that the clearance is cut down to the smallest limit and this assumes that the cone and speech coil will

(Continued on page 910.)

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 906.)

The tapping chosen for use is joined by a flex lead to X on the P.J.3 and to the third contact on the wave-change switch.

For greater selectivity the clip may be moved from the 60 tap and used on the 30 tap instead. But this will sharpen tuning too much for most cases, and thus the 60 tap, which gives greater strength but not such sharp tuning, is generally to be preferred. Once the best position is decided the flex may be left on the tap chosen.

GRID BIAS FOR THE "DUAL-RANGER."

S. E. (Barry Docks).—"How much grid bias is required for the 'Dual-Ranger'?"

The value of grid bias necessarily depends upon the power valve used, and the amount of H.T. applied to it. With every power valve will be found a makers' recommendation as to the G.B. needed.

As indicated on the Blue Print (G1), either a 9- or an 18-volt battery is usually required.

ADDING ANOTHER LOUDSPEAKER.

J. P. (Long Sutton).—"Please tell me if adding another loudspeaker to a 3-valve set will be likely to diminish the power very much?"

"This is a thing I do not remember seeing dealt with in 'P.W.' and I am rather concerned about it because my son wants to run a second loudspeaker lead from the set to his bedroom, using a 'balanced armature' there, like the one we already have in use.

"The set has ample power for one loudspeaker, but how much is it going to drop when the second one is connected?"

Very little indeed. In fact, you will probably hardly notice the difference, for although it will certainly be there the ear is very accommodating to changes in volume, and if there is at present ample power, there certainly should be quite sufficient to work both loudspeakers really well.

By the way, tell him to try both the "in series" and the "in parallel" connection for the speakers. Usually "in series" is better, but not always.

And remind him that long loudspeaker extensions are not really advisable unless the set has an output-filter circuit.

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How to Make a Sailplane!



THIS ripping Model Sailplane—an engineless model aircraft—can be made in a spare hour for only a few pence. It will rival the performance of almost any self-powered model plane. You will find full details of how to construct this super-glider in the 1932 HOBBY ANNUAL, the finest book for the boy who is keen on making things and finding out how things work. This topping gift book is profusely illustrated with photographs and drawings that show "how" in the simplest way. There are also two large folding photogravure plates.

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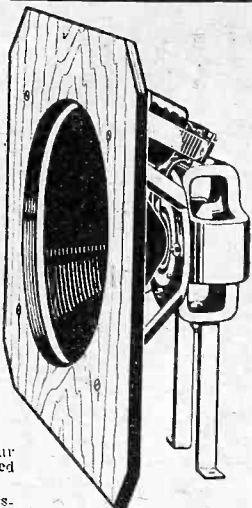
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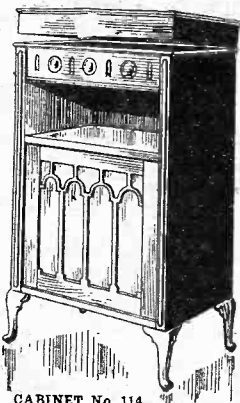
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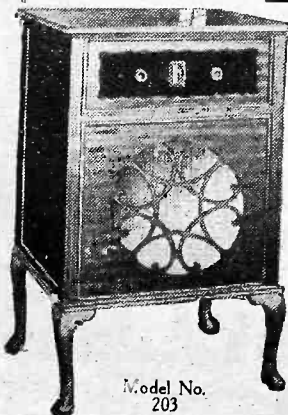
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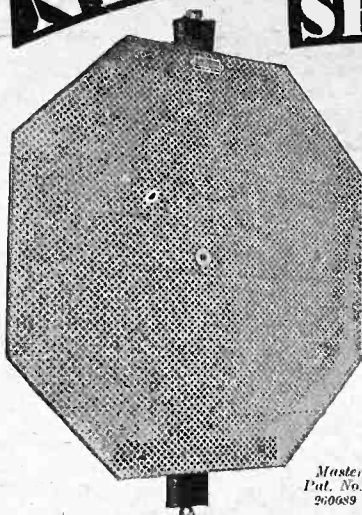
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Address.....

TECHNICAL NOTES

(Continued from page 908.)

be reasonably symmetrical and pretty accurately centred.

The Leather Suspension.

In making up the speech coil and former you will need to make liberal use of some type of celluloid cement or varnish.

Another very important point is the leather suspension. A good many people use chamois leather for this purpose but, although this is quite satisfactory if a really *thin* piece is chosen, it is apt to be sluggish and unsatisfactory if too thick.

As it will usually be impossible to cut a complete ring from one piece of leather, the general practice is to cut it in three or four sections and piece these together to form the complete ring. It is preferable not to have the end of one section overlapping that of the next; with careful manipulation and cutting you can generally get the sections accurately butt-ended.

Centring the Cone.

The "spider" for supporting and centring the cone is in some ways the essence of the whole business. The spider may have three or more legs and is sometimes made of thin sheet celluloid, sometimes of galvanised fibre, and I have even seen them made of fairly stout paper, well coated with shellac varnish.

The spider really makes up for any inaccuracies in the construction of the cone and forces the speech coil into more or less the right position in relation to the pole pieces of the magnet. Of course, the more accurate the cone is beforehand, the less work is thrown upon the spider and this is all to the good.

Whilst the spider support keeps the speech coil from shifting in a direction at *right angles* to the axis of the cone, it should allow as free a movement as possible in a direction *parallel* to the axis and for this reason the spider should be of very thin material.

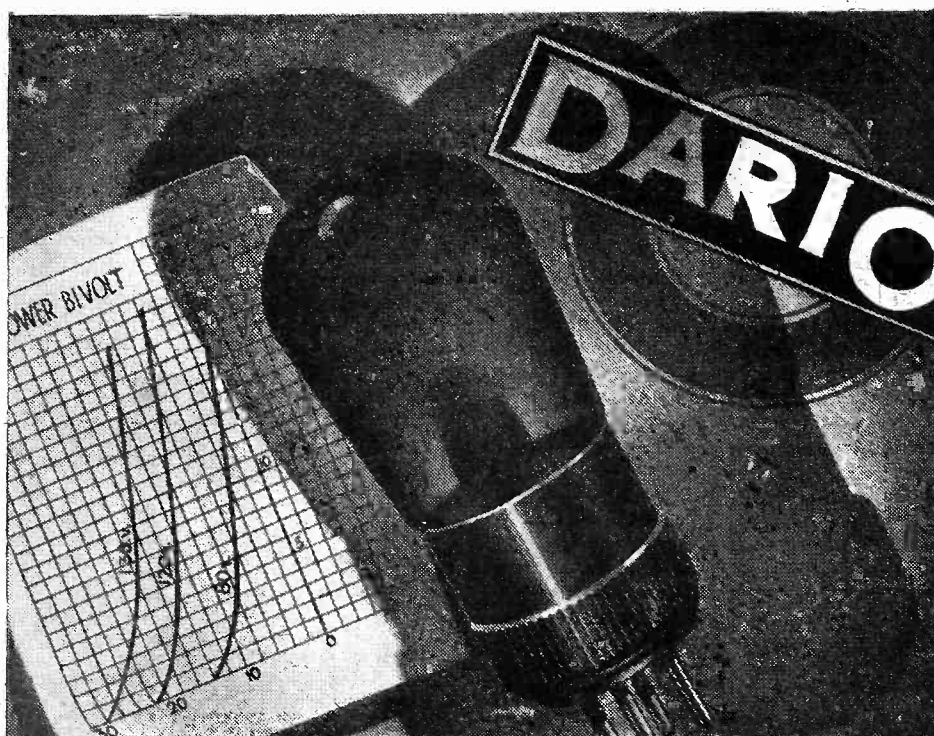
I think I mentioned in these Notes some little time back the importance of the leather suspension. If this gets baggy it does not really contribute to the support and suspension of the outer edge of the cone and, in fact, may actually keep the cone pulled out of its normal mean position.

It is surprising how great an influence this has upon the operation of the speaker. I had a case recently where the leather edge was all buckled (the leather which had been used was far too thick and stiff) and the speaker was operating very badly, but when the leather was removed and a nice thin chamois leather "surround" was fitted instead, the moving coil went back to a different position from that which it had previously occupied and the reproduction from the speaker was immensely improved.

One Valve or Crystal?

I wonder how many people still use crystal sets? Those of us who have been in the radio game since broadcasting started are apt to regard crystals as things of the past, but there must be a very large number of the rising generation who make their first acquaintance with radio through the medium of a crystal set and a pair of earphones.

(Continued on page 912.)



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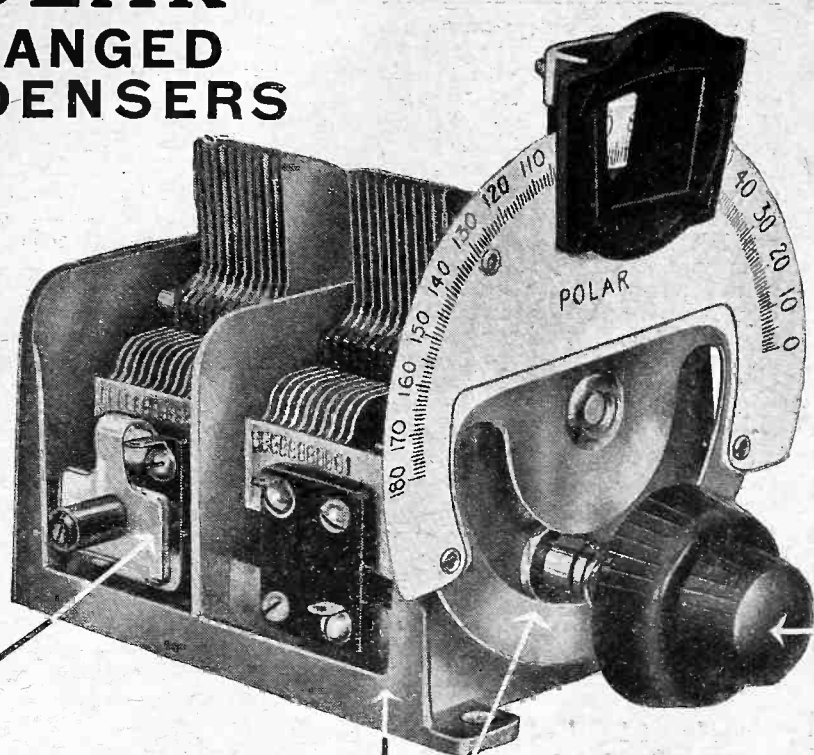
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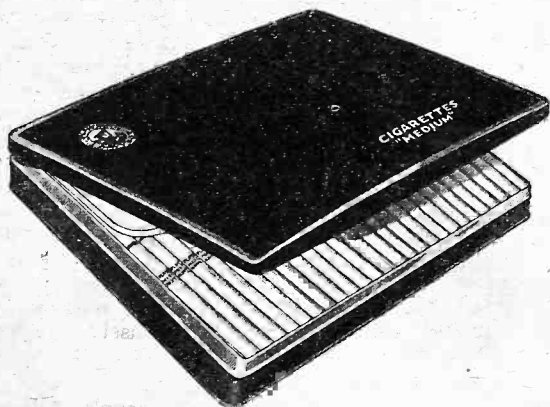
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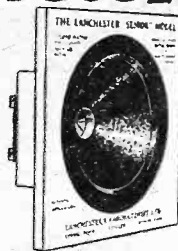
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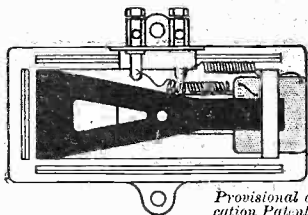
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(M.C.111)

TECHNICAL NOTES

(Continued from page 910.)

I was in the radio department of one of the large stores a few days ago and was very struck by the number of people buying complete crystal receivers. The manager of the department told me that there was a very good sale for crystal sets and that, notwithstanding the great popularity of valve sets, it was quite a mistake to think that the day of the crystal receiver was past.

Talking about crystal sets and valve sets, I always think that a one-valve receiver is a much better proposition and its cost nowadays is so low that one would think that anyone contemplating going in for a crystal set could easily be persuaded to change over to a single valver.

It is true that the moment you go from crystal to valve you are in for high-tension and low-tension batteries, with the necessary recharging of the latter, whilst the maintenance of a crystal set is actually nil. Still, the much greater use that can be made of

TECHNICAL TWISTERS

No. 91. "SHORTING."

CAN YOU FILL IN THE MISSING LETTERS?

The term shorting is used to denote a direct low-resistance connection across two points which are normally at potentials.

Thus a wire joined across a tuning coil affords a short cut to the current flowing, and in effect cuts the out of

Similarly an unwanted condenser may be cut out of action by it, these being useful instances of shorting.

If a wire falls across battery connections, or the of a coil wears through, we get accidental shorting—which may be dangerous or detrimental according to circumstances.

Last week's missing words (in order) were: Resistance, Anode (or Plate), Ohms, Amperes, Fifty.

the one-valve set, together with its definitely greater reliability, seem to me to put it into a different category altogether. I have still to find any sort of crystal detector which will really stay put for any length of time.

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MIRROR OF THE B.B.C.

(Continued from page 894.)

Bradford Festival Choral Society whose choice of carols will include examples of old Norman and old Basque.

The carols on Thursday come in the evening programme when, at 7.30 p.m., listeners will hear the first broadcast from St. Asaph Cathedral in Flintshire which, as is well-known, is the seat of the Archbishop of Wales. Incidentally, St. Asaph's is one of the smallest, if not actually the smallest, cathedral city in Great Britain, while its cathedral has the same distinction.

Famous Bands.

Band concerts have no particular association with the Yuletide season, but they are, as we all know, a distinctive feature of Northern musical life, and so it is not surprising to find two such programmes down for that week.

The first on Monday, December 21st, will be given by the Merseyside Military Band, a comparatively new organisation which has already made two appearances before the microphone; and the second on Thursday, December 24th, which is to be given by the Doveholes Public Band, which takes its name from a Derbyshire village lying on the Buxton side of Chapel-en-le-Frith.

This band, although founded in 1856, did not until 1924, after a complete re-organisation, really distinguish itself in the competitive field, and to-day it is in the proud position of holding the championship of the High Peak continuously since 1925 and of winning the first prize at Belle Vue, Manchester, in May, 1928, and again in July, 1931.

Sampling the Shows.

Meanwhile, there is a revue on Tuesday, December 22nd, and possibly a round of visits to the Palace and Paramount Theatres in Manchester, and the Argyll Theatre, at Birkenhead, on Wednesday, December 23rd, to sample the entertainments which will go on over the Christmas holidays.

All the usual outside broadcasts of orchestral music will be sandwiched into the week's arrangements, including an hour's concert of seasonable music which Laddie Clarke's Orchestra is playing at the Imperial Hydro Hotel, Blackpool, at 8 p.m. on Boxing Night.

Midland Regional opens its Christmas Week programmes with a concert of appropriate music in the Birmingham Studio, on Sunday, December 20th, and a relay on the same evening from St. Martin's Church, which is one of the oldest in the Midlands.

Christmas Carols.

The Bull Ring in Birmingham, in which it is situated, was the centre of great activity in bygone days and close by was the Castle of the old Lords of Birmingham.

A Carol Service by the Choir of St. Martin's, the organist of which is Mr. Richard Wassell, the conductor of the Birmingham Police Band, will also be broadcast at mid-day on Thursday, December 24th. Wednesday, December 23rd, brings a Carol Service by the Choristers of Gloucester Cathedral, relayed from the Chapter House, a fine Norman structure built somewhere between 1088 and 1095, where the Conqueror is said to have conceived the idea of the Doomsday Book.

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Finished instrument. Royalties Paid. £7:10:0 Cash or £2 deposit and 11 monthly payments of 11/-.

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Two Screened-grid, Detector and Power. With valves and cabinet. CASH PRICE £10:15:0 19/8
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Valves for above £1 7s. 6d. Cabinet 17/6.

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BLUE SPOT SPEAKER UNIT AND CHASSIS. Type 100-U. Cash price £1 19s. 6d. Balance in 7 monthly payments of 5/5.

AMPLION MOVING-COIL SPEAKER, TYPE M.C.6. Permanent magnet, with output transformer. Complete. Cash price £3 7s. 6d. Balance in 11 monthly payments of 6/2.

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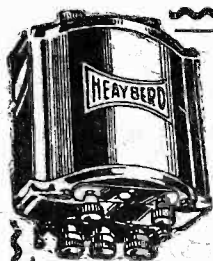
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FOR THE LISTENER

(Continued from page 894.)

there has always been a certain cocksureness about its value as a teacher.

It has put education before entertainment. Whatever criticism may have been levelled at its light music, or its vaudeville, or its drama, it has stubbornly regarded its educational value as unassailable.

And now the bishop says that this is practically no good! He offers weighty reasons.

The lectures, he says, are necessarily compressed. It is education by tabloid. The professor talks for half an hour, and then leaves the listener to his own devices. Half a dozen or so of such talks constitute a course; that is to say, the ground is covered in three or four hours.

This would be laughed out of court even in one of the minor universities of America. There is no opportunity for question and answer, which is the crux of the educational process. Some professors at the microphone do indeed suggest questions to be debated by listening groups; but the debate is without expert guidance.

Information and Education.

In brief, what the B.B.C. provides is not education, but a mass, or rather little compressed dollops, of information. Information is not education.

You may memorise the Encyclopedia Britannica from A to Z, and still be quite unintelligent. It isn't what your stomach will carry that matters, but what it can digest. The important thing is not the food you swallow, but what you yourself can make out of it when you have got it there!

Unless the mind becomes more and more flexible, much knowledge is far more dangerous than a little. The value of education is to give flexibility to the intelligence. Apart from this, mere information is a dead weight.

Theoretically, the bishop is right; but I think that he perhaps takes the matter too seriously. I also think that the B.B.C. is apt to take itself too seriously on this matter.

"Cut the Cackle."

Except for the student-groups, I imagine the most listeners are like myself, and listen to what is likely to interest them—as a matter of interest, not as a matter of education. We forget most of what we hear; as is right we should.

The B.B.C. is at its best, I think, not in the elaborately pre-arranged talks, but in those occasional topical talks, like the one on Manchuria the other day, which come pat to the moment.

I was glad to hear what Mukden was like. These vivid little glimpses of places and persons give some sort of a setting to our daily reading of important foreign events, and greatly assist the imagination.

Many speakers irritate me because they take such an infernal time in getting to the point. I listened the other night to Sir Norman Angell; for, having played most games in my time, I was interested in his "Money Game."

He wasted more than half his time in preliminaries which had no bearing on the game at all. He is not the only sinner by any means. I should like to hang a text in the talking studio: "Cut the cackle and get to the horses."



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THE "DEX-PEN"

(Continued from page 879.)

With such a pentode, should you acquire one, a five-socket valve holder is required in the V2 position. This will be furnished with a fifth terminal, and the flex lead should, in such a case, be connected to the fifth terminal on the valve holder.

The other point to watch is that some makers indicate which of the two filament pins on their pentodes must go to L.T. negative. In the wiring diagram the L.T. negative socket of the pentode valve holder (V2) is the one farthest from the left-hand edge of the baseboard.

Pentode Filament Connections.

All that is required to make the other socket negative is to change over the connections to the F terminals of V2, not forgetting when this is done to change the G.B.+ flex-lead over as well.

No difficulty will be found in tuning the set. The Selector coil, as most of you will know, is not used on the long waves, and when the Extenser is tuning long-wave stations, the Selector arm is left on stud "B."

As with all sets employing no H.F. amplification, best reception of distant stations will be obtained with a good outdoor aerial. With a reasonably efficient aerial the set should yield a good number of "foreigners," especially after dark.

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At first you can "search" for medium-band stations without using the Selector coil. This will enable you to locate stations in the medium-band section of the Extenser.

Having found your station, any interference from unwanted stations can be dealt with by adjustment of the Selector coil. You will soon find where the Selector knob is to be turned to keep any particular station free of interference.

about Grid-Bias Values.

When deciding on what value of grid bias to employ, be guided by what the maker of your pentode says on the matter. When following the instructions remember that, although you are applying 120 volts to the pentode via the H.T.+2 terminal, the resistance of the 10,000-ohm resistance causes the priming grid to receive about 100 volts.

The bias stated by the valve maker to be suitable for 100 volts on the priming (or screen) grid should be chosen.

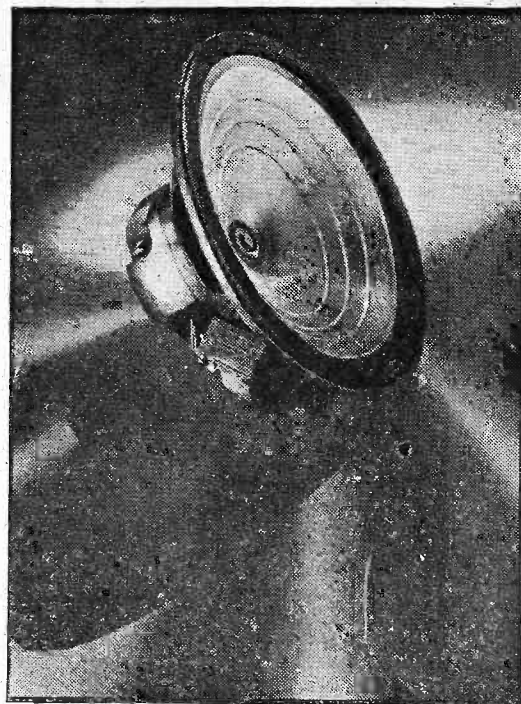
It is important to switch off the set before moving either of the plugs from the grid battery. Before switching on the set for the first time, make sure that the connections are properly made to the grid battery, and make doubly certain that the positive plug is in the positive socket of the battery.

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THE PROGRESS OF BRITISH BROADCASTING

(Continued from page 880.)

rebuild the Daventry transmitter entirely, so that its performance will be in no way inferior to the most modern transmitters."

The much-discussed interval signal, which has been in use since December, 1930, has a section of the Year Book all to itself. "Many suggestions," it is stated, "have reached the B.B.C. from time to time as to the type of interval signal to be used. The majority of them are impracticable owing to the difficulty of combining mechanical and electrical considerations. Many other suggestions, such as the metronome, the tick of a grandfather-clock, a musical chord, or jingling bells, were tried, but for various reasons none of them was considered satisfactory."

Interval Signal Requirements.

"What are the requirements of an interval signal? Primarily," states the Year Book, "it must be flexible in use and available at a moment's notice; obviously, also, it should not require additional staff for operating it. Another requirement is that it should be as unobtrusive as possible, so as not to irritate listeners. There are many types of signal which would, perhaps, in the first instance be more pleasing than the present one. It is doubtful, however, whether one could listen to them seven or eight times a day, week after week, with the same equanimity that one listens to what has been called 'the ghost in goloshes.'"

The apparatus used is extremely simple and easy to operate, and has the undoubted advantage that very little of it is mechanical. A microphone is installed in an electric clock fitted with a second hand. A relay operated by a switching device fitted quite close to the control engineer is responsible for the following actions: (1) polarising the microphone; (2) heating the filaments of the amplifier; (3) Connecting the output of the interval signal amplifier to the other amplifiers in the chain of transmission.

An Unofficial Studio.

The cabinet of the clock is lined with felt to cut out unnecessary echo effect and the clock, with its microphone, is installed in a large felt-lined box which renders it sound-proof. Unofficially, this box is known as "Studio 10a," and is, perhaps, the only studio that has never been visited by a member of the public. Each tick of the clock indicates the passing of one second,

and it can, therefore, be used for timing purposes.

The Year Book is published at two shillings, and contains, among many other things, details of the distribution of licences throughout the kingdom; of the financial position of the Corporation; of the international broadcasting situation; of the personnel of the B.B.C. orchestras and the several combinations of singers and of the advisory committees on religion, music, spoken English, national lectures, school broadcasting, adult education and so on, who have played an important part in the provision of 67,000 hours of programme entertainment during the year.

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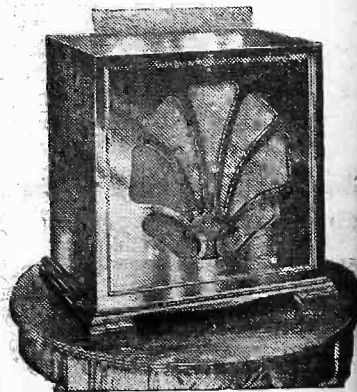
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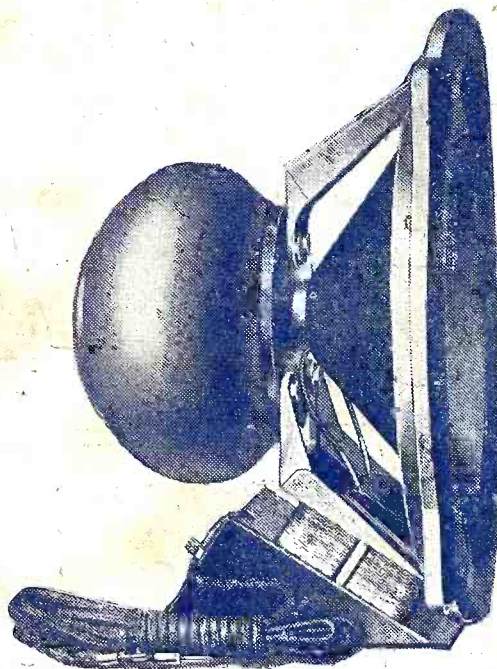
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