

ALL ABOUT MODERN TONE CONTROL

Popular Wireless

Every Thursday
PRICE
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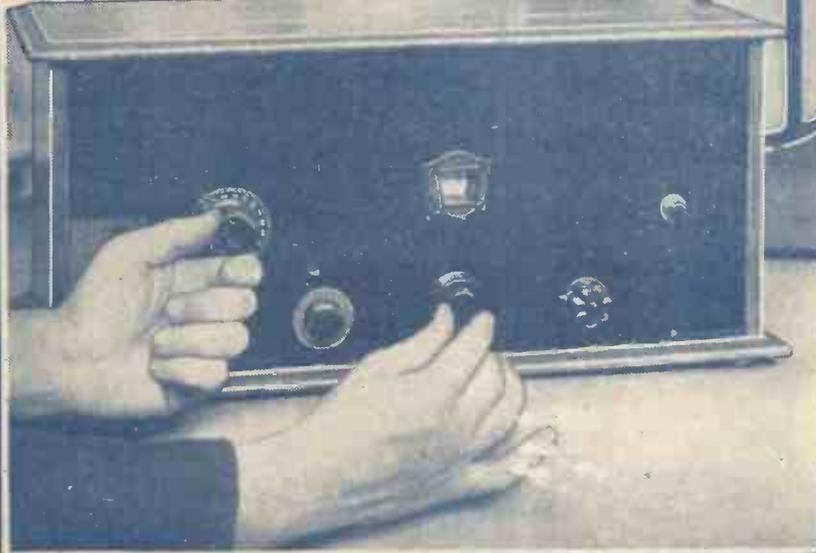
No. 544. Vol. XXII.

INCORPORATING "WIRELESS"

November 5th, 1932.



"P.W."
Presents
**THE
1933
FOUR**
"EUROPE'S
PROGRAMMES
FOR ALL"



ALSO:
THIS YEAR'S RADIO CABINETS
THE NEW "POSTE PARISIEN"
AN EVENING WITH AN "APEX"
A SPECIAL ARTICLE

By Capt Eckersley,
etc., etc., etc.

Whether it's bought
Or whether it's built,
Earth your Receiver
By fitting a **FILT!**

GRAHAM FARISH
FILT
PERCOLATIVE CHEMICAL EARTH

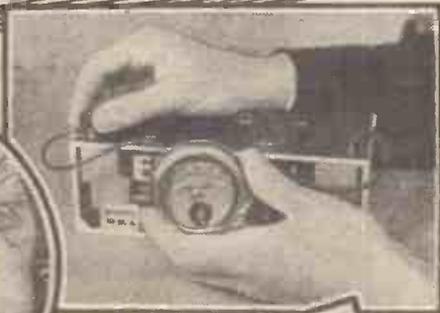
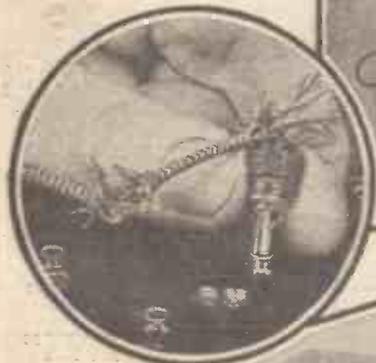
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your radio dealer order
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GRAHAM FARISH,
LTD.,
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PRICE
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COMPLETE

An Invaluable Book for THE HOME CONSTRUCTOR



Tracing Trouble



How Your Set Works

Every conceivable aspect of Radio is comprehensively dealt with in the Complete Handbook of PRACTICAL RADIO.

There are articles on the Simplicity of Modern Home Radio, Famous Modern Circuits, Short-Wave Favourites, "The Power They Use" (concerning Radio Stations), etc., etc.

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There are hints on modernising old receivers, on tracing trouble, on finding Stations . . .

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So much that will be absolutely invaluable to you, whether you are a radio fan or just one of those who like to "listen-in." Here are just a few of the Contents :

"What Set Do You Want?"

Erecting an Aerial

Choosing Your Loudspeaker

Your Valves

Hints on Super-Hets.

The Radio-Gramophone

How to Build a Simple Receiver

Television Developments

How Your Set Works

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Separating the Programmes

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How to Make an Adaptor for Short Waves

Short Wave Favourites

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etc., etc., etc.

All this, and much more, for Sixpence—in the

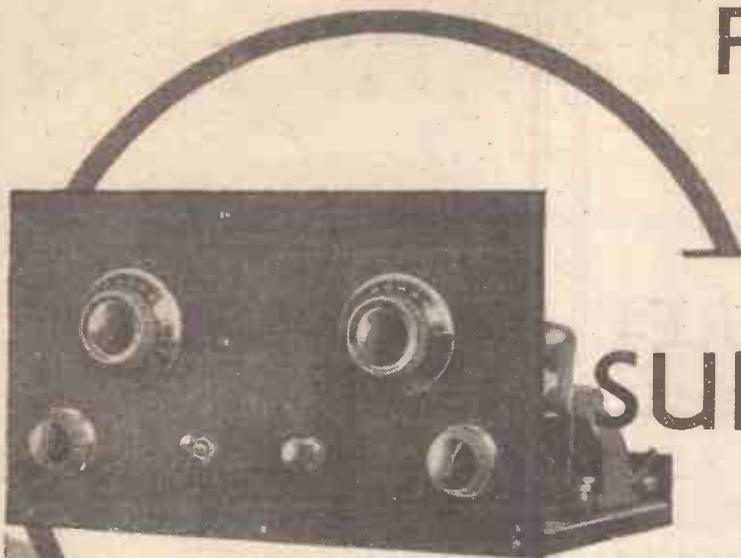
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PRACTICAL RADIO

NOW ON SALE 6^d.

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Another fine FERRANTI KIT



THE SUPERMIN 3

FERRANTI Ltd.,—who have given to Radio so many refinements and improvements—now introduce a Receiver which will meet the requirements of thousands of Home Constructors—as regards both price and performance.

A Screened Grid 3 Receiver—easy to build and to operate—which will bring in 20 to 30 stations under most circumstances.

Two tuned circuits have been employed in a manner which gives an unusually effective combination of selectivity and quality. The Receiver is thoroughly de-coupled, enabling you to use an H.T. Eliminator without fear of hum or motor-boating.

A receiver of really attractive appearance, inside and out. The technically minded will be particularly intrigued by the unique metal-coated baseboard and panel. The kit comprises all you need, (except valves, cabinet and batteries).

With the exception of the variable condensers, all the components are of FERRANTI manufacture, so that nothing more could be said for the quality of workmanship.

The price of the kit, including all components, fixing screws and wire, complete with metallised panel and baseboard, in sealed carton, represents radio's best value at £5.

FERRANTI SUPERMIN 3

Ask your dealer for a FREE Constructional Chart or write direct, enclosing 1½d. stamp
FERRANTI Ltd., 'S' Constructor's Dept. Hollinwood, Lancs.

KIT PRICE

£5

"BAND
PASS
3"

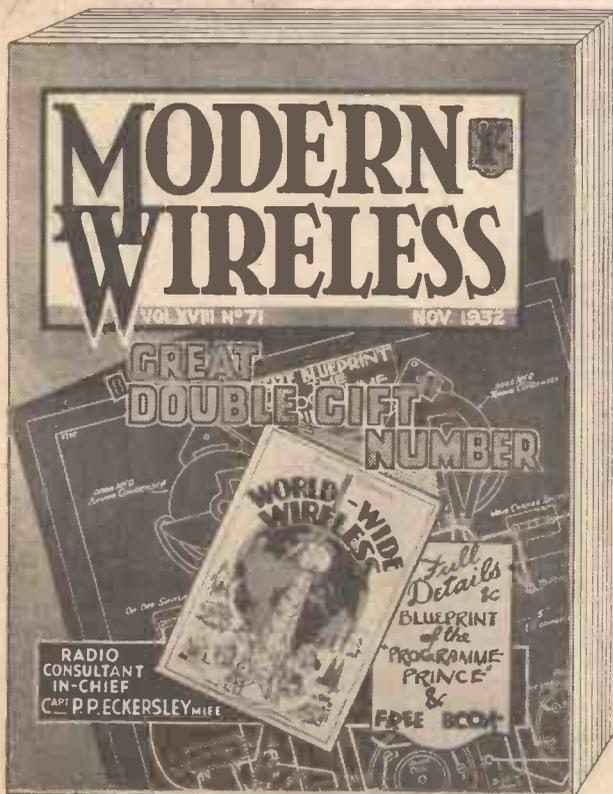
"APEX"

"MAXIMIN
3"

MODERN WIRELESS

GREAT DOUBLE - GIFT NUMBER
 The November number
 offers you
TWO FREE GIFTS!

1. **BLUEPRINT** and full details of a great new three-valve receiver giving out-of-the-ordinary results,
"THE PROGRAMME PRINCE"
2. **MAGNIFICENT BOOK** telling you all you want to know about foreign stations and their programmes,
"WORLD-WIDE WIRELESS"



A TWO-VALVE AMPLIFIER
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Two Special Sections—
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Also :

The "Diode" for Superhets Quality Detectors
 My Broadcasting Diary On the Short Waves
 On the Test Bench Round the Turntable
 Spotlights on the Programmes, etc.

Big 19-page Supplement, fully illustrated,
"THE WORLD'S PROGRAMMES"

A feature which gives more entertainment
 and more useful information than any
 other foreign programme section in radio
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ON ALL BOOKSTALLS - - - ONE SHILLING

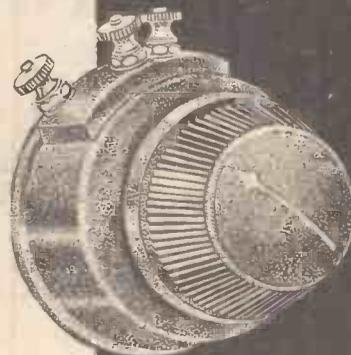
RADIO IGRANIC DEVICES

**GIVE MORE
FOR YOUR
POPPY
THIS YEAR**

**REMEMBRANCE
DAY
NOV. 11**

LOGARITHMIC VOLUME CONTROL

Wire wound, the Igranic Logarithmic Volume Control is fitted with a specially graded resistance track. It has been evolved to afford a uniform control of volume where a valve or valves of the Variable Mu type are employed in a circuit. The graded resistance makes the volume control obey the same law as the valve. Sizes 5,000, 10,000, 50,000 ohms, and they can also be supplied with combined switch. Price 5/6 (with switch, 7/6).



IGRANIC COMPONENTS WILL BE THE MAKING OF YOUR SET.

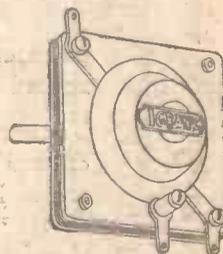
IGRANIC MIDGET RADIO SWITCH

A neat, compact component specially suitable for switching filament current "on" and "off." Moulded bakelite with heavily plated metal front—one hole fixing, 1 amp. at 250 volts. 3 amps. at 125 volts. Prices, with terminals, 1/8. With soldering tags, 1/6.



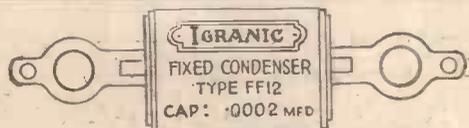
IGRANIC DIFFERENTIAL CONDENSER

An extremely dependable component with a very low minimum capacity. It has a perfectly balanced maximum capacity of .00015 mfd. on each side. Terminals and soldering tags are fitted. Price, complete with bakelite knob, 3/6.



NON-INDUCTIVE FIXED CONDENSER

These condensers are sealed into bakelite cases provided with lugs for screwing to a baseboard. They are damp-proof and are tested at a voltage nearly three times in excess of their rated working voltage and risk of breakdown is thereby minimised. Non-inductive, they are strong mechanically, sound electrically, and fitted with screw terminals to facilitate connections. Prices: 1 mfd., 2/3; 2 mfd., 2/9; 4 mfd., 5/-.

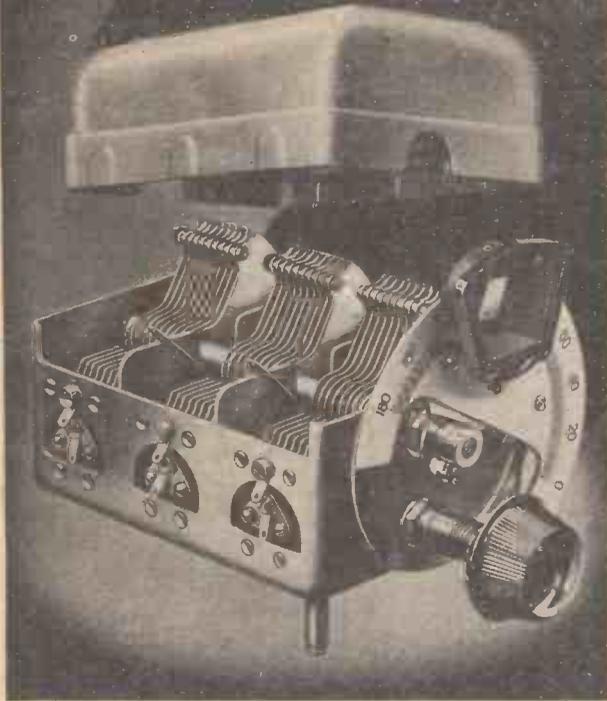


FIXED CONDENSER

In the small type seven capacities are available. The greatest care is taken to secure accuracy and only the finest materials are used. Small and compact, these condensers are suitable for use on very high voltages for ordinary reception or low power transmission. Eyeleted tags for fixing direct or soldering are provided. Prices from 9d. to 1/6.

Write to-day for fully illustrated Catalogue No. R.192 of complete new range of Igranic Quality components, Igranic Electric Co. Ltd., 149, Queen Victoria Street, London, E.C.4.

J.B. NUGANG type A



A RIGID CHASSIS THAT IS ALL ONE PIECE

Matched to within 1/2 of 1 per cent + half a mmfd.

so strong that there can never be the slightest distortion in use. NUGANG TYPE "A" is similar to the standard Nugang Model, but with the addition of a powerful Disc Drive. Easily fitted—only round holes to cut in the receiver panel.

Trimmers to each stage operated by external starwheels. Vanes wide spaced and of heavy gauge. Special rotor bearings ensure permanent accuracy and give remarkable free movement. Capacity, '0005 mfd.

Write for new catalogue.



NUGANG TYPE "A"
Complete with Disc Drive.

Fully screened.		Semi-screened (without lid.)
18/6	2-gang	16/6
27/-	3-gang	24/6
34/6	4-gang	31/6

PRECISION INSTRUMENTS

Advertisement of Jackson Brothers, 72, St. Thomas' Street, London, S.E.1. Telephone: Hop 1929.

WHAT'S THE TROUBLE?



TEST QUICKLY SAFELY & SURELY

Whatever trouble develops in any radio set, it cannot elude an "All-in-One" Radiometer. Simply connect each component in the sensitive finger of this wonderful instrument points where the fault lies.

With its aid you can keep your set in 100% condition. Ask to see it demonstrated at any radio dealer's or electrician's, and buy one—it will save you money and much worry. If in any difficulty send P.O. to: —

PIFCO LTD., HIGH STREET, MANCHESTER.

Standard Model "All-in-One" Radiometer for Battery Sets only, as shown here. Price **12/6**

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FOR EVERY SET — there's a PILOT AUTHOR KIT

CASH — C.O.D. — or H.P.

EVERYTHING RADIO CARRIAGE PAID TO YOUR DOOR

CASH, C.O.D. or H.P.

COSSOR MELODY MAKER. Model 334. With metallised Variable-Mu S.G. and detector valves, power valve and cabinet. Cash Price £6/7/6. Carriage Paid. Balance in 11 monthly payments of 11/10. Send 10/- only

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

LISSEN "SKYSCRAPER 3" KIT with Lissen Valves, Walnut Console Cabinet and special Balanced Armature Loud-speaker. Cash Price, £6/5/0. Carriage Paid. Balance in 11 monthly payments of 11/6. Send 11/6 only

READY RADIO 303. 3-valve Kit (Det., 2 L.F.), with valves, cabinet and permanent-magnet moving-coil speaker. Cash Price £6/17/6. Carriage Paid. Balance in 11 monthly payments of 12/7. Send 12/7 only

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READY RADIO KENDALL-PRICE S.G.4. S.G., Detector, L.F. and Power. Complete kit less valves and cabinet. Cash Price £4/6/6. Carriage Paid. Balance in 11 monthly payments of 8/-. Send 8/- only

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R & A "VICTOR" PERMANENT MAGNET MOVING-COIL SPEAKER-DE LUXE. With 6-ratio input transformer and protecting grille. Cash Price £3/10/0. Carriage Paid. Balance in 11 monthly payments of 6/5. Send 6/5 only

EPOCH "20 C" PERMANENT MAGNET MOVING-COIL SPEAKER: (New Edition) With 5-ratio input transformer. Cash Price, £1/15/0. Carriage Paid. Balance in 5 monthly payments of 6/3. Send 6/6 only

BLUE SPOT SPEAKER UNIT AND CHASSIS. Type 100U. Cash Price £1/12/6. Carriage Paid. Balance in 6 monthly payments of 5/2. Send 5/2 only

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

ATLAS ELIMINATOR. Type A.C.244. Three tappings, S.G., detector and power. Output: 120 volts at 20 m/a. Cash Price £2/19/6. Carriage Paid. Balance in 11 monthly payments of 5/8. Send 5/6 only

GARRARD INDUCTION GRAMOPHONE MOTOR. For A.C. Mains. Model 202. Mounted on 12-inch nickel motor plate with fully automatic electric starting and stopping switch. Cash Price, £2/10/0 Carriage Paid. Balance in 11 monthly payments of 4/7. Send 4/7 only

GARRARD JUNIOR B SPRING MOTOR, complete with turntable. Cash Price, £1/13/0. Carriage Paid. Balance in 5 monthly payments of 6/1. Send 6/1 only

APEX

EXACT TO SPECIFICATION

KIT "A" 79/-

Author's Kit of specified components including **ready drilled panel** and terminal mounts, but less valves and cabinet. **CASH or C.O.D. Carriage Paid.** Or 12 monthly payments of 7/3. Carriage Paid. One Set of Valves £1/12/3. One Specified Cabinet 15/-

KIT "B" £5-11-3
As Kit A but WITH VALVES, less cabinet. **CASH or C.O.D. Carriage Paid** £5-11-3
Or 12 monthly payments of 10/3 Carriage Paid.

1933 FOUR

AS DESCRIBED IN THIS WEEK'S ISSUE.

KIT "A" CASH or C.O.D. Delivered Carriage Paid.
Author's Kit of specified parts including **ready drilled panel**, but less valves and cabinet. **£4-12-6**
or 12 monthly payments of 8/6.

ESSENTIAL KIT-BITS

You pay the postman—we pay post charges.

Set of 4 Specified Valves	£1 19 3
Cabinet to Specification	15 0
Polar Uniknob 2-Gang Condenser ..	19 6
2 Telsen Screened Coils	17 0
Lissen Hypernik Transformer	12 6

IMPORTANT.— Parts, Kits, Miscellaneous Components, Finished Receivers or Accessories for CASH, C.O.D. or H.P. on our own system of Easy Payments. Send us a list of your wants. We will quote you by return. C.O.D. orders value over 10/- sent carriage and post charges paid.

STOP PRESS OFFERS

BLUE SPOT UNIT AND CHASSIS, Type: 99 P.M. Including matched transformer. Cash Price, £2/19/6. Balance in 11 monthly payments of 5/3. Send 5/6 only

READY RADIO "METEOR" S.G.3. Three-valve screened-grid receiver, with valves, cabinet, and permanent-magnet moving-coil speaker. Covers short, medium, and long waves without coil changing. Cash Price £3/17/8. Balance in 11 monthly payments of 16/3. Send 16/3 only

W.B. PERMANENT-MAGNET MOVING-COIL SPEAKER. Type PM4. Complete with transformer. Cash Price £2/2/0. Carriage Paid. Balance in 7 monthly payments of 5/9. Send 5/9 only

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

If the Makers Can Deliver Peto-Scott Will Supply Immediately

PETO-SCOTT CO. LTD., 77, CITY ROAD, LONDON, E.C.1

Dear Sirs,—Please send me C.O.D./CASH/H.P. for which I enclose £ s. d. CASH/H.P. Deposit. Send me your **FREE 1933 Catalogue**
NAME.....
ADDRESS.....
P.W. 5/11/32

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Buy by Post — it's Quicker

1933 WALNUT ADAPTGRAM

Trade Mark

Constructed in Walnut with inlaid Walnut Veneers.

MODEL A Convert your existing set to a Radiogram. Comes to you with vigncted front as illustrated and motor-board, ready to take your own Set, Gramophone Motor and Pick-up. No skill or expensive tools are required to transform your Radio into a combination instrument, presenting the professionally finished appearance of the most luxurious Radio Gramophone money can buy. 12 monthly payments of 63/-



Carriage and Packing 2/6 extra. England and Wales.

MODEL B with Garrard Double Spring Motor. 12" Turntable. Automatic Stop. B.T.H. Tone-Arm with Pick-up, and Volume Control complete. Automatic Needle Cup. Carriage Paid. Cash or C.O.D. 6/8 or 12 monthly payments of 12/- 6/8

MODEL C with Collaro Induction Electric Motor with Tone-Arm, Pick-up and Volume Control in one Unit. 12" Turntable. Automatic Stop. Automatic Needle Cup. Carriage Paid. Cash or C.O.D. 7/8 or 12 monthly payments of 13/9 7/8

PETO-SCOTT WALNUT CABINET SPEAKER

Fitted with the famous BLUE SPOT 100U.



In handsome Walnut Cabinet with Contrasting inlaid Walnut Veneer.

Send 4/6 Only

Balance in 11 monthly payments of 4/6
CASH OR C.O.D. CARR. PAID 47/6

The wonderful tone of Blue Spot 100U gives you a new enthusiasm for wireless entertainment. Equal in performance to a good Moving-Coil Speaker. It gives full value to every note in the musical scale including the difficult bass notes. Sensitive to very small inputs and is therefore entirely satisfactory for battery operated sets, as well as all mains sets. It needs no matching transformer; can be used with normal or Pentode valves.

47 Good Radio Programmes 'on the Air'

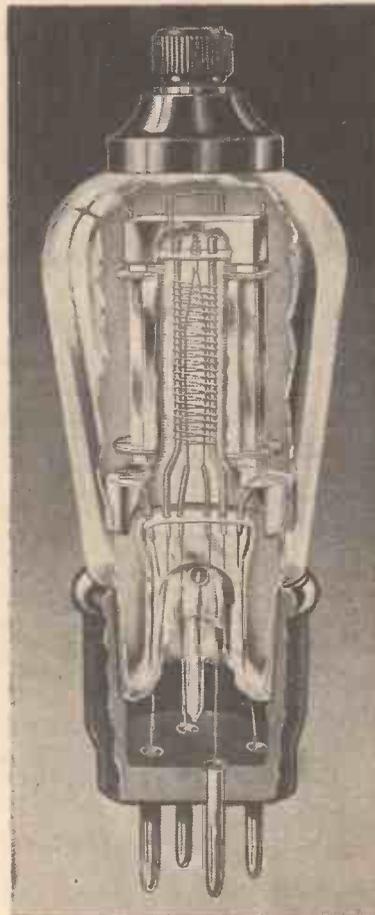
Why be tied to one or two stations?



... how to increase the range of your set

Every night the great European stations pour out a wealth of entertainment. Are you one of the thousands of people whose worn-out or inefficient valves prevent them from enjoying it?

To increase the range of any S.G. Set — to enjoy a wider choice of programmes — use Cossor Screened Grid Valves. Due to their abnormally low inter-electrode capacity and unique construction, including the famous Mica Bridge, Cossor S.G. Valves will definitely increase the range of any well-designed Screened Grid Receiver.



Send for a free copy of the 40-page Cossor Valve and Wireless Book which contains a wealth of interesting and useful information including Radio Definitions — Useful Circuits — List of Stations, etc., etc. Please use the Coupon.

COSSOR SCREENED GRID VALVES

A. C. Cossor Ltd., Highbury Grove, London, N.5.
Depots at Birmingham, Bristol, Glasgow, Leeds, Liverpool,
Manchester, Newcastle, Sheffield, Belfast and Dublin.



To A. C. COSSOR LTD., Melody Dept., Highbury Grove, London, N.5.

Please send me, free of charge, a copy of the 40-page Cossor Valve and Wireless Book B.17.

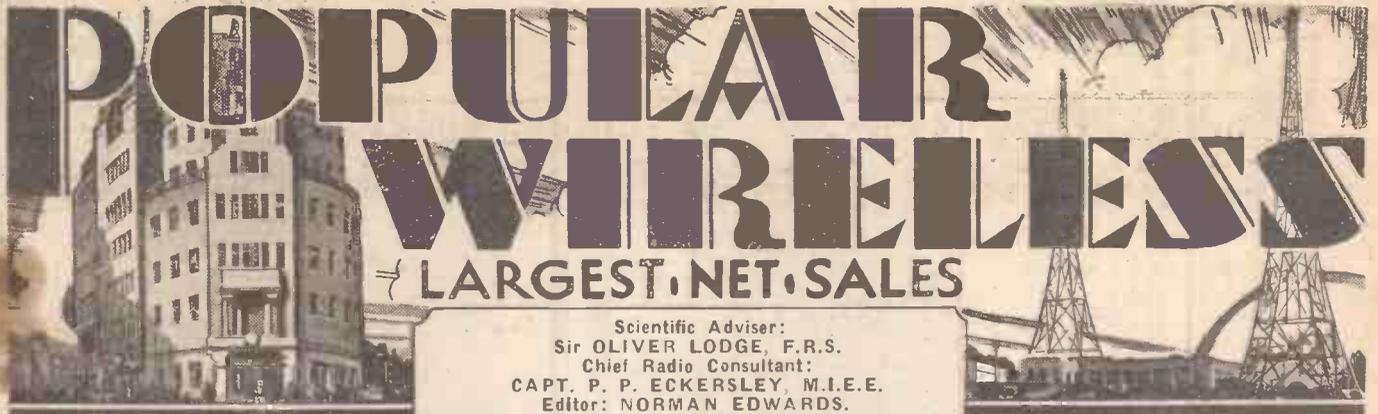
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My usual Retailer is

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P.W. 5/11/32.



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 CAPT. P. P. ECKERSLEY, M.I.E.E.
 Editor: NORMAN EDWARDS.
 Technical Editor: G. V. DOWDING, Associate I.E.E.

SMART COMMENT
 1932 VINTAGE
 FRANCE "COPS IT"
 FEATHERED WOPS

RADIO NOTES & NEWS

CATS'-MEAT MAN
ARTIFICIAL PARASITES
ADVANCE GIPPSLAND!
THE HANDY MAN

Firework Night.

"HERE is an S.O.S. Will anyone knowing the whereabouts of Guido Fanx, a soldier of York, communicate at once with the Chief of the Trained Bands, Whitehall. This man, who was last seen sneaking about near the Houses of Parliament in company with nine kegs of gunpowder, a dark lantern and a tinderbox, is believed to have been suffering from *fire-workus*, and it is feared that some harm may overtake somebody." Prelude to the Second General News Bulletin as it might have been given in 1605, the whole inspired by the sad racket which is at present going on in next door's garden.

though the ladies' voices were too too modern and smacked of the affected "edge of South Kensington" style. The Verger, though the part was excellently played, used a prose form which I believe to be a genuine 1932 vintage. I don't think that Sam Pepys would have recognised it. Nevertheless, this play condenses much painstaking research and should make Londoners take a new interest in St. Paul's.

So That's How They Do It.

THE "Sunderland Echo" says of Sir John Reith—very kind of 'em!—"He lifts a finger and a hundred new programmes are launched." M'yes! I

in the middle of symphonies! "We have here," said Gabriel, "the Last Trump." "Excuse me," interposed Sir John, "I have here Greenwich Mean Time. *Pip pip.*"

Broadcast Gramophone Records.

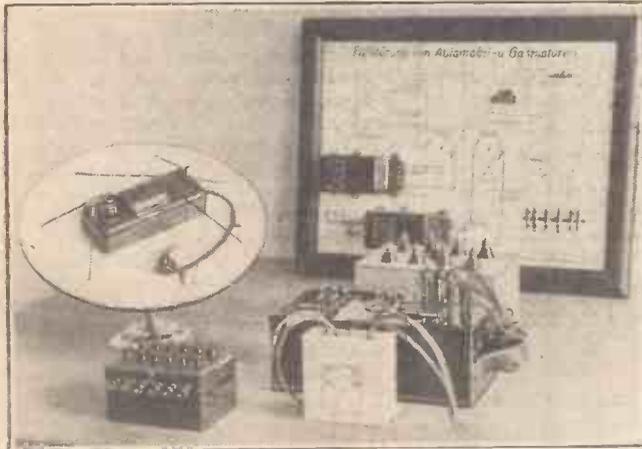
EXCEPT for the "controlled" broadcasting of gramophone records by the B.B.C. the makers of records have decided to prohibit all public performances of their products. This ukase will affect theatres, cinemas and hotels, etc. France, in particular, has "copped it," as some French programmes are almost entirely composed of records. My view is that the unlimited opportunity of the public to hear records broadcast—which is precisely what the record makers complain about—is excellent free publicity.

Many are the records I have bought simply and solely because I heard Kit Stone play them!

Details of the A.-A.R. and T. Society.

I AM now able to state that the function of the Anglo-American Radio and Television Society (Hon. Pres.: Mr. Leslie W. Orton, "Kingsthorpe," Willowbank, Uxbridge) is to help radio enthusiasts in the design, construction and alteration of receivers and to give them data about receivers, stations, etc. besides putting them into touch with members in other parts of the world. The most advanced branch is at Huddersfield, with its own club-room, S.W. receiver, orchestra, dramatic

(Continued on next page.)



WIRELESS WARS

BERLIN is staging an anti-interference campaign, and some of the apparatus used is to be seen in the picture on the left.

LONDON is the centre of a "Where's Your Licence?" campaign, an incident in which is depicted below.

New and Apt Description.

I OBSERVE with solemn glee that a dealer has written to a manufacturer, announcing that a lady customer, whose receiver had been behaving in forward fashion, had described its naughtiness as "a frying noise." The dealer thought that epithet to be both original and clever. Ha! Jolly good! Reminds me of a smart comment which I heard last week by a man who suffered from a nearby oscillating aerial. Said he, "I should describe the noise as 'howling.'" I thought it most original.

Bouquet to B.B.C. and Author.

MOST sincere congratulations to the B.B.C. and Mr. C. Whitaker-Wilson on their Christopher Wren play. Generally speaking, it was deucedly clever. Echo effects fine. Dialogue clever, too,

thought that it must be something like that. They sound exactly like it, especially on Sundays. I wonder what would happen were he to lift two fingers and a foot! Again, "You cannot conceive Sir John making the slightest mistake." My hat! He's made dozens—and if a man never makes a mistake, says the old saw, he never makes anything. If he would only stop those soul-harrowing, astronomical *pip pips*



NEWS—VIEWS—AND INTERVIEWS (continued)

society, and Morse classes. Joining a branch (2s. 6d. per annum) is optional; membership of society is free. An official organ is being prepared. Postage stamps with all communications, please.

Unfair Competition.

IT is recorded that, as a result of radio, there were 12,676 arrests made in the U.S.A. Dear me! I didn't know that the American police needed any help in arresting folk. I thought that the trouble was to convict 'em. Again, 'tis said that, thanks to wireless warnings, fifteen people were actually caught red-handed.



But my information also shows that, in order to catch these red-handed birds, the U.S.A. cops had to use 2,255 radio-equipped cars. Hardly worth the expense! Why, Mussolini can catch scores of mafia black-handed, with a few wop police with feathers in their hats. What blundering amateurs these Yank slops are, compared with "effete" Europeans!

Cause and Effect.

THE wise men told Marconi that he was attempting the impossible. He did the impossible. And so, according to a report made to the Madrid Conference by the International Broadcasting Union, there are now 140 millions of listeners in the world, whose sets are valued at £299,000,000. A sum of 39 million pounds is spent annually on actual broadcasting, and the annual consumption of current by broadcasting is 1,573,200,000 kilowatt hours.

Haunted by Luck.

FRANK TITTERTON, the warbler in the programme of October 29th, is either a spirit sympathetic to black cats or is literally haunted by luck in the guise of those quadrupeds. Here is his Cat history. One black cat followed him into his house and stayed for some months. Cat vanished, and in two days another (black) cat arrived. Cat stayed six months and vanished.



A third (black) cat arrived and stayed two years. When number three arrived a fourth tried to join the household, but deferred to No. 3. Black cats often follow Mr. Titterton in the street. I suppose that he must be the reincarnation of a cats'-meat man!

Happiness a Crime?

I READ that the manager of the Minsk and Saratoff broadcasting stations, being visited by a flash of humanity, allowed some Hungarian dance music to be broadcast instead of the usual Communist propaganda. For so doing he has been sentenced to ten years' imprisonment by the

gang in charge of Russia for the moment. In order to avoid the subject of politics I will comment only on the leniency of the sentence. Many of his fellow Russians have been shot because they wore clean collars and used toothbrushes! Hungarian dance music! Could criminality sink lower? One shudders to think of this wretch contaminating the pure Marxist minds of his fellows.

Pinching the Triangle.

I AM deeply indebted to the "Irish Times" for the news that a Dublin professor has invented a radio apparatus stated to be worth £100,000, by means of which it is possible "to eliminate any sound from an instrument in an orchestra so that anyone could play a similar instrument in unison with the unseen band." Not so bad, that! If I read it aright, it means that the device would enable you to cut out Teddy Brown's xylophone and leave his "boys";

"SHORT WAVES"

"Special Offer.—'All-British' 1932 12-guinea model, five-valve Suitcase Portable. Receives all stations."—Advt. Even the Apex can't beat that!

Gipsy Smith, the evangelist, placed his hat over the microphone, saying: "I like my voice to be natural." We should never have suspected him of talking through his hat.—"Punch"

The question of broadcasting controversial subjects has been much discussed by the B.B.C.

Our much-married man timidly asks if there are any subjects which are not controversial.

BEAM WIRELESS—Foretold in 1878. Introduced in 1928.

Matilda: "Oh, mamma, such fun! Jack has got some men from the Bush to supper, and they want him to sing 'My Pretty Jane,' and he wants you to play the accompaniment for him."

Carolel Mamma (opening the piano): "Certainly, my dear. But I would prefer you not listening any longer to the merriment going on in Jack's hut."—"Punch" (1878).

THE WIRELESS FAN'S LULLABY.

Hush-a-by, Suddaby, on the top note, Alan and Handley are playing the goat. When the valve conks, the programme will fall. Mother must then do the cross-word in the "Mail."

or to eliminate the noise of the lady harpist who sits on the right hand at the Queen's Hall Promenade Concerts. In short, this gadget could pinch the triangle, or sneak the last cymbal clash in Tchaikovsky's "Pathetic" Symphony.

Dance Band Changes.

HENRY HALL'S Dance Band is mutable. The tenor saxophone feller, Mr. Denahy, has been succeeded by Mr. J. Halsall from Billy Cotton's Band. Robins, the drum chap, has returned to the stage; no doubt Sydney Moseley will take credit for this! Val Rosing, the vocalist, has departed; young Dick Matthews, the boy oboe player, has left because of the difficulty of scoring numbers for his instrument, but he will have odd jobs with the B.B.C. Henry Hall remains put.

Screening in Wales.

NOT coal, but radio. T. J. T. (Simons-town, S. Africa), who says that broadcasting there is "putrid," is a native of N. Wales, whereto he hopes to return soon.

He comes from Llanberis, and asks what the "screening" is like there. Listen, friend!

In July I trudged from Beddgelert to Llanberis via the Gwynant and Llanberis passes in heavy, horizontal rain—about thirteen miles. Hence radio did not figure on the bill. In "P.W." for July 30th and August 6th, W. L. S. describes his own radio experiences in N. Wales; thus he has redeemed his promise to which you somewhat reproachfully refer.



Model Fleas.

NO, dear reader, not a biological class. I am thinking of a philanthropic company which has been formed in France with the object of combating interference with radio reception. The statutes of this company, rendered into English *a la* evening school, include the phrase, "will engage in the creation, construction and sale of efficient devices for combating the various kinds of artificial parasites."

Trade News.

DELIGHTED to receive news of Gippsland Broadcasting Station, Gippsland, as you do not know, is 3TR (Victoria, Australia). Its publicity expert tells us that its wavelength is 234.3 metres and that the population of Gippsland is 100,000.

He adds that its power is 50 watts in the aerial and that Gippsland produces meat, wool, butter, and sugar. He goes on to say that from Monday to Friday it transmits from 10.30 a.m. till 2 p.m. and from 6 p.m. till 10.15 p.m., and that 3TR offers to introduce merchants to the desirable field of meat, wool, etc. Advance, Gippsland!

Will-Power and Wireless.

I READ in the "Yorkshire Observer" that Major Raymond Phillips can cause an electric kettle to "perform its function" by will-power. A very handy man to have around the house, I must say. The saving in electrical power . . .

I admired Major Phillips' radio-controlled airship many years ago; it was a deuced clever bit of model engineering. But I don't like the kettle stunt, and I don't believe that will-power enters into the matter at all. It is the principle of the "Theremin" all over again. You simply make body capacity send valves into oscillation and work relays therefrom.



The New "POSTE PARISIEN"



LISTENERS in this country are in an excellent position for receiving the new Paris transmitter known as the "Poste Parisien." This station, which formerly had an output of barely 0.5 kilowatt, has been rebuilt on thoroughly up-to-date lines by the Société Française Radio-Électrique and raised to an antenna power of 60 kilowatts.

Wide Range.

Tests made during the last few weeks have given most satisfactory results, perfect reception being secured throughout Europe and large sections of Africa and Asia.

IN THE TRANSMITTING HALL



The mercury vapour rectifiers and their controls, and (left) one of the power stages.

The new station is situated in the Seine-et-Oise Department, to the south-west of Paris (about 17½ miles from Notre Dame Cathedral), on a high plateau, well cleared from the surrounding country. The Transmitter Building is placed in the middle of the grounds, about 100 yards in front of the towers, and accommodates on the ground floor, the rotary converters, transformers, storage batteries, pumps and control panel for the power supply, etc., and on the first floor, the transmitting set proper and the rectifying plant.

Automatic Temperature Control.

The transmitter supplies 60 kilowatts to the aerial with 90 per cent. modulation. It comprises three parts: (1) control and modulation stages, (2) intermediary stages, and (3) the output or power stage.

The Control Stages are made up of the Master Oscillator, anode-control modulated amplifier, modulator, and a push-pull

All about the splendid station that transmits on 328.2 metres. The dial reading is about one degree below that of Breslau.

amplifier acted upon by the master oscillator direct and not modulated.

The master oscillator, which is controlled by a quartz crystal, is kept at constant temperature by automatic control.

The Intermediary Stages are two in number and are hooked up in push-pull. The valves are biassed in such a way as to work only as amplifiers, the operating point being at about the mid-point of the characteristic.

Impulsion Principle.

The first intermediary stage, which is constituted by the circuits of the intermediary amplifiers, includes two low-power triodes operating at 60 watts dissipation. The second stage also includes two circuits each of which comprises two water-cooled triodes of 10 kilowatts dissipation. The oscillating circuits of these

two stages are designed in such a way as to act as band filters.

The final Power Stage operates on the impulsion principle, the triodes being biassed in such a way as to make the anode current in the absence of any excitation practically nil.

Neutralised.

It includes, like the intermediary stages, two push-pull circuits.

The triodes, six in number for each circuit, are individually biassed by means of a potentiometer device. The same as in connection with preceding stages, the circuits are neutralised, every anode inductance including

a neutralising winding connected to an adjustable condenser.

Power for feeding the station is supplied by the Sud-Lumière Supply Company through two lines terminating at a distributing booth located on the grounds at about 500 yards distance from the transmitter building. This booth is connected to the Transformer Cabin of the transmitter by two underground armoured cables.

Power Plant.

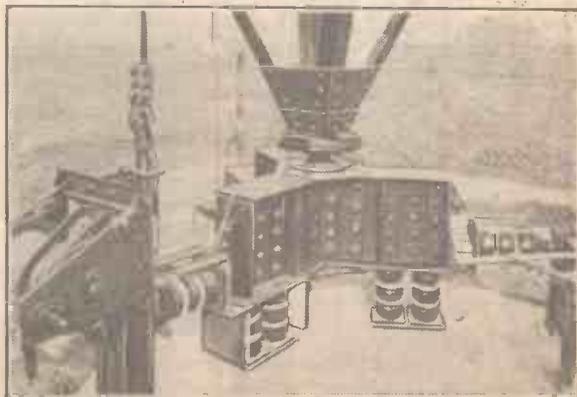
The Power Plant comprises a 225 kw. mercury vapour rectifier, with auto-transformer and step-by-step controller enabling a direct current voltage adjustable between 7,000 and 13,700 volts to be obtained for feeding the anodes of the valves in the two last power stages. This rectifying plant includes three rectifier tanks each fitted with two valves, two of which are kept in normal service, whereas the third one serves as standby and can be put into operation at a moment's notice by means of a special switch.

There is, further, a set of rotary converters supplying filament current to all the valves, anode voltages for the control and modulating stages, as well as the grid bias of the various valves. A main switchboard carries all the controls for the converters, their filters and distant-control contactors.

An adequate supply of cold water for the water-cooled valves is secured by

(Continued on next page.)

A WEIGHTY MATTER



The base of one of Poste Parisien's insulated masts. It can be earthed by the big switch shown on the right. To the left can be seen the aerial-holding winch.



FITTING FUSES

Some Practical Suggestions
By N.E.B. LOMAX

an individual anode circuit may be responsible for a very small percentage increase in the current flowing in the primary circuit, insufficient to blow the primary fuses.

To guard against this, the primary fuses should be supplemented by additional fuses in the H.T. circuits. The best position for these is in series with the rectifier anodes (see Fig. 1), when almost complete protection is afforded, even to the rectifying valve.

THE inclusion of fuses in various electrical circuits has been conventional practice for many years, but the advisability of their incorporation in wireless receivers, particularly those operated from the mains, is not so generally realised.

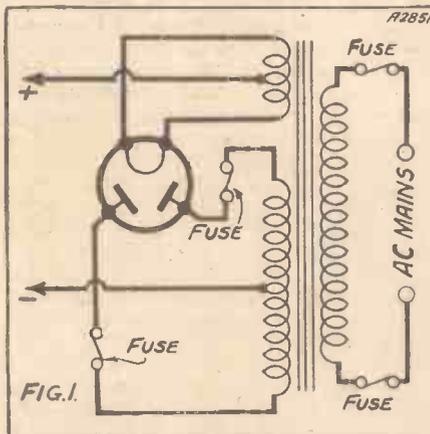
Any receiver which is connected to the mains will, of course, be drawing current through the ordinary house lighting fuses, and it is often assumed these form adequate protection. Owing to the relatively low consumption of a wireless receiver, it is quite possible for serious damage to occur to windings, valves, etc., through overload, before the house fuses blow.

For this reason additional fuses of a rating according to the current flowing should always be incorporated in or near the receiver.

The Best Position.

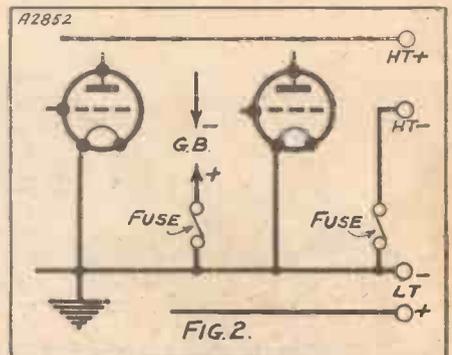
In the case of A.C. mains, while a system of primary fuses is sound and generally satisfactory, it does not entirely protect components in the H.T. feed circuits from risk of damage should a partial short-circuit occur. For instance, an overload of several hundred per cent in the current flowing in

EXTRA SAFETY



To protect components in the H.T. feed circuits, it is advisable to insert fuses in series with the rectifier anodes.

FOR COMPLETE PROTECTION



How the grid bias and high tension circuits are safeguarded

To gain complete protection it is advisable to fuse all three sources of current, H.T., L.T. and G.B., but this is quite a simple matter. See Fig 2 for the method of insertion of H.T. and G.B. fuses. In the case of L.T., the fuse should be as near to the accumulator as possible, and special holders for insertion in one of the L.T. leads are obtainable.

What Size Fuse ?

In determining the sizes of various fuses required, whether for mains or battery-fed receivers, the current which the circuit may safely carry without damage should be considered, and not the current which normally flows.

It should also be remembered that the charging current of a reservoir condenser may easily blow a fuse unnecessarily, and for this reason it is desirable to fit as large a fuse as possible compatible with safety.

The fuses available for wireless use are quite inexpensive, a holder and a dozen spares costing less than the price of one general-purpose valve.

THE NEW "POSTE PARISIEN"

(Continued from previous page.)

means of two motor-driven pumps. There are further provided a filter for this water, a heat dissipator of a capacity of 150,000 calories per hour, and two motor-driven pumps for the water cooling of the heat dissipator.

The first set of pumps, which are automatically controlled by a float, raise the water from a well up to a tank on the roof of the building. From this reservoir the water comes down by gravity through the valve-jackets, after which it circulates through the heat dissipator in order, at last, to flow out into the lower tank-well.

Insulated Masts.

The heat dissipator is cooled in turn by a circulation of ordinary water pumped from an outside supply by the second set of pumps and sent back to this tank through a water-jet cooling pond.

The aerial is of the flat-top type, being composed of three 165 foot horizontal wires. The lead-in is a vertical prism 360 feet in length. The aerial is supported by two stayed towers 390 feet high and mounted on insulated bases, which are placed 585 feet apart. Each tower rests on a dome-shaped base with a triangular support, held vertical by 18 special insulators and laterally, by 9 similar insulators.

Earthing System.

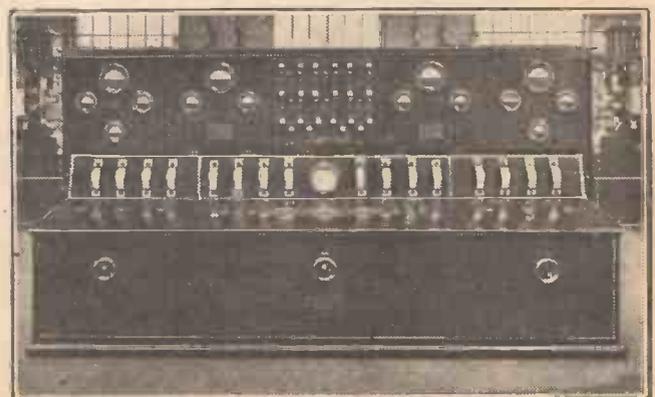
These insulators are protected by removable sheet-iron shields.

The ground system is constituted by copper strips connecting the tower bases and surrounding the building as well as by copper wires perpendicular to the tower lines. These

strips and wires are buried about 2 feet under ground so as to allow of the ground being cultivated.

The aerial is fed by a high-frequency feeder system about 110 yards long, connecting the antenna base to the output terminal of the transmitter.

THE MAIN CONTROLS



The majority of the circuits are centrally controlled at this panel.

AN EVENING *with an* "APEX"



BY
K. D. Rogers

Ranging round Europe on the latest set triumph of "Popular Wireless."

HOW have you got on with your "Apex" receiver? Perhaps you have the set built to the original specification, with the original parts, or perhaps you have gone in for one of the Ferranti or Colvern constructional charts and built the receiver from that. Whatever you have done in that line, how are you getting on with it? How many stations have you heard?

Laboratory Examination.

Many of you will not yet have made the few alterations that are required to get the "Apex" in trim for short-wave reception, so in the following I am going to limit myself in the main to an account of the original "Apex" under normal operating conditions on the ordinary broadcast wavelengths.

As Chief of the Research and Construction departments, I suppose I am fairly familiar with the handling of all the receivers described in POPULAR WIRELESS, which sets, incidentally after stringent laboratory examination, have to pass personal aerial tests under the critical eyes of Mr. G. V. Dowding and Mr. A. J. Randall as well as myself. Thus by the time the details reach publication stage, we know the sets pretty well.

In addition, however, after they have passed their normal tests, I often take models of the various receivers home, and give them a lengthy trial on my own aerial. In this way, I become familiar with all the notable receivers (such as the "Apex"), and, as a matter of fact, I thoroughly enjoy myself with them.

Optimum H.T.

The "Apex" is the latest receiver that I have had at home operating under normal "house listening" conditions, and I have been very pleased with it. Perhaps as the set emanated from the Research Department, I ought not to say such a thing, but I must confess that the power that little set has of pulling in the foreigners really surprised me.

There is no need to go into any description of the set, nor of how best to operate

it, though I would like to emphasise the value of getting the optimum H.T. potential on the screen-grid of the S.G. valve. It is easy to set the various voltages in the act, and to leave them thus set because quite satisfactory results are being obtained, but it is not always a wise thing to do. Very often, even though very good results are being obtained, a considerable increase in sensitivity can be secured by a little judicious variation of the screen-grid voltage.

The screened grid valve needs comparatively careful adjustment if the last ounce of programme pulling is to be obtained from it. So just try another voltage tap or two on your "Apex," and see if it makes any difference. I tried it during my home tests and found that while previously I had been getting good results, the stations I could then hear were greatly increased in loudness and in clarity when

the S.G. voltage was increased about 6 volts or so. It all depends on the individual valve—no hard-and-fast voltage can be specified.

When I arrived home one Thursday evening with the familiar brown-paper parcel under my arm, I was welcomed by my wife with the usual remark that greets the arrival of a wireless receiver in my home. "What, another one?" she said. "Thank goodness it is a small set. It won't be so noisy as the last." (Referring to a commercial super-het I had had on test the week before.)

Pulling Power.

I explained that she would be sure to like this one, it was our latest three-valve, and would surprise her as to its behaviour. No background, no screeching, just plain pulling power—plenty of programmes, and all that.

(Continued on next page.)

WHERE DID THAT PROGRAMME COME FROM?



Checking up a station on the map after it has been received on the "Apex." It adds great interest to programme reception if you know where the station is.

AN EVENING WITH AN "APEX."

(Continued from previous page.)

She thereupon agreed to reserve judgment until she had heard the set put through its paces and what that judgment was you shall hear in due course.

One cannot justly criticise a set's behaviour when one is hungry, so any action with the "Apex" was postponed until after the evening meal. This made it something like 8 o'clock before the wrappings were removed and with batteries, aerial, loudspeaker and so on connected, the on-off switch was pulled out and we settled down to criticise.

I say we, because, in spite of her studied indifference to radio and the caustic remarks with which she greets every new set arrival, my wife is really quite interested in wireless from the reception point of view, and was almost as eager as I to find out how the "Apex" would act under our home conditions.

A Preliminary Canter

These are quite normal—some distance from the London transmitters, (the set had successfully passed local cut-out tests before, so I was not worried about that), and with quite a small aerial and ordinary direct earth. Incidentally, I am on D.C. mains and the tests were carried out both on battery and D.C. mains unit anode power supply.

Having set the voltages as I thought they should be, I proceeded to tune the set, keeping the variable condensers as closely in step as possible. It was not long before I picked up the London National, and a little above him a powerful foreigner that eventually turned out to be Heilsberg. A good start that was continued

Here there was the usual Hilversum (or is it Huizen?) and Radio Paris, Daventry and Eiffel Tower. Coming down this time as I had got the condensers in the "in" position after the run up the lower band:

Not so bad, but it could obviously be improved, with more careful tuning and the use of reaction. The aerial taps on the Colvern coil were set at No. 2.

You do not want to go through the processes of reaction and coil tap variations that were next carried out, but it ought to be mentioned that not much reaction was necessary, as I could use a larger tap on the coil very often, seeing that I was sufficiently far away from the London stations not to have interference from them.

Occasionally I would go to tap No. 1, and bring up reaction to get rid of those troublesome foreigners on top of the London and Northern stations, or to get rid of the latter when the same foreigners were wanted. It acts both ways, you know.

Alternative Programmes

The Northern Regional was picked up well, and, of course, Fécamp simply roared in. Rome thumped his (or should it be her?—they have a lady announcer) way through the ether to come out of the speaker at fine strength, and so did Poste Parisien, Leipzig, Toulouse, Sottens, Stuttgart and Strasbourg, among a medley of

It was at this juncture that I tried a little variation of the screening grid potential, with a remarkable improvement in results. That, together with reaction and sharpened tuning, got rid of a great deal of the interference, and I was able to enjoy a greatly increased list of alternative programmes.

The effect of reaction in lessening the damping of the circuit that it reacts upon is not realised and used enough these days;

"AND HERE'S ANOTHER ONE!"



Making a final adjustment on the detector tuning dial to bring in a distant programme.

it is a very valuable phenomenon, for it increases the selectivity of the tuned circuit involved, and thereby enables the selectivity of the set to be very greatly enhanced.

When you have reaction coupled with a special aerial input tap scheme, such as is employed in the "Apex," the question of getting good selectivity hardly arises, for one can get a surprising degree of sharpness with these two adjustments.

When I had had my fill of medium-wave broadcasters (and I tuned in some score and a half of them that evening) I returned to the long waves to see how the voltage alteration and slow tuning plus reaction would affect reception there. It will be remembered that so far I had only roughly tried the set above 1,000 metres.

One or Two "Yanks"

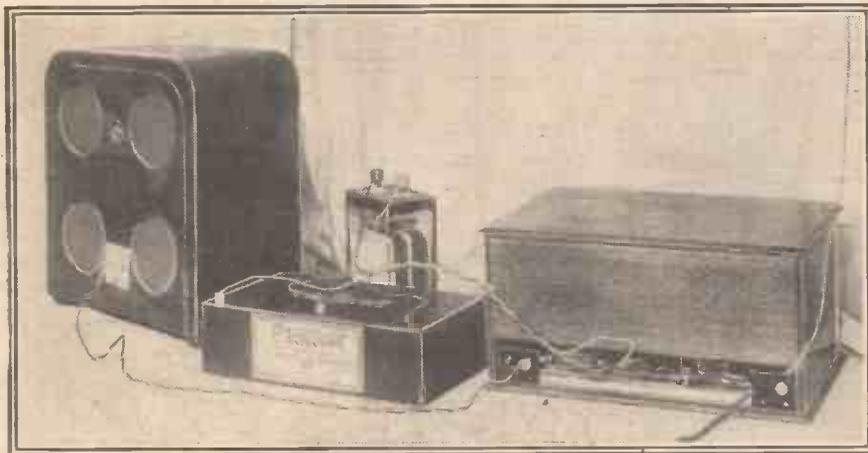
The same favourites were still there, but this time the list was augmented by Oslo, Kalundborg, Motala, Warsaw and Königswusterhausen. A bag of nine. Not bad!

Towards midnight I tried the very short waves, and though conditions were not particularly good, as shown by a test on my standard short-waver, I managed to log a large number of Continentals (both 'phone and telegraphy) and one or two Yanks. The latter were not coming over well by any means, but this was not due to the "Apex," for I had the same results with the standard set.

I did not sit up very late, I must confess, and between 12.30 and 1 a.m. saw me closing down for the night. I was thoroughly satisfied with the performance of the little set. The stations had come in remarkably well on the speaker—a moving-coil type with permanent-magnet field.

I think that perhaps my wife summed up the whole evening (during which she had remained an interested audience) quite effectively when she said: "How much does that little set work out at?" I told her. Then: "I want to get a kit for Dick. Will you get one for me? He'd love it." The "Apex" had won its laurels.

THE CONNECTIONS AT THE BACK



Don't forget to vary the potential of the screening grid—it will make a difference to the set's sensitivity.

successfully through the London Regional and Mühlacker, Midland Regional and Northern Regional, ending with Brussels.

Trying the Long Waves

Such was the first end-to-end-of-the-dial bag without any pause for adjustment of reaction, or for careful tuning. I decided to run round the long waves before doing a more careful survey of the 200-500-metre band.

mush that was constantly varying in intensity as the continentals strove to outdo one another in the ether.

What was to be done about that mush? Not such a difficult problem as it appears. A little cut down in aerial input by means of the coil tap adjustment, and increase in reaction, cleared a great deal of the mush and heterodynes. A wonderful thing reaction if used properly, but a veritable curse if it is not perfectly controllable.

MODERN TONE CONTROL

(Continued from previous page.)

costs? As I mentioned before, the remedy lies in employing a compensating device elsewhere in the set.

The use of a pentode in the output circuit is one method of partially correcting for the deficiencies of selective H.F. amplification.

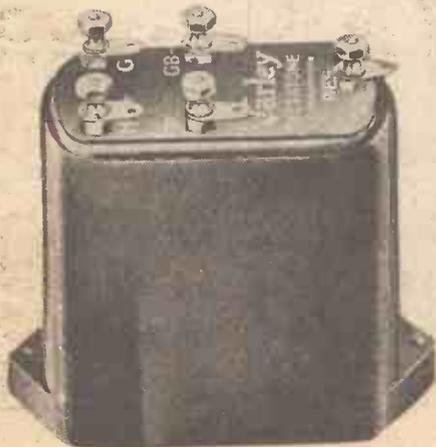
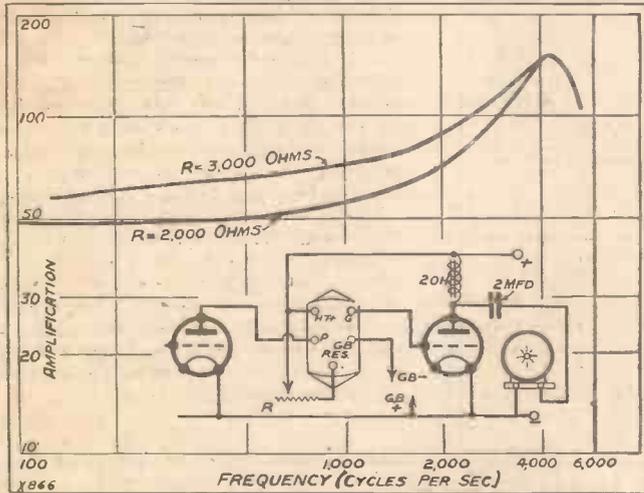
One of the fundamental facts concerning this class of valve is that it over-emphasises the high notes and, in consequence, provides a means of compensating for any loss of "top" elsewhere. But the pentode scheme has its limitations, and its advantages from the standpoint of tone correction may not fit in with the other output circuit requirements.

Another Method.

Another method is to employ an L.F. transformer designed to give a rising characteristic, so that the higher musical frequencies are amplified to a greater extent than the middle and low frequencies.

Such transformers do not usually provide enough over-emphasis of the upper register, or alternately they emphasise the top notes at the expense of the low ones.

USING A RESISTANCE

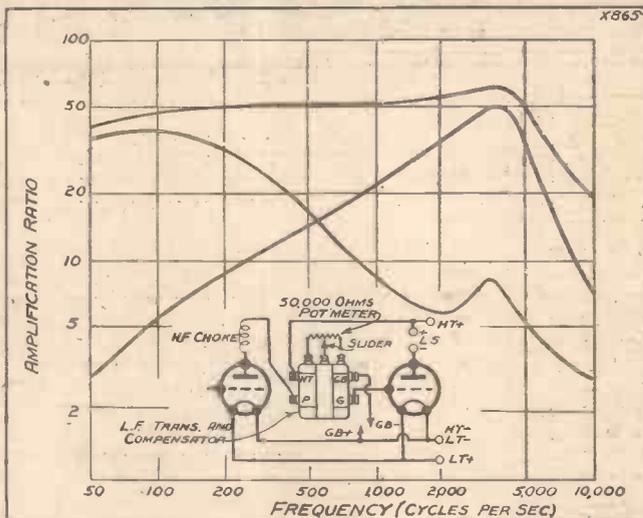


Moreover, the response curve is very susceptible to valve impedance, and circuit conditions have to be just right.

Readily Adaptable.

So we are compelled to look round for some device which enables the necessary tone correction to be adjusted to suit any particular circuit requirements easily and instantaneously. The tone control has to be readily adaptable to any set and must not be simply a "gadget" which gives an apparent compensation merely by cutting off some of the bass.

FOR A POTENTIOMETER



to a rising characteristic.

Thus the listener has at his disposal a convenient means of varying the tone to suit his particular circumstances.

If he desires the transformer to behave as if it were not intended for a tone control, he places the potentiometer in the midway position. On the other hand, if his circuits are of a very selective nature, or there is any other factor in the set which tends to cause a loss of high notes, then he merely rotates the knob until he obtains the correct compensation; his ear at once telling him when the balance of tone is just right.

Another desirable feature with a tone control is the fact

that one can use it in gramophone amplifiers or radio-gram receivers for reducing or completely eliminating the needle scratch. Here again—a turn of the knob and the amount of scratch can instantly be adjusted as required.

A still further valuable feature of these compensators is their ability to cut out heterodyne whistles and reduce mush on distant stations.

Full Control of Tone.

The Lissen tone control is another unit which emphasises the top or bass notes at will, or alternatively provides an even characteristic.

One of the attributes of the Lissen compensator is the fact that it can be used in conjunction with the "Hypernik" transformer by linking it up with the terminals on the transformer, the compensator having precisely the same dimensions as the base of the "Hypernik."

The Varley tone transformer is called the "Rectatone" and has a 7-1 ratio. Two of its curves are shown on this page and it will be observed that the response commences to rise very sharply after about 1,000 cycles and continues to do so to just over 4,000 cycles when it falls rapidly. Thus you have a method of compensating for the losses due to selectivity.

These curves, of course, are merely examples of what can be obtained with two resistance values, namely 2,000 and 3,000 ohms.

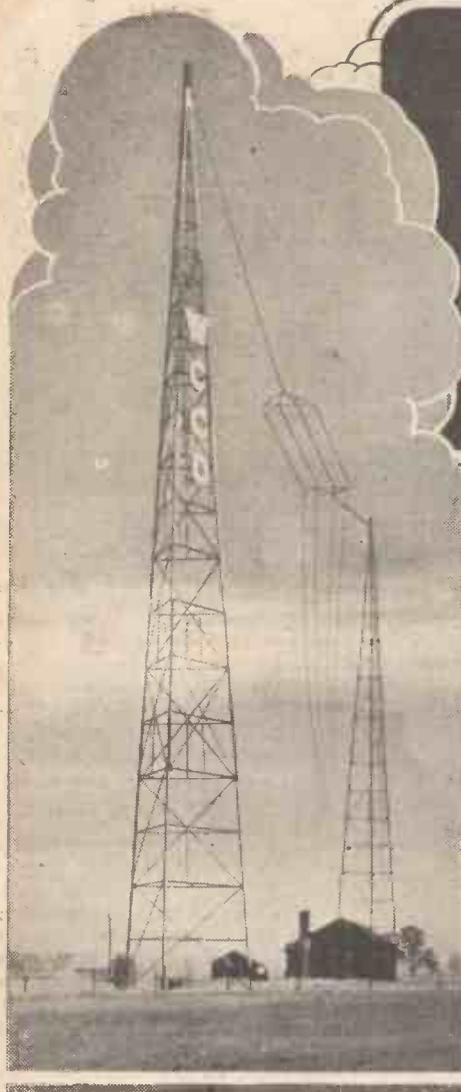
Varying the resistance alters the shape of the response curve, and so it is possible to obtain a full control of tone correction, or alternately to use the transformer as a normal straight-line instrument.

The dimensions of the Lissen Tone Control allow it to be slipped underneath the Hypernik transformer, thereby simplifying connecting and assembly. Typical curves and circuit are given above. The Varley "Rectatone" has a ratio of 1 to 7, and utilises a variable resistance to furnish the required tonal control.

Fortunately for the constructor, there are now several very effective tone compensators on the market, although in fairness to certain of the leading commercial set manufacturers we must not forget the fact that tone control is no new discovery.

The constructor requires a unit which he can insert in his set, with the knowledge that it can also be transferred to any other receiver.

Now the palm for being the first firm to realise this goes to the "Multitone" people, who some months ago entered the field with their adjustable tone control transformer. The "Multitone" looks like an ordinary L.F. transformer, and is used in conjunction with a potentiometer of not less than 5 megohm. By varying the setting of the potentiometer the response curve is altered from a falling, through a level,



The Gold Medal STATION

WCCO is its official name, and it broadcasts from St. Paul and Minneapolis, in the north-west of America. Some interesting details about this and other commercial broadcasting stations are given below.

By OUR SPECIAL CORRESPONDENT.

apart from its own "local" circle of 100 miles' radius, WCCO renders a regular broadcasting service to an outer area covering no less than 260,000 square miles.

No wonder, therefore, that the station has grown and grown and grown since it was first taken over by its present owners in 1924. Recently the station operated on a power of 5 kw., but now, by permission of the American Federal Radio Commission, it has taken a giant's stride in its evolutionary progress, and has become the proud possessor of a 50-kw. transmitter.

Several Studios Used.

The station operates on a wavelength of 370.2 metres. Perhaps you have heard it. The chances are, however, that you have not, for WCCO does not go in for "distance getting," preferring to serve satisfactorily its own "local" listeners.

WCCO has several studios. Some of them are located in the Hotel Lowry, St. Paul, whilst others are situated in the Nicollet Hotel in the adjacent town of Minneapolis.

The cost of erecting and maintaining the St. Paul and the Minneapolis studios and equipment of WCCO is met by the station owners, the Washburn Crosby Company, under their agreement with the Chambers of Commerce of the two towns. The Minneapolis business community contributes an annual \$30,000 and the commercial firms of St. Paul \$20,000 towards a yearly operating cost of \$100,000.

Eighteen miles north-west of the associated towns of Minneapolis and St. Paul you will find the aerial towers of WCCO rising to the sky. It is a new Western Electric transmitter of standard type, crystal controlled, and it is powered from electric cables coming from Minneapolis.

Adjacent to the Minneapolis and St. Paul studios there are control-rooms in which the microphone matter is manipulated before being sent off by permanent land-line to the transmitter.

Advertising Charges.

WCCO is linked up with the famous WEA F at New York City, and also with other broadcasters in the different American states. Occasionally it relays Paris, London, and a few other European stations.

As a radio advertiser, pure and simple, WCCO claims to possess a service second to none in the whole world.

Half an hour's evening time on WCCO costs an advertiser fifty-seven one-thousandths of a cent for each receiving set in the area of WCCO's intensive service area. There are, it is calculated, some 300,000 receiving sets in this area of roughly 100 miles radius, and the cost of delivering a half-hour's evening programme of discreet advertising matter mixed up with entertainment to ten receiving sets in WCCO's "local" area, artistes' fees included, works out at less than the price of a 2-cent stamp.

That is a little sample of how they work out commercial radio advertising charges in the States, and how both the advertiser and the station officials are enabled to keep

(Continued on next page.)

THEY call it the "Gold Medal Radio Station," this WCCO.

It is located at St. Paul, or, rather, in the adjoining towns of St. Paul and Minneapolis, which form the principal population-centre of the American north-western state of Minnesota.

The station derives its curious name from the fact that it is owned and operated by the Washburn Crosby Company, which is an important flour-milling concern in the American North-West, and which specialises in the production of a certain brand of "Gold Medal flour."

Any Advertising Accepted.

The station-owners do not attempt to disguise the fact that theirs is, in many respects, a commercial station; and, for a consideration, they will advertise any article of yours through radio channels over an area covering many thousands of square miles.

The station, of course, exists for the broadcasting of entertainment and general items as well as for purely commercial advertising purposes. Located as it is near to the Canadian border, station WCCO is the principal source of radio entertainment not only to half a dozen of American states, but also throughout a region extending far into Canada.

It has, in fact, been computed that,

WHEN A HOTEL IS NOT A HOTEL



The St. Paul studios of WCCO are situated in the lounge of the Hotel Lowry—when the visitors aren't using it for dancing!

THE "GOLD MEDAL" STATION

(Continued from previous page.)

a strict check upon the economic side of the matter.

The station, of course, does not entirely depend for its existence upon its advertising revenue. As stated before, its primary charge is shouldered by its owners in association with the business communities of the twin towns in which its studios are situated. Advertising fees, no doubt, count for something, but a high-powered, up-to-date American broadcaster, like WCCO, which depended upon such fees for its existence would have a short life indeed.

No Licences.

Before leaving this subject of radio-advertising, it might be of interest for me to mention that the WCCO authorities, in common with many other American broadcasters, take half an hour during the middle evening as being the radio-advertising

equivalent of a full-page of American magazine space. It is an advertising unit, in fact, and it is a unit upon which most computations are based.

Station WCCO begins its programmes early in the day. There are items in the morning, school-instructional courses in the afternoon, and the usual sequence of studio matter from six o'clock onwards. Closing down at midnight, except on special occasions, WCCO brings a busy routine day to an end. Its entertainment is free to all listeners. There are no licences required. And so, after all, if you don't like the advertising bits which are judiciously inserted between the entertainment items you can easily switch off.

BALANCE AND CONTROL



The WCCO control-room at Minneapolis, also placed in a popular hotel. Through this room must pass all the programmes on their way to the transmitter 18 miles away.

Radio is cheap to the listener in the American States.

DERBYSHIRE:

October 31st to November 5th.

HEREFORDSHIRE:

November 11st to November 26th.

LINCOLNSHIRE:

December 12th to December 17th.

NOTES FROM THE MIDLANDS AND THE WEST

The London broadcasting authorities will have to keep very wide awake if they are to keep pace with the ambitious programmes described
By OUR SPECIAL CORRESPONDENT.

WARWICKSHIRE:
January 16th to January 21st.

LEICESTERSHIRE:
February 27th to March 4th.

NORTHAMPTONSHIRE:
March 27th to April 1st.

GLOUCESTERSHIRE:
April 24th to April 29th.

THERE'S a fine ambitious programme of broadcasting activities for you!—the dates fixed for Midland Regional's "County" broadcasts. Each county has a week in which its talent, drama, history, industries, *et cetera*, will be featured in the Midland programme; surely if it all sounds as well to the ear as it looks on paper, this scheme is going mightily to please listeners in the Midland counties—and make other B.B.C. Regions look to their laurels!

Radio Pageant of History.

Derbyshire was wisely chosen to give the scheme a good start, for that romantic county offers endless scope to the enterprising programme-organiser.

A radio pageant of Derbyshire history by

Britain's leading radio playwright, L. du Garde Peach (who lives in Derbyshire); relays from the Rolls-Royce and L.M.S. Railway factories at Derby; recitals of Derbyshire songs and stories; two plays in Derbyshire dialect performed by the Village Players from Mr. Peach's home-place, Great Hucklow—such are only a few of the features of Derbyshire's radio week.

Representative of the Counties.

Centrally situated at Daventry, the Midland Regional transmitter is fairly easily received in all the counties featured, but if some other Regions attempted a similar scheme there would be the paradox of listeners in some counties being unable to hear their own county programme.

The West Region could not possibly put on such a series, representative of the counties of Wales and the West of England, for the obvious reason that the present low-power West Regional transmitter at Cardiff does not provide a service to all these counties. And even when the high-power West Regional at Watchet opens some parts of Wales will still be out of reach of the West Regional programme.

Serving North Wales.

It has been rumoured for some time that to help the West Regional Director over his difficulties (more especially in serving North Wales) the co-operation of

the North Regional station will sometimes be obtained, and the first evidence of this method of the improvement and expansion of the Regional Scheme was seen on October 25th, when the opening of the new wing at the National Museum of Wales by Prince George was relayed from Cardiff by North Regional. This station is received quite well in North Wales, but one wonders what Northern listeners will think about it.

West Regional, by the way, has paid North Regional the compliment of imitation by launching a new series of talks on "My job and why I like it."

New Birmingham Studios.

The machinery is now being installed at Watchet, and the two 500-ft. masts are finished. Test transmissions should first shake the western ether early in 1933.

To return to the Midlands—the extension of the B.B.C. premises in Broad Street, Birmingham, is going on rapidly, and the new part of the building (which has been built out over a garage) may now be explored, the floors, windows, heating apparatus and lighting being finished. I was not greatly impressed by the amount of available room, even in these larger premises.

When the new studios are finished programme work at Birmingham will be greatly facilitated, more particularly dramatic work, which is at present sustained under circumstances which I am sure would drive London B.B.C. producers to the nearest asylum.

MAN-MADE INTERFERENCE



A permanent exhibition of the various causes of radio interference—together with the cures—is now held in the "chamber of horrors" at Berlin's Broadcasting House.

READ

MODERN WIRELESS

Britain's Leading Radio Magazine

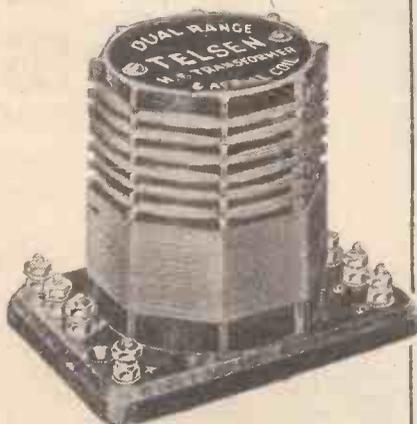
TELSEN DUAL-RANGE COILS



TELSEN DUAL-RANGE AERIAL COIL

Incorporates a variable selectivity device, making the coil suitable for widely varying reception conditions. This adjustment also acts as an excellent volume control, and is equally effective on long and short waves. The wave-band change is effected by means of a three-point switch and a reaction winding is included ...

7/6



TELSEN H.F. COIL

May be used for H.F. amplification with Screened-Grid Valve, either as an H.F. Transformer or, alternatively, as a tuned grid or tuned anode coil. It also makes a highly efficient Aerial Coil where the adjustable selectivity feature is not required ...

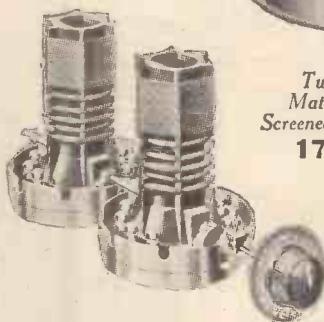
5/6



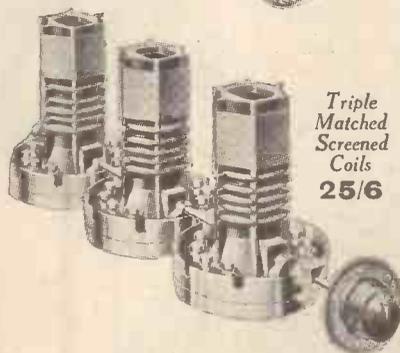
TELSEN SCREENED COILS

The result of much research and experiment, these coils embody the ultimate efficiency attainable in a perfectly shielded inductance of moderate dimensions. Provided with separate coupling coils for medium and long waves, they are suitable for use as aerial coils or as anode coils following a screened-grid valve, giving selectivity comparable only with a well-designed band-pass filter. The coils are fitted with cam-operated rotary switches with definite contacts and click mechanism, and are supplied complete with aluminium screening cans, bakelite knob, and handsome "Wave Change" escutcheon plate, finished in oxidised silver ...

Twin Matched Screened Coils
17/-



Triple Matched Screened Coils
25/6



8/6

Full instructions are supplied with every Telsens Screened Tuning Coil, showing you the alternative methods of mounting the coils, either singly or in twin-matched or triple-matched form as required.

TELSEN

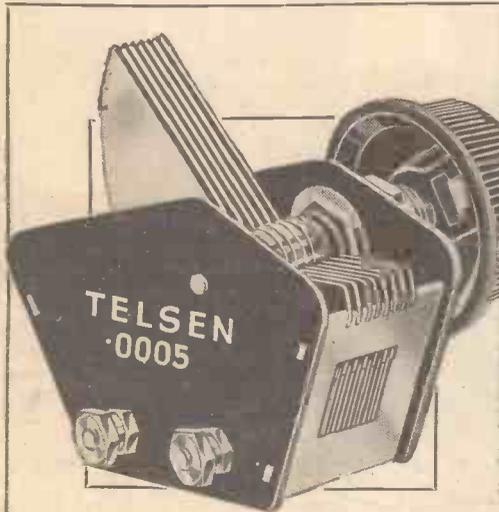
RADIO COMPONENTS

TELSEN RADIO COMPONENTS ARE 100% BRITISH

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO., LTD., ASTON, BIRMINGHAM

TELSEN

BAKELITE DIELECTRIC CONDENSERS



TELSEN BAKELITE DIELECTRIC TUNING CONDENSERS

New design of great rigidity and exceptional compactness, ensuring the utmost efficiency in use even where space is very limited. The well-braced vanes are interleaved with a minimum of the finest solid dielectric, giving absolute accuracy of tuning. Supplied complete with knob.

2/6

In capacities '0005 and '0003

TELSEN DIFFERENTIAL CONDENSERS

Improved type of exceptionally rigid construction. The rotor vanes are keyed to the spindle and fitted with definite stops. A strong nickel silver contact makes connection to the rotor, a positive connection being made to the stator vanes. Supplied complete with knob.

2/6

In capacities '0002, '00015 and '0001



TELSEN REACTION CONDENSERS

In capacities '0003, '00015 and '0001

2/4

In capacities '00075 and '0005

2/6

TELSEN AERIAL SERIES CONDENSER

The ideal volume and selectivity control, solidly constructed, with very low minimum capacity. The externally keyed switch-arm when rotated to a maximum position, connects with a contact on the fixed vanes, thus short-circuiting the condenser for maximum volume. Supplied complete with knob.

2/3

Capacity '0003



TELSEN
RADIO COMPONENTS

TELSEN RADIO COMPONENTS ARE 100% BRITISH

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO., LTD., ASTON, BIRMINGHAM

RECEIVERS OF RENOWN



No. 9.—THE LISSEN TWO-VALVE ALL-ELECTRIC A.C. RECEIVER

THE efficiency of an all-electric two-valver is such that surprisingly good results can be achieved with as few as two valves.

Indeed, a detector and pentode all-mains receiver is practically equivalent to a det. and 2L.F. of the battery type, and given a reasonably effective outdoor aerial a very satisfactory "bag" of stations is assured, except, perhaps, in "swamp" areas or badly-shielded localities.

You cannot obtain super-heterodyne results with an all-mains two, but you can get unlimited enjoyment from a set of this type provided you appreciate its limitations, and treat it accordingly.

Hum Adjuster.

It is this class of receiver wherein lies the solution of radio for everybody, because its economy in first cost and in upkeep brings it within reach of the listener with the smaller pocket.

The Lissen "A.C. Two" is a design incorporating the minimum of "frills" but including all those essential factors that make for efficiency.

The circuit comprises a grid-leak detector followed by a transformer-coupled pentode stage.

The aerial tuning circuit is of conventional type, the aerial being taken through a small fixed condenser to one of two alternative tappings on the dual-wave winding. There are actually four different ways of joining up the aerial, each giving a different degree of selectivity.

The detector valve is the Lissen A.C./H.L. indirectly-heated, and reaction is obtained by feeding back the high-frequency potentials in the anode circuit via a common reaction winding and reaction condenser in which the moving vanes are at earth potential, a procedure which eliminates hand-capacity effects.

The pentode is *directly* heated, the Lissen P.T.425 being used in this position. There is no hum on normal mains with this arrangement, and the makers have incorporated a hum adjuster in the set to meet the requirements of abnormal mains. This is a very practical point, and proves that the manufacturers have taken every precaution to ensure satisfaction.

Turning to the mains side of the receiver, the standard model is designed for 200-250-volt supplies having frequencies ranging from 40-60 cycles.

There is also an alternative version for 100-125-volt mains, and still another model for 200-250-volt D.C. supplies.

Each model is priced at seven guineas, this figure including a four-pole balanced-armature loudspeaker built into the design.

As mentioned previously, there are no "frills" and for simplicity's sake the usual "on-off" switch is omitted, the adapter plug being inserted into a conventional

metres. In our tests we used our large outdoor aerial, and both the selectivity and sensitivity were fully up to the average for this class of circuit.

We found the tuning and reaction adjustments to be smooth and capable of fine adjustment, the reaction in particular being free from "ploppiness" or backlash.

With some pentode designs there is a tendency for the reproduction to suffer from a slight over-emphasis of high-note response, but in the case of the Lissen "Two" it is evident that care has been taken suitably to balance the output load, and the reproduction has a pleasing tone, speech being crisp and life-like.

This receiver, with its nicely moulded cabinet, chassis construction, and simple control, is good value for money.

Every Lissen set is sent out with the fullest instructions concerning its operation, and there is no excuse for the listener failing to achieve satisfactory results.

TECHNICAL SPECIFICATION

NUMBER OF VALVES.—Two.

A.C./H.L. indirectly-heated detector, followed by transformer-coupled L.F. stage with directly-heated P.T.425 Pentode output valve.

Valve Rectifier, U.650, half-wave type.

ARRANGEMENT OF CONTROLS.—

One for tuning, one for volume, plug and sockets for changing from medium to long waves.

SPECIAL FEATURES.—Hum adjuster, illuminated tuning scale and drum control, four-pole balanced-armature loudspeaker, all-bakelite moulded cabinet, metal chassis.

VOLTAGE RANGE.—200-250 volts, 40-60 cycles, also 100-125 volts (model L.N.3001.)

PRICE.—Seven guineas.

DIMENSIONS.—Height, 14 ins. Width, 12½ ins. Depth, 5 ins.

MAKERS.—Lissen, Ltd., Lissenium Works, Worpole Road, Isleworth, Middlesex.

socket or lamp-holder when it is desired to use the set.

There are no controls whatever on the front of the distinctive bakelite moulded cabinet, but in the top right-hand corner is a very neat illuminated tuning scale, the illuminating bulb, when alight, acting as a reminder that the set is connected to the mains.

Good Value for Money.

The two chief controls, viz., the drum-drive tuning control and the reaction-condenser are adjusted from the back of the receiver, a most convenient procedure in practice.

The remaining adjustments are the alternative aerial sockets and the wave-change plug. These are also located at the back of the set, along with the additional loudspeaker sockets, hum adjuster, and mains-voltage tappings.

The wave-range of the receiver is approximately 250-550 metres and 1,000-2,000

D.C. Model.

Moreover, every receiver carries the backing of the Lissen after-sales service, a point well worth bearing in mind when purchasing a set.

The circuit of the D.C. model is very similar to that of the A.C. version, the main difference being in the type of valves, and the mains equipment, which are, of course, chosen to suit the special requirements of D.C. mains.

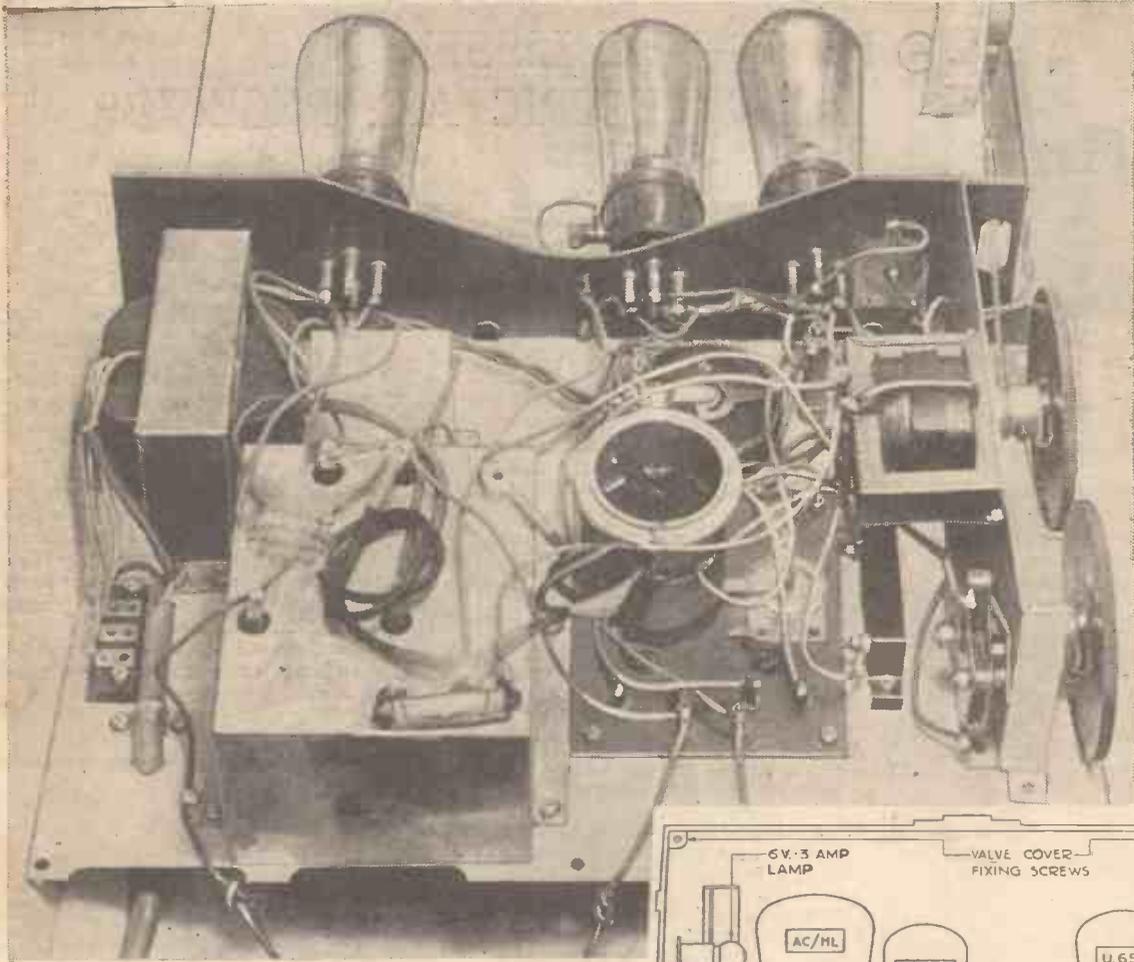
(Continued on next page.)

NO OPERATING SKILL NEEDED

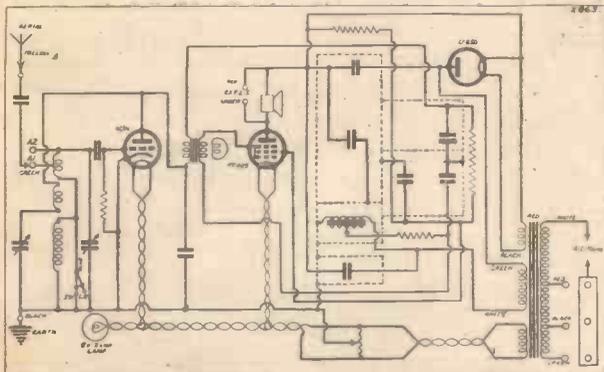


Drum controls are employed for tuning and adjusting the volume. Wave-changing is carried out by inserting a plug in the appropriate socket.

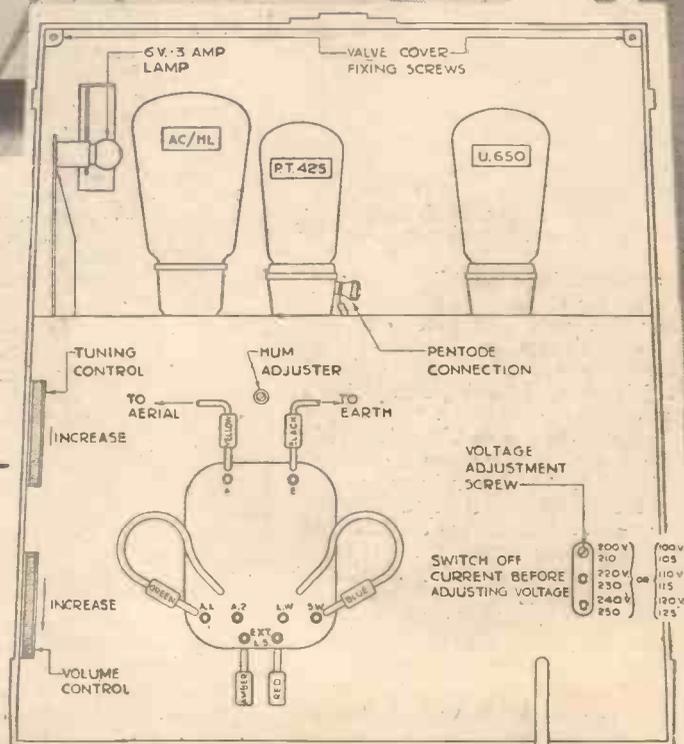
THE LISSEN TWO-VALVE ALL-ELECTRIC A.C. RECEIVER—(Cont. from previous page.)



ECONOMY IN RUNNING COSTS COMBINED WITH SIMPLICITY IN OPERATION



The Lissen two-valve all-electric receiver is available in both A.C. and D.C. mains versions. The A.C. model is designed for 200-250 volts, and also 100-125 volts, 40-60 cycles, while the D.C. version works on mains voltages of 200-250. Both models utilise a pentode valve in the output stage. Among the special features of the A.C. model may be mentioned the hum adjustment, which is a very practical refinement.



TO A.C. MAINS SUPPLY SOCKET

Hoof-Beats on the High Road!

HOW STUDIO
SOUNDS ARE PRODUCED



Clip-clop . . . clip-clop, slightly resonant, slightly hollow—the Effects Studio produces the sound of hoof-beats by clapping together two halves of a coconut. Look to your high-tension current supply if the sound you get is wooden, flat and unconvincing—because you are obviously missing the detail, missing the resonance, missing the hollowness. And if you miss it in these hoof-beats you miss it also in all sorts of broadcast items. It is a pity to miss the detail of broadcast radio when you can so certainly get it by merely fitting a Lissen High Tension Battery—obtainable at all radio dealers.

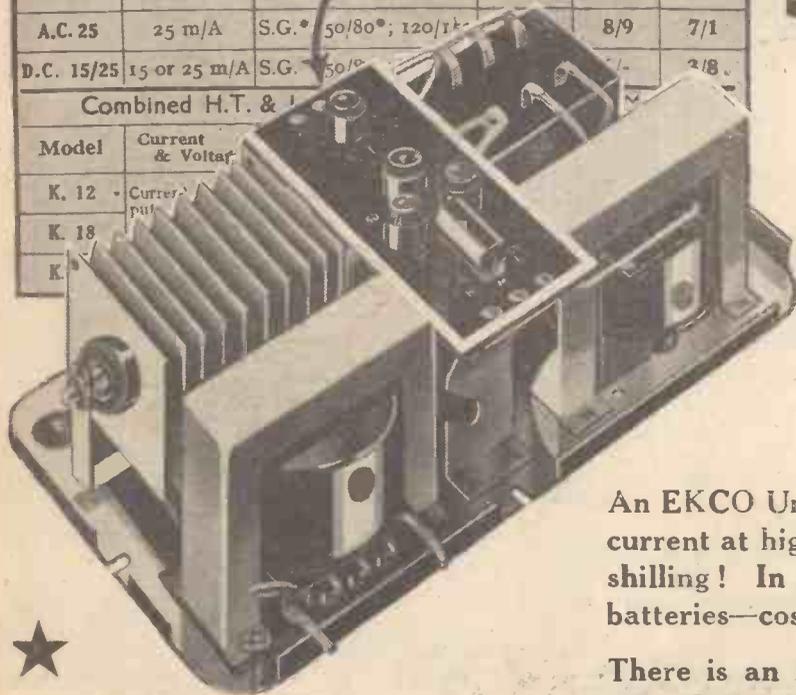
**an exclusive process makes it last longest
and provide a pure high tension current
that gives realism to your radio - always**

Only in the Lissen Battery do you get this Secret Process!

EKCO H.T. UNITS

Model	Current Output	Voltage Tappings	Price	EASY PAYMENTS Initial Payment 11 Monthly Payments of	
A.C. 12	12 m/A	S.G.; 80; 120/150	£2.15.0	6/6	5/-
A.C. 18	18 m/A	S.G.*; 50/80*; 120/150	£3. 7.6	7/9	6/2
A.C. 25	25 m/A	S.G.*; 50/80*; 120/150	£3. 17.6	8/9	7/1
D.C. 15/25	15 or 25 m/A	S.G.*; 50/80*	£1. 19.6	6/-	3/8

Combined H.T. & L.T. Charger Units (for A.C. Mains)	
Model	Current & Voltage
K. 12	Current Output and Voltage Tappings same as Models A.C. 12, A.C. 18 and A.C. 25.
K. 18	
K. 25	



50/- worth of H.T. for one shilling!

An EKCO Unit will give you ample, silent, unvarying current at high voltage for one year at a cost of one shilling! In a year you would buy at least four H.T. batteries—costing at least 50/-!

There is an EKCO Unit for every type and size of set. Just connect the appropriate model in place of your usual battery—then switch on—that's all!

Choose the Unit suitable for your set from the Table below or post coupon for full details. No alterations to set, valves or wiring.

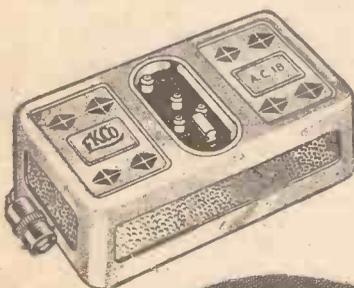
Based on 3 hours daily use of an average 3-v. set.

The Unit Control Panel, Showing:—

Top: The S.G. Plug, with its three alternative voltage tappings; 80-90; 70-80; 60-70; up to 3 m/A.

Centre: Negative Plug.

Bottom: The 50/80 v. Plug, adjustable in three positions, High, Medium and Low, up to 3 m/A; and the 120/150 v. Plug—120 volts at approximately 21 m/A up to 150 v. at approximately 11 m/A.



All models are similar in external appearance.
Size, 9 x 5 x 3 1/2

EKCO H.T. UNITS					
Model	Current Output	Voltage Tappings	Price	EASY PAYMENTS Initial Payment 11 Monthly Payments of	
A.C. 12	12 m/A	S.G.; 80; 120/150	£2.15.0	6/6	5/-
A.C. 18	18 m/A	S.G.*; 50/80*; 120/150	£3. 7.6	7/9	6/2
A.C. 25	25 m/A	S.G.*; 50/80*; 120/150	£3. 17.6	8/9	7/1
D.C.15/25	15 or 25 m/A	S.G.*; 50/80*; 120/150	£1. 19.6	6/-	3/8

Combined H.T. & L.T. Charger Units (for A.C. Mains)					
Model	Current & Voltage	L.T. Output (for charging accumulators)	Price	EASY PAYMENTS Initial Payment 11 Monthly Payments of	
K. 12	Current Output and Voltage Tappings same as Models A.C. 12, A.C. 18 and A.C. 25.	1 amp. at 2, 4 or 6 volts	£3. 19.6	9/-	7/3
K. 18		1 amp. at 2, 4 or 6 volts	£4. 12.6	10/3	8/5
K. 25		1 amp. at 2, 4 or 6 volts	£5. 7.6	11/9	9/10

Tappings marked * are adjustable.

EKCO

RADIO POWER UNITS

To E. K. COLE, LTD. (Dept. A.25.), Ekco Works, Southend-on-Sea.
Please send me illustrated FREE literature of EKCO All-Electric Radio.

Name.....
Address.....

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.

SQUEALING SETS—H.F. CHOKES—REPAIRING L.T.—SELECTIVITY—DECOUPLING.

A Little "Squeal."

S. D. (Birkenhead).—"I have a det. and 2 L.F. receiver, which works very well indeed. But every time I switch off the L.T. (it is a battery set) there is a little 'squeal.' Do you think this is an indication that something is wrong?"

No, nothing wrong! If your filament temperature was permanently less than the valve designer intended, then your set would howl and be unstable.

When you switch off, the H.T. supply persists—it persists because the smoothing condenser is still charged and leaks away only slowly through the valves, the filaments of which are cooling and not demanding, therefore, a full load current.

In slowly dimming, the filaments reach a condition where the valves are still functioning and where there is still some H.T. to make them function—the set howls, but the temperature soon falls to a value where the set no longer operates at all and the squeal stops—so does the set.

Choking H.F.

H. J. D. (Cardiff).—"Since an H.F. choke must possess a certain amount of distributed capacity, it seems to me that H.F. must pass the windings and flow through the external circuit.

"In view of this, I cannot see that it is possible to obtain the maximum magnification from a 'parallel-feed' H.F. amplifier when the anode circuit of the S.G. valve contains an H.F. choke. Am I correct, please?"

The choke connection involves the choke being tuned partly by its self-capacity, as you say. But, more than this, the valve capacity—usually much larger than the choke self-capacity—tunes the choke.

And so choke capacity H.F. magnification is really tuned anode magnification with a varying efficiency according to frequency.

But in spite of the choke being more or less efficient according to the value of the frequency applied, the resulting impedance of the choke, self and valve capacity tuned, as it is more or less, is usually higher than the impedance of the tuned circuit proper, hence the latter takes charge and determines sensitivity and selectivity.

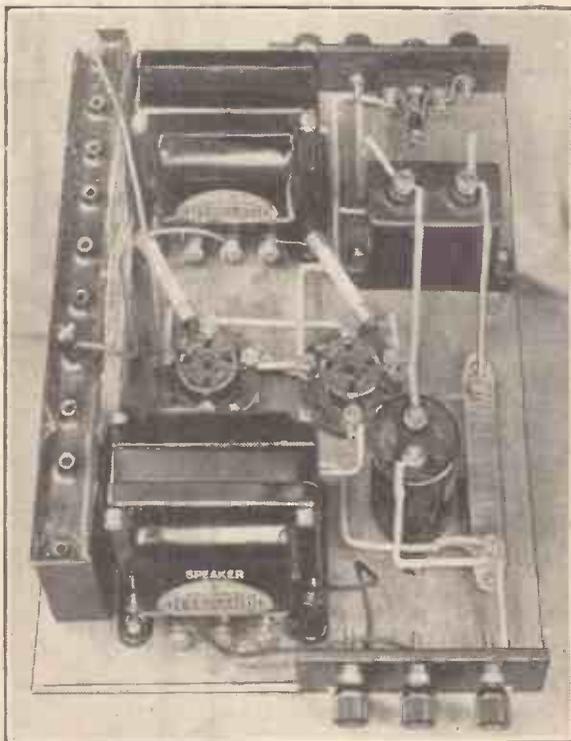
Accumulator Repairs.

J. R. W. (Edinburgh).—"Some of the positive plates of my L.T. accumulator have started to buckle, and it looks as though these plates will soon be touching the negative plates, since the corrugated separators are gradually being flattened.

"Would it be in order to remove the plates and hammer them flat with a hammer?"

No! I think not. I know very little indeed about accumulators—their use and abuse; but I feel the latter term would be

A PUSH-PULL ADVANTAGE



The addition of an extra L.F. stage after a set often results in overloading of the new output valve. If the extra stage takes the form of a push-pull amplifier, such as the photo shows, overloading is avoided.

a fair one to use in connection with any operation involving so unscientific an instrument as a hammer.

My best advice to you is to seek it elsewhere, and no quarter better than that where the accumulator was born and made.

Improving Selectivity.

M. C. (Dulwich).—"I understand that a larger aerial gives poor selectivity, and a

small aerial good selectivity. Surely it is not essential to decrease the aerial dimensions in order to achieve high selectivity.

"Will not a series aerial condenser be just as effective?"

Yes. I think just as effective, but I am not perfectly sure of my quantities. The insertion of the series aerial condenser does, however, reduce sensitivity, which is one of the reasons it makes the aerial more selective. There is another reason, but that's immaterial now.

In any case, I think a medium-sized aerial with a variable series condenser by far the best arrangement.

Choosing De-coupling Values.

D. L. (Falmouth).—"I have read that all that is required for 'de-coupling' a valve's anode circuit is to arrange for the necessary resistance to be high compared with the condenser impedance at a low frequency.

"I find this works all right, providing a high resistance is used (such as 20,000 ohms) with even a 2-mfd. condenser. At 50 cycles the impedance of a 2-mfd. condenser is roughly 1,600 ohms.

"An 8-mfd. condenser has an impedance of about 400 ohms at 50 cycles, so such a capacity should allow a 5,000-ohm resistance to be used.

Although this arrangement preserves the same ratio of resistance to condenser impedance, I have found it does not work. Why?"

The voltage on the valve anode is greater with the 5,000-ohm resistance than with the 20,000-ohm resistance, and therefore the whole performance of the amplifier different, being more sensitive and more inclined to instabilities when the decoupling resistance is low.

WHY WAVE-CHANGE?

Some notes on the ever-present problem of effecting an easy change-over from one waveband to another without impairing efficiency.

BROADCASTING in this country, and throughout the continent of Europe, has been going on for ten years and more. It commenced normally on wavelengths between 200 and 500 metres, but it was not long after the start that it was decided that for proper service over fairly long distances it was necessary to use wave-lengths above 1,000 metres.

Accordingly Daventry took the air, to be followed by numerous other high-power long-wave stations on the Continent.

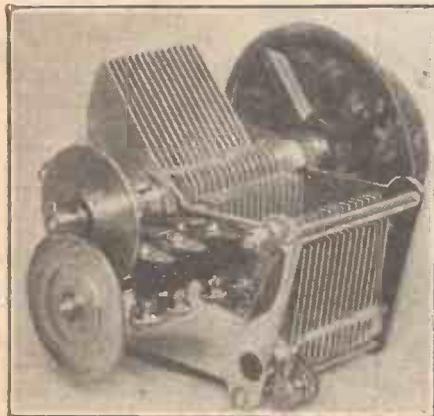
The lower-wave transmitters were kept on, and so European listeners (unlike the American) have been forced to use sets that will enable tuning to be carried out both on what are called the medium and on the long waves.

Delightfully Simple.

Some years ago this two-range tuning was accomplished by the simple but tedious method of using coils that were interchangeable; larger coils being inserted in the sets in place of the smaller ones whenever a long-wave programme was required, and the reverse taking place when the medium waveband was to be explored.

Clumsy all that, though it was efficient and economical. But it has passed with various advances in the design of radio receivers, and nowadays a great number of listeners operate more or less complicated

SLOW-MOTION TYPE



The Webb "Wavemaster" extender has an integral slow-motion drive, the mechanism of which can be seen in this illustration.

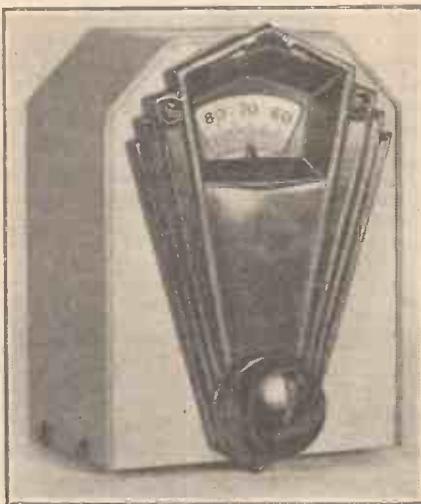
switches whenever one band of frequencies is to be changed for another. Possibly you do that, but have you ever stopped to think how inconvenient it is to have to push or pull, or turn, perhaps two switches every time that you want to change the tuning range?

There is no need to do this wave-changing, switch-operating business, as many of our older readers know; it can all be done automatically in such a way that while you operate the tuning control of the set you slide smoothly from one band to the other with no pause to twist knobs or pull switch controls.

In other words, when you have, for instance, reached the limit of one waveband on the tuning control you just go on tuning and automatically you are searching the other waveband for programmes.

It is all delightfully simple and, further, though you can thus slide uninterruptedly from one waveband to the other and back again, you can never lose yourself; you know all the time exactly where you are on the tuning scale.

COMPLETELY SCREENED



Known as the "Telexor" the Telsen extender illustrated here is completely enclosed in a metal case, and a dial light is included in its construction.

The device that enables this wonderfully easy control is known as the "extender," and has been in general use now for some months, and for the sake of readers not conversant with it we will give a brief explanation. It consists of a tuning control which is so designed that it does away completely with coil switching panel controls, the rotating spindle of the "extender" carrying out the wave-change without any conscious effort on the part of the operator of the receiver.

A Typical Example.

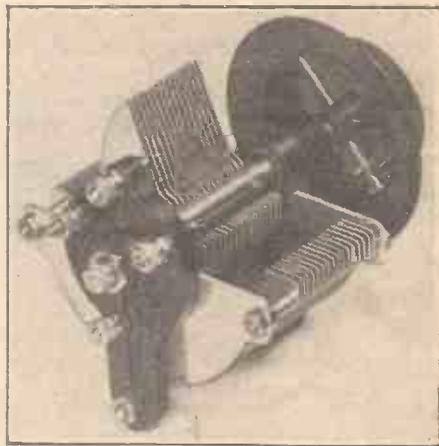
Let us take a typical example. Suppose you are listening to the London Regional programme and want a change. You normally proceed to search the rest of the medium waveband, and then if there is nothing there to please you, you manipulate those switches we have referred to, and go on searching between 1,000 and 2,000 metres.

There is a definite pause while you pull or push or turn the switch or switches, and then you take up the search again, hoping to find the programme of your choice.

How much nicer it would

be if your set were fitted with the extenser method of tuning, and when you tired of the London Regional and found nothing on the medium-band to take its place you could just go on turning the tuning dial, automatically searching those long waves through Huizen, Radio Paris, Daventry, Eiffel Tower, Motala, Oslo, and so on. All done without a pause, yet a definite reading on

A "FORMO" FORM



This type of extenser has a particularly neat arrangement for the self-changer contacts.

the tuning dial to denote exactly where you are on the wavelength scale, and on which band you are tuning.

Ideal, isn't it? And it is within the reach of everybody, for the extenser system is so easy to use and easy to fit that every home constructor can employ it with the same facility as he would an ordinary condenser tuner.

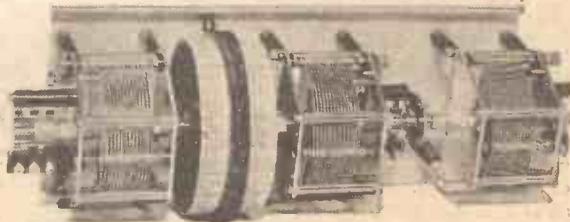
Wave-changing, as it affects the operating side of the set, disappears when the extenser is used. Naturally, we have to wave-change, but the transition from one band to another is so smooth that to all intents and purposes, as it affects the owner of the set we might be tuning further up (or down) the one band of frequencies.

That is ease of tuning if you like, and in the past many of the POPULAR WIRELESS set designs have made use of this unique and wonderful method of tuning. The extenser takes the place of the ordinary tuning condenser and the wave-change switches at one and the same time, so it is easy to understand what a simplification of design and construction is obtained.

Easy Change-over.

With very few exceptions the old sets can be converted into the new, by the replacement of an extenser for each variable condenser that the receivers now contain, and next week we are going to show in detail how very easy such a change-over is.

GANGED MODEL



That satisfactory ganging of Extensers is a practical proposition is exemplified by this beautiful "Cyldon" three-gang job.

A MULLARD 2-VOLT COMBINATION

That's all we need say. If it's Mullard you know it's the best. Mullard valves have stood the test of years: public preference has proved their quality and reliability: constant research and constant improvement makes them the valves of the moment. Now a new construction, the greatest development in modern valve design, makes them non-microphonic.

P.M.12 Screened Grid - price 16/6

P.M.1HL Detector - price 7/-

P.M.2A Power Valve - price 8/9

(MADE IN ENGLAND)

The valves specified for the "1933 Four" described in this issue are:—

*Mullard P.M.12. Mullard P.M.1HL. Mullard P.M.1LF
Mullard P.M.2A or P.M.202.*



Adv.: The Mullard Wireless Service Co., Ltd., Mullard House, Charing Cross Road, London, W.C.2

ARKS

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LOW PRICE

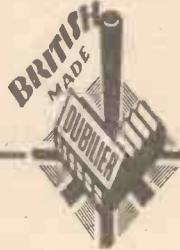
THERE ARE

6

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REASONS**

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**DUBILIER
DRY
ELECTROLYTIC
CONDENSERS**



QUALITY POINT No. 3

LOW POWER FACTOR

The power factor of these condensers is about 8%, which is less than half that of the "aqueous" types.

NOTE THESE PRICES

- 4µf. . . . 4/6
- 6µf. . . . 5/-
- 8µf. . . . 5/6

These Condensers are designed for a Maximum Peak Voltage of 450 (D.C.+A.C.)

Write for a copy of the new booklet, "Choosing your Condensers and Resistances."

DUBILIER CONDENSER CO. (1925) LTD.
Ducon Works, Victoria Road, North Acton, W.3

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HIGH TENSION**

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H.T. SUPPLY UNIT**

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PRICES IN
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Name

90 volt £2-18-0

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OSRAM 2-VOLT VALVES WITH THE WEMBLEY FILAMENT

The filament with the highest electron emission efficiency of any Battery valve filament in the world.

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The high slope Screen Grid valve for extremely sensitive reception and increased range in screened coil sets.

Slope 1.75 m.a./v.
Impedance 200,000 ohms.

Price 16/6

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The sensitive, non-microphonic Screen Grid valve for stable and efficient H.F. Amplification in any screen grid set, and for Detection.

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Impedance 200,000 ohms.

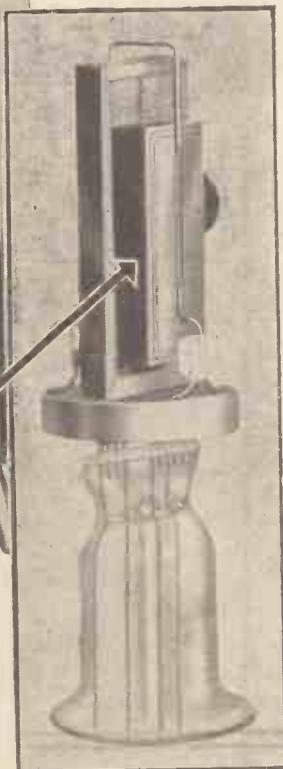
Price 16/6

OSRAM VS.2

The new Variable mu Battery Screen Grid valve which requires only a 9-volt grid bias battery for effective and distortionless volume control.

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Price 16/6



NOTE:—

CLOSE MESH SCREEN AND PLATE ANODE FOR LOW CAPACITY AND HIGH EFFECTIVE AMPLIFICATION.

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Construction for Reliable Control.

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Valves

MADE IN ENGLAND
SOLD BY ALL WIRELESS DEALERS

FOR EXTRA QUALITY WITHOUT EXTRA COST

TELSEN

L.F. TRANSFORMERS COUPLING UNITS and OUTPUT CHOKES

TELSEN "RADIOGRAND" L.F. TRANSFORMERS

Typical of all that is finest in British Radio craftsmanship. Designed in accordance with recent research, constructed on the soundest engineering principles and tested rigorously for immaculate performance and enduring efficiency.

Ratio 3-1
Ratio 5-1 **7/6**

TELSEN "RADIOGRAND" (Ratio 1.75-1) TRANSFORMER

For use in high-class receivers employing two stages of L.F. amplification. When used following an L.F. stage employing choke or resistance coupling, it gives ample volume with remarkable reproduction **10/6**

TELSEN "RADIOGRAND" (Ratio 7-1) TRANSFORMER

Gives extra high amplification on receivers employing only one stage of L.F. amplification. Not recommended for use with two L.F. stages, as overloading is likely to occur. **10/6**

TELSEN POWER PENTODE OUTPUT CHOKES

For mains operated pentodes taking an anode current of up to 40 m.a. Serves both to prevent direct current passing through the speaker and to match the speaker to the pentode valve, with the choice of three ratios—1-1, 1.3-1, 1.7-1. Used with a 1-mfd. condenser it gives a great increase in both quality and volume. **10/6**

TELSEN TAPPED PENTODE OUTPUT CHOKES

For mains and battery operated pentodes taking an anode current of up to 20 m.a. The single tapping provides (by reversing) ratios of 1-1, 1.6-1, 2.5-1, ensuring perfect matching under widely varying conditions. Also suitable for matching a low impedance speaker with an ordinary power valve, a 1-mfd. coupling condenser being recommended for this purpose. **7/6**

TELSEN INTERVALVE L.F. COUPLING CHOKES

Primarily designed for use as coupling chokes, but may be used in any circuit carrying not more than the stipulated maximum current. The 100 H type is for H. or H.L. type valves, and the 40 H for L types.

Rating	Normal Current	Max. Current	
40 H. @	5 m.a.	10 m.a.	5/-
100 H. @	3 m.a.	8 m.a.	

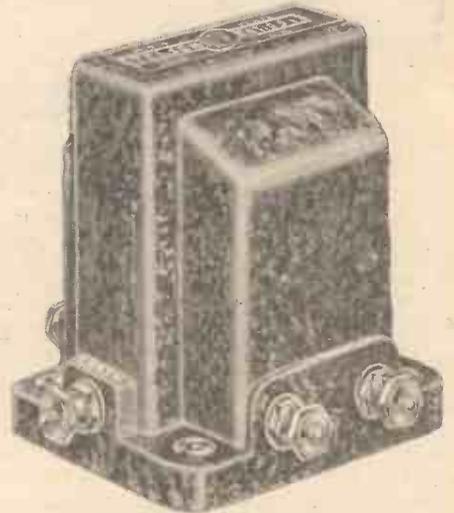
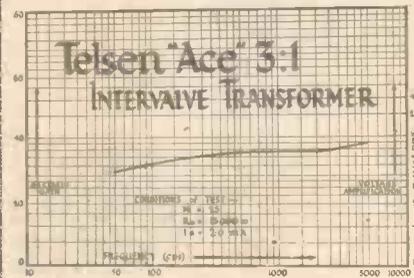
TELSEN OUTPUT CHOKES

Designed for use with power or super-power valves taking an anode current of up to 40 m.a., this output filter provides an ideal response curve under all conditions. For use with a condenser of not less than 1 mfd. capacity. **7/-**

THE TELSEN "ACE"

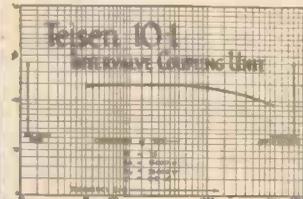
The Telsen "Ace" is eminently suitable for Receivers where highest efficiency is required at low cost and where space is limited. As its characteristic curve will show, it gives a performance equal to that of the most costly transformers. Ratio 3-1
Ratio 5-1

5/6



TELSEN 10-1 INTERVALVE COUPLING UNIT

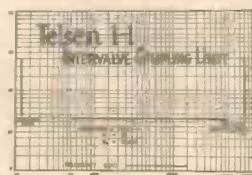
A filter-fed transformer using a high permeability nickel alloy core, securing a 10-1 voltage step-up while preserving an exceptionally good frequency characteristic. The response is compensated in the higher frequencies for use with a pentode valve giving an amplification greater than anything previously achieved, equal to two ordinary L.F. stages but with better quality of reproduction. **12/6**



12/6

TELSEN 1-1 INTERVALVE COUPLING UNIT

A modern development of the deservedly popular R.C. unit incorporating a low pass filter feed in its anode circuit, thus preventing "motor-boating," "threshold howl" and other instability due to common couplings in eliminator and battery circuits. Used with an H.L. type valve it gives an amplification of about 20 and a perfect frequency response on a negligible consumption of H.T. current. **7/6**



7/6

TELSEN MULTI RATIO OUTPUT TRANSFORMER

For use with moving-coil speakers, having a low impedance speech coil winding and suitable for anode currents of up to 40 m.a. Three ratios—9-1, 15-1, 22.5-1—allow for correct matching of speakers of widely varying characteristics. **10/6**

TELSEN OUTPUT TRANSFORMER (Ratio 1-1)

For connecting the speaker to the output stage, using a triode valve. Avoids saturation by isolating the D.C. from the speaker windings. Also keeps H.T. voltage from the speaker and its lead, which is especially important where a D.C. eliminator is being used. Suitable for anode currents of up to 40 m.a. **10/6**

TELSEN

RADIO COMPONENTS

TELSEN RADIO COMPONENTS ARE 100% BRITISH

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO., LTD., ASTON, BIRMINGHAM

THIS YEAR'S RADIO CABINETS

All about the wide variety of makes and designs which now enable the constructor to house his set in a really handsome piece of furniture at low cost.

By A. S. CLARK.



WHEN the radio set was a thing of bits and pieces, held together by plenty of hope and a "spot" of wire, we seldom bothered about a cabinet, or at the most it was a very plain and austere one. And even then, there were nearly as many wires and accessories on the outside as inside!

But that was a long, long time ago, and nowadays the wireless set has to look handsome and take its place alongside tables, chairs, and other pieces of furniture in the home. Having built a set really worthy of the name and got it going just as a tip-top set should, the constructor naturally wants to house it in a cabinet capable of doing justice to its fine performance.

Intriguing Variety.

And never before has he had such an intriguing variety of designs from which to choose. In fact, picking a cabinet for the set is almost as big a job as choosing the circuit.

Prices this year are down, while there is no doubt that quality has gone up in a most remarkable way. Now is the time for those with an old, and in many cases somewhat dilapidated cabinet which has served for many receivers, to launch out and turn their

FOR A RADIO-GRAM



"SHUT THE DOOR"

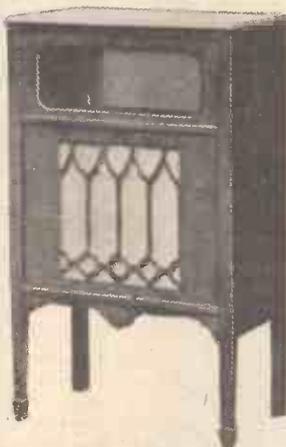


A feature of the handsome Pickett Bros. cabinet (above) is that the doors can be closed, completely concealing the set and speaker. It is the well-known "Pianotone" Elite de Luxe model, and can be obtained in either mahogany or oak.

To the left is a "Langmore," made by the Miscellaneous Trading Co. Ltd. The construction is such that it may be used as a radio-gram if desired.

sets into instruments which please the artistic eye as well as the artistic ear. Personally, whether receivers will work as record reproducers as well, or not, I would advise the owners to go in for a cabinet which takes set, speaker, and all the batteries or mains unit. It is far better than a separate speaker cabinet and the batteries outside.

AN "ALL-IN" CASE



This design is specially suitable for containing an ordinary type loudspeaker, set and accessories in one pleasing piece of furniture. Makers: W. T. Lock and Co.

that is just *my* opinion, and there are many who prefer something on the lines of the so-called "American" style case. These have been improved, and there are a number of cabinets of this type which have all the signs of modernity (or antiquity if desired!) of their bigger brothers.

A Standard.

Here I think I must divert for "a jiffy," just to explain that the fact that most home-constructor designs are shown in ordinary cabinets is not because they require such a style, but simply because it has become a "standard." There is such a wide choice open to constructors, and tastes vary so largely, that to show a set in one particular model might easily put

some people off building it, because they do not like the style and imagined it was imperative to the design.

You see, practically all the "posh" cabinets available will take sets using a baseboard and vertical panel. This is, of course, as it should be, for most constructors like to get as good a cabinet for their set as possible, the ideal apparently being for the radio to vie with the piano as a piece of furniture.

The "all-in" cabinets can be broadly divided into two classes, those which stand on the floor and have feet or legs of some sort, and those which are intended to be accommodated on a table. The latter are generally known as console cabinets.

Which Wood?

So far as both types are concerned, there are a variety of woods from which to choose. The three which are the most common and which are often listed for all models, are oak mahogany and walnut.

Of these, oak is the cheapest, followed by mahogany. Some of the very cheap lines, but nevertheless very attractive ones, are made up with a mixture of oak and ordinary ply-wood, oak-faced ply-wood sometimes being called into service.

Of the pedestal or console type cabinets it is usual to find the speaker fret in the lower part with the controls above, while lifting the flat lid reveals the turn-table in cases where the instrument is a radio-gram. In most instances the wooden panel above the

(Continued on next page.)

SIMPLE AND EFFICIENT



This is a Peto-Scott version of the ever-popular American-type cabinet, which has the advantage of low cost and great accessibility.

THIS YEAR'S RADIO CABINETS

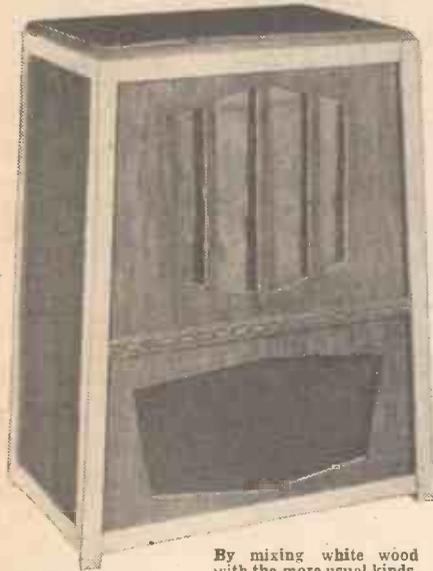
(Continued from previous page.)

speaker can be vignettted to any design desired, or the controls may be mounted directly upon it.

Other cabinets have a shaped opening behind which an ebonite or wood panel is fitted in the ordinary way. The more expensive and the de-luxe cabinets are provided with doors which cover up the speaker opening and the controls.

An interesting point in connection with radio-grams, is that many makers will fit the motor without extra charge when it is ordered with the cabinet. At the same time it is interesting to note also that for those who wish to house a radio set only that more compact cabinets that do not provide space for the motor are available.

TWO COLOURED WOODS



By mixing white wood with the more usual kinds. Direct Radio Ltd. obtain a very pleasing effect in this console radio cabinet.

Assuming that supply is governed by demand, it appears that the type of cabinet which stands on the floor is far more popular than the console type, although there is, of course, a wide variety of the latter available. Further it is significant that remarkably few portable cabinets are listed in the catalogues.

For those who prefer to house receiver and loudspeaker in separate cabinets there is quite a good selection of first-class speaker cabinets to be had. These will appeal very largely to the constructor who takes a pride in making up his own reproducers, for it enables them to be given just that final touch which makes them in everyway as attractive as those purchased complete.

In connection with speaker cabinets, it is well to remember that thickness of wood is an important factor in avoiding box resonance. And as an indication of the scientific way in which radio cabinet construction is tackled we may mention that one maker holds patents for the method by which undesirable resonances are avoided.

Colour Contrast.

Another interesting feature of one make is the obtaining of a colour contrast by the mixing of white wood with the more usual stained and polished woods.

Finally, for those who like to make their own cabinets as far as possible; the pieces of wood can be obtained ready cut to size for assembly, or ready assembled but not polished.

And now, having told you all about the large variety of cabinets available, let me give you a few tips on choosing one for your own purpose.

Of course, the ideal is to choose a style and wood which lines up exactly with the form in the particular room in which the set is to be placed. But let me suggest, at the expense of being looked down upon by those who are expert in furniture styles of all the periods, that the colour is the one really important thing.

Modernistic Affair.

Since a radio set is a modern amenity, who is to say what its particular shape and style should be to fit in with one

A COUPLE OF ATTRACTIVE CABINETS



The loudspeaker cabinet to the right is a Steinbac production, and ideal for housing a home-made cone.

To the left is a Cameco speaker and set cabinet, on which the controls are accommodated on the wooden front below the speaker fret.



certain furniture period? If you cannot match it up properly with the furniture, choose a really modernistic affair with squares and triangles.

So long as its colour is right it won't seem much (if at all) out of place, for as I have just said, the radio set is a modern innovation. So let it look modern!

And another point. Even if you are not at present interested in record reproduction, but intend to have a cabinet which stands on its own on the floor, choose one which will house a gramophone motor.

You need not use the turntable board at present, but it will always be there if you want to add a pick-up and motor later on. And even men change their minds these days.

Not Only Looks.

On the other hand, if you intend to have a radio-gram, but have not the motor, then order it with the cabinet and take advantage of the offer of most firms to fit it for you.

If you can afford to, remember that good looks are not the only thing on which to judge a cabinet if it is to give long, satisfactory service. The seasoning of the wood must be complete, or the cabinet may warp or show cracks after a time.

Although fitting a motor is not difficult, it needs a certain amount of care, and when you can get it fitted free—why not?

Remember, also, that the wood of which the speaker compartment is made should be fairly thick and strongly built together, if there is to be no resonance which will upset the output frequency-characteristic curve.

THREE REPRESENTATIVES OF THE CONSOLETTES

The shape of the "Moroc" design (below) lends itself to fitting a clock if the owner desires. And this may be of the electric type to work in conjunction with an A.C. set or just an ordinary clock.



The wooden "panel" below the speaker in the Osborne cabinet (above) can be removed if a completed set is to be fitted into the console, or it can be used instead of ebonite if desired.

Described by the maker, W. S. Wilkin, as a "transportable" cabinet, this attractive case is available in oak, mahogany, or walnut.



QUALITY RADIO FOR ALL

303

METEOR S.G.3

The set you can build in 20 minutes

Guaranteed Reception of 30 stations

'303' CABINET MODEL

Complete Kit and Valves with beautiful walnut cabinet fitted with new type of moving-coil speaker.

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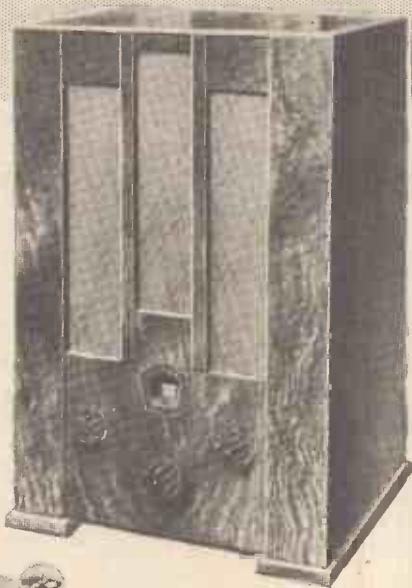
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'303' KIT

with set of three Mullard Valves.

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METEOR S.G.3 CABINET MODEL

Complete Kit with set of three Mullard Valves and full instructions with beautiful walnut cabinet fitted with new type moving-coil speaker.

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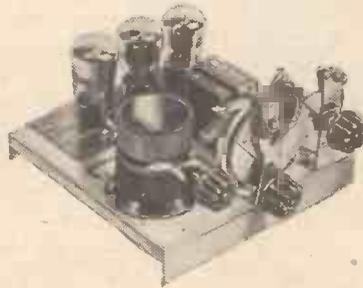
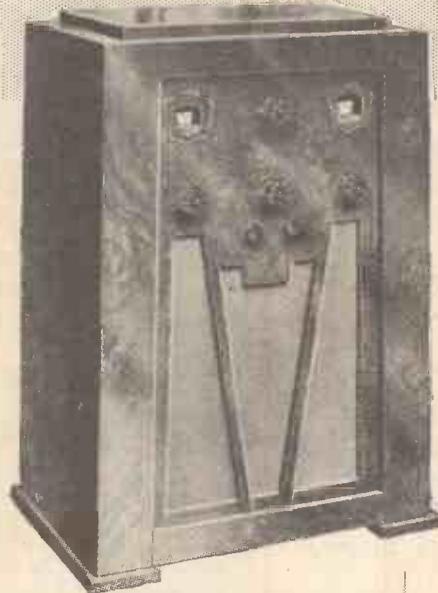
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METEOR S.G.3 KIT

With set of three Mullard Valves.

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Or 10 monthly payments of 12/6

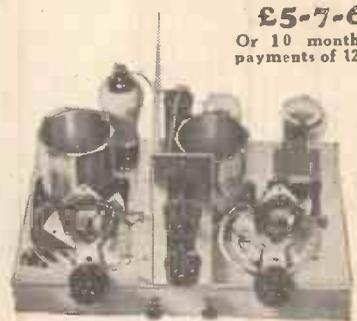


47'3

'303' KIT Complete Kit of Parts with full instructions.

75'3

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Post coupon now and we will send you FREE a sixpenny 20-page book, written by Mr. G. P. Kendall, B.S.c. It tells you all about the Meteor S.G.3 and 303 and contains complete instructions, plans and photographs showing how to build these wonderful sets.

We will also tell you what our REGISTERED USERS' SCHEME means to you.

THE MIRROR OF THE B.B.C.

By O. H. M.

ASTONISHING LICENCE INCREASE

PARLIAMENTARY ACTIVITY—BERNARD WALKE CONTINUES—
POST OFFICE REORGANISATION—ARMISTICE DAY PROGRAMME.

WHEN an enterprising publicist enthusiastically predicted that the five million licence figure would be reached before the end of the National Radio Exhibition in August, and then there was no substantial forward movement at the time, the pessimists got busy again and had a real "field day," but their opportunity was as unnoticed as it was ineffective. Because, before the middle of September, the rate of increase of licences turned sharply upwards, again denying the "saturation point" exponents.

Nearly Doubled.

But what happened in September, a matter of about eighty-six thousand new licences in the twenty-six working days of the month, was nearly doubled in the first twelve days of October. And when the complete figures for October are available I have no doubt that the five million figure will be topped by at least a hundred thousand, with many more to come before the end of the year and in next year. The reason is not so much the renewed activity of the enforcement branch of the Post Office as the close and continuous co-operation of the B.B.C.

This leads me to believe that there is a good deal more in this than meets the eye, namely, that some sort of accommodation has been reached between the Postmaster-General (Sir Kingsley Wood) and Sir John Reith about the prospect of stabilising B.B.C. finances. My reason for suggesting this is that hitherto the B.B.C. has held aloof from aiding enforcement of licence campaigns for the obvious reason that most of the new money that came in went to the Treasury.

A Solid Tradition.

Already most of the results forecast by self-appointed prophets of the disastrous consequences to the B.B.C. of the reassembly of Parliament have been falsified. True there is revived interest in broadcasting and a certain number of questions, but no sign at all of any considerable Parliamentary dissatisfaction with the B.B.C.

The only uncertain factor appears to be the "Clerk at the Table," who is so solid a tradition that he is believed not to take too kindly to an organisation only ten years old.

Tribute to the B.B.C.

The Postmaster-General's acceptance in principle of the recommendation of the recent report on the Post Office and the apparent intention of the Government to implement this report, form in effect a great tribute to the B.B.C. organisation which Sir John Reith has developed. There was more in the reference to the new appointment of the "Director-General" for the new Post Office organisation than meets the eye.

The fact is that the B.B.C. represents a new form of public utility organisation, with the directness of efficient private

enterprise without at least the most glaring disadvantages of either ordinary "predatory" businesses or of Government Departments, and which has already become the model for general reorganisation of public utilities of all kinds.

Common Sense Prevails.

It is good news that Father Bernard Walke has not been excluded from B.B.C. programmes at the instance of those who disagree with him in his attitude on matters of church discipline and practice. I hear there was some hesitation at Broadcasting House, but that in the end common sense prevailed in the realisation that the admitted programme value of Bernard Walke's work as relayed from his church has nothing

whatever to do with differences of opinion in another capacity.

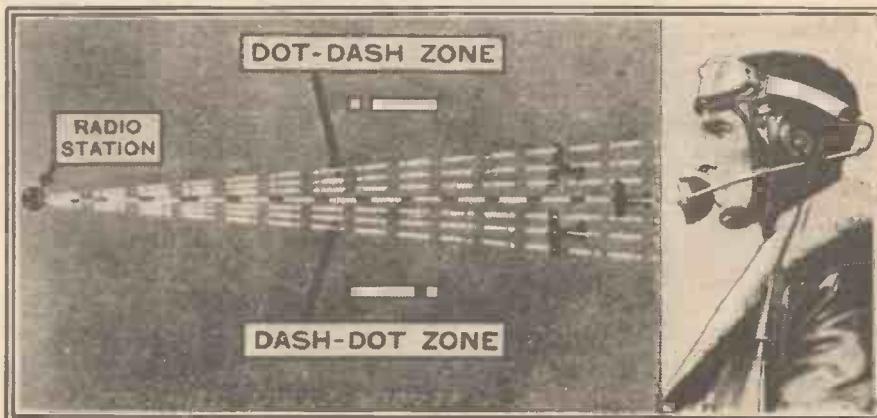
Cenotaph Service.

Armistice Day will soon be here, and with it, of course, the solemn Cenotaph Service, which, as usual, will be relayed and broadcast so that listeners in all parts of the country and most of the Empire can hear it. Arrangements have also been made to broadcast the Albert Hall Festival of Remembrance; while from the studio will be given a programme called "In Memoriam," arranged by David Tennant and E. A. Harding.

The Prince from Belfast.

Right in the middle of the Birthday Week programmes of the B.B.C. comes one of the most important outside broadcasts of the year, the State opening of the Parliament Buildings of Northern Ireland, at Belfast, by the Prince of Wales, on Wednesday, November 16th. It is unnecessary to give details of this broadcast, which will be transmitted Nationally as well as to the Empire, except to say that with its music and speeches and devotional portions, it will be as impressive as anything ever done by the B.B.C.

BEAMING ACROSS A CONTINENT



By means of a directive radio beam pilots flying from one radio station on the route to another are informed of any divergence they may make by the change in the Morse signal. It is a steady drone when dead on their course, but changes to dash-dot—or to dot-dash—if they veer outwards. The longest beacon-course of this kind in the world is now in use between New York, Chicago and California, a distance of approximately 3,000 miles.

THE LISTENER'S NOTEBOOK

A rapid review of some of the recent radio programmes.

CONVERSATIONS with friends of mine have caused me to wonder whether the ordinary listener is really as critical of broadcast programmes as he is supposed to be. Of course, he does criticise, but I doubt whether his criticism can be taken seriously.

For my own part, I can't help feeling that, as his enjoyment of an item depends so much on the mood he is in at the time, his criticism must lack consistency. For instance, when he curses, say, the "Our Neighbour" series of talks, he really means that on the occasion of No. 2 talk, when he formed his opinion of the series as a whole, he was never less in the mood for a talk.

I wonder, too, whether those responsible for, the programmes are critical listeners,

whether they ever entertain fears about any of the items they have included on the season's bill of fare. If they do, then I suppose it is now that they are having their moments of anxiety.

We ordinary listeners are in the happy position of being able to sit back comfortably in an armchair, to listen dispassionately, and to pass our verdict. We approve if we approve. If we disapprove, we curse. And there the matter ends as far as we are concerned.

Feverish Activity.

With the programme builder the matter doesn't end so simply. A sleepless night is probably the prelude to several days of feverish activity putting things right.

(Continued on page 509.)

For consistent reliability



The Metropolitan Police trust to



MARCONI VALVES

companies) have chosen Marconi Valves.

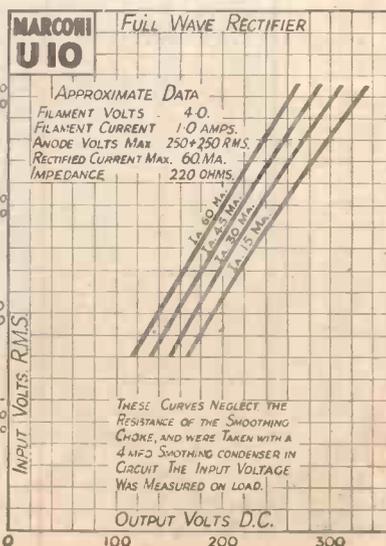
LOOK FOR ROBUST RECTIFIERS!

The whole performance of the receiver is dependent upon its high tension supply; a smooth flow of unrestricted current is the primary requirement of every set. Marconi H.T. Rectifying Valves incorporate every refinement; of the most advanced technique; features such as heavy low-temperature tape filaments, large, rigidly supported anodes, interlocked assemblies and extremely high vacuum, together ensure a consistently satisfactory performance throughout a long life. The curve for Marconi U10, largely used in 3 and 4 valve receivers, is shown here; note its generous output and excellent voltage regulation.

MARCONI RECTIFYING VALVES

U10	250V.—60M.A.	12/6
U12	350V.—120M.A.	15/-
U14	500V.—120M.A.	20/-
G.U.L.	1,000V.—250M.A.	25/-

(half-wave)



BILL SYKES and the Artful Dodger no longer set about their business in quite the same old care-free way. They think things out beforehand and maybe borrow a good fast car for the job—and they don't stop for anything!

But things are rather more difficult for them around London. As soon as they get away their description and probable direction is wirelessed all over the Metropolitan area and at once the patrol cars are off on the track.

Eventually the authorities hope to set up a National Police radio service with high power transmitting stations in various parts of the country.

One quality police apparatus must have—it must be consistently reliable. That is why the Metropolitan Police (like Imperial Airways, the B.B.C., and almost all the big shipping

THIS set is an outstanding achievement, and that is no matter for wonder because it represents the home radio crystallisation of the best features of modern wireless reception technique. It is no exaggeration to say that the whole of the radio industry has contributed to its design.

And I am so pleased with the performance it gives, that I feel tempted to indulge in a few words of rhetoric, but I feel sure my purpose will be better served if I stick to facts. Let the "P.W." Four speak for itself in the following tabulations. Every reader can then form his own judgment.

In passing, it may be noted that this method of "presenting" a set obviously demands confidence on the part of the

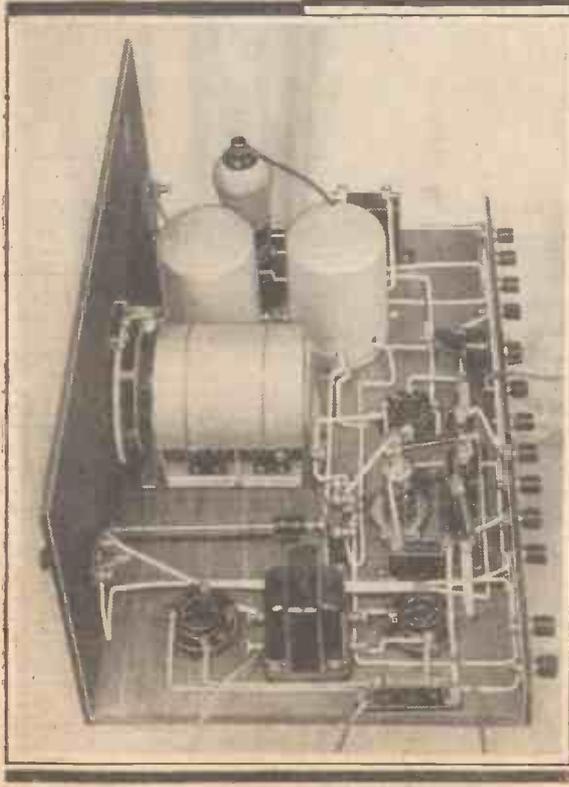
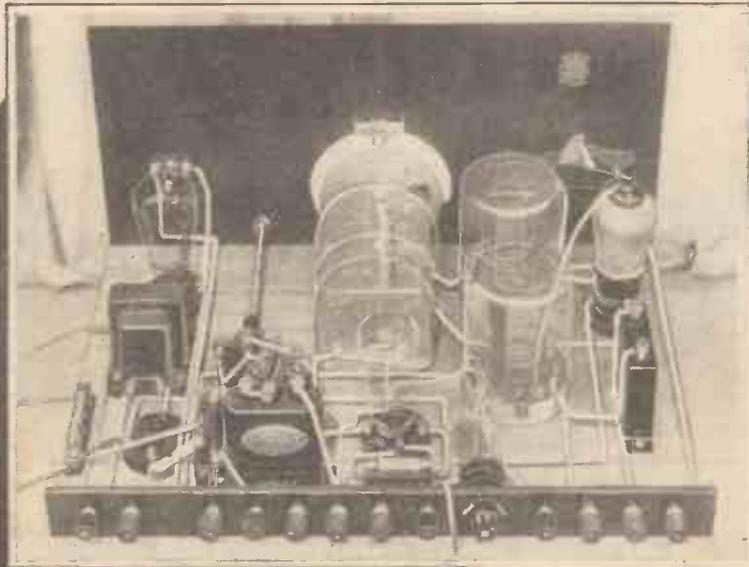
designer or designers because it renders it a simple matter for the reader to make direct comparisons with the specifications of other sets.

The "P.W." 1933 Four possesses these features:

1. Single-dial tuning. One of those modern but inexpensive gang condensers is used to provide unified adjustment without efficiency loss. (During a practical test an unskilled listener was able to bring in about a score of programmes at good loudspeaker strength, without doing anything else but rotate the single tuning dial.)

2. Ganged wave-change switches. One knob controls both circuits. This feature imposes no extra cost or construction work.

KNIFE-EDGE SELECTIVITY—GREAT RADIO POWER



**EXPERIENCED
CONSTRUCTORS—
PLEASE NOTE**

Don't be prejudiced by the very patent simplicity of this four-valve set. Maybe some of you are still using 1930 and even earlier multi-valve sets which, in comparison with the "1933 Four," are complicated instruments, intricate to handle and costly to run.

We can easily understand that you may believe there is a wide tendency to sacrifice efficiency in modern sets in order to simplify assembly and operation.

In cases this accusation is, perhaps, justified, but not with the "1933 Four." We urge you to build it.

**YOU WILL BE AMAZED BY THE
EASE WITH WHICH STATIONS
ROLL IN.**



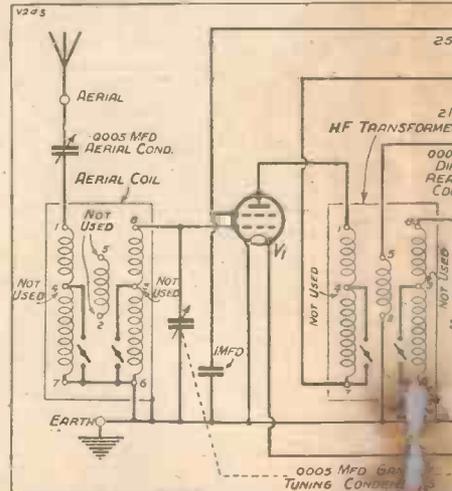
EUROPE'S PROGR

A triumphant combination of the most mo

By G. V. DOWDIN

- 3. Radio-gram switching for a pick-up. Three valves giving full-power record results.
- 4. Screened components eliminate necessity of partition screens, baseboard shielding, and other complications.
- 5. Reaction condenser is set-back to eliminate hand-capacity and shorten vital leads.
- 6. Aerial condenser operates as a pre-detector volume control and selectivity adjustment, and also enables individual aerial systems to be matched to greatest advantage.
- 7. The circuit is S.G. H.F., grid circuit rectification, resistance coupled L.F., and transformer coupled L.F.
- 8. There is differential reaction.

A HIGH-EFFICIENCY CI



An S.G. H.F. valve is employed in conjunction with

COMB THE CONTINENT W

THE 1933 FOUR

(Continued from previous page.)

of ganged condensers is one of the most specialised branches of the industry. Expert design and high-grade materials

and machinery are necessary for their successful production. A poor "gang" may lose you more stations than a "dud" valve.

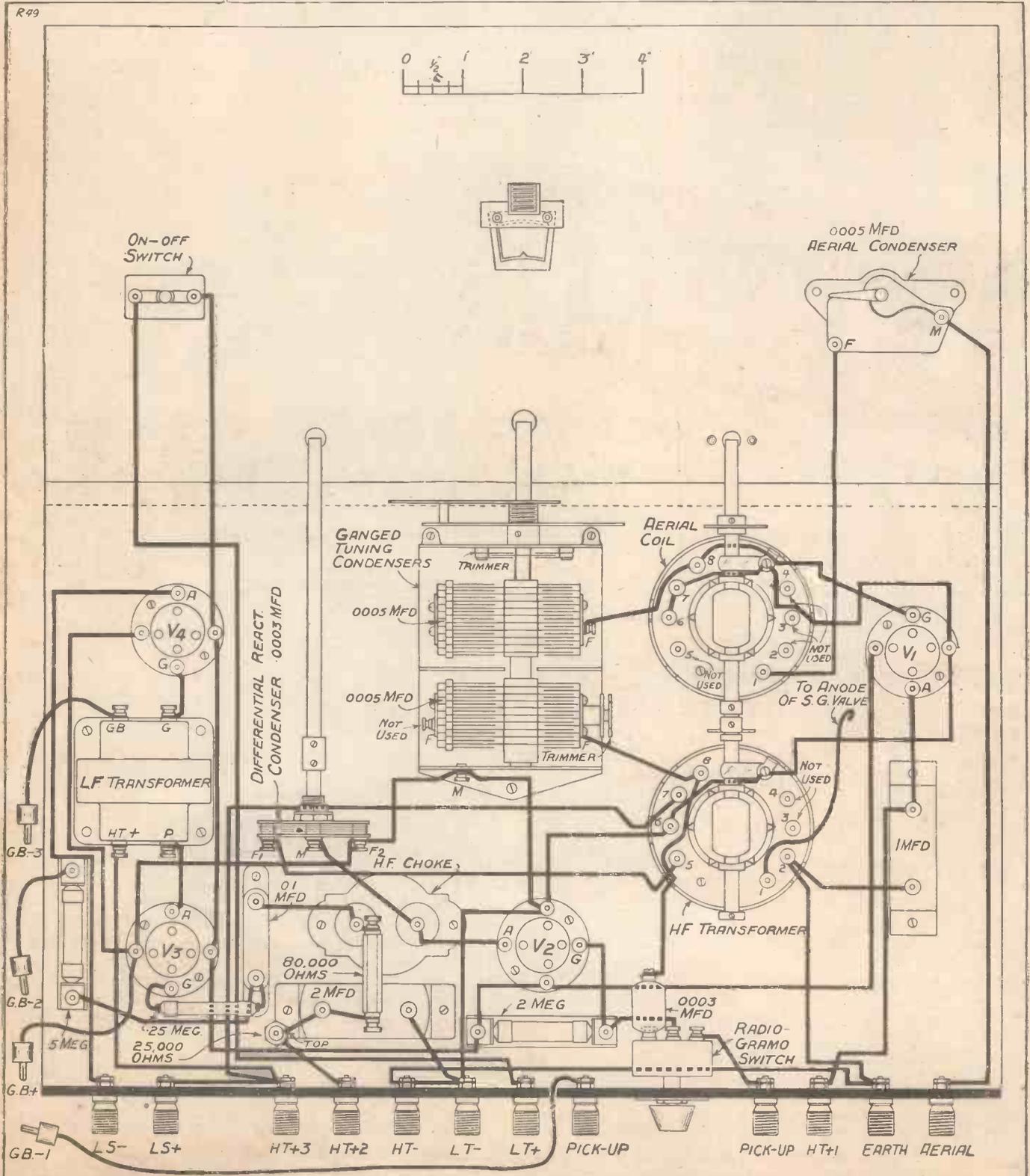
Keep as close as you can to the layout of the components. Place those which lie on the baseboard just as carefully as the panel components. Remember the 1933 Four is a high-efficiency set and not what

is termed in test-room parlance a "shuffle-on hack."

As you will notice, two of the resistances in our original model do not possess baseboard fixing holders, but are held in position by their own connections. There are no reasons against the use of resistances in holders in either case, and if it is necessary

(Continued on page 482.)

NO SCREENS—NO SOLDERING—NO UNDER-BASEBOARD WIRING



Have you ever seen a more straightforward assembly? There are no constructional complications of any kind.



Graham Farish says

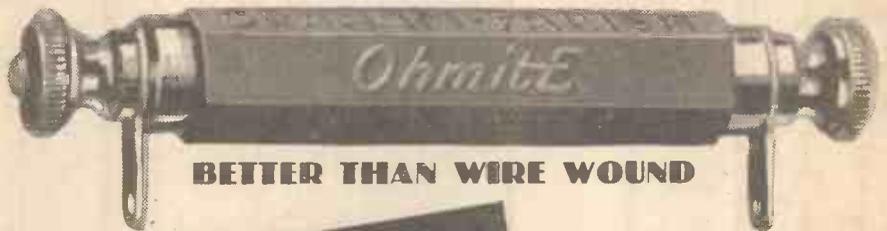
IT COSTS ME MONEY

It costs me literally thousands of pounds to tell you about my products. My business instincts, my Scottish caution tell me it would be money wasted to exaggerate my claims. That's why you can safely follow my recommendation to try G.F. Components. Believe me, you'll find them a step ahead of any you've tried before.

Graham Farish **OHMITE** RESISTANCES

The popular and efficient resistances for all general purposes. All values 300 ohms to 5 megohms. 1/6d. each.

1/6
EACH



BETTER THAN WIRE WOUND

FIXED Graham Farish **CONDENSERS**

In a complete range of capacities, upright or flat mounting. Registered design No. 723271. Every condenser is tested on 750 volts D.C. The capacities are accurate within fine limits, and every condenser can be thoroughly relied upon.

.00005 mfd. to
.004 mfd.

.005 mfd. to
.01 mfd.

1/6 1/6



GRAHAM FARISH COMPONENTS

GRAHAM FARISH LTD., MASONS HILL, BROMLEY, KENT.

THE 1933 FOUR

(Continued from page 480.)

to alter their positions slightly in order to accommodate the holders on the baseboard, that won't matter a scrap.

On the other hand, it must be admitted that the absence of holders in the case of the resistances we use makes for slightly easier assembly, but this doesn't amount to much in a set so inherently straightforward to construct.

Wiring Up.

You will need covered wire for wiring up, but not that cotton-covered or silk-covered wire such as is employed for winding coils or frame aeriels. The covering needs to be of a tougher character.

We recommend Glazite or 18-gauge tinned

copperwire and Systoflex tubing. You will require about 11 yards in actual lead length—i.e. 11 yards of Glazite or alternatively, of tinned copper wire with 9 yards of the Systoflex covering for it.

Earthing Terminal.

Particular care is desirable when passing the leads through the screening cans of the coils to the coil terminals. Only sufficient bare wire should be left at the ends to make the loops, but see that you do not screw the terminals down on to insulation.

And the leads must be passed through and maintain an "easy" fit in the holes;

THE VALVES WE RECOMMEND.

	H.F. Stage	Detector	1st L.F.	Output Valve	Output Valve Mains Unit
Mullard ..	P.M.12	P.M.1H.L.	P.M.2D.X.	P.M.2A.	P.M.202
Cossor ..	220S.G.	210H.L.	210L.F.	220P.A.	230X.P.
Mazda ..	S.G.215	H.L.2	L.210	P.220	P.220A.
Marconi ..	S.22	H.L.2	L.210	LP.2	P.2
Osram ..	S.22	H.L.2	L.210	LP.2	P.2
Tungsram ..	S.210	H.210	L.G.210	P.220	S.P.230
Lissen ..	S.G.215	H.L.210	L.210	P.220	P.X.240
Eta ..	B.Y.6	B.Y.1814	B.Y.1210	B.W.604	B.W.303
Six-Sixty	215S.G.	210H.L.	210D.	220P.A.	220S.P.

for if the metal were to cut through the insulation at these points, unhappy "short circuits" might occur. It will be necessary to reverse the screw which holds the clip that makes contact with the switch spindle on each coil. Unscrew and turn the screw upside down. You then have an earthing terminal. This point is briefly dealt with in the literature accompanying the coil.

Don't bend the insulated wire too sharply. Sharp right angle bends may look neat, but they are apt to crack the covering.

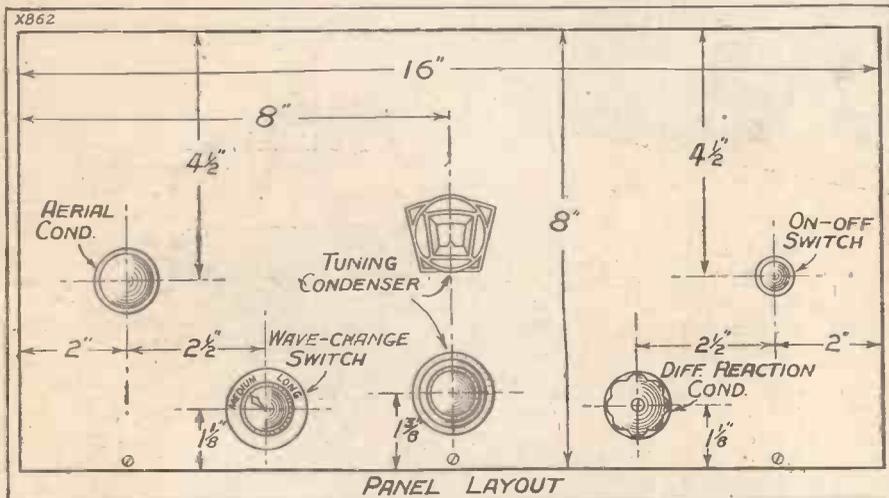
Particularly Straightforward.

The lengths of the four grid-bias leads will depend upon the position of the grid-bias battery. The best place for this will be on the side of the cabinet. Inside, of course. A clip costing a few pence can be purchased. If you merely stand the battery inside the set, resting it on the L.F. transformer, cut a piece of stout cardboard to act as a shield for the components, for in time the battery may exude moisture. (Good batteries shouldn't do that, but the precaution is advisable all the same.)

Well, I don't think there is anything else to be said about the construction of this set that cannot just as easily be learned by the reader glancing at the photos and diagrams, for as I have said, it is a particularly straightforward instrument.

I will give you the installation details next week.

AND ONLY ONE WAVE-CHANGE SWITCH!



A further simplification is introduced by the ganging of the wave-change switching. This is actually simpler to instal than separate switches!

YOUR COMPLETE SHOPPING LIST FOR THE 1933 FOUR

- 1 Panel, 16 × 8 in. (Permeol, Peto-Scott, Becol, Wearite, Goltone, Lissen).
- 1 Baseboard, 16 × 10 in.
- 1 Cabinet for 16 × 10 in. panel and 16 × 10 in. baseboard (Cameo, Morton, Peto-Scott, Osborn, Gilbert).
- 1 Two-gang .0005-mfd. condenser (Polar Uni-Knob, J.B., Lotus, Radio-phone, Utility, Cyldon).
- 1 .0005-mfd. Solid dielectric variable condenser (Lissen, Ormond, Telsen, Ready Radio, Polar, Graham Farish).
- 1 .0003-mfd. differential reaction condenser (Ready Radio, Polar, Lotus, Telsen, Graham Farish).
- 2 Telsen screened coils.
- 1 2-mfd. fixed condenser (Ferranti type C2, Telsen, T.C.C., Lissen, Dubilier, Igranic, Peto Scott, Formo).
- 1 1-mfd. fixed condenser (Ferranti type C 10 or see above).
- 1 .01-mfd. fixed condenser (T.C.C. upright type, Lissen, Dubilier, Telsen, Ferranti).
- 1 .0003-mfd. fixed condenser (Dubilier 665 or see above).
- 1 2-megohm resistance and holder (Ready

- Radio, Ferranti, Graham Farish, Lissen, Dubilier, Telsen, Igranic, Ediswan, Mullard, Watmel).
- 1 25-megohm resistance and holder (Ready Radio, or see above).
- 1 80,000-ohm resistance (Graham Farish, Dubilier, Colvern, Wearite).
- 1 25,000-ohm resistance (Graham Farish, Dubilier 1-watt type, Colvern, Lissen, Wearite).
- 1 2-point on-off switch (Bulgin Type S 38, Telsen, Lissen, Ready Radio, Tunewell, Goltone, Keystone, Ormond).
- 1 3-point change-over switch (Bulgin Type S 86, Ready Radio, Tunewell).
- 1 H.F. choke (Igranic Type Z 11, Ready Radio, Lewcos, Slektun, Peto Scott, Telsen, Sovereign, Tunewell, Wearite, Goltone, R.I., Lotus, Varley).
- 1 L.F. transformer (Lissen Hypernik, R.I., Slektun, Ready Radio, Graham Farish, Ferranti A.F.10, Telsen, Bulgin, Multitone, Tunewell, Lotus, Lewcos, Varley Nicklet).
- 4 Valve holders (Lotus, W.B., Lissen, Telsen, Bulgin, Clix, Goltone, Igranic, Ready Radio, Lotus).
- 1 Terminal strip, 16 × 1 1/2 in. (Peto Scott, etc.).

- 12 Indicating terminals (Clix type A, Belling & Lee, Bulgin, Igranic, Ealex).
- 11 yds. of 18-gauge tinned copper wire and 9 yds. of sleeving (Goltone, Wearite).
- 1 Panel bush for 3/8 in. spindle.
- 1 Ebonite coupling link, 1/8 × 1 in.
- 1 1/8 × 5 in. extension spindle.
- 4 Plugs (Clix, Igranic, Bulgin, Belling & Lee).

ACCESSORIES.

- BATTERIES.**—L.T. Accumulator (Ediswan, Oldham, Pertrix, Lissen, G.E.C., Exide).
H.T. Battery. This should be of ample size to deal with the requirements of the valves chosen. (Lissen, Pertrix, Magnet, Ediswan, Ever Ready, Marconiphone).
G.B.: See above list.
- LOUDSPEAKERS.**—(Celestion, Blue Spot, Marconiphone, R & A, Epoch, H.M.V., B.T.-H., W.B., Ormond, Ferranti, Baker, Lanchester, Igranic, Clarke's Atlas.)
- MAINS UNIT.**—This should have three H.T. tapings, i.e., S.G., Det and Power with output to suit valves employed. (Ferranti, Atlas, Regentone, Ekco, Tunewell, R.I.).
- Recommended aerial and earth equipment: (Electron "Superial," Graham Farish "Fit" earthing device).



Graham Farish says

YOU CAN'T BE MORE CRITICAL THAN I AM

I don't know what tests you make of the Components you buy, but I do know that every one I sell is tested far more stringently before it leaves my factory. It has to be not only capable of doing the job for which it is designed—but it has to bear electrical stresses greater than will ever be required in practice before I allow it to bear my name. That is why you can trust every Graham Farish product to the limit.

Graham Farish **LIT-LOS** SOLID DIELECTRIC VARIABLE CONDENSERS

2!
EACH

A very carefully constructed instrument, compact in size and efficient in design, with accurately gauged bakelite dielectrics and solid brass pigtail connection to moving vanes. Made in all capacities up to .0005 mfd. in log mid-line, straight line capacity and differential types. Used by many leading manufacturers and specified in sets by famous designers. One hole fixing; supplied complete with terminals.

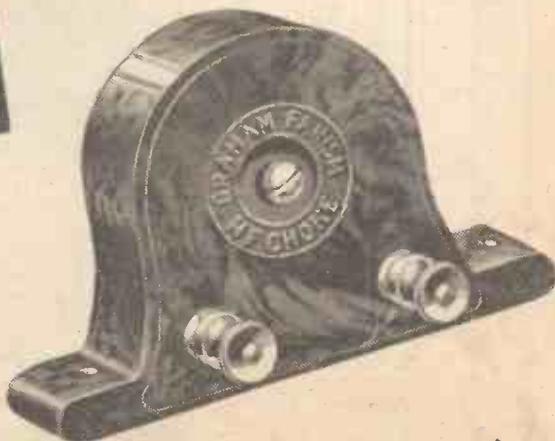


Graham Farish **SNAP** H.F. CHOKES

2!
EACH

Of new design, wound to give high impedance on long and medium wave-bands. Has small self-capacity with large inductance. Totally enclosed in moulded case.

Every Wireless Enthusiast should have a copy of the G.F. Component Book. Send a postcard request for your copy, free by return.



GRAHAM FARISH COMPONENTS
GRAHAM FARISH LTD., MASONS HILL, BROMLEY, KENT.

FROM THE TECHNICAL EDITOR'S NOTE BOOK

TESTED
AND
FOUND-?

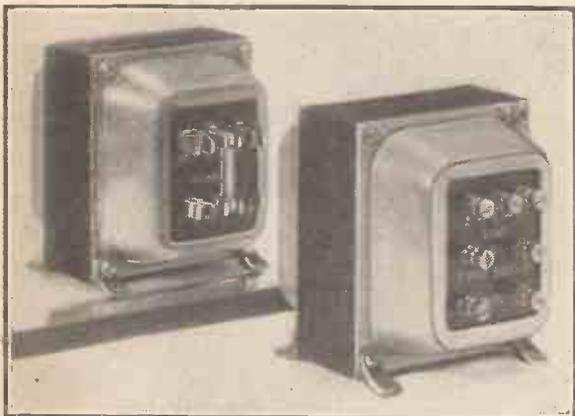


A SOUND SALES MAINS TRANSFORMER

THE Sound Sales Super Shielded Mains Transformer is one of the neatest and most compact components of its kind I have ever seen. And it also embodies some original features of design.

Most important is the combined fuse and tapping selector. As you will see from the photo, the fuse (which in itself is a useful novelty for a mains transformer) has a choice of three clips, and by shifting it from one to another the mains input is suited. (The actual voltages covered are 210, 230 and 250.)

INGENIOUS VOLTAGE ADJUSTMENT



This view of the Sound Sales Transformer taken before a mirror shows the ingenious combined fuse and tapping selector at the back.

The clips are such that while it is easy to move the fuse with the fingers, it will resist accidental impacts successfully.

The transformer is designed for the Westinghouse Type 8 and similar ratings of metal rectifier and is totally enclosed and shielded.

The H.T. winding is not centre-tapped, and has an output of 240 volts at no load, falling only to 220 volts at as much as 250 milliamperes. (This was applied as a test load, but even at the 250 m/a there was negligible temperature rise.)

The L.T. winding is rated at 2 + 2 volts, 3 amperes, and gives 4.2 volts on no load, falling to 4 volts at full load. Which also is,

as will be agreed, exceptionally good voltage regulation.

Obviously this transformer is sound in fact as well as in name.

LISSEN FLEXIBLE CONDENSERS

Messrs. Lissen have applied the Spaghetti idea to condensers. Known as Lissen Flexible Condensers, these new components are available in two values, viz. .0001 mfd. and .0006 mfd.

The capacities are obtained by spirally winding a thin wire round an insulated conductor. And it should be noted that they, the flexible condensers, are much more robust than the early Spaghetti resistances.

Indeed, I cannot visualise them developing faults so long as they are not subjected to very clumsy handling.

Their main purpose is to act as selectivity condensers, and for this they are perfectly suitable in every way. They are inexpensive and easy to wire into circuit.

THE CLARION DIAL

The new Slow-Motion Dial manufactured by The British Clarion Co., Ltd., embodies the Full Vision principle. That is to say, the whole scale remains permanently visible and a pointer moves around it.

In addition, the dial is translucent, and a light moves round behind it. This results in a luminous panel accompanying the pointer in its travels. The striking effect renders close tuning a fascinating process, and the Full Scale visibility is of great value when placing stations.

It enables the operator at once to place any one particular wavelength in respect of the remainder of the band covered by the condenser with which the drive is used.

The slow-motion movement is excellent, and is positive, smooth and entirely free from backlash.

This Clarion Dial is undoubtedly one of

the best articles of the kind that has been brought before the public, and it deserves success both on account of its original design and its general effectiveness.

THE GOLTONE "ULTRITE" AERIAL

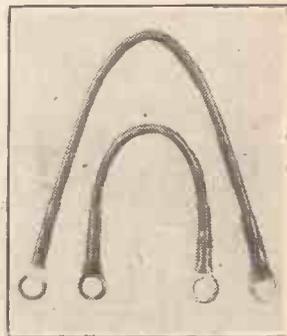
This is an unusually good aerial made by Messrs. Ward & Goldstone, Ltd.

It consists of no less than eleven strands of tinned copper wire covered first by strongly protective and highly insulating vulcanised rubber. Over this is a stout cotton braiding which is vulcanised on to the rubber in order to form an extremely tough weatherproofing.

It will be observed from all this that Ultrite has been designed on a "last for ever" basis.

To test its qualities in this respect I immersed a length of it in acidulated water for a period of one week. But at the end of that period the material was quite unaffected.

THEIR CAPACITIES



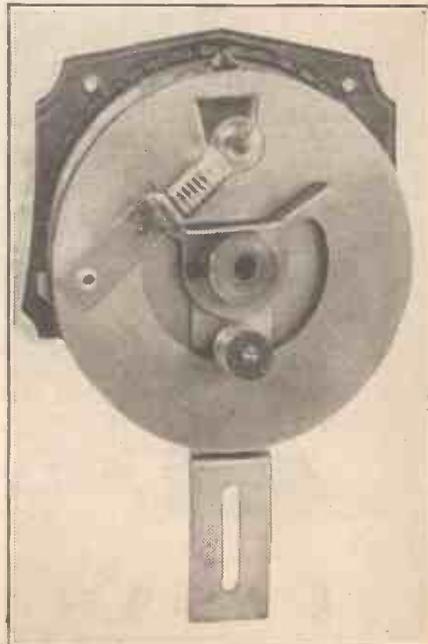
The short Lissen Flexible Condenser has a capacity of .0006 mfd., and the long one .0001 mfd.

There will be little need for me to refer to its radio efficiency, for "P.W." readers will be able to gauge that it is first-class in that regard by the above-mentioned construction details.

Ultrite is sold in 25, 50, 75 and 100 feet lengths at 1/6, 1/9, 2/7 1/2, and 3/6 respectively.

(Continued on page 485)

LIGHT BEAM STATION SELECTION



The light follows the pointer round the scale of this Clarion Full-Vision Slow-Motion Dial.

Graham Farish says

IF YOUR SET'S WORTH A DOLLAR

it's worth the trifling outlay entailed in fitting these two components. **FILT**, the efficient Earth, will prove that your set is capable of infinitely better results than you had believed. **GARD** is a necessity on every aerial, it safeguards your set, even your home itself, against the menace of lightning. Take my tip—fit both.



EARTH WITH
Graham Farish
FILT



You'll never know how good your set can be till you fit **FILT**. **FILT** means efficient earthing—a vital factor in good reception. Greater volume, increased range, reduced oscillation, mains hum and crackle eliminated. Hundreds of listeners have expressed their surprise at the improvement obtained by **FILT**.

Simply bury the copper receptacle containing the wonderful **FILT** chemical which spreads through the earth, attracting moisture and making a highly conductive area several feet deep. **FILT** keeps moist and highly conductive, earthing your set perfectly and giving you every ounce of power, range and purity.

Filt is a patented device and proceedings will be taken in all cases of infringement.

2/6
COMPLETE

PROTECT WITH
Graham Farish
GARD
LIGHTNING ARRESTER



This nationally famous little Arrester provides permanent and complete protection against lightning and static interference, and makes it unnecessary to switch off the set during a storm. The **GARD** is simply fixed between earth and aerial. It needs no attention. Its protection is permanent. Definitely does not affect reception.

1/6

GRAHAM FARISH COMPONENTS
GRAHAM FARISH, LTD., MAYONS HILL, BROMLEY, KENT



A joker is a substitute for any card, but

there is no substitute for—

**WILLS'S
CAPSTAN
CIGARETTES**

They suit everyone

10 for 6^d
20 for 11^d⁰



C.C.404.A

**THE MOST POPULAR
RADIO-GRAM CABINET
ON THE MARKET**

REDUCED **39/6** Carriage TO **39/6** Paid!!!
QUALITY GUARANTEED IMPROVED
Soundly constructed in selected oak, etc., and hand polished.

SPECIFICATION.—3' 3" high, 1' 10" wide, 1' 6" deep. To take panels up to 18" x 7". Panel opening to suit set. These cabinets allow ample room for the following:—
Pick-up, Motor, Speaker, Batteries, etc., all for the reduced price of 39/6.

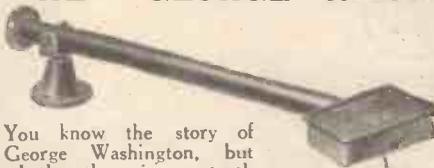
Catalogue Post Free. From one of the Largest Mail Order Works in England.

W. S. WILKIN, Cabinet Manufacturer,
12-26 Nelson Mews, Southend-on-Sea, Essex.

Guernsey Depot:—
Messrs. Leale, Ltd., 7, Bondage, Guernsey.



**THE "GEORGE WASHINGTON"
PICK-UP**



30/-

You know the story of George Washington, but whether there is any truth in it or not we are unable to say. What we can vouch for, however, is the fact that our Mark III Pick-up always tells the truth. With no minor resonances to add coloration, the reproduction from the record is a faithful replica of the original recording, and if you appreciate music this is the pick-up you must have.

Send for Catalogue. **BOWYER-LOWE & A.E.D. LTD.,**
DIAMOND WORKS, BRIGHTON.

The Famous Monthly Magazine every

Here are some of the features in the NOVEMBER issue:—

Boy will Enjoy

"THE TRUMPET OF THE EMPEROR"

By DRACOT M. DELL

"TERROR ISLAND"

By BARTON FURSE

"GALLEONS O' DEATH"

By Rear-Admiral E. R. G. R. EVANS, C.B., D.S.O., R.N.

CHUMS has been famous for many, many years—and is now more popular than ever. Every month it is crammed with splendid yarns of the daring exploits of well-known explorers, sea mysteries and exciting tales of school and sport. There are also articles on hobbies and films, and eight pages in PHOTOGRAVURE:

CHUMS

Buy the November Issue Now - - - 1/-

**THE famous
BRITISH GENERAL
TUNING UNIT**



NOW REDUCED TO 10/6

Increased demand, enlarged turn-over enables us to offer this popular tuning unit at this remarkable price. Cuts out coils. Covers all wave-lengths from 200 to 2,000 metres. Easy fixing; simple tuning. Free wiring diagrams supplied.

From all dealers or direct:
BRITISH GENERAL MANUFACTURING CO. LTD.,
Brockley Works, London, S.E.4.

TESTED AND FOUND—?

(Continued from page 484.)

It is, of course, perfectly pliable but it does not easily get itself into tangles. Indeed, it is as good mechanically as it is electrically.

GRAHAM FARISH RADIO COMPONENTS

The fame of Graham Farish extends in several directions. One radio enthusiast will immediately couple the name with "Gard," the well-known lightning protector, and another with those exceptionally good "Ohmite" resistances (first of all the dependable "composition" types, I believe). Yet a third will at once think of "Filt," the very popular and effective percolative earth.

INEXPENSIVE AND GOOD



The Graham Farish "Litlos" variable condenser, and "Megite" potentiometer volume control.

But in addition to all these, there is a fine range of Graham Farish components which deserves to be remembered on many counts. Some of those components are quite new, and my samples only recently to hand.

For example, there is the "Litlos" variable condenser. This is of the solid dielectric form, and is available in tuning reaction and differential types at only 2s.

It has the smoothest action of any component of the kind that I have ever handled. And the vanes are securely anchored. There is none of that flapping about that so badly

mars the operation and use of some solid dielectrics.

Also, the material with which it is made appears to be of high quality, for its efficiency is relatively high. It is a real value-for-money article that constructors should note.

The "Megite" potentiometer volume control must be the cheapest wire-wound type available, for it lists at 3s. 6d. in resistances up to 25,000 ohms. Values exceeding that cost 4s. 6d.

Its main structure comprises two solid but neat bakelite mouldings providing complete protection for the resistance element.

The action embodies that smooth stiffness that is essential for ideal volume control setting. The contact is complete throughout and there are no noises while the moving element is in motion.

The well-finished brown bakelite knob exactly matches the knob of the "Litlos" condenser, so that they constitute a perfect panel pair.

For sixpence Graham Farish sell a Vertical Holder. This handy little gadget rigidly holds a Graham Farish H.F. choke, Ohmite, or Megite or a standard grid leak in a vertical position.

This often enables considerable economy in baseboard space to be made, and it would be well worth the while of every constructor to include one of these holders in his collection of radio materials.

Another Graham Farish component costing only sixpence is their four-pin valveholder. But it is in no sense a "junior" component. It bears comparison with any valveholder.

Fine Bakelite Moulding.

It, too, includes a fine bakelite moulding (Graham Farish seems to be masters of the art of moulding) so shaped that the material is, reduced to minimum bulk in accordance with the best modern "low loss" practices.

The sockets are well sunk to eliminate risks of valve damage through the user's own carelessness. Terminals are provided in addition to soldering tags, and each of these latter is in one piece with its socket, thus avoiding soldered or pressure joints.

The shape of the sockets and a kind of spring device ensure easy and positive contacts with valve pins. There is also a

surface roughening which renders each socket an automatic valve pin (and contact) cleaner. If that is accidental to the construction of the holder, it is a very fortunate accident. If it is purposely done, then it is

ATTRACTIVE CONSTRUCTOR ITEMS



The Graham Farish fixed mica condenser, valveholder, and vertical holder.

a distinctly praiseworthy idea, and one that is quite new to me.

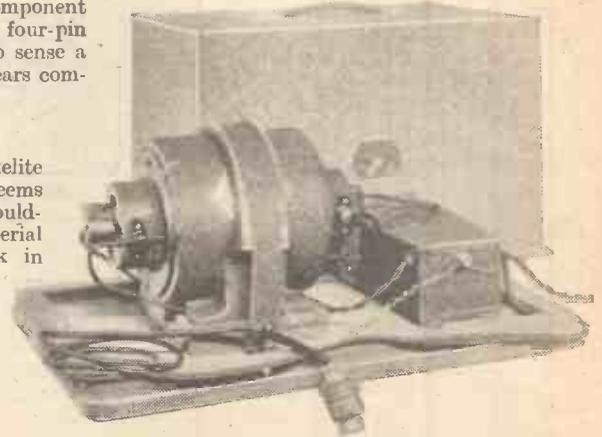
I have just sufficient space to refer to the Graham Farish fixed mica condenser, which is a high-grade component that retails at only 1s. for all capacities up to .004 mfd., and 1s. 6d. for those up to .01 mfd.

High Efficiencies.

It has the valuable feature that it can be mounted either vertically or horizontally. And the samples I have tested have negligible capacity errors, and evince high efficiencies.

In conclusion, I think it true to say that this Graham Farish selection of com-

SMOOTH AND SILENT



The efficient rotary converter made by the Electro Dynamic Construction Co.

ponents represents British radio at its best, priced at extraordinarily competitive figures.

(Continued from page 506.)

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 investigation! 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.

STATIONS WORTH HEARING

Realising the importance of providing listeners with up-to-the-minute news about long-distance stations and conditions, "P.W." publishes regularly the notes of a Special Correspondent who nightly searches the ether in order to provide a log that is really up to date.

HAVE you, I wonder, discovered the latest newcomer to the medium waveband? This is Budapest No 2 (or Csepel, as he appears in some lists), who is operating on 210 metres each evening just now.

The output rating of the station is not more than 3 kilowatts, but thanks probably to his short wavelength he is often remarkably well heard. If your set will tune down as low as 210 metres you should certainly try for Budapest No. 2, and unless conditions are bad, or you are very unlucky, you are pretty sure to find him.

Worth Attention

Perhaps the easiest method is to make a careful note of the settings required for Fécamp on 223 metres, and then to drop slowly downwards. If you can tune in either Aberdeen or Newcastle your task will be very much simplified, for Budapest occupies the next channel below that of Newcastle and the next but one to Aberdeen.

Another station which has recently increased its power and is therefore worth attention, is Valencia, on 268 metres. The Spanish station is now rated at 8 kilo-

watts, and I have had excellent reception on several recent evenings.

To find him, either work slowly upwards from the London National or drop down a little from Turin. So far as I can ascertain, Madrid Union Radio's new transmitter is not yet in operation, or, at all events, not regularly, but the station is often very well received just now.

The Loudest Voice

Unfortunately, Madrid shares a wavelength with the giant Moscow Stalin, so that you must find a time when the Russian is not at work.

Berlin Witzleben, though not a reliable station, is showing very considerable improvement, and can now frequently be received at good volume on the loud-speaker. If Lyons Doua, on 466 metres, has not yet appeared in your log, now is the time to fill up the gap. (I don't guarantee that he will be coming through strongly on each and every evening, but you are pretty certain to record him sooner or later if you include him in your list of possibles when you are searching over the upper part of the medium waveband.)

At the moment Prague's is about the

loudest voice on the medium waveband. In one way this is not surprising, for he is rated at 120 kilowatts, but the distance between Czecho-slovakia and this country is a big one.

Vienna is not at the moment quite so good as he was, but Munich is showing great improvement and Budapest can now be regarded as a completely reliable station in the evenings.

Is Sundsvall, on 554 metres, amongst your captures? This is a 10-kilowatt station which one would expect to be well heard in this country on account of its comparatively long wavelength. For some reason, though, it was seldom recorded last winter by British listeners, except those who live in the north.

Reliable Stations

This year Sundsvall has already been well received on quite a number of occasions. Sundsvall, like not a few otherwise good stations, is handicapped by having a wavelength partner: you must try for him at a time when Palermo is silent.

Should your set be capable of going up to 566 metres, don't fail to try for Grenoble. The wavelength is shared by a small German relay, Hanover, but when the French station is coming in well he is powerful enough to swamp the interference. Another station worth attention near the top of the medium waveband is Riga, whom I have heard very well several times lately.

I have given you quite a number of new stations to try for. For reliable reception I can recommend on the medium waves Brussels No. 1, Langenberg, Stockholm, Strasbourg, Poste Parisien, Breslau, Hilversum, Heilsberg, Turin, and Nurnberg. On the long waves Kalundborg, Oslo, Motala, Radio-Paris, and Huizen.

THE past week has been distinctly uneventful—for myself, at any rate. I

have found the most interesting waveband to be the amateur 5-metre band, and even there I have had no one to listen to but my own transmitter, left running at home while I tour the country listening to it!

Recent "Sundays out" by R.S.G.B. members have begun to show that 5 metres is going to be quite useful, after all. With very low inputs—6 watts or so—it is possible to cover 30 miles, and probably more. Already signals have been sent and received right across London.

Ten metres, on the other hand, is not being used much nowadays, chiefly because it is more dependent upon conditions than is "five." Not that it cannot always be used for local work in the same way as 5 metres—that has been shown possible already.

My One-Valver Grows Up

The difference is that it is a wavelength suitable for DX work when conditions are right for it, and for that reason it seems a pity to settle down and use it as a band for local chats. I can see that in a year or two 5 metres, as far as the amateur transmitter

SHORT-WAVE NOTES



News and views regarding an exciting and fascinating waveband.

By W. L. S.

is concerned, will have taken the place of the present 150-175-metre band for local work.

My one-valver has "grown up" at last. I am using a resistance-coupled stage after it, but with a switch for cutting it out when necessary. I find the extra stage rather useful on those quiet nights when one can hear no mush, no signals, no anything with the one valve only.

When conditions are approaching "good" I leave the L.F. out and carry on as usual with the single valve, but I must admit that I do find it a comfort to have just a small amount of extra "mag." available for state occasions.

I use a coupling resistance of 50,000 ohms, a grid condenser for the L.F. valve of .002, and a grid leak of .5-megohm. Quite a small amount of amplification results from this, but it has the advantage that the set remains almost as quiet as the single-valver.

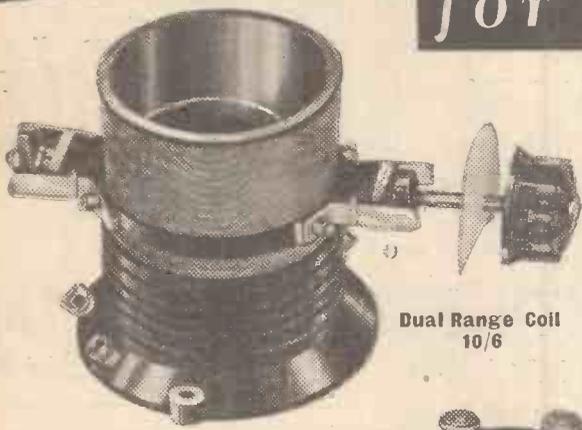
Just by way of comparison I tried a transformer-coupled stage for a few moments, and after the resistance-coupled arrangement the "hiss" and "frying" noises were unbearable. I think it is largely a matter of what one has become used to, but I confess that after I got used to fairly weak signals and quiet backgrounds I cannot stand a noisy receiver unless I listen with the 'phones on the table.

The Empire Transmitter

The good news that Empire Broadcasting really is in the offing should cheer up our overseas readers considerably. G5SW has, after all, been a mere experiment, and the new station at Daventry should be received at least as well as any other European stations in most parts of the world. A friend of mine concerned with the designing of short-wave receivers for use in the Tropics is very thrilled over the simplification of his job that will result!



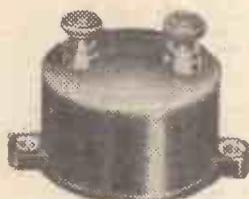
MAKE YOUR OLD SET BETTER THAN IT WAS WHEN NEW for a few shillings



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L.F. Transformer 8/6



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Condenser 3/6

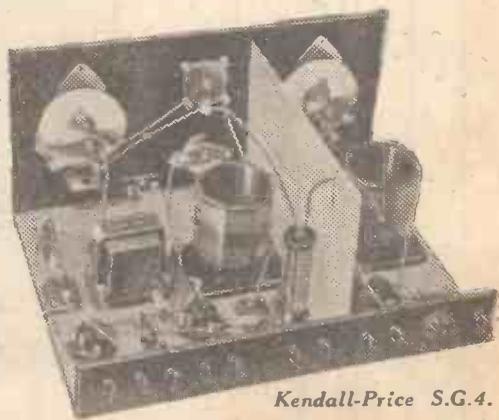
Is your radio set behind the times? Is it failing to give you modern efficiency? Do you realise how easily and cheaply you can make it even better than it was when new? Take advantage of the many improvements in design and efficiency which have been discovered since your set was built and bring it right up to date with Ready Radio Components. Every Ready Radio Component is the outcome of extensive laboratory research of the famous designer, Mr. G. P. Kendall, B.Sc., and possesses special features which will give you greater efficiency and reliability. As soon as you put Ready Radio Components into your set you will be impressed by the improvement.

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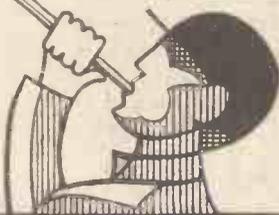
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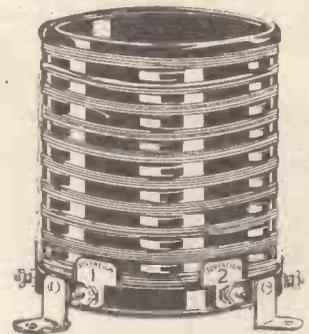


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Out of the Blue

AUSTRALIAN APPARATUS

By CAPT. P. P. ECKERSLEY, M.I.E.E.

In this cheery and informative letter to "P.W." readers our Chief Radio Consultant packs a wealth of observed information about broadcasting in the Antipodes, and makes interesting comparisons with our own radio system.

THE Australian receiver, dear reader, is a very good receiver. Dare I whisper that in respect of selectivity it is a good deal better than a lot—oh, quite a lot—of British or European receivers!

And one thing is absolutely certain—the appearance—shape, finish, etc., of Australian receivers, price for price, is greatly superior to any receiver I have seen in Britain. (With the possible exception of Mr. Joseph's design of the exterior of the stenode radiostat shown at last year's Olympia show).

"De gustibus non disputandum" they say; but at the same time we think there is either "taste" or not. Have a look at the illustration of the A.W.A. instrument which accompanies this article, and you will agree with me that the harmony of proportion is worthy of great praise.

Valves and Speakers.

The finish of the woodwork is also very fine indeed. No, we shall have to buck up to beat the Australians in regard to looks, anyhow!

The Australian set designer has two acts of faith. The dynamic speaker and the American valve—should I say the moving-coil speaker and the stable valve?

I am persuaded he is wrong about the speaker. I think it is a pity he should have so much on his side when one attempts to back up the British valve.

Let us look a little more deeply into this question of receiver design, and compare an ideal with practice here in Australia and with you at home.

Plenty of Wavelengths.

Owing to the unplanned distribution of stations which exists, in greater or less degree, all over the world the problems of selectivity are more acute than they need be. In Australia they've got all the wavelengths for 6,000,000 people that Europe has to use for 250,000,000, and America for 100,000,000! And yet they have a selectivity problem!

It's mad, isn't it? Dear old *laissez-faire*, and oh, the horror of planning anything!

Well, they're up against it here almost as much as we are. They stick stations all over a city, and some poor wretches living under the shadows of one station want to select others 20 k.c. away in frequency and 30 d.b.s. down in strength.

The leading firms have so far used straight R.F. tuning, but secondly use four stages of filtration and not very high mag. valves. They laugh at us for putting all our eggs in one basket. They say that there are 200 different types of valves on the British

market. For one purpose they only use one type of valve practically; for high-frequency, for example, they use relatively low-impedance valves and plenty of them. It's right.

To-day, the *cognoscenti* (those who are inclined to have new names more than new ideas) are talking super-heterodyne. They may be right; that's a matter for solid calculation of quantities, but I wager that America's rush over to the super has largely influenced their opinion.

I shall speak with more assurance later; to-day, I say, there is no real evidence one way or another to say whether a properly designed straight R.F. set is better, as good as, or worse than the super-het. taking all factors into consideration.

Detectors and R.C. Coupling.

For detection they still use bottom bend.

This, I think, is wrong, because the signal, to get linear detection in the bottom bend, must be relatively strong and, as they're keen to reach out, and as selectivity is a permanent problem and as, therefore, demodulation effects are fundamental to selectivity, it would appear that the power grid-leak detector was essential to give demodulation with weak signals.

The Australian low-frequency is all resistance-capacity. This pleases me.

I am impressed, however, by the fact that the resulting quality is not so good as from most British sets, which always led the world in quality and continue to do so.

"Pentode Mad."

They're all pentode mad here, and pentodes—while great noise makers—are also distorters. You cannot get linear amplification with pentodes, at least with any I've studied.

Then again, I'm a bit suspicious of the bottom-bend detector for good quality. And also transmission here is not as good as at home.

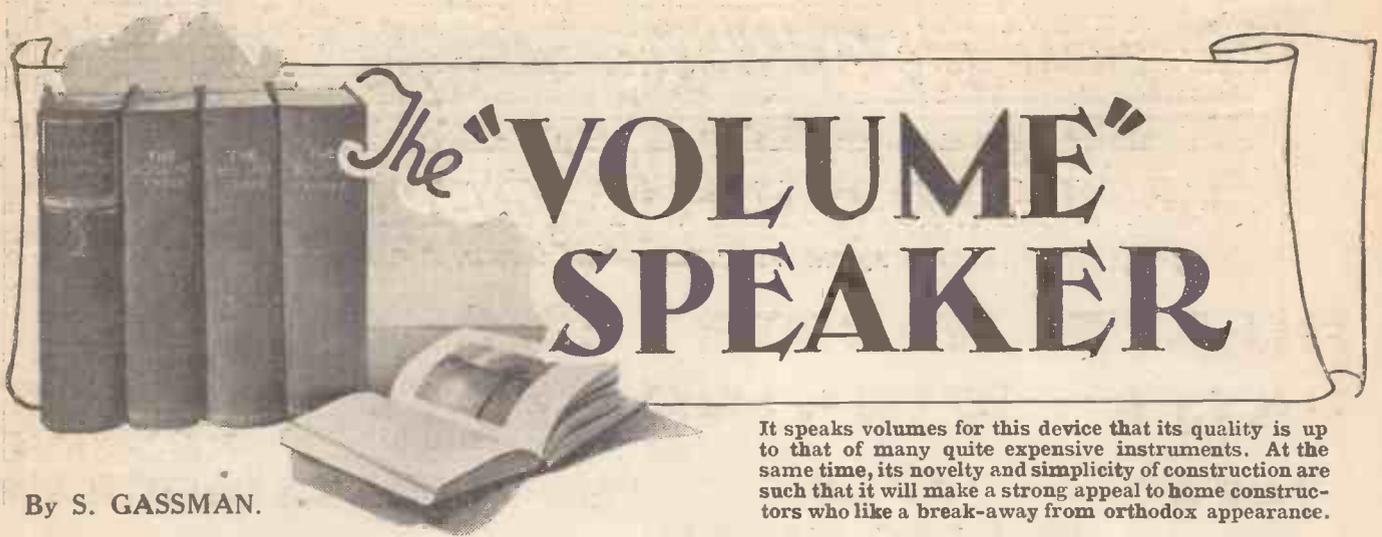
The manufacturing facilities here are very good indeed. The A. W. A. factory, for example, is as modern and well-equipped as any I have seen anywhere in the world.

(Continued on page 502.)

HARMONY OF PROPORTION



Capt. Eckersley was greatly struck by the appearance of Australian sets, and enclosed this photograph in his letter as an example of good design.



By S. GASSMAN.

It speaks volumes for this device that its quality is up to that of many quite expensive instruments. At the same time, its novelty and simplicity of construction are such that it will make a strong appeal to home constructors who like a break-away from orthodox appearance.

JUDGING by the number of letters we have received since the "Volume"

Three was described in "P.W." on December 19th, 1931, there must be a large number of people eagerly looking forward to the advent of the loudspeaker ending this series.

Although the loudspeaker is primarily designed for use with the "Volume" Three set, it will work equally well with any other set.

For those of you unfamiliar with the "Volume" Three series I should explain

open to accommodate the H.T. and G.B. batteries and accumulator or mains equipment.

Mystifying Your Friends.

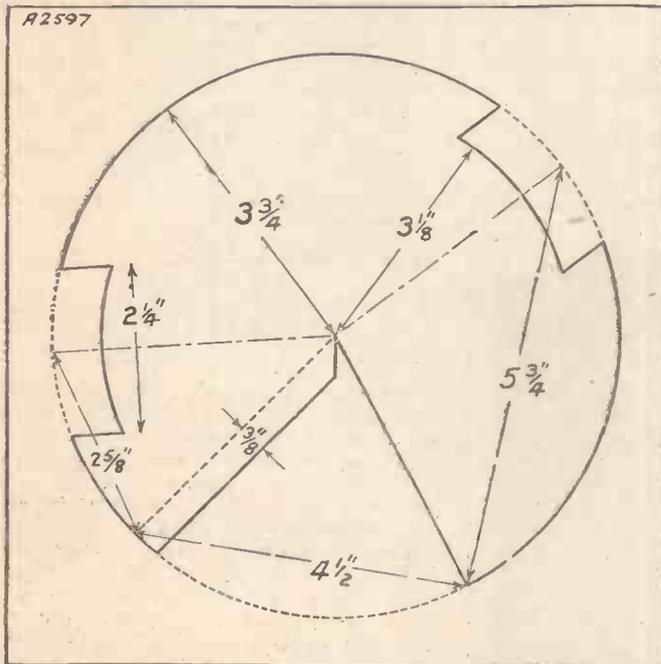
The loudspeaker described in this article is the third and last of the series and forms the fourth "edition."

Besides entertaining you through the ordinary channels, this series may provide you with amusement at the cost of your family or friends who, not knowing of the contents of the volumes and hearing but

not seeing the set, would be highly mystified.

You will see from the photographs that the loudspeaker is a cone type, with a reed-movement unit. This is mounted to one of the sides which is hinged to the main framework so that the loudspeaker can be swung in almost any direction.

But before proceeding with the construction it is advisable to check up two points. First, that the speaker will not be too large for your bookshelf; and secondly, that the side that holds the speaker is on the side best suited for your requirements.



CONE CUTTING
 Marking out the paper from which the cone is cut is quite easy, and all the dimensions that you need to know are set out on this diagram.

Any Good Make Will Do.

The loudspeaker unit shown in the photographs is a Telsen. Any good make will do provided it will not be too large.

The two sides, top and bottom arc of wood. The curved back is made of copper sheet which you will find easily workable.

You will also observe two small panel

(Continued on page 494.)

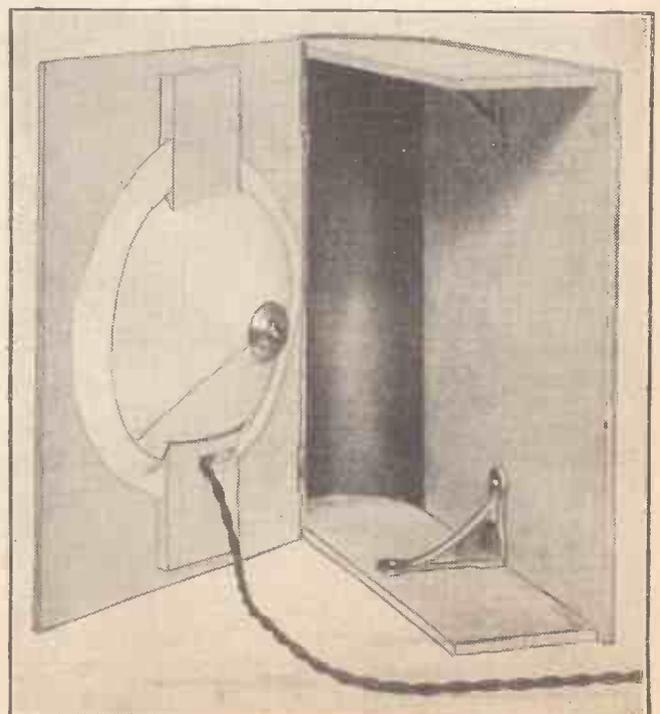
that it commenced with a three-valver built into a hook, or to be more precise, a wooden case camouflaged to resemble a book.

Surprising Punch.

It had 2 L.F. transformer-coupled stages and these, in conjunction with the special aerial coil, gave surprising punch for so small a receiver.

There followed, on January 16th, the battery case, which consisted of two volumes fixed side by side with the inside

AN ENTERTAINING BOOK
 You do not have to be a skilful carpenter to make a successful job of the speaker. The inside is just as simple as the exterior!



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1 Ready Radio .0005-mfd. solid dielectric condenser.	2	6	
1 Ready Radio Bakelite condenser. .0005-mfd. differential.	2	6	
2 Telsen screened coils.	17	0	
1 T.C.C. 2-mfd. fixed condenser.	3	10	
1 T.C.C. 1-mfd. fixed condenser.	2	10	
1 T.C.C. .01-mfd. fixed condenser, upright type.	3	0	
1 Dubilier .0003-mfd. fixed condenser, type 665.	6		
1 Ready Radio 2-megohm resistance and holder.	1	4	
1 Ready Radio 25-megohm resistance and holder.	1	4	
1 Dubilier 20,000-ohm resistance.	1	0	
1 Dubilier 250,000 ohm resistance, 1 watt.	1	0	
1 Ready Radio 2-pt. on-off switch.	10		
1 Ready Radio 3-pt. change-over switch.	1	6	
1 Ready Radio standard H.F. choke.	1	6	
1 R.I. "Dux" L.F. transformer.	6	9	
4 Valve holders.	2	0	
1 Terminal strip, 16" x 1 1/2", drilled.	1	6	
11 Belling-Lee indicating terminals, type "B".	2	3	
Connecting wire, 3/16" panel bush, chonite coupling link, 3/16" x 1 1/4" extension spindle 3/16" x 5/8", plugs, hex. screws, etc.	1	3	6
1 "159" cabinet.	1	0	0
Mullard valves: PM12, PM2DX, PM1LF, Super Power 202.	2	2	6
	£7	2	8

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1 Ready Radio .0003-mfd. solid dielectric reaction condenser.	2	3		
1 Ready Radio 3-pt. wave-change switch.	1	6		
1 Ready Radio 2-pt. wave-change switch.	10			
1 Bulgin on-off switch, Snap type S.80.	1	6		
3 Valve-holders.	1	6		
1 T.C.C. .0003-mfd. fixed condenser "S".	1	3		
1 T.C.C. .0002-mfd. fixed condenser "S".	1	3		
1 T.C.C. .0001-mfd. fixed condenser "S".	1	3		
1 T.C.C. 2-mfd. condenser.	3	10		
1 T.C.C. 1-mfd. condenser.	2	10		
2 Ormond .0005-mfd. s.m. variable condensers No. 6.	13	0		
1 2-meg. grid leak, wire ends.	10			
1 Dubilier 30,000-ohm resistance, wire ends, 1 watt.	1	0		
1 Dubilier 200,000-ohm resistance, 1 watt.	1	0		
1 Ready Radio H.F. choke.	1	6		
1 R.I. L.F. transformer.	6	9		
4 Belling & Lee indicating terminals.	10			
2 Terminal strips.	1	0		
1 Coil Glazite.	6			
1 Belling & Lee 5-way battery cord.	2	0		
1 Piece copper foil, 10 ins. x 5 1/2 ins.	1	0		
Plugs, screws, etc.	7			
3 Mullard valves: PM12A, PM1HL, PM2A.	1	12	3	
1 "159" walnut cabinet.	16	9		
1 Blue Print Free.				
	Carried forward	£5	18	0

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1 Utility 2-gang .0005-mfd. tuning condenser, type W.321.	19	6	
1 Telsen .0003-mfd. variable condenser with shorting switch.	2	3	
1 Wavemaster .00035-mfd. differential reaction condenser.	2	3	
1 Ready Radio 3-pt. Rotary change-over switch.	2	9	
3 4-pin valve holders.	1	6	
1 Dubilier 2-mfd. non-inductive condenser.	3	9	
1 T.C.C. 1-mfd. condenser.	2	10	
1 Dubilier .0001-mfd. fixed condenser type 670.	1	0	
Carried forward	£2	13	4
Brought forward	£2	13	4
1 Dubilier .0003-mfd. fixed condenser type 670.	1	0	
1 Lewcos H.F. choke.	6	0	
1 Ready Radio H.F. choke.	1	6	
1 Dubilier 2-meg. grid leak, 1-watt type with wire ends.	1	0	
1 Dubilier 2,000-ohm resistance.	1	0	
1 Ready Radio L.F. transformer.	8	6	
1 Permcoll panel 18 in. x 8 in., drilled to specification.	5	6	
2 Terminal strips 3 in. x 1 1/2 in.	6		
4 Belling-Lee terminals.	10		
1 Piece copper foil 9 in. x 6 in.	1	0	
1 Belling-Lee 6-way battery cord.	2	6	
Carried forward	£4	2	8

	£	s.	d.
Siemens H.T. battery, 120 volt.	13	6	
Siemens G.B. battery, 9 volt.	1	0	
Oldham 0.50 accumulator.	9	0	
Epoch 20th century moving coil speaker.	1	15	0
Bluespot 6ER magnetic type and major chassis.	2	10	0
Bowyer Lowe Mark 111 A.E.D. pickup.	1	10	0
Collaro B.30 automatic stop double-spring grammo. motor.	1	13	0
Atlas A.C. 244 H.T. unit.	2	19	6
Atlas A.K. 260 H.F. unit with trickle charger.	4	10	0
Atlas D.C. 15/25 H.T. unit for D.C. mains.	1	19	6
Oldham 120-volt wet H.T. accumulator, 5,500 m.a. hour capacity.	4	1	0
Or twelve payments of 7/6.			
Selectonet indoor aerial.	2	6	
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G.O.P. aerial lead-in tube and lightning arrester.	2	6	

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NAME.....
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ANY COMPONENT CAN BE SUPPLIED SEPARATELY

THE "VOLUME" SPEAKER

(Continued from page 492.)

brackets screwed inside the framework for extra strength and rigidity. I should mention that the shape of the loudspeaker is almost, but not quite, the same as the set, differing in that the bottom is flush with the bottom edges of the two sides.

The sizes of wood that will be required are as follows. One side, 11 in. \times 8 in.; the other, 11 in. \times 7 $\frac{1}{2}$ in. The top and bottom ends are both 9 in. \times 3 in., whilst there are two more odd pieces, one 11 in. \times $\frac{1}{2}$ in., and the other 10 in. \times 2 in. All the wood is $\frac{1}{4}$ in. in thickness.

Cut With a Pair of Scissors.

The curved back, which is made of thin copper sheet, is of gauge No. 22, and measures 11 in. \times 4 $\frac{1}{8}$ in. The metal can be cut with a large pair of scissors, but your dealer will most probably cut it to size for you if you ask him to.

The side that measures 11 in. \times 7 $\frac{1}{2}$ in. has a hole in it 6 $\frac{1}{2}$ in. in diameter. The centre of the hole should be 4 in. from one of the long edges (which subsequently becomes one of the front edges of the case), and 5 $\frac{1}{2}$ in. from an adjacent edge.

If you use the loudspeaker unit shown here, then the strip on which it is mounted should have a hole $\frac{3}{4}$ in. diameter in it in its exact centre. Two smaller holes should be drilled below this, both $\frac{1}{4}$ in. diameter and of distances 1 $\frac{1}{2}$ in. and 2 $\frac{1}{2}$ in. respectively from the $\frac{3}{4}$ -in. hole.

All Ready to Start.

The larger hole is for the loudspeaker adjusting screw, whilst the smaller holes carry the loudspeaker flex in such a way as to prevent it touching the cone.

With the exception of the top and bottom ends, the various pieces of wood are now ready for assembling, but a little care is required in getting the shape correct on the top and bottom ends. 1 $\frac{1}{8}$ in. from one end draw a line parallel with it and mark off its centre. Then, with a radius of 1 $\frac{1}{8}$ in., draw an arc. This will give the shape of the end. Behind the line drawn, that is to say, on the side nearest the curved end, another line should be drawn parallel to it $\frac{1}{4}$ in. away. This line indicates the position of the back edges of the two sides that are eventually to be fixed to it.

Repeat these operations on the piece of wood that is to become the other end, and having finished this the various sides and ends are ready for assembling.

Lay the bottom end of the case-to-be on the bench with the curved end furthest away. The 8-in.-wide side should be fixed to it with its bottom edge also on the bench and with its back edge in the position you have marked on the curved end, you will remember this was the line nearest the curve.

The top end is then fixed $\frac{1}{4}$ in. down from the top of the side and the metal brackets as shown in the photographs.

Next to be fitted is the $\frac{1}{2}$ -in.-wide strips to which the baffle is to be hinged. Secure it in a similar manner to the opposite side, i.e. with its back edge on the indicating line and its bottom edge resting on the bench.

Hinging the Baffle.

Two hinges need to be screwed to this strip with their centres 1 $\frac{1}{4}$ in. from either end. The hinges are 1-in. brass and are fixed with $\frac{1}{4}$ -in. screws. The baffle should now be fixed to the hinges.

The framework is completed by fixing the metal back. The metal can be pierced or drilled to take four screws or nails $\frac{1}{4}$ in. from the bottom end. If screws are used, then the holes must be well countersunk. Also drill four holes $\frac{3}{8}$ in. down from the top end. When the foil has been fixed to the curved ends file away any unevenness caused by nail or screw-heads.

At last we come to the actual loudspeaker construction which is the main purport of

The cone is fastened to the reed with its edges about $\frac{1}{2}$ in. from the baffle. To prevent the remote possibility of chatter it is advisable to solder the nut and reed together at the apex of the cone. Failing solder, a spot of seccotine will do nearly as well.

The cone is finished by gluing a series of strips of thin washleather about 1 in. wide all the way round the cone and baffle with the exception of the strip of wood to which the speaker unit is fixed.

Now for the "camouflaging." Before doing this, however, it is necessary to try out the loudspeaker and adjust it, for the speaker unit is to be covered with cloth.

A Free Choice.

Therefore, when adjusting the unit turn the adjusting screw to the position before the point of maximum sensitivity so as to be on the safe side.

I must not forget to mention that the loudspeaker flex should be passed through the holes provided for this purpose before the framework is covered.

Well, coming back to the covering, use a cloth suitable for covering a baffle aperture, and yet not too thin for the framework to be seen underneath it.

The choice of the material and its colour is, I think, best left to you. Its size must not be less than 22 in. \times 12 in.

Beginning with the side opposite the baffle, cover this so that the material overlaps about $\frac{1}{8}$ in. and the top and bottom edges about $\frac{1}{2}$ in. These overlapping portions only are glued to the wood and, if necessary held in place with drawing-pins while drying.

It is inadvisable to glue the whole surface of the cloth, for it might soak through and so spoil its appearance. Stretch the cloth round the back and glue it to the strip of wood to which the baffle is hinged.

From there it is again stretched across the baffle and secured on the underside of this, but be sure when covering this side that it is closed.

Completing the Camouflage.

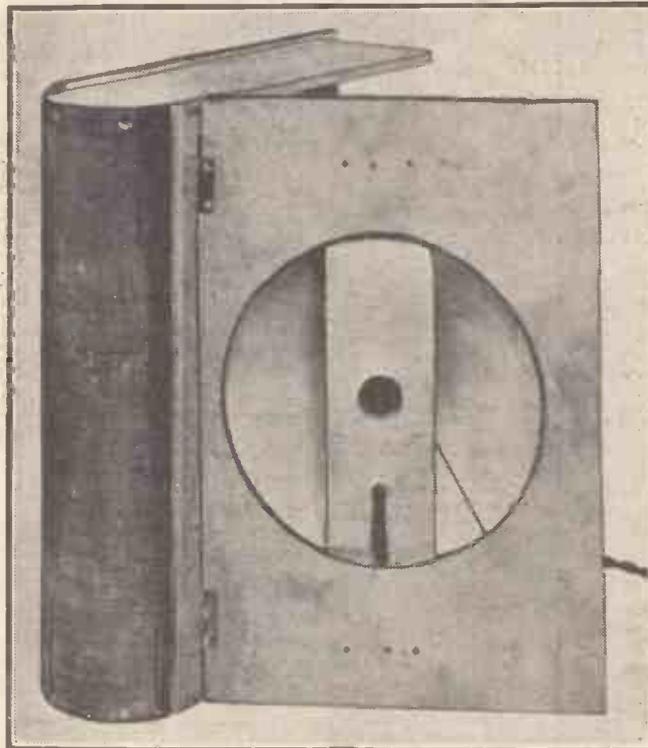
It is necessary for the top end of the framework to be quite smooth and flat. Therefore the overlapping portions along the top edges of the two sides should not be glued on to the surface of the top end.

There now remains the closely ruled sheet of paper representing the leaves of the book. Rule a sheet of notepaper 10 in. by 3 in. wide along its length with a lead pencil, the lines almost touching one another.

The paper must then be cut exactly the same shape as the topside and glued down. If air bubbles appear prick them with the point of a pin and rub lightly with a handkerchief.

This completes the data for building the loudspeaker, and you will indeed be fortunate if the building of it gives you as much pleasure and enjoyment as it gave me.

WAITING TO BE "BOUND"



It's only wanting the final covering to complete it, and when this is in place you won't be able to tell it from a book of "ordinary" words. The covering is of cloth, so that the sound is not interfered with in any way.

this article. I think we had best begin with the cone, which can be cut from any good make of conc paper. The diagram on the previous page will give you all the details you will require for making it.

Leave It Overnight.

When cut out, stick it together with seccotine or glue, and leave it to dry overnight with a light weight of some kind or another placed on its apex to preserve its shape.

Mounting the loudspeaker unit to its strip of wood is the work of a moment.

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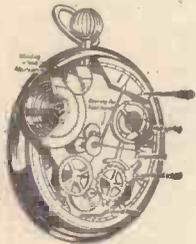
• Exide Batteries for wireless low tension and high tension. Drydex Dry Batteries for wireless high tension and grid bias. Also for torches, cycle lamps and bells.

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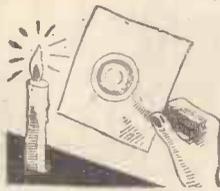
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You can prove that the whole of a candle is not alight by holding a sheet of paper in the flame. The unburnt part of the flame leaves the paper white.

A man's load on the Earth



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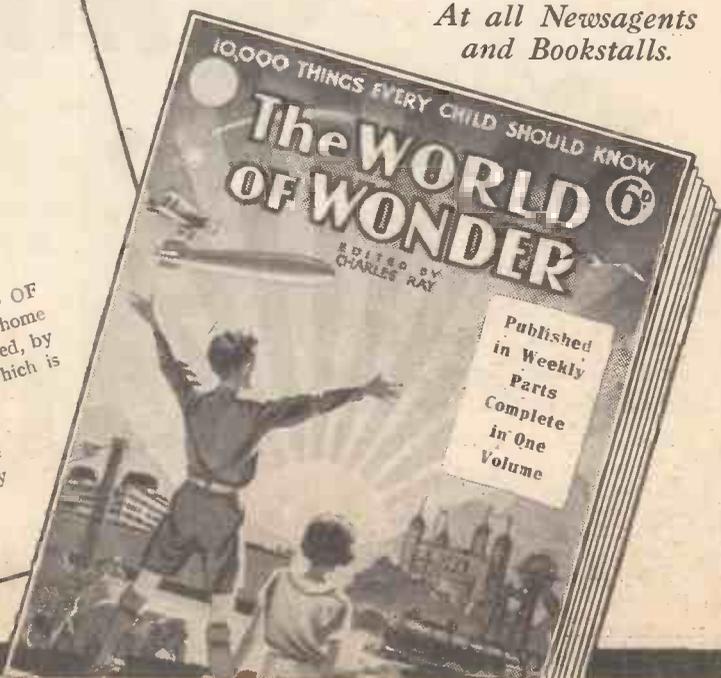
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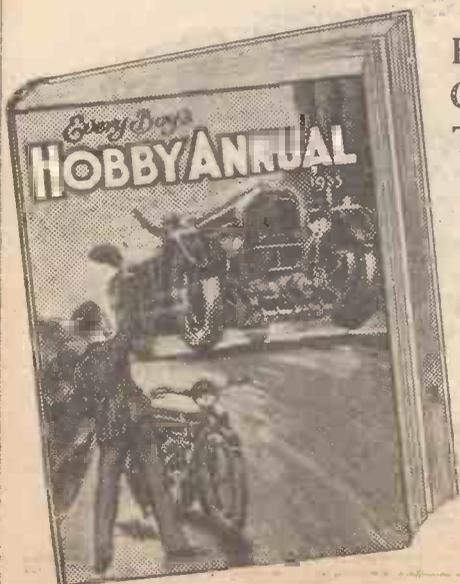
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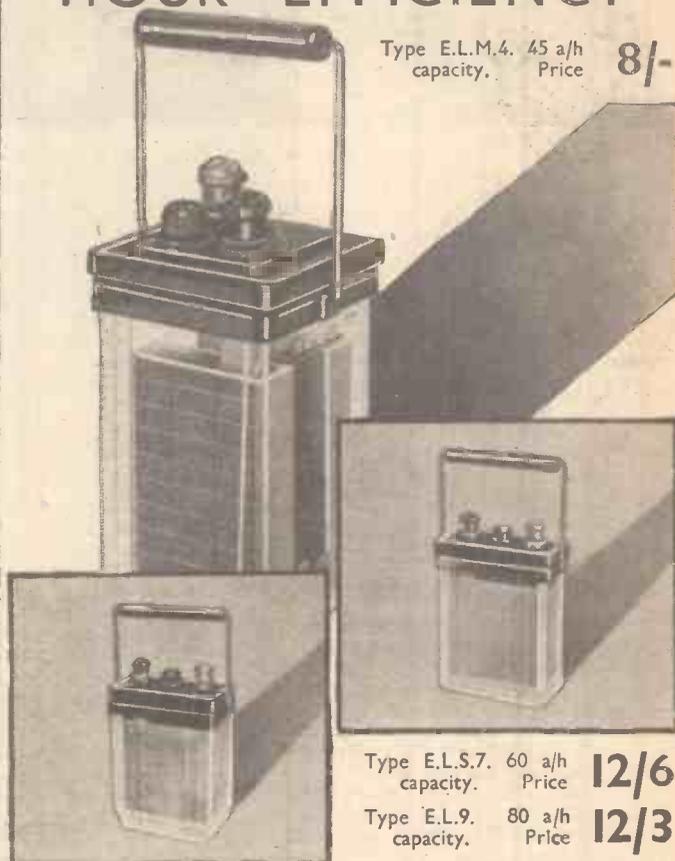
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RADIOTORIAL

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

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

QUESTIONS AND ANSWERS

WHEN THE FUSE IS SHORTED.

D. J. J. (Leamington).—"The set is a three-valve (detector and two low frequency) built by my son, Christmas, 1930. The following March he joined the Merchant Service, and I always leave over any little alterations till he comes off a voyage.

"When he came home five weeks ago I got him to put in a new valve holder, as I had been getting crackles (which got unbearable when you touched the V2 valve holder). And after he put in the new holder we had no more trouble with the crackles, so he went to sea again thinking all was O.K. But we had reckoned without the fuse.

"At the time he put in the new wiring he broke the flashlamp bulb which is joined between H.T. negative and L.T. negative. And he put a piece of wire across the two temporarily, advising me to get another similar bulb and

shorting wire, and inserted the bulb into the holder. When I switched on I was surprised to find no programme came through.

"And when I opened up to see what was the matter I got a shock and a scare, for the inside of the set was lit up! It was the new bulb, full on!

"You can be sure I lost no time in switching off. And then, not liking to be done, I gently took out the bulb, put the wire back across the bulb holder, and tried the switch again, to see what would happen next. To my surprise, all right as rain.

"So, for the present, I am leaving it alone, but I wish I could know what was the matter, and how to get the fuse working properly."

From your description it is quite clear what has happened, and fortunately it is very easily put right.

The cause of the trouble is that because H.T. neg. and L.T. neg. are so generally connected together it is easy to think of them as being one common terminal point, instead of the junction of two different circuits—high tension and low tension. And

in carrying out the valve holder wiring your son evidently considered them as one point, and the effect of this is that the fuse is now in the low-tension circuit, instead of in the high-tension negative lead.

We think if you do the following you will find that the set will work as it should, and the fuse will not light up.

Disconnect the H.T. and the L.T. negative leads from their terminals, and undo the wire across the bulb holder. Insert the bulb in this.

Then connect the negative lead from the H.T. battery to the L.T. negative terminal. And, finally, connect the L.T. negative lead to the H.T. negative terminal, and switch on.

All right? Then you can re-label the terminals and carry on for good in the new method.

If, however, you meet a snag and the set does not work as it should, we should be inclined to let the fuse go hang for the time being and use your present

DO YOU KNOW—

the Answers to the following Questions?

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

- (1) What is normally the correct speed for a gramophone record to turn?
- (2) How to find the frequency of a transmission on 7 metres?
- (3) When Kalundborg's new high-power station is due on the air?
- (4) If you take the lid from a screened coil unit, does this affect the dial readings? And if so, how?

connections until your son's return. It should be an easy matter to put right by someone of experience with the set in front of him.

WAS IT PRAGUE?

"TATČO" (Beddington).—"On the upper part of the medium waves my attempted tuning curve goes a bit out, and I wonder if you can help me to identify one or more of the three strong stations which are puzzling me?"

(Continued on page 500.)

IS YOUR SET BEHAVING ITSELF?

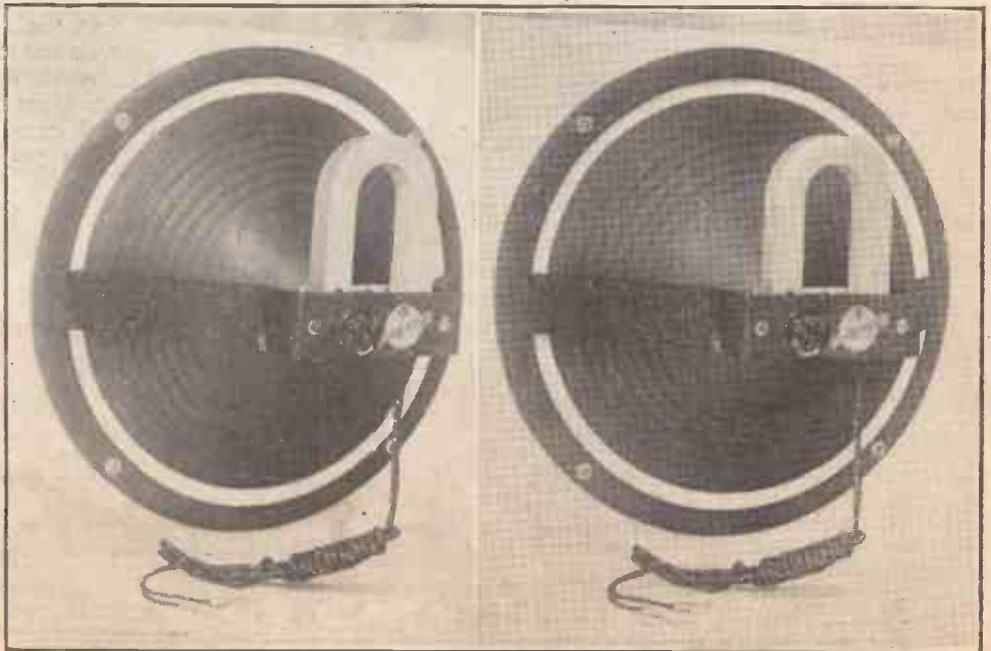
Perhaps your switching doesn't work properly? Or some mysterious noise has appeared and is spoiling your radio reception? Or one of the batteries seems to run down much faster than formerly? Whatever your radio problem may be remember that the Technical Query Department is thoroughly equipped to assist our readers, and offers its unrivalled service. Full details, including scale of charges, can be obtained direct from the Technical Query Dept., POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4. A post card 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.

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put this in after I had taken off the wire across the bulb holder.

"I forgot it for a couple of weeks, but after he had gone I got a bulb, exactly the same as before, undid the

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Look at this Blue Spot loudspeaker through a "P.W." True-viewer if you want to see it "stand out" like a solid instrument.

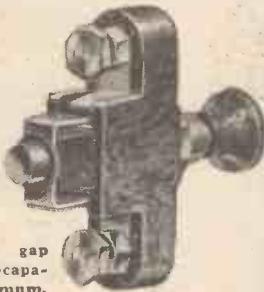
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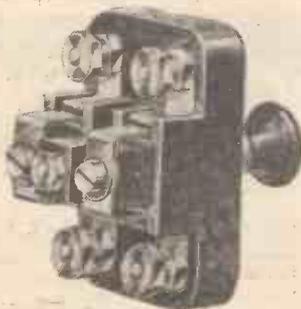
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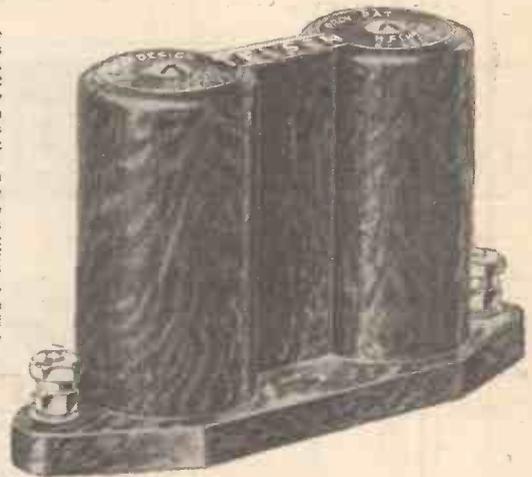


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RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 498.)

"The set is S.G., detector, and L.F., so there are two tuning dials. And North Regional, whom I do know, comes in at 88½/82 But I get three others I am not sure about.

On 84½/77 there is a German who generally closes down early, and on 86½/79 there is another German (whom I take to be Langenberg), who works after the B.B.C. has closed down.

"Up above North Regional, on 89½/83½ there is another 'mystery,' a very powerful station talking in a language neither German nor French. And last night at 10 p.m., he sent a time signal consisting of a long dash followed by six dots.

"If you could suggest, from the foregoing readings, what stations these are I should be very grateful, as not knowing the languages, it seems impossible to identify them all.

Easy to Identify.

Dial readings are not usually very helpful because they are not sufficiently complete to form the basis of an estimate. But yours are an exception, because with the other information given by you it is possible to know almost with certainty who these stations are.

Knowing the North Regional is 88½ on the first dial, we note that about one degree above it is the powerful programme in which you heard a 10 p.m. time signal consisting of a long dash and dots.

There is no doubt whatever that this is Prague. For his wavelength is immediately above that of the North Regional, and he does use a time signal of the type described.

Rather farther away from the North Regional reading and lower in wavelength you have a German programme, which you "take to be Langenberg."

Presumably you heard an announcement to that effect, but in any case we think that you can be sure this was Langenberg, because not only is the reading just where one would expect to find it, but it is confirmed by the presence of another "German" on a reading of 84½.

Actually this latter is a German-speaking Swiss station, and unlike the Germans, it does close early quite regularly. It is not an easy station to identify from the announcements, because not only does the language lead one to believe it to be a German, but its name is given as "Schweizerischer Landessender"—an awful mouthful.

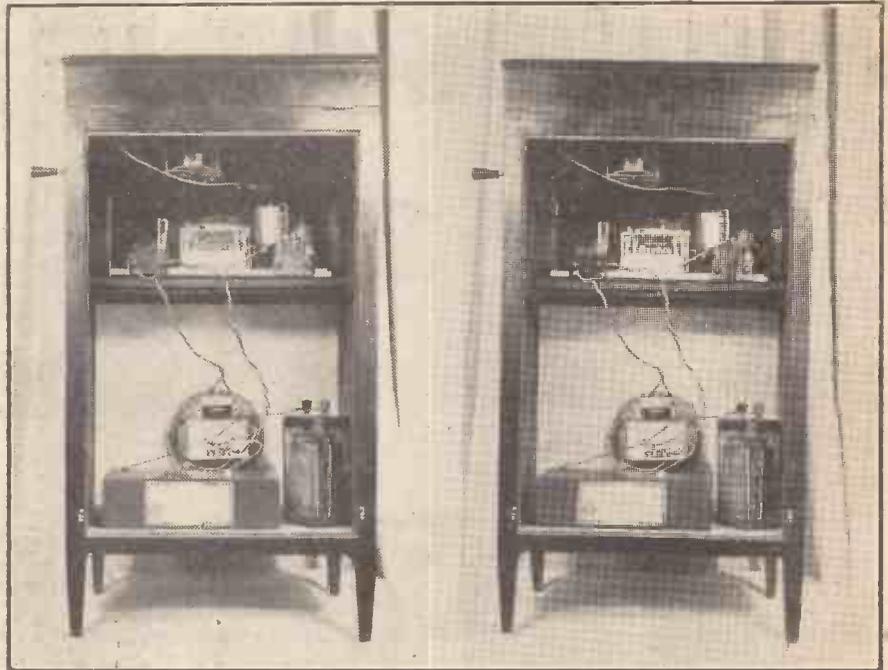
However, you may be lucky enough to catch the word "Beromuster" sometimes (which is the name of the actual site of the station), or else that of the

town from which the programme is emanating, for Schweizerischer Landessender relays either the Basle, Berne or Zurich programme.

If you hear any of these names while tuned to 84½/77 you can be sure you are on to Schweizerischer Landessender (or "Beromuster," as he is generally called), and then you need have no doubt whatever about the other stations being as named above.

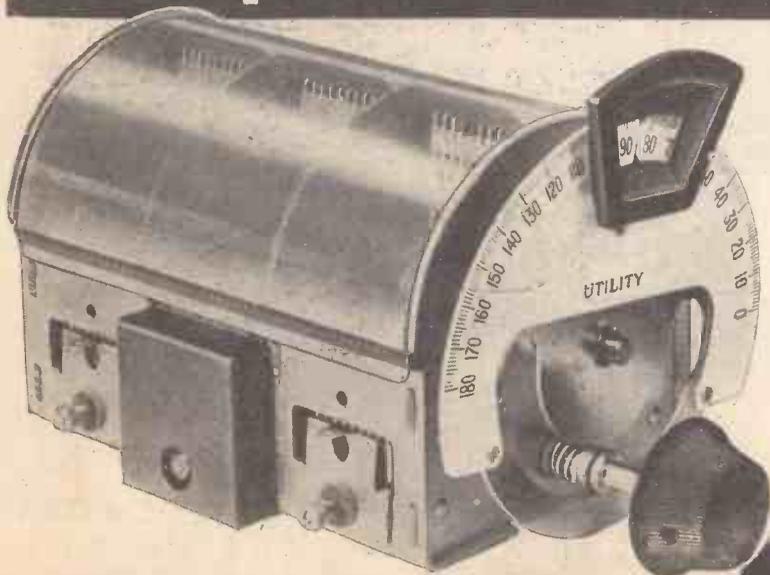
(Continued on page 502.)

A PEEP BEHIND THE SCENES



An inside view of the "P.W." Radio-gram for stereoscopic reproduction.

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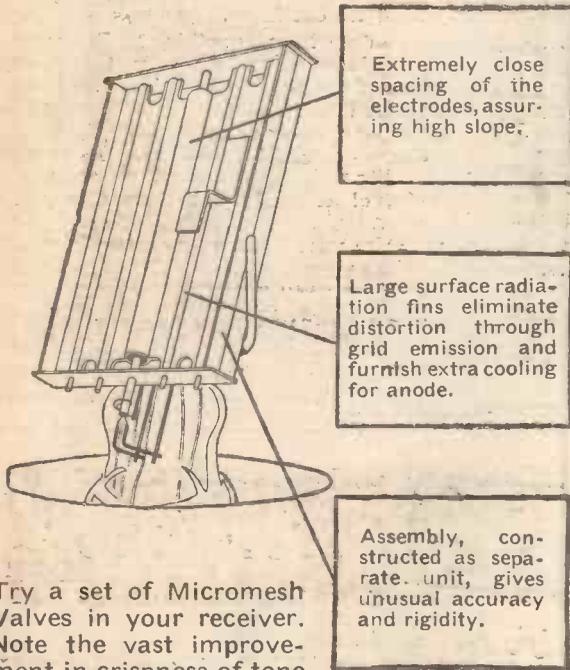
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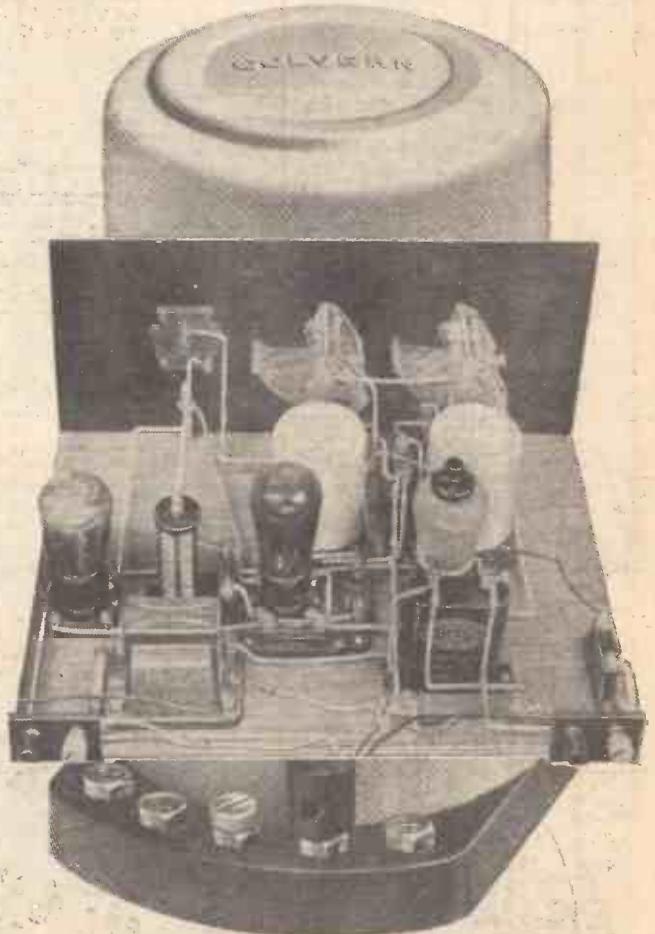
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RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 500.)

FITTING A FILTER FOR THE LOUD-SPEAKER.

"MINNIE THE MOOCHER" (Blackpool).—
"Two points about the 'Apex' blueprint before I get to work on it: (1) Is the following O.K. for fitting a filter for the loudspeaker on the lines of the one for the 'Magic'?"

"Connect the L.F. choke across the present L.S. terminals. One side of the new 2-mfd. condenser to negative end of choke, other side of this condenser to new L.S. terminal. Remaining L.S. terminal to earth terminal."

"(2) Instead of the 200,000 ohm leak between G of V3 and G on L.F. transformer, can I use a 150,000 that I have left over from my four-valver?"

(1) The connections you outline are quite O.K. for filtering the plate current from the loudspeaker.

(2) The value of the resistance is not at all critical so 150,000 ohms will probably do just as well.

THE REACTION CONDENSER OF THE "APEX."

M. P. (Retford).—"I am very pleased with the blueprint of the 'Apex,' which I hope to put together the week-end after next. But I am a bit stuck on the condenser for reaction. Would a differential do instead?"

THE ANSWERS

TO THE QUESTIONS ON PAGE 498
ARE GIVEN BELOW.

(1) Seventy-eight times a minute when the needle is actually bearing on the record.

(2) To find the frequency in kilocycles divide the wavelength into 300,000. In this case $\frac{300,000}{7} = 42,857.1$ kilocycles (approx.)

(3) The intention is to have it ready somewhere about next April.

(4) Usually the condenser dial-reading for any given station will move to a lower reading.

DID YOU KNOW THEM ALL?

"I like to do a bit of running-round the foreigners, usually on the Sunday afternoon and evening, and I get a good selection on my present set; detector and 2-L.F. I think with an S.G. stage I ought to get plenty more, with enough power in hand for B.B.C. items, which at present are on the too loud side.

"I want to use the same L.F. transformer, tuning condenser and, if possible, differential. Could this be put in with one 'fixed' terminal left unconnected? Capacity is '0003."

Yes, certainly. When a differential condenser is left with one of its "fixed" sets of vanes disconnected, it becomes in effect a two-terminal condenser similar to the one used for the "Apex."

"P.W." PANELS, No. 96.—BRNO

Brno is in Czechoslovakia, 752 miles from London.

As announced, the name sounds like "Birno." Man announcer; occasionally uses French, English and German. Usually Czech.

Brno's wavelength is 342 metres. Closes down with the words "Radiojournal Brno. Dobrou noc," the last two words meaning "Good-night."

OUT OF THE BLUE

(Continued from page 491.)

They use automatic machinery more than we do; I am told this is because of the high cost of labour.

High Standard of Workmanship.

Whatever the reason, the accuracy and workmanship is of a very high standard, and no one has a right to pretend that the Australian mechanic is not as careful and as hardworking as his cousin at home.

Considering the geographical isolation and the small population it amazes me to find so much talent and knowledge in Australia. If only they'd take their transmission out of the hands of the bureaucrats and start and plan a scheme they'd have the finest system in the world, and receivers which would do it justice.

What We Can Learn.

Can we learn something? Better and more balanced proportion in the appearance of our sets, stable, uniform and many valves (instead of as now a high mu distorting squealer balancing itself by luck!) fine workmanship, and selectivity with quality? Yes, we could learn something but, of course, I didn't see this year's show.

Once more I am, yours sincerely,

P. P. ECKERSLEY.

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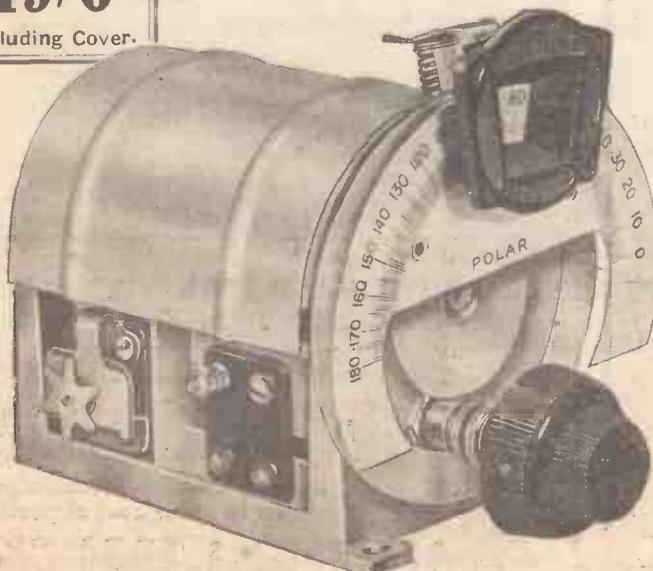
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Mazda Radio Valves are manufactured in Great Britain for The British Thomson-Houston Co. Ltd., London and Rugby

* * * * *
THOSE
"UNPUBLISHED SONGS."
 * * * * *

IT is not surprising that many hundreds of songs have been sent to Broadcasting House as a result of the announcement that Denis Freeman is arranging a programme, to be heard in late November, of songs which have yet to find a publisher. A fortnight or so back these unpublished songs received by the B.B.C. exceeded six hundred, and they were still pouring in, keeping some of the staff busy with acknowledging and registering the MSS.

Unknown Authors.

The task of selecting a suitable programme from this big bunch of contributions is not easy, even when the large number of lyrics which have no music attached are eliminated as being quite worthless for the projected broadcast.

Songs of all sorts are still left—songs of the glorious Devon kind, ballads, comic songs, jazz tunes and even two complete song-cycles, written by all manner of people from a peer's son to a North-Country gas-fitter, and it looks as though this programme of "Songs You Cannot Buy," as it will be called, may even stand up to a short series of similar broadcasts, if listeners like it and sufficiently good material is forthcoming.

Many interesting points are raised by this programme of unpublished songs, and why they are good enough to broadcast if the recognised music publishers have turned

them down. It is true, of course, that while some songs may be well worth hearing, they lack the commercial value essential to the cost of exploitation, but there must also be other songs which publishers have "missed" in the same way as good novels and good plays—among the latter being "Tons of Money," and more recently "Journey's End"—are sometimes turned down several times before a more discerning mind realises their proper value.

Names count in the song-writing profession as in all others, but even a big name, as every music publisher has discovered, is no sure guarantee that a song will be successful. The success of a song, both

=====

NEXT WEEK!

All about **MAKING YOUR OWN LOUDSPEAKER.**

Thursday "P.W." Threepence

=====

from the point of view of writer and publisher, depends upon how the public buy it in the form of sheet music and mechanical reproductions, and public taste is as fickle in music as in most other things.

That is why there is another side to the question of "song plugging" upon which so much nonsense has been said in the past, and useless energy expended by the B.B.C. in attempting to stamp it out. No publisher "plugs" songs which the public does not show an inclination to accept, because all the plugging in the world will not make the public buy any songs it does not want.

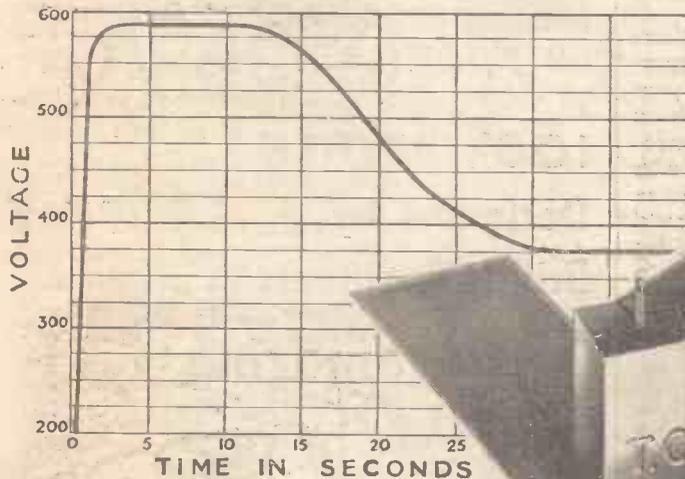
One has only to listen to some of the tunes played by the B.B.C.'s own dance band to realise this truth.

There is the further point, of course, that broadcasting can and does assist the sale of some tunes, even outside any arrangement or "consideration" which may be made between publishers and band conductors or leaders. Instances of this occurred some months ago with a song entitled "Please Don't Mention It"—now a "best seller"—which was specially written for the B.B.C. in a production called "Post-man's Knock."

Publishers and recording managers realised its potentialities as a big hit, and almost fell over each other to secure the rights of handling it, and very much the same thing happened with "Good-night, Vienna," and "Blackbird in the Apple Tree," both of which were originally written for microphone presentation.

Money in Tunes.

Apart from broadcasting there are many instances of film show music attaining dizzy heights of popularity, and scrambles among music publishers to secure publishing rights, all of which goes to show that there is big money in tunes the public takes a liking to, and how highly developed is the game and competition for discovering and purchasing saleable material, and finally with making the most out of it for all who have their fingers in the lucky pie. Meanwhile it will be interesting to see if Denis Freeman's programme of "Songs You Cannot Buy" is productive of any "winners," and who will get the plums which may be hidden among the leaves.



The above graph, an actual example, shows what happens when an A.C. Set is switched on—an immediate rise to 595 volts, then 30 seconds before normal conditions are reached. For half a minute smoothing condensers are subjected to this overload! Again to the fore in condenser practice, T.C.C. have produced a new condenser—the type 87—definitely built to withstand these dangerous surges—up to 650 volts. Play for safety! Ask for the surge voltage figure of your condensers, be sure they are T.C.C.—the condensers in the green case.

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0.25	2 1/2"	1 1/2"	3/8"	2 6
0.5	2 1/2"	1 1/2"	3/8"	2 10
1.0	2 1/2"	2"	1/2"	3 8
2.0	2 1/2"	2"	1/2"	4 9
4.0	2 1/2"	2"	2 1/2"	8 0

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Do not miss your chance.

TESTED AND FOUND ?

(Continued from page 484.)

A.C. FROM D.C.

Direct current mains impose awkward restrictions on listeners desirous of operating some kinds of modern mains apparatus. Particularly is this the case with, for example "all-electric" radio-grams of certain types.

However, it is possible to transform D.C. into A.C. by means of a Rotary Converter. I recently received a device of this nature from the Electro Dynamic Construction Co., Ltd.

It is designed for an input of 220 volts D.C., and an A.C. output of 220 volts 82 amperes. (I presume other ratings can be obtained if required.)

A good filter and a cabinet to damp down mechanical noise are provided.

The converter runs with exceptional smoothness, and the output is perfectly clean. We have operated numerous different A.C. sets from this converter and it has given every satisfaction.

TRADE JOTTINGS

By G. T. KELSEY.

I'M tempted to remark after rather careful observations during the last few weeks that everybody's doing it. At least, those that aren't ought seriously to be thinking about it!

I suppose it is hardly necessary for me to add that I am referring to the building of the famous "P.W." "Apex" receiver. Our technical people certainly seem to have produced the goods this time, and in London, Manchester and Edinburgh, to mention just a few of the places to which I have been for first-hand information, the reception of the "Apex" has been particularly gratifying; in fact, I'm not at all sure that the better word would not be astonishing.

Now comes another stroke of luck for all would-be "Apex" enthusiasts, for Messrs. Colvern, who were the makers of the coils used in the original model, have just produced a full-size blue-print of this latest "P.W." achievement, and it can be had free for the asking.

If you take my tip you will make your application right away, for otherwise the man next door may get there first! Send a 1d. stamp to Colvern Limited, Mawneys Road, Romford, Essex.

Something New in "Traffic Cops."

I recently had an opportunity of examining something really natty in the way of
(Continued on page 508.)

THE NEW "LANGMORE" RADIO CABINET No. G.5. MADE OF SEASONED OAK

(SEE ARTICLE ON PAGES 473-4 OF THIS ISSUE)



PRICE
38/6 Each

Packed Free.

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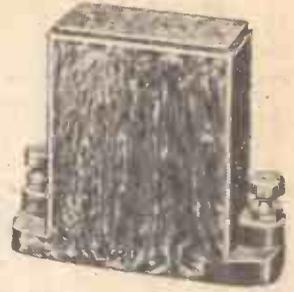
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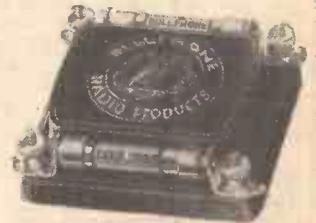
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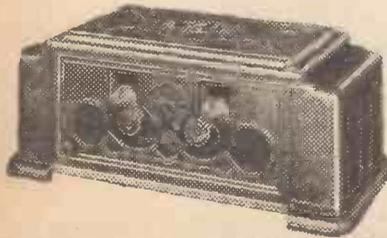
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Write for booklet describing many amazing uses
Dept. X, McCaw, Stevenson & Orr, Ltd., Belfast.
There is only ONE SECCOTINE

TRADE JOTTINGS
(Continued from page 506.)

accessories—the new Pressland Aerial Control COP, as it is called.

Primarily, this new Pressland production is a well-made and easily fitted lead-in tube. But it is something much more than just a lead-in tube.

Through the centre of the tube itself there is an adjustable plunger scheme which is for the purpose of controlling selectivity. The outside end of the Cop is also ingenious in that it is fitted with an efficient-looking lightning arrester.

I shall be interested to see how readers get on with it, although from my preliminary examination I have a pretty shrewd idea even now!

I was particularly struck with the finish of this new accessory, and as evidence of the faith which the makers have in this new safety device, a free fully operative insurance policy is given with every one sold.

A New Mullard Scheme.

The Mullard concern have just introduced a little grid leak wrinkle which I think is a most commendable idea.

We all know of the difficulties of "neck-twisting" in order to find out the value of a grid leak tucked away in some inaccessible corner of the set, and if the value of the leak happens to be stamped on the underside—especially if the leak is one of those that solders on to the wiring—it's apt to provoke—ahem!—shall we say just slight discoloration of the atmosphere?

But not so the new Mullard productions. For these new leaks make use of a colour code indicating scheme by which it is instantly possible to determine the value. The leaks have a main body colour, and two colour bands—one at the end, and one rather more than half-way along.

The idea is that for the present these leaks are intended for set makers only. But if you happen to have a commercial set in which they are used, and can get hold of the colour code, which should not be a difficult matter, you will never be in doubt concerning the value of the resistances in the set. Perhaps I should add that to make the leaks absolutely fool-proof, they are also marked in the conventional way.

The "Clarion Call."

I have just received a copy of a new leaflet produced by the Clarion Radio Valve Co., to describe their range of "tubes." The range includes valves for every purpose, from the ordinary 2-volt battery types to indirectly-heated A.C. mains valves and rectifiers.

A copy of the leaflet can be obtained—free, of course—from The Clarion Radio Valve Co., Tyburn Road, Erdington, Birmingham.

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THE LISTENER'S NOTEBOOK

(Continued from page 476.)

With the winter programmes well under way now, it is easier to form an estimate of the work of the B.B.C.'s programme builders. Instinctively one feels the urge to appraise, particularly if one recognises the fact that their schemes must be designed to suit a catholicity of tastes. It would be futile to say that everything that has come over the air this season has been beyond reproach.

Personally, I think all the talks are good. In the case of some, this is only meagre praise. They all reach a high standard of excellence both in matter and manner, and show a decided advance on last year's standards.

"The Un-named Listener" talks have such a sparkle about them that we have long since forgotten and forgiven the uncertain start they made.

Mr. Ratcliffe's authoritative talks on the United States of America were extraordinarily interesting and helpful, but no more so, perhaps, than are Mr. G. Harrison Brown's on Germany

An Inspired Thought.

It was an inspired thought on someone's part to present such a series as "Our Neighbours," for haven't we all an eye on the European, American, and—in fact, every situation?

Mr. Vernon Bartlett abroad, too, supplies a much-needed want. If we must think internationally, we must know the truth about international affairs. And who can provide us real food for thought better than Mr. Bartlett?

While the "Consider Your Verdict" series attracts because of its novelty, I can't refrain from expressing a little disappointment at the mildness of some of the prosecuting and defending barristers. There seems to be a total absence of those forceful and impassioned speeches, calculated to sway any jury, which we are wont to associate with real live barristers.

Perhaps they can't forget that these are only mock trials (carrying little or no fee) and not the real thing.

Rather in the Air.

I think it is also a pity that there is no announcement of a result of these trials. Doubtless, people are taking tremendous interest in them; the pros and cons are being carefully thought of and discussed, and it seems rather unsatisfactory that listeners shouldn't have the opportunity of comparing their verdict with that of some authoritative legal man. As it is, the matter is left rather in the air.

Music, and particularly Chamber music, has also improved in the way of selection. This may not be a fact, however, but it is certainly my impression.

I am thinking chiefly of those Chamber concerts—with audience. Perhaps the audience has made all the difference. Whatever it is, there seems a different atmosphere about these concerts nowadays.

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TECHNICAL NOTES

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

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

Radio Patentees Please Note.

THOSE of you who may be interested at any time in applying for a patent for a radio invention, or any other invention, for that matter, will find it important to know of certain changes in the Patent Law which will be brought about as the result of the New Patents and Designs Act, 1932, which came into force on November 1st.

I have before me a complete resumé of the more important changes; this has been sent by Messrs. Kings Patent Agency, Limited, whose advertisements have appeared in the columns of POPULAR WIRELESS for many years.

"Provisional Protection."

The period of "provisional protection" for an invention has been extended from nine months to twelve months. This has a bearing on the question of applying for corresponding patents in other countries under the International Convention arrangement, because it means that if the complete specification is not filed in the British Office until the end of the twelve months allowed, any foreign applications which may be contemplated, will have to be despatched before the filing of the Complete Specification in this country.

Another interesting change is that the Patent Office Search with regard to the novelty of the invention, which hitherto has been confined to British Patent Specifications during the past fifty years is, by the new Act, extended to foreign specifications and other documents. The widening of the search in this way will bring the English practice more into line with that which prevails in Germany and the United States of America, and which is one of the reasons why a German or American patent when granted is often considered to be more watertight.

The time for "acceptance" of the Complete Specification has been extended to eighteen months from the application, and the Government fees on filing a Complete Specification have also increased.

Certain increased powers have been invested in the Comptroller, who will now have a much freer hand to deal with exceptional or special cases.

Perpetual Motion.

In the case of an action for infringement of a patent the practice of the Courts was formerly to consider the granting of relief in respect of any valid claims without regard to any invalid ones in a patent.

By the new Act the patentee has to furnish proof that invalid claims in his patent were framed in good faith, if he wishes the Court to grant relief in respect of the valid claims without regard to the invalid ones.

If the patentee does not furnish such proof the Court will not grant relief

such as an injunction in respect of any valid claim which is held to be infringing.

The new Act also gives the Comptroller power to refuse the grant of a patent upon what he regards as a frivolous application such as, for example, an invention for a perpetual motion machine.

There are many other interesting and important changes in the Patent Law, and those of you who wish to keep yourselves posted may communicate with Messrs. King's Patent Agency, Limited, 146, Queen Victoria Street, London, E.C.4.

Long-Distance Transmission.

During the recent eclipse of the sun, experiments and observations were made in various parts of the world in order to find out something about the effect of the eclipse upon radio transmission and reception. Amongst the most important of these tests were some which were made by Dr. E. F. W. Alexanderson, the Radio Consulting Engineer of the General Electric Company, Schenectady, New York.

Before describing these experiments, perhaps I should explain that it has been suggested some little time ago by Dr. Irving Langmuir, one of the most prominent physicists in the United States, that there may be a "corpusecular" or "electronic" emission from the sun, this emission travelling at about a thousand miles a second.

Skip Distance.

In the tests a radio-frequency of 8,655 kilocycles was used, mainly because this would have a "skip distance" not much greater than the distance at which observations were made, and also because the "fringe-effects" of fading at the edge of skip distance would be strongly pronounced.

These phenomena are especially apparent in television under certain unfavourable conditions, where multiple reflections cause several images, both positive and negative, which rapidly appear and disappear, suggesting a dance of ghosts.

I haven't the space to go into the details of the tests, but the main results of the observations was that a normally strong signal almost totally disappeared during the two hours preceding the optical eclipse of the sun which, in accordance with astronomical calculations, would be the time during which the corpusecular or electronic eclipse would take place.

This disappearance of the signal was so striking and complete that the observers were for a time in doubt whether something had gone wrong with their receiving arrangements, but when, shortly before the optical eclipse began, the signal came back, first in a scattered way and then strongly and continuously, they felt that they had a remarkable proof of the correctness of the theory of the electronic eclipse.

Night Effect.

During the same period observations were made by earphones on other signals. One particularly interesting signal was a telegraph signal from Germany with approximately the same wavelength as that from Schenectady.

This German signal was heard during the whole afternoon but, during the period when the Schenectady signal was at a minimum, the signal from Germany was at its maximum with a very substantial increase.

(Continued on next page.)

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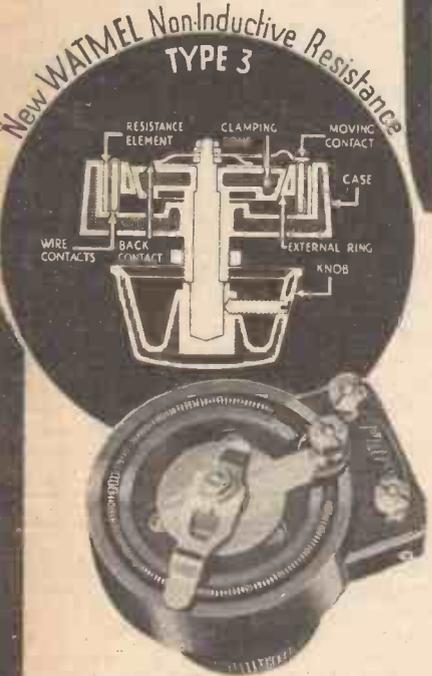
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TECHNICAL NOTES

(Continued from previous page.)

Now in interpreting these observations it is important to remember that, according to the astronomers, the "electronic-shadow" falls East of the path of the total eclipse where the observations were made. In this particular case the electronic shadow, as shown on published graphs, covered a large area nearly bridging the Atlantic ocean.

According to this, therefore, it seems that the signal from Germany came in stronger because the electronic shadow produced the effect of night over the Atlantic ocean and a signal of this wavelength is known to be stronger over such a distance at night than during the daytime.

Electronic Bombardment.

As regards the effect of the presence or absence of electronic bombardment on the signal from the West, this is not so easy to see and Dr. Alexanderson believes that it may be that the short-wave signal is actually received after it has travelled a considerable distance and been reflected.

Hoyt Taylor has found that in such a case a signal may travel a distance of a thousand miles and then be reflected back so that it behaves as though it had, in fact, come from a place two thousand miles away.

It is assumed that in the experiments of Alexanderson the only signal they were able to receive at the point of observation, which was 200 miles from Schenectady, arrived at that point, not after a direct travel of 200 miles, but by way of one of these Taylor reflections from some point about a thousand miles East. The disappearance of the signal during the electronic eclipse can then be explained if we assume that the reflecting medium had something to do with an electronic bombardment which was absent at that time.

The Appleton Layer.

If this theory is correct it remains to explain the nature of the reflecting medium which is produced by the electronic bombardment. Possibly this may be due to what is now known as the "Appleton layer" and which must be recognised, in addition to the Kennelly Heaviside layer, to explain various phenomena in radio transmission.

The important fact emerging from all these observations appears to be that a signal of a particular wavelength and over a particular distance is almost completely suppressed by the electronic eclipse if this eclipse area lies beyond the point of observation and roughly on the line from the transmitting station to the observing station.

Wavelength Control.

In view of the enormous number of sets in different parts of the world transmitting simultaneously on wavelengths often very close to one another, it is becoming increasingly important that each station shall keep exactly to its allotted wavelength or frequency, so that interference with transmissions on neighbouring wavelengths may be reduced to a minimum.

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(Continued on next page.)

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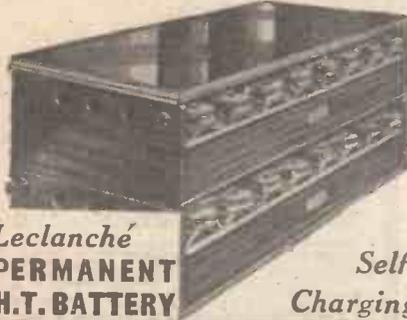
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TECHNICAL NOTES

(Continued from previous page.)

it is necessary that they shall have measuring apparatus which may be frequently checked against some national or international standard.

To meet this need, waves of accurately-known frequency have for some years past been transmitted from the radio station at the British National Physical Laboratory for the purpose of checking up the calibration of wavemeters and other apparatus. Up to this year some 15 different radio frequencies were employed as being suitable for commercial purposes and in addition a special standard-frequency transmission was sent out to enable owners of amateur experimental transmitting stations to enjoy similar facilities.

Quartz Oscillator.

The majority of commercial radio transmitting stations on land, including broadcasting stations, now have in their installation some source of oscillations the frequency of which is accurately controlled. The controlling mechanism may be simply a suitable low-power oscillator or use may be made of a quartz crystal or a tuning fork which, by suitable arrangements, may be made to oscillate at a very constant frequency.

The vibrating tuning fork appears to be the most accurate arrangement known at the present time and, although its frequency is usually low, often about 1,000 cycles per second, this may be multiplied up by methods of "frequency multiplication" to the desired radio-frequency of, say, 100,000 to 10 million cycles per second for the emission of radio waves.

Frequency Standards for Amateurs.

In view of the fact that various radio stations have now equipped themselves in this way, it was decided that the extensive programme of standard frequencies was no longer necessary, and that this might usefully be replaced by a single frequency of 1,000 cycles per second. This frequency is derived from an installation which is maintained in continuous operation day and night at the National Physical Laboratory, and which serves as the national standard of this country.

This low frequency standard is transmitted in the form of 1,000-cycle modulation on a carrier wave of a normal frequency of 360 kilocycles (wavelength 830 metres). A regular monthly programme of such transmissions is now maintained by the National Physical Laboratory, so that any station may make a comparison between its own frequency standard and the national standard. The quarterly programme of standard frequency transmissions for amateur experimenters is still being continued by the laboratory.

Anyone interested in this work and desirous of having the full schedule of frequency transmissions and other information should communicate with the Secretary, Department of Scientific and Industrial Research, 16, Old Queen Street, Westminster, S.W.1.

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List and cost of parts given in detail for each set. Ask your Radio Dealer for this splendid book. **EDDYSTONE** STRATTON & Co. Ltd. (F) BROMS GROVE STREET, BIRMINGHAM. **SHORT WAVE** LONDON Service Depot: WEBB'S RADIO STORES, 164, Charing Cross Rd., W.C.2. **MANUAL**

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Here are but a few of the benevolent services of the British Legion for distressed Ex-Service men and their dependants:

- £3,594,348 spent in relieving distress (3,568 voluntary benevolent committees)
- 2,166 families assisted to emigrate.
- £75,000 spent in Housing Scheme for disabled.
- £163,443 advanced to finance employment schemes.
- Sanatorium and Training Settlement maintained for tuberculous ex-service men (total population 700).
- Thousands of men placed in employment annually.
- 270 disabled men permanently employed making poppies.
- 16,909 men set up in business.
- £75,800 granted to St. Dunstan's to help blinded men.

1932 is a very difficult year for the men who served 1914-18, so PLEASE PAY VERY GENEROUSLY for your Poppy on REMEMBRANCE DAY—NOVEMBER 11th, and if possible, send a donation to Capt. W. G. Willcox, M.B.E., Organising Secretary, Earl Haig's (British Legion) Appeal Fund, 26, Eccleston Square, London, S.W.1.



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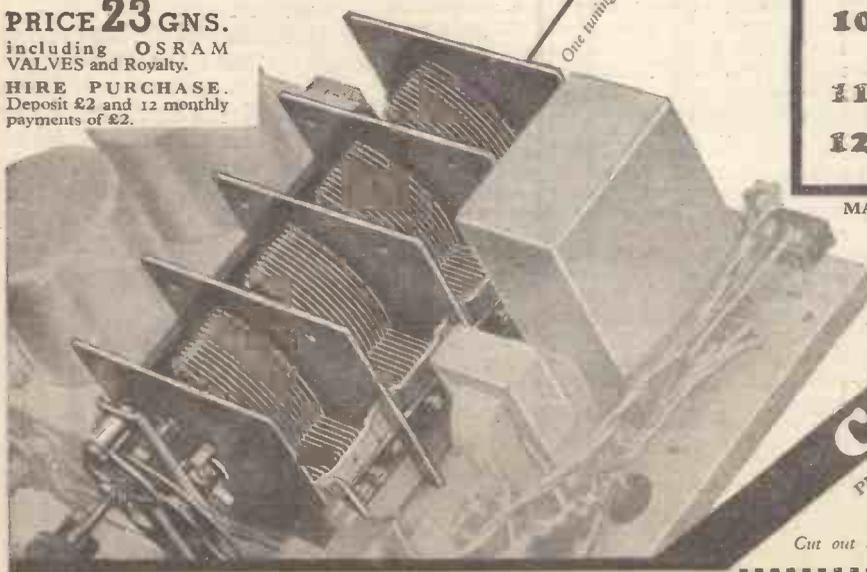
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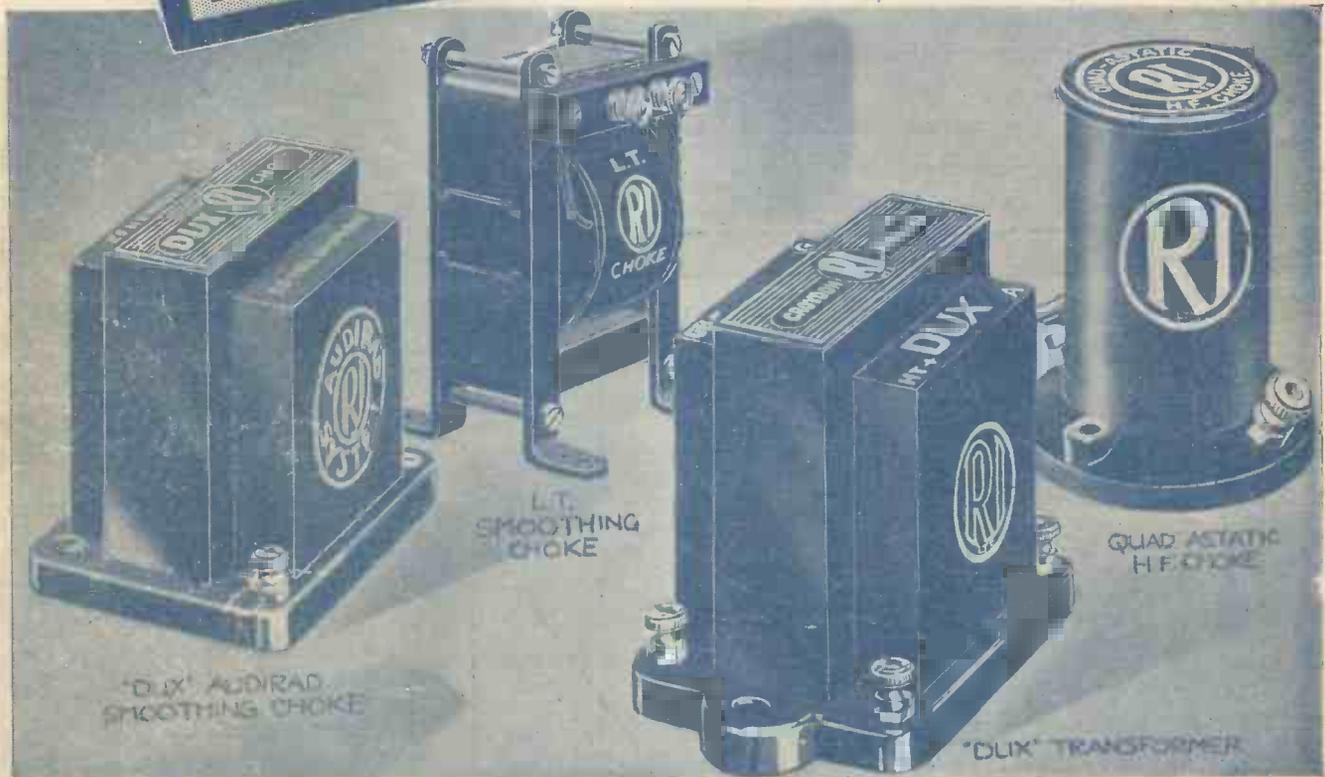
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Specified for D.C. Mains Set A combination component dealing with L.F. and stopping the unwanted H.F. frequencies. Specially suitable for all modern circuits—particularly mains receivers, it is now universally acknowledged as the most economical choke on the market—economical in price and in space occupied. L.F. Inductance 25 henries. H.F. inductance of H.F. stopper 10,000 micro-henries. Maximum D.C. current 50 m.a. **8'9**

List No. DY31.

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Specified for 'Apex' "Dux" has been specified for best results at the lowest cost in practically every good modern circuit. Equal in performance to transformers costing many times as much, it is the lowest priced transformer which is really efficient and which gives the good L.F. amplification so vital in modern circuits. List No. DY29. **6'9**

Ratio: 1 : 3½ (standard) or 1 : 4½ (auto-connection). Inductance 30 henries.

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Specified for D.C. Mains Set The best choke for smoothing L.T. current obtained from metal rectifiers, it can be used with confidence in all critical circuits. Inductance: 0.1 henry at 1 amp., 0.05 henry at 2 amps. Maximum D.C. 2.5 amps. D.C. resistance } ohm. **21'**

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List No. FY2.

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