

MAKING THE MOST OF YOUR LOUDSPEAKER

# Popular Wireless

Every Wednesday  
PRICE  
3d.

No. 546. Vol. XXII.

INCORPORATING "WIRELESS"

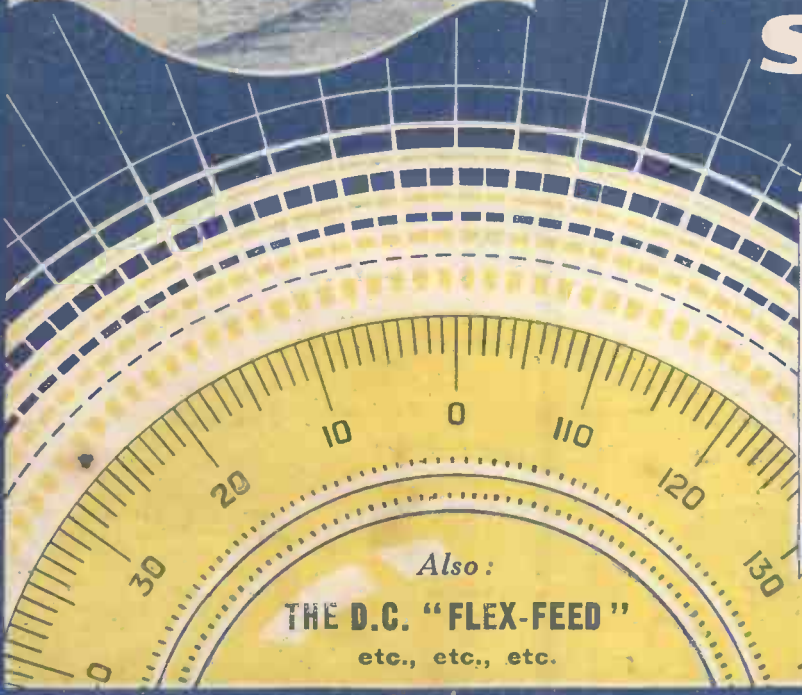
November 19th, 1932.



# "AZ"

## The NO-GAP TUNING SYSTEM

*New Era in Radio Reception Begins*



Also:  
**THE D.C. "FLEX-FEED"**  
etc., etc., etc.



### FOR EVERY SET — there's a **PILOT AUTHOR KIT**

Send your  
Orders to  
**PETO-SCOTT**  
CO. LTD.  
77, CITY ROAD,  
LONDON, E.C.1  
Also 62, High Holborn,  
London, W.C.1.  
[ADVT.]



● Is your set a ruler of the radio waves with every port in reach; or just a worn out coaster tied down to one or two stations? Your valves fix the limits of your voyagings. Fading valves can't give you to-day's programmes at their best. Change to Tungram now! Tungram valves are specified by many more than 61 British Setmakers. Money cannot buy a better valve, and yet they are priced as low as 5/6. Change to Tungram now. Give your set the power it needs, and go full steam ahead to better radio!

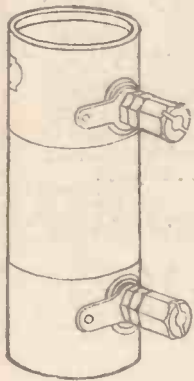
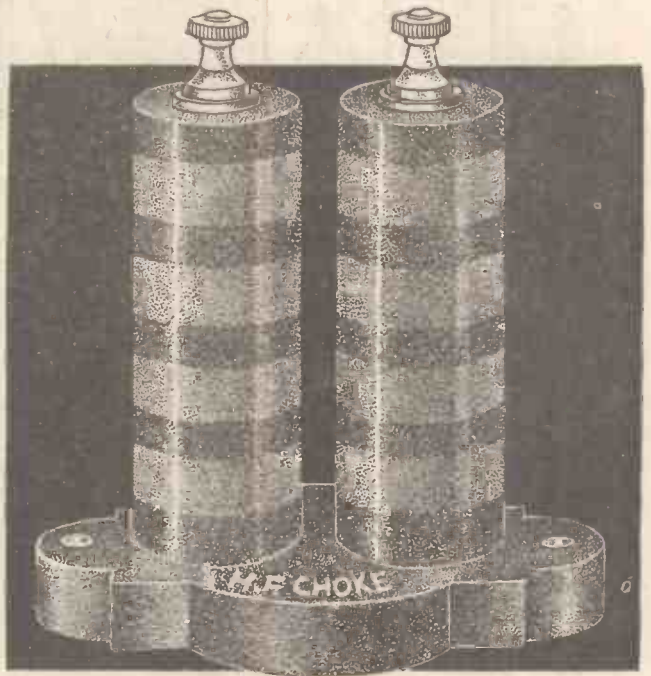
# TUNGSRAM

## RADIO VALVES

Write for FREE literature to Tungram Electric Lamp Works (Gt. Britain) Ltd., 72, Oxford Street, London, W.1.

# IGRANIC QUALITY COMPONENTS

Igranic Components—built of first-class materials—are raising the standard of radio. Take, for example, the Igranic Binocular type high frequency choke. Due to the binocular construction the external field is extremely small—enabling it to be placed in close proximity to other coils with negligible interaction. It is exceptionally efficient over the entire wavelength range of 150 to 2,500 metres. It has D.C. resistance of 830 ohms and an inductance value of 158 millihenries. PRICE **3/9**



### SHORT-WAVE H.F. CHOKE

Specially developed for efficient operation on wavelengths of the order of 10 to 80 metres. Useful for a number of purposes where the presence of H.F. currents would give rise to troublesome hand-capacity effects, unsatisfactory reaction control, and instability of the low-frequency amplifier.

PRICE **2/-**



### SCREENED DUAL-WAVE COIL

with self-contained wave-change switch. Designed to give maximum efficiency on the medium and long wave bands, covering a range of 200-550 metres and 1,000-2,000 metres when tuned with a .0005-mfd. variable condenser.

PRICE **12/6**

## IGRANIC COMPONENTS WILL BE THE MAKING OF YOUR SET.

Write to-day for fully-illustrated Catalogue No. R.193 of complete new range of Igranic Quality Components.

Igranic Electric Co., Ltd., 149, Queen Victoria Street, London, E.C.4.

### SEND FOR THE 1932 CATALOGUE



# FOR YOUR S. T. 400



**J. B. DIFFERENTIAL.**  
·0003, 4/6. ·0001, 4/-.  
Insulated centre spindle. Bakelite dielectric between vanes.



**J. B. MIDGET.**  
·00004. Complete as illustrated, 4/-.  
Small dimensions. Low minimum capacity. Ebonite insulation. Rigid one-piece frame.



**J. B. POPULAR.**  
Slow-motion type (35/1).  
Capacity, ·0005. Complete with 3" dial, 8/6. Extra heavy gauge brass vanes. Rigid nickel-plated frame. High-grade ebonite insulation.

Ask  
to  
see  
them  
at  
your  
dealer's



Advertisement of  
Jackson Bros., 72, St  
Thomas' Street,  
London, S.E.1. Tele-  
phone: Hop 1929.

# COMPARISON FURNISHES PROOF

**U**NLESS you can afford to buy a really first-class moving-coil speaker, such as Blue Spot 99 P.M. at 59/6, or the De Luxe 75 P.M. at 75/-, you should give up the idea of having a moving-coil speaker at all.

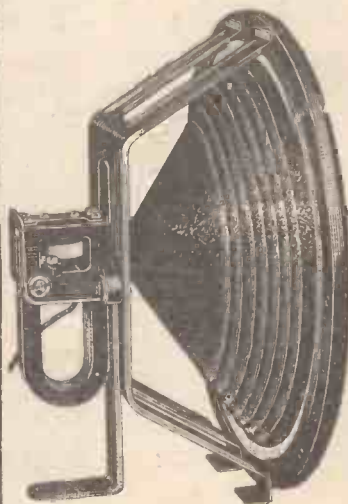
Blue Spot 100U will give you as good, or better performance than any but the best moving-coil Speakers. Compare it with the general run of moving coils—as many as you like—and you will find ample proof of this claim. The tone of 100U is clear and true. It reproduces every note in the musical scale with fidelity and charm.

Blue Spot 100U can be used with any kind of receiver—battery or all mains, and with normal or Pentode valves. No matching transformer is required.

Don't risk disappointment by purchasing a "cheap" moving-coil speaker when, in Blue Spot 100U, you can get the equivalent of a good one for a moderate outlay. Write for Catalogue No. P.W. 57U.

### BLUE SPOT RECEIVERS

Have you had particulars of the most amazing and most modern sets in Europe—the Blue Spot Battery Operated 4-valve receivers and the Blue Spot All Mains A.C. 5-valve receivers. Catalogue No. P.W. 57 R. free on request.



## 100U

PRICE COMPLETE  
MOUNTED TO  
CHASSIS

## 32/6

BRITISH MADE



**THE BRITISH BLUE SPOT COMPANY LTD**  
BLUE SPOT HOUSE · 94/96 ROSOMAN STREET · ROSEBERY AVENUE · LONDON · E.C.1

Distributors for Northern Ireland, Scotland and Wales: H. C. RAWSON (Sheffield and London), Ltd., 100, London Road, Sheffield; 22, St. Mary's Parsonage, Manchester; 44-46, High Bridge, Newcastle; 37, 38, 39, Clyde Place, Glasgow.

# There IS a Reason for Pertrix long-life!

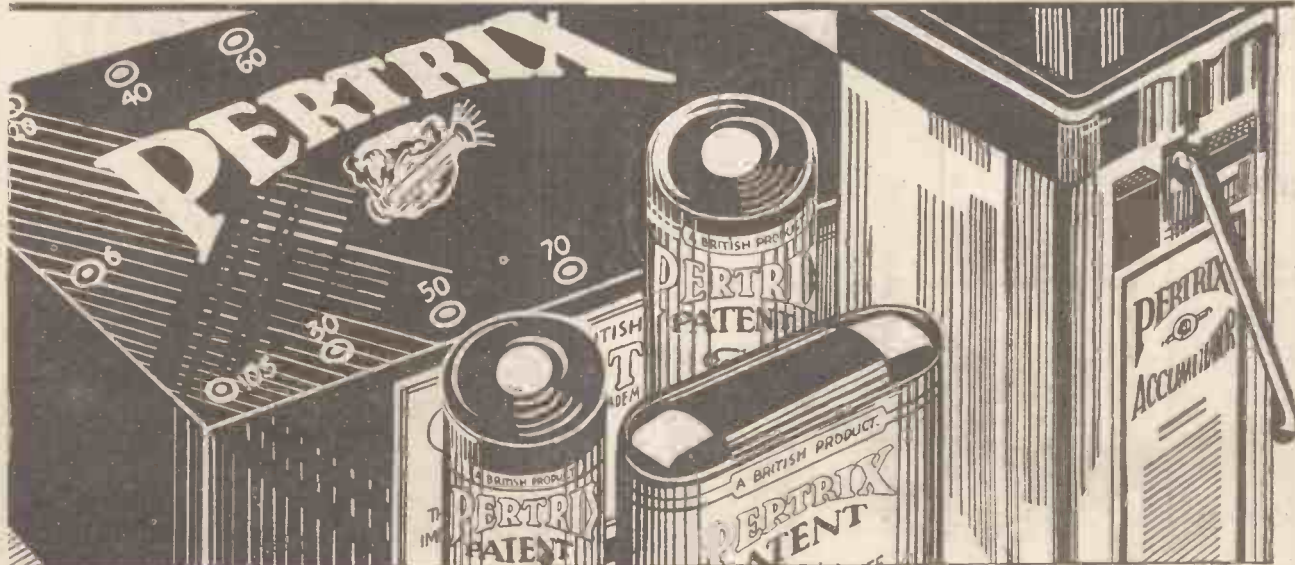
Most dry batteries are advertised as being "long lived," but NEVER is there a reason given. There is a very definite and adequate reason for the long life of Pertrix Batteries—They are made by a patented process which eliminates the use of sal-ammoniac, a substance which corrodes the zinc cups

and shortens the life of the battery. The chemicals used in Pertrix Dry Batteries have no corrosive effect on the zinc cups, and this contributes largely to the long life and remarkable recuperative powers for which Pertrix—the world's most economical batteries—are famous.

# PERTRIX

TRADE MARK

## DRY BATTERIES & ACCUMULATORS



Advt. of Britannia Batteries, Ltd., 233 Shaftesbury Avenue, London, W.C.2. Works: Redditch (Worcs.) Telephone: Temple Bar 7971 (5 lines).  
Branches: Manchester, Glasgow, Bristol and Dublin.

**FREE!**

*Here's  
Your  
Chance!*

**FREE!**

**Be Sure  
To Secure**

**Your Two Great Gifts**

A valuable 24-page  
work of reference

**EVERYBODY'S  
WIRELESS HANDBOOK**

**S.T.400 Full-Size**

**SHILLING  
BLUE PRINT**

**With**

**THE WIRELESS CONSTRUCTOR**

Now on Sale

DECEMBER NUMBER

Price 6d.

The full constructional details of

**THE S.T.400**

constitute the most comprehensive set description ever published.

*JOHN SCOTT-TAGGART'S LATEST AND GREATEST DESIGN!*

**ZONE  
HOME  
TESTED! TESTED! TESTED!**

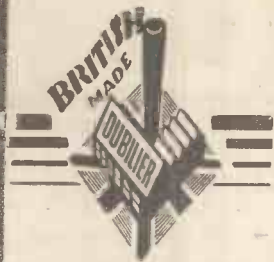
December Number

**The WIRELESS  
CONSTRUCTOR**

Now on Sale

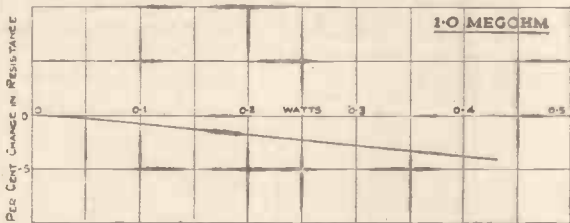
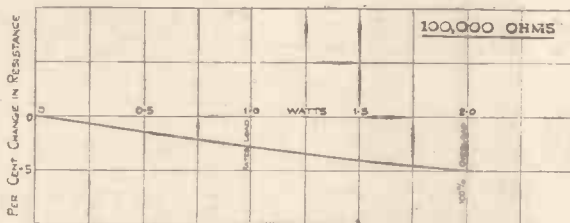


**BUY THE  
RESISTANCE  
OF  
PROVED  
PERFORMANCE**



**DUBILIER  
TESTS No.1**

**LOAD  
CHARACTERISTICS**



When tested with the rated load applied for 16 hours each day, the resistance value always comes back to the initial value after cooling. The "hot" resistance also remains constant over long periods.

You can ill afford to incorporate inferior Resistances in your set! Besides, it's not worth the risk when you can buy Dubilier

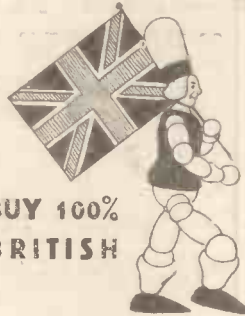
Metallized Resistances and be certain of getting infinitely better results; results that leave no room for complaints or regrets, because Dubilier Resistances are subject to the most exacting tests before being released for sale. There are Resistances to meet your every need in the Dubilier range. See your local dealer about these components—not only will he confirm our claims, but will be enthusiastic about them.



1 watt type, 1/6s. 2 watt type, 2/6s. 3 watt type, 3/6s.

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

**DUBILIER  
METALLIZED  
RESISTANCES**



**BUY 100%  
BRITISH**

**LOOK  
FOR "EDDY"  
IN YOUR  
DEALER'S  
WINDOW**

Mazda valves are standardised by most leading British receiving set manufacturers. They are designed by British engineers and manufactured throughout in our British factory devoted entirely to Mazda valve production. You can buy with confidence!

**Always ask for Mazda valves—your dealer has them.**

**The amazing**

**MAZDA  
THE  
BRITISH  
VALVES**

V.164



The Edison Swan Electric Co. Ltd.  
155 Charing Cross Rd. London. W.C.2

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

# PETO-SCOTT for

**FIRST IN 1919—FOREMOST TO-DAY  
DON'T DELAY—ORDER NOW**

## TELSEN JUPITER S.G.3

Sent Carriage Paid on first payment of

**7/-**

Balance in 11 monthly payments of 7/-.

Complete Kit as advertised less valves and cabinet. Cash Price, carriage paid.

**£3.17.0**

**PETO-SCOTT—  
the largest Radio-by-Mail House—  
have carefully selected these popular items to give you better Radio this XMAS.**

## SLEKTUN SCOUT S.G.3

S.G. Detector and Power less valves and cabinet. Cash or C.O.D. carriage paid.

**£3.19.6**

Sent Carriage Paid on first payment of

**7/3**

Balance in 11 monthly payments of 7/3.

**BLUE SPOT SPEAKER UNIT AND CHASSIS.** Type 100U. Cash Price £7/12/6. Carriage Paid.

Balance in 6 monthly payments of 5/2.

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

**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.

**EPOCH "20 C" PERMANENT-MAGNET MOVING-COIL SPEAKER** (New Edition). With 5-ratio input transformer. Cash Price £1/15/0. Carriage Paid.

Balance in 5 monthly payments of 6/6.

**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.

**R & A CHALLENGER PERMANENT-MAGNET MOVING-COIL SPEAKER.** With special Ferranti multi-ratio input transformer. Cash Price £1/15/0. Carriage Paid.

Balance in 5 monthly payments of 6/6.

**CELESTION P.P.M. PERMANENT-MAGNET MOVING-COIL SPEAKER.** With impregnated diaphragm and dual impedance input transformer. Cash Price £2/7/6. Carriage Paid. Balance in 11 monthly payments of 4/6.

Send **5/2** only

Send **5/6** only

Send **4/6** only

Send **6/6** only

With **6/5** order

Send **6/6** only

Send **4/6** only

## THIS YEAR'S WINNER

# LISSEN "SKYSCRAPER" S.G.3

**COMPLETE WITH VALVES**

### CHASSIS KIT

Chassis Model with (Lissen) S.G., Detector and Pentode Valves. Cash Price, carriage paid **£4.9.6.**

Delivered, carriage paid on first payment of **8/3**

Balance in 11 monthly payments of 8/3.

### CABINET KIT

With Lissen Valves, Walnut Cabinet and special balanced-armature Loudspeaker. Cash Price, carriage paid **£6.5.0.**

Delivered, carriage paid on first payment of **11/6**

Balance in 11 monthly payments of 11/6.

**ONLY FROM PETO-SCOTT  
ON GENEROUS EASY TERMS**

*Carriage paid to your door*

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

Send **5/6** only

**HEAYBERD H.T. UNIT D.150.** Tapped variable 60/120 v. variable 0/150 fixed. Max. 25 m/a. at 150 v., 20 m/a 120 v. Cash Price £4/6/0. Carriage Paid. Balance in 11 monthly payments of 8/10.

Send **8/10** only

**EKCO A.C. 18 H.T. ELIMINATOR FOR A.C. MAINS.** Tapped S.G. 80 v. 120/150 at 12 m/a. Cash Price £3/7/6. Carriage Paid. Balance in 11 monthly payments of 6/3.

Send **6/3** 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 £1/13/6. Carriage Paid. Balance in 5 monthly payments of 6/1.

Send **6/1** 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

## COSSOR

MELODY MAKER MODEL 334

Metallised Variable-Mu S.G. and Valves, Power Valve and cabinet.

Cash Price, Carriage Paid **£6.7.6.**

Delivered Carriage paid on first payment of

**10/-**

Balance in 11 monthly payments of 11/10.

## RADIO FOR THE MILLION STATION MASTER THREE

MODEL A BATTERY TYPE.

With 3 Valves and Cabinet for battery use.

Cash Price, Carriage Paid **£5.11.0.**

Delivered Carriage Paid on first payment of

**10/-**

Balance in 11 monthly payments of 10/2.

## READY RADIO "METEOR" S.G.3

3-valve screened-grid receiver less Valves, Speaker and Cabinet. Tunes in short, medium and long waves without coil changing. Cash Price, Carriage Paid **£3.15.3.**

Delivered Carriage Paid on first payment of

**7/-**

Balance in 11 monthly payments of 7/-.

## COSSOR

MELODY MAKER MODEL 335

Complete with Valves, Speaker and Cabinet, Employs Cossor Variable-Mu S.G. H.F., Stage Detector and Power Valves. Cash Price **£7.17.6.**

Delivered Carriage Paid on first payment of

**10/-**

Balance in 11 monthly payments of 14/10.

## RADIO FOR THE MILLION STATION MASTER THREE

MODEL B BATTERY TYPE.

As Model A but with Speaker in attractive Cabinet.

CASH or C.O.D., Carriage Paid **£7.10.0.**

Delivered Carriage Paid on first payment of

**10/-**

Balance in 11 monthly payments of 14/-.

## READY RADIO "METEOR" S.G.3

3-valve screened-grid receiver with Valves, Cabinet and Permanent Magnet Moving-Coil Speaker. Tunes in short, medium and long waves without coil changing. Cash Price, Carriage Paid **£8.17.6.**

Delivered Carriage Paid on first payment of

**16/3**

Balance in 11 monthly payments of 16/3.

**STRICT PRIVACY GUARANTEED—WE DEAL WITH YOU DIRECT**



# EVERYTHING RADIO

## PETO-SCOTT WALNUT CONSOLE

Constructed in Walnut with contrasting in-laid Walnut Veneers.

Comes to you with vignette front, as illustrated, ready to take your own set. No skill or expensive tools are required to transform your Radio into a beautiful Console instrument, presenting the professionally finished appearance of the most luxurious Radio Receiver money can buy.

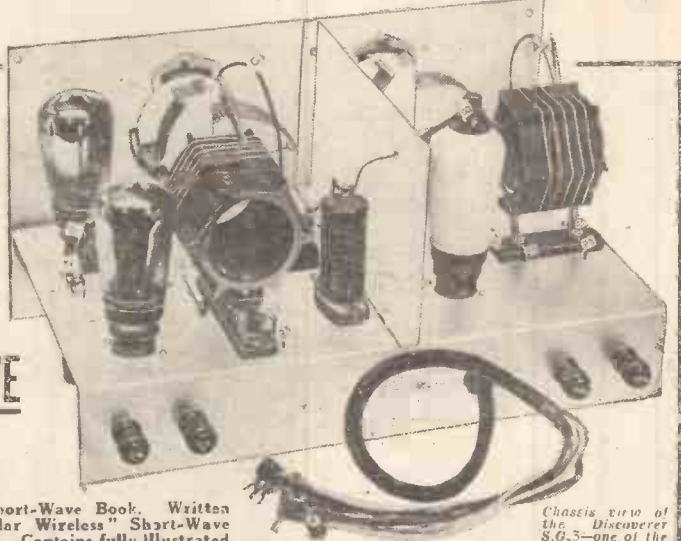
Or 12 monthly payments of 5/8.  
**62/-**  
Baffle Board Ready Drilled, 3/6 extra.

Carriage and Packing 2/6 extra England & Wales.  
Dimensions: 36" high; 21" wide; 15" deep. Parcel 18" X 8". Baseboard, 14" deep. Lift-up Lid.



## IMMEDIATE DELIVERY CASH - C.O.D. - H.P.

## BUILD YOURSELF A KELSEY SHORT-WAVE RECEIVER



with the Peto-Scott Short-Wave Book. Written and Edited by "Popular Wireless" Short-Wave Expert, G. T. KELSEY. Contains fully illustrated Constructional articles for building 2, 3 and 4-valve S.W. Sets and a Kelsey S.W. Adaptor. Detailed list of parts with prices given for every set. Technical and wiring diagrams together with FREE FULL SIZE BLUE PRINT OF KELSEY S.W. ADAPTOR. From all Bookstalls and Shops, W. H. Smith & Sons, or direct from Peto-Scott

Chassis type of the Discoverer S.G.3—one of the most efficient sets it is possible to design for S.W. Reception. Described in Peto-Scott's Short-Wave Book.

**1/-** POST FREE

## PILOT BAND-PASS UNIT

Whether your set is Mains or Battery operated, the **PILOT BAND-PASS UNIT** cuts out programme interference effectively and sharpens tuning to needle-point selectivity. It is simple to attach and can be operated by anyone without technical knowledge. No valves or extras required.

Instantly converts any Set to Band-pass Tuning with Needle-sharp Selectivity.



CASH or C.O.D. **25/-** or 6 monthly payments of 4/6.

## 1933 KELSEY SHORT-WAVE ADAPTOR

Tune-in the Short-Wave Stations of your present set. Plus the Kelsey Short-Wave Adaptor—fits without any alteration. No extra valve required; no extra apparatus. Ready for immediate use and sold complete with Dial Calibration Chart and simple tuning notes. Specially compiled by an expert.



Tunes in the World's Short-Wave Stations on your Existing Set.  
**45/-** CASH or C.O.D. Or 9 monthly payments of 5/6.

### DISCOVERER S.G.3.

This is one of the most magnificent S.G. three-valves ever designed for short-wave work. It combines all the advantages of high efficiency S.G. amplification with amazing simplicity of operation, and, in the words of the designer—represents the last word in modern short-wave technique.  
**KIT "A" Pilot Author Kit of specified parts less Valves & Cabinet. CASH OR C.O.D. Carriage Paid.**  
Or 12 monthly payments of 8/3. **90/-**

### COURIER 3

A magnificent long-range 3-valve short-wave receiver capable of tremendous volume from stations thousands of miles away. Aburdly simple to handle and inexpensive to build and covering all waves from 15 to well over 100 metres. About the finest combination of detector and 2 I.F. that it would be possible to design.  
**KIT "A" Pilot Author Kit of specified parts less Valves & Cabinet. CASH OR C.O.D. Carriage Paid.**  
Or 12 monthly payments of 6/9. **73/2**

### TOURIST TWO

This receiver is altogether different from the usual run of 2-valves, and those who only associate with 2 or 3 programmes with this number of valves have a very big surprise in store when they operate the "Tourist Two". Its range and station-getting abilities are truly wonderful.  
**KIT "A" Pilot Author Kit of specified parts less Valves & Cabinet. CASH OR C.O.D. Carriage Paid.**  
Or 3 monthly payments of 6/10. **48/6**

### KELSEY SHORT-WAVE ADAPTOR

A simple and inexpensive little unit that will enable you to hear programmes from all over the world on your existing set.  
**KIT "A" Pilot Author Kit of specified parts, less Cabinet. (Valve not required). CASH OR C.O.D. Carriage Paid.**  
Or 6 monthly payments of 5/6. **30/6**

## PETO-SCOTT WALNUT CABINET SPEAKER

Fitted with the famous BLUE SPOT 1000.

In handsome Walnut Cabinet with Contrasting in-laid Walnut Veneer.

CASH OR C.O.D. **47/6** CARR. PAID



Send **4/6** Only

Balance in 11 monthly payments of **4/6**

Equal in performance to a good Moving-Coil Speaker. 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.

## PILOT AUTHOR KITS—Exact to Specification

### A P E X

**KIT "A"** Author's Kit of specified components including ready-drilled panel and terminal mounts, but less valves and cabinet. **79/-**  
Or 12 monthly payments of 7/3. Carriage Paid.  
One Set of Valves **£1/12/3.**  
Cabinet: **15/-**

### 1933 FOUR

**KIT "A"** Author's Kit of specified parts including ready-drilled panel but less valves and cabinet. **92/6**  
Or 12 monthly payments of 8/6

### SKY HAWK

**KIT "A"** Author's Kit of specified components including ready drilled ply panel but less valves and cabinet. **39/9**  
Or 6 monthly payments of 7/-. Carriage Paid.  
Specified Valves **£1/12/3.** CASH OR C.O.D. Carriage Paid.

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

Telephone: Clerkenwell 9406-7  
West End Showroom: 62 High Holborn, London, W.C.1 Telephone: Holborn 3248

Dear Sirs, Please send me CASH/C.O.D./H.P. for which I enclose £.....d CASH/H.P. Deposit. Also send your FREE 1933 Radio Catalogue.

NAME .....  
ADDRESS .....  
P.W. 19/11/32

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

# "Stations all round the dial... at full loudspeaker strength"

Yorkshire owner's tribute  
to efficiency of the  
Cossor Melody Maker

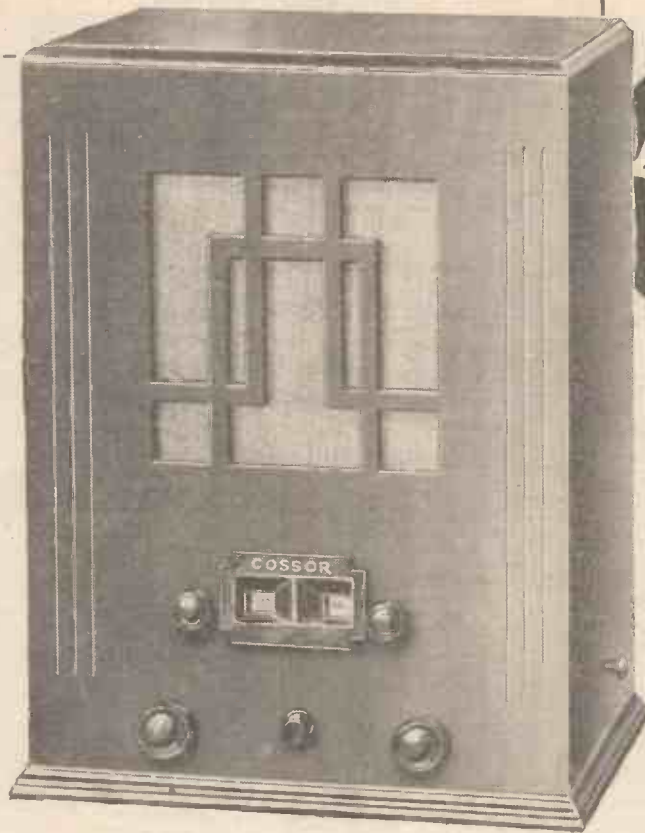
DONCASTER  
1st October, 1932

Dear Sirs,

"I cannot say how pleased I am with the performance of your Model 335—range, volume, tone, selectivity are all that can be desired. Rome, Radio Paris, Berlin and stations all round the dial come in at full loud speaker strength. I have had more expensive radio but my 335 is the best I have had yet. Without doubt it is the finest value for money radio on the market."

Yours truly,  
Signed \_\_\_\_\_

The original of the above letter may be inspected at our Head Office: Cossor House, Highbury Grove, London, N.5.



**PRICE**  
**£7.17.6**

## BATTERY MODEL 335

with Self-Contained Loud Speaker

Kit of Parts includes Cossor 220 V. S. G. Variable - Mu Metallised Screened Grid, Cossor 210 H. L. Metallised Detector and Cossor 220 P. Output Valves; Individually Shielded Coils, Cossor L.F. Transformer; All-Metal Chassis and all parts for assembling the Receiver as illustrated; handsomely finished cabinet 18½ in. high, 13½ in. wide, 10½ in. deep and 10 in. Balanced-Armature Loud Speaker with rear adjustment. Provision is made for fitting Gramophone Pick-up Socket, and Plug. Price

**£7.17.6**

Hire Purchase Terms: 17/6 deposit and 9 monthly payments of 17/6

**SCREENED GRID  
CIRCUIT**

**ALL-METAL  
CHASSIS**

**SELF-CONTAINED  
LOUD SPEAKER**

BY every post, from all over the country, we receive letters like this—definite proof of the outstanding performance of the Cossor Melody Maker. This remarkable receiver is definitely to-day's greatest value in Screened Grid Radio—it is right up-to-date in design, it uses Cossor Variable-Mu Screened Grid Valves, individually Shielded Coils, All-Metal chassis, etc., etc. Send at once for a free Constructional Chart which tells you how to save money by assembling the Cossor Melody Maker at home—no wireless knowledge is necessary—please use the coupon.

## ALL-ELECTRIC MODEL 337

with Self-Contained Loud Speaker

Kit of Parts includes Cossor M.V.S.G. Variable - Mu Metallised Screened Grid, Cossor 41 M.H. Metallised Detector, Cossor 41 M.P. Output and Cossor 442 B.U. Rectifier Valves; Individually - Shielded Coils; Cossor L.F. Transformer; All-Metal Chassis; Cossor Mains Transformer and all parts necessary for assembly. Handsomely finished cabinet 18½ in. x 17½ in. x 10½ in., Balanced-Armature Loud Speaker with rear adjustment. Provision for fitting Gramophone Pick-up Plug and Jack. Price

**£11.15.0**

Hire Purchase Terms: 25/- deposit and 11 monthly payments of 21/-

All-Electric Models for A.C. Mains only. 200 to 250 volts (adjustable). 40-100 cycles.

Prices do not apply in I.F.S.

# COSSOR MELODY MAKER

### BATTERY MODEL 334

Kit of Parts, similar to Battery Model 335 except that no loud speaker is supplied. Handsomely finished cabinet 9½ in. high, 13½ in. wide, 10½ in. deep. Price **£6.7.6**

Hire Purchase Terms: 14/- deposit and 9 monthly payments of 14/-

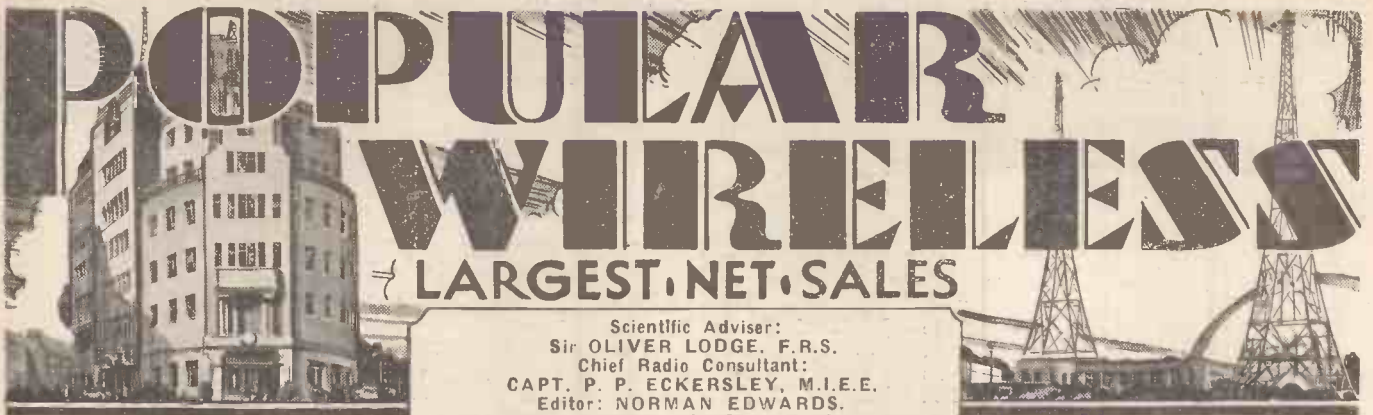
### ALL-ELECTRIC MODEL 336

Kit of Parts, similar to All-Electric Model 337 except that no loud speaker is supplied. Handsomely finished cabinet 10½ in. high, 17½ in. wide and 10½ in. deep. Price **£9.15.0**

Hire Purchase Terms: 19/6 deposit and 10 monthly payments of 19/6

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 full set of Constructional Chart, that tells me how to build the Cossor Melody Maker.  
(Strike out type not required.)  
Name \_\_\_\_\_  
Address \_\_\_\_\_  
P.W. 19/11/32



Scientific Adviser:  
 Sir OLIVER LODGE, F.R.S.  
 Chief Radio Consultant:  
 CAPT. P. P. ECKERSLEY, M.I.E.E.  
 Editor: NORMAN EDWARDS.  
 Technical Editor: G. V. DOWDING, Associate I.E.E.

LET'S BE ACCURATE  
 NOW TO IT!  
 YOUNG BLOOD  
 SMALL MERCIES

## RADIO NOTES & NEWS

STRING AND SEALING WAX  
 "QUOD" FOR PIRATES  
 THE LAST WORD  
 TRUST THE MAYOR

### New Honour for Marconi.

PRESIDENT HINDENBURG has awarded to Marconi the Goethe Medal for Science and Art which was instituted to celebrate the Goethe centenary this year, and I expect that the inventor will feel unusually gratified with this honour, because, although Goethe is chiefly known in this country as the author of "Faust," he was a scientist of no mean order. One of his most remarkable scientific performances was his theory that the skull is a special modification of a vertebra.

### A Royal Visit.

THE recent visit of H.R.H. Prince George to the Cambridge factory of Pye Radio, which employs 1,300 people, and which produced 15,000 Pye receivers during October, is a good indication of the importance attached to the radio trade. I see that it is claimed that this is the first royal visit to a radio works in this country, but in the interests of historical accuracy, I must point out that Prince George visited the Marconi Works at Chelmsford last May.

### The "Grammie" Aids the "Movie."

RATHER an interesting instance of the mouse helping the lion. I learn that Ivor Novello's play, "Party," is being filmed at Hollywood and that in order to enable the producer to judge the lengths of the laughs the whole performance has been recorded. H.M.V. got the job, and did it in thirty-six records, which will cost the film fellow a tenner each, which I suppose is merely "car fare," even nowadays, to those celluloid celebrities of California.

### The "Record" Revolution.

AND, talking of records, the war against their public performance continues, though dealers may use records for demonstration purposes. The record manufacturers appear to me to be throwing away a lot of priceless advertising. Time will elucidate the question.

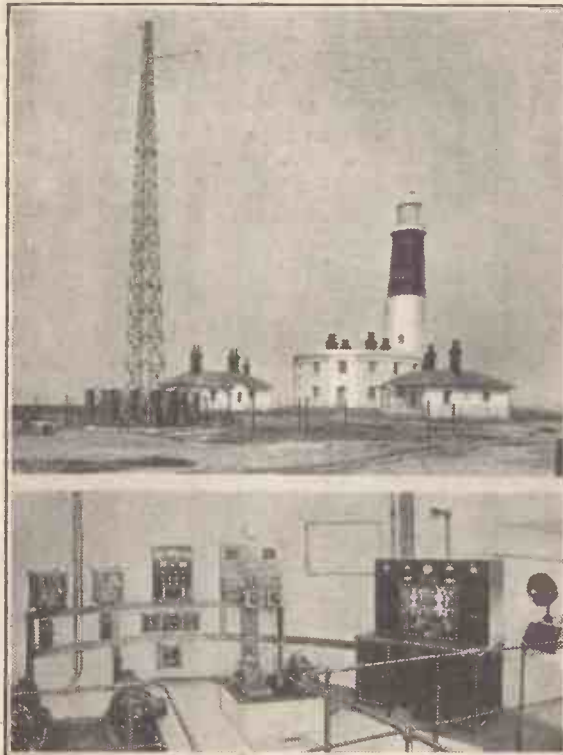
Anyhow, already Music Master Records,

Ltd., has arranged to make gramophone records "for public entertainment only."

### The Case is Different.

I OBSERVE that in the Press generally, there is a tendency to foreshadow the decline of radio home construction, chiefly as the result of observers returned from the U.S.A.

### "FOR THOSE IN PERIL . . ."



Dungeness, one of the British "Radio Beacon" stations that give timely warning to vessels of their positions in fog, etc., works under the call-sign G D M, on 1000 metres. The power is 1 kilowatt and the effective range about 100 miles. The generators and (centre) the time clock and its code wheels stand beside the transmitter, which is shown to the right in the lower picture.

"Believe me, there's nowt to it" (said he, lapsing into Midlandish). In America, where time runs faster than here, a craze is soon dead or "put on the spot" in favour of another. Home-construction, in our land of slow changes, will last till A.D. 2000.

### Society Announcement.

ONCE more I have pleasure in drawing attention to that "live" body, the Croydon Radio Society. (Hon. Sec.: Mr. E. L. Cumbers, 14, Campden Road, S. Croydon. Phone: Croydon 1540.) Its syllabus to January 13th ranges from a demonstration by the youngest member to lectures by professional specialists. A feature of interest is the "Questions Night and Broadcast Programmes Criticism," and there is a "Gramophone Pick-up Night." Meetings at 8.30 p.m. at "The Horse and Groom," Cherry Orchard Road, E. Croydon.

### Two Queries: One Answer.

D. P. (Chesterfield) found "just below Rome" a strong station with a lady announcer (annunciatrix?) and bells for an interval signal. What station? Sorry, can't find my wavelength list. In reply to the other question, I may say that the Egyptian terminal of the London-Cairo radio-telephone service is situated at Abu Zabal, which is about 17 miles from Cairo, and belongs to the Marconi company, not to the Government.

### Bits of G. and S.

WE must be thankful for small mercies, I suppose, but the practice of the B.B.C. of broadcasting an odd act or so of Gilbert and Sullivan's plays amounts to cruelty. On December 3rd we shall hear the second act of "The Mikado," and on December 9th, Act I of "The Gondoliers," both from the Savoy Theatre; the former on the National waves, and the latter on Regional waves. In a wireless Utopia we should be able to tune in to any theatre and hear the whole performance.

### Programme Chit-Chat.

GERMANY having contributed her bit to the B.B.C. Birthday Week celebrations, the U.S.A. comes next. On November 19th, if you are lucky, you will hear a relay of Paul Whiteman's band, which is alleged to be the world's best dance orchestra. No doubt 'Enery 'All will have frightfully flappy ears on that date—though if Paul's

(Continued on next page.)

# NEWS—VIEWS—AND INTERVIEWS (continued)

band specialises in drawing, slurring, nasal tenors and tin-can rackets interspersed with triple-distilled bilge about red-hot mummies, I prefer Henry *et Cie*.

## "Dealing with the Dealers."

**A**NOTHER ear full, this time not from a victim but an onlooker. My informant, who is an expert in "all-mains" sets, states that he was called in to "vet" one such, after the dealer's Service Van had pronounced it perfect. The interior of the patient shocked him. The metal chassis was "secured" by two wood-screws which were bent



over after the first few turns, and the battery cable was held to the side of the cabinet by a bent nail. The original reed of the loudspeaker unit, not being long enough, was lengthened by a soldered-on piece, out of centre! A chamber of horrors, indeed! How do they get away with this string and sealing-wax work? Or do they?

## Confiscation of Receivers.

**I**T appears that the recent Wrexham case of piracy, when an unlicensed set was ordered by the bench to be confiscated, has given rise to some difference of opinion amongst listeners. Unfortunately for the disputants, the matter is set beyond argument by the relevant Act, dated 1904, which clearly allows the confiscation of an unlicensed set. In passing, I may observe that the Act goes as far as to allow twelve months "quod" (without hard labour) for offences under the law on this subject.

## News from the Front.

**O**UR Special War Correspondent with the Post Office Forces, which are operating against the radio bandits with "tanks" (i.e. plain vans), informs us in a despatch that during the first eleven days of October the P.O.'s demonstration on the London sector produced a licence issue at the rate of over 12,000 a day, as compared with the 2,800 issued daily during September. These P.O. vans remind me that in days gone by the Chinese used to advance towards their foe wearing hideous masks and emitting noises to match their ugly mugs, in order to turn the foe's heart to water and to cause his knees to knock the one against the other.



## New British Aerodrome Station.

**O**N behalf of the Air Ministry, the Marconi Company is to erect a radio station at the Manchester Corporation Aerodrome, Barton Moss. This station will be controlled and manned by the Air Ministry, and will be the first fully-equipped radio station to be built in a

municipal airport for the use of civil aviation services. The power and range of the station will suffice for the needs of aircraft on the Irish Sea crossing to Belfast or Dublin, and will permit of communication over a wide area of N.W. England and Wales, and the Midlands.

## The New Italian.

**W**ITH Fascisti-like thoroughness, the projected chain of up-to-date transmitters for Italy comes into being, link by link. The latest link is at Bari, and is a Marconi production and the "last word" in design, being constructed like a switchboard on which all the controls are mounted with the valves and their associated circuits at the back. The unmodulated aerial energy is 20 kw.,

## "SHORT WAVES"

A Scotsman was recently admitted into a London hospital with his head jammed down the horn of a loudspeaker. It was afterwards ascertained that, in the church from which the service was being broadcast, the collection had been upset.

"B.B.C. Dance Orchestra; Chef d'Orchestre, sir Henry Hall," we read in a French paper's programme of relays from other countries. Coming events

"Wireless has undoubtedly come to stay," we read in a contemporary. Ours has, anyway; it simply won't go!

Enthusiastic Salesman: "Yes, it's actually a fact—we sell our wireless sets by the dozen."

Rival Salesman: "Uhuh! How much a dozen?"

Salesman: "Yes, sir, this is the most selective set we have. You can absolutely tune out every station except the one you want."

Scotch Customer: "Weel, I seems tae me 't would be better if ye could get mair than ane. 'Tis no guid wasting music when ye hae' paid out siller tae hear it!"

(To the tune of "Underneath the Arches.")

"Underneath the bedclothes  
My dreams will fly away:  
Underneath the bedclothes  
I try to sleep each day.  
Every night you'll find me  
Tired out and worn—  
But your blooming wireless keeps working  
Till the mornow's dawn.  
Screeching when it's raining,  
And howling when it's fine,  
I hear it all above!  
Raving to my pillow—  
If only words could slay!  
Underneath the bedclothes  
I've cursed your life away."—"Pictorial Weekly."

and the working wavelength is 273.73 metres. The aerial is of the quarter-wave "T" type on two 80-metre towers placed 180 metres apart.

## P.O. Pirate Hunt.

**T**HE official organ of the Post Office Telegraph and Telephone service practically admits that the Vans are bluff. The success of detector van campaigns is greatly increased by press publicity, coupled with uneasiness in the public mind. (My italics.) An article entitled "Pirate Hunting," in the November issue, declares that the majority of defaulters are found in the working-class districts, many being unemployed or on

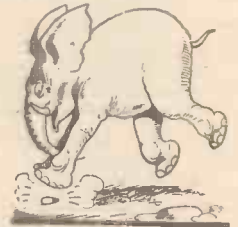
"short time," and hardly able to buy the bare necessities of life. It's all rather sad and sordid, whichever side one looks at.

## Zoological Notice.

**T**ALKING of valves, it seems that manufacturers will go to any length to prove that their products are unbreakable.

Some modern valves would seem to withstand any shocks—even a stamped c of elephants.

Radio fans in the far flung outposts of Empire will be able to indulge in a new form of sport. Testing the claims of valve manufacturers with the aid of elephants "off duty" may one day rank with tiddledy-winks as a relaxation for our Empire builders.



## Journalists Again.

**F**OR the special information of the farmer who wrote to me and said that journalists are not essential, I would record that of the three persons who have been appointed by Canada to inaugurate nationally-controlled broadcasting, two are journalists, namely, Mr. H. Charlesworth and Mr. T. Maher. They are to collaborate with the Director of Radio Research, Ottawa. Apropos of this, I might mention that Cobbett, author of "Rural Rides," and the greatest champion English farmers ever had, was a journalist.

## Gossip Corner.

**H**ERE'S a snippet which will appeal to boys and girls! Walter Giesecking, the eminent pianist, has exploded the proverb, "Practice makes perfect."

His view is that he plays better when he practises but little. Giesecking goes seeking butterflies instead of strumming scales. (Little Alfred will draw your attention to this, or I'm much mistaken!) In fact, he recently went butterfly chasing in the Alps for six weeks, during which time he did not poke a single ivory key. Then he played in the Mozart festival, and, his friends said, never did a better job.



## Potted News.

**G**ERMANY has just opened picture radiotelegraphy services with Vatican City and the Dutch East Indies. The Moydrum (Athlone) high-power station is expected to be completed next month. The French Chamber has had laid before it a Bill providing for the better protection of private radio messages from being picked up by private stations and used wrongly. Also, the French Government has asked French mayors to cut out orders about electrical apparatus which interferes with radio, because a ministerial commission is going into the matter. I should prefer to rely on the mayors. **ARIEL**

# MAKING THE MOST of YOUR LOUDSPEAKER



I CONCLUDED my article last week with a description of a box baffle treated with sound absorbing material after the manner of the baffle developed by the B.B.C.

As I mentioned at the time, either slag wool or acoustic down can be used, and I leave the choice to the constructor. Slag wool is, of course, the substance recommended by the B.B.C., and it can be obtained from F. McNeil & Co., Ltd., 52, Russell Square, London, W.C.1, or the Allyte Slag Wool Co., 27, King Street, London, E.4, and the acoustic down from H. L. Williams, 72, Oxford Street, London, W.1.

Slag wool is a fairly heavy substance, whereas the down is light in weight, which accounts for the big difference in the weights required to fill the same volume.

### Attractive Cabinet Cone.

In connection with a box or plain baffle, if the volume to be handled is at all big, it pays to make the baffle of the thickest possible wood, and the  $\frac{3}{4}$  in. thickness specified may be taken as a minimum.

Now this week I want to tell you how to make a very attractive little cabinet cone.

The basis of the whole thing is one of those inexpensive and amazingly efficient balanced-armature units, of which the Blue Spot 66K, Ormond, Telsen and Lissen units are outstanding examples.

Using one of these units the complete loudspeaker can be made for something under £1. In the actual speaker shown in the photographs, the cone unit employed

is the Blue Spot 66R and this is a more expensive model than the others I have mentioned, but those who can run to it will find it well worth the outlay, owing

In this, the second article of the series, Mr. Johnson Randall describes the construction of a highly attractive and efficient cabinet cone loudspeaker which can be made up for less than a pound. After this he gives a simple and interesting explanation of how the three main types of speakers work.

to the excellent power handling capacity and high sensitivity.

As a matter of fact, one of the special merits of this type of speaker is its sensitivity, a feature that brings real volume within the reach of the man who owns a small set.

After my comments in the last article about the desirability of using a large

baffle area in order to do justice to the low notes, I can well imagine some of my readers querying the dimensions of this cabinet cone, so let me explain.

The average inexpensive balanced-armature unit does not reproduce the bass to quite the same extent as the moving-coil or inductor dynamic class of speaker, and for this reason there is little point in employing a baffle area large enough to bring out the musical notes to the order of 100 cycles and below.

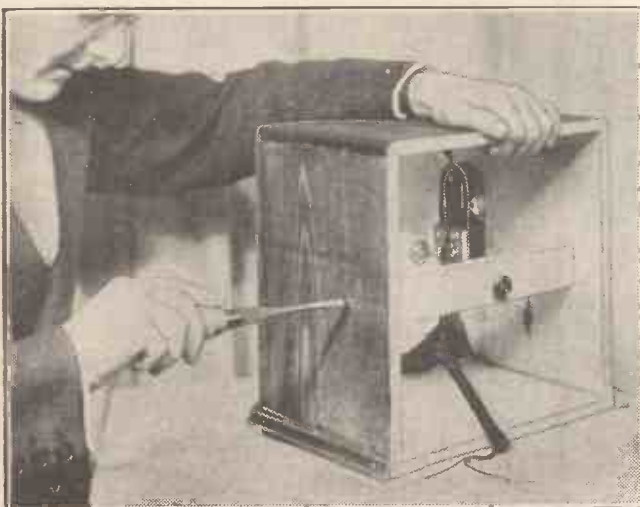
### Ample Baffle Area.

A cabinet of the dimensions depicted in the diagrams is equivalent to a flat baffle of about 20 in., and is ample for all normal purposes in so far as this particular type of speaker is concerned.

The cabinet is untreated; that is to say, there is no slag wool or padding, and I do not think that there would be much advantage in treating it in this way, provided a stout wood is employed in the construction. Of course, no back should be used other than a piece of silk stretched

(Continued on next page.)

## BUILD THIS CABINET CONE FOR SENSITIVITY, VOLUME AND ECONOMY



The final operation in the construction of the cabinet cone is mounting the batten for supporting the unit. This consists of a strip of wood, which is screwed into position, as shown above.

**MAKING THE MOST OF YOUR LOUDSPEAKER**  
(Continued from previous page.)

over a skeleton framework to keep out dust. Curiously enough it is sometimes an advantage to introduce a slight resonance in these types of speakers, because this tends to counteract for any lack of true bass response from the cone itself.

At any rate, as far as this particular cone is concerned, I would assure readers that all these factors have been duly considered and arranged for in the design.

**Not a Difficult Job.**

The first part of the constructional work following the acquisition of a unit, is to make a paper cone.

Now this is by no means a difficult job. First of all, you will need a sheet of kraft, or cartridge paper. Kraft paper, incidentally, is obtainable from Messrs. Page & Pratt, Ltd., 5, Ludgate Circus Buildings, London, E.C.14, but almost any stationer should be able to supply it.

The maximum radius of the cone when flattened out is 6 1/2 in., so the procedure will be to first of all make a circle of this radius with a pair of compasses, and then to describe inside this circle another having a radius of 5 7/8 in.

Next, measure off a distance of 5 1/2 in. across the inside of the inner circle, and draw two lines from the centre of the circle, cutting these points.

Then, draw another line parallel to one of those you have already drawn and about 1/2 in. away; this is shown in the diagram, and is marked "half-inch flap for sticking down."

With a pair of scissors you now cut out the unshaded portion of the cone; remember to cut along the radius shown as a black line as far as the centre of the circle.

Then along the edges snip out little pieces of the cone at regular intervals between the outer and inner circles, so as to enable the edge of the cone to be turned back for mounting purposes.

The cone when completed can next be attached to the driving rod of the unit, the procedure being to place one of the washers provided on each side of the cone,

and then to tighten up by means of the nuts at the back and front of the washers.

At this stage, it is inadvisable to tighten these nuts because the final adjustments can be made when the unit is mounted in the cabinet.

As far as the cabinet is concerned, I do not think I need go very fully into the matter of construction, because the diagrams and photographs are self-explanatory.

The fret in the front of the cabinet should be cut to a size slightly smaller than the cone diameter, and, of course, the particular design chosen is a matter for individual taste. A plain circular hole can be used if desired.

**An Important Point.**

A cabinet of this type, although simple in construction, can be made to look quite professional with the aid of beading round the base, and such other "trimmings" as the constructor may choose.

A square of silk gauze seccotined in position behind the fret not only improves the appearance, but also helps to keep the dust out of the inside of the cabinet; a point of some importance in practice.

The cone unit is mounted on a wooden batten, which is screwed into position at the back of the cabinet, and the actual dimensions for the adjusting knob will depend upon the particular unit the constructor prefers.

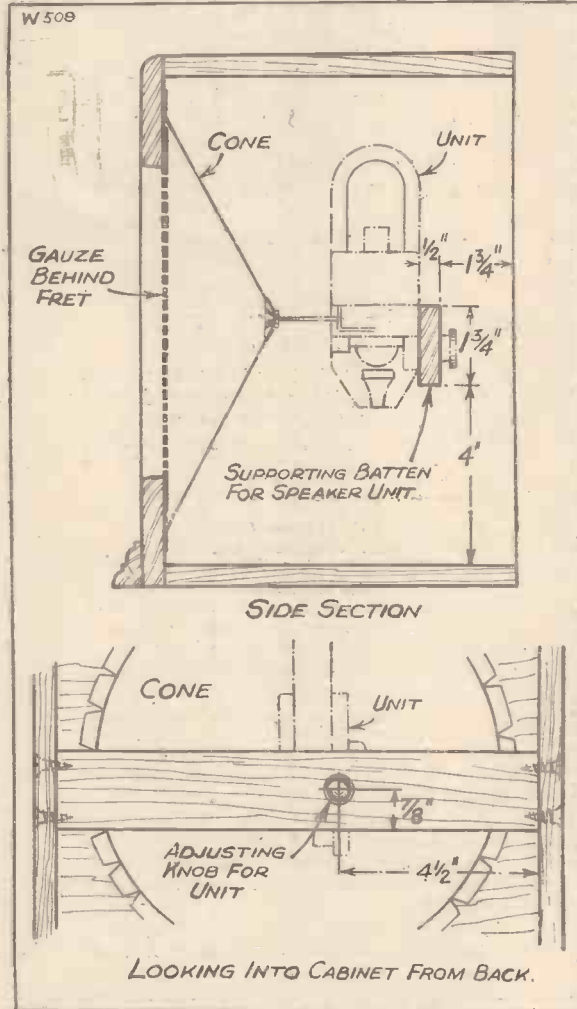
What you have to bear in mind is the fact that the centre of the cone should come opposite the centre of the cabinet, and also there must be no strain on either the paper cone or the driving rod which transfers the sound impulses from the unit to the cone.

**Fixing the Unit.**

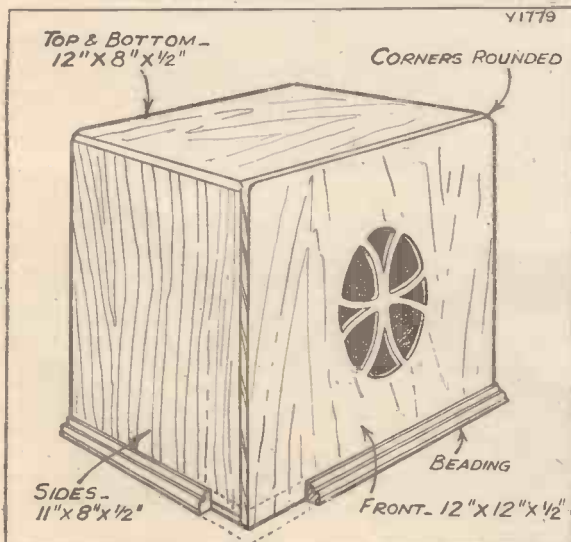
So I suggest that you hold the unit and cone in position, and then with a pencil mark off the appropriate place on the wooden supporting strip where the unit is to be fixed. A hole can then be

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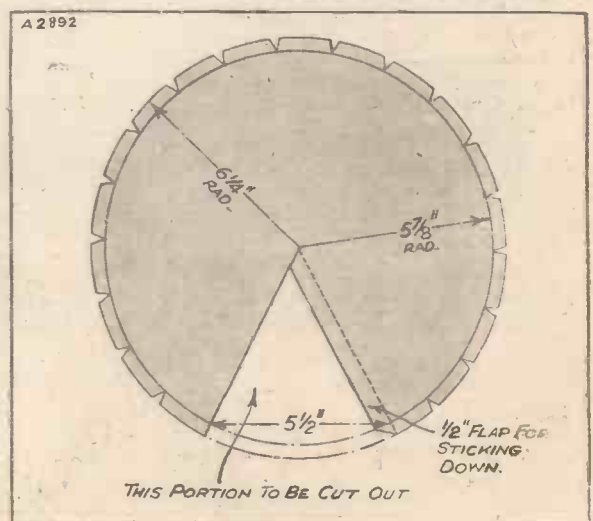
**HOW THE UNIT IS FITTED**



**EASY TO BUILD**



**THE CONE DETAILS**



Here are all the dimensions you need in order to make the cone a success. The cabinet does not require any skill other than that possessed by the average constructor. Those who feel that cutting the fret is beyond them can, if they wish, substitute for this a plain circular hole.

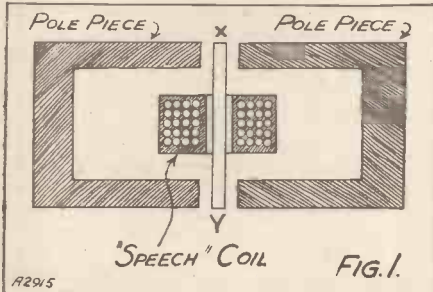
# MAKING THE MOST OF YOUR LOUDSPEAKER

(Continued from previous page.)

drilled through the strip for the spindle of the adjusting knob to pass through.

Last of all the strip can be secured in position with the aid of two screws at each end, as shown.

## THE BALANCED ARMATURE

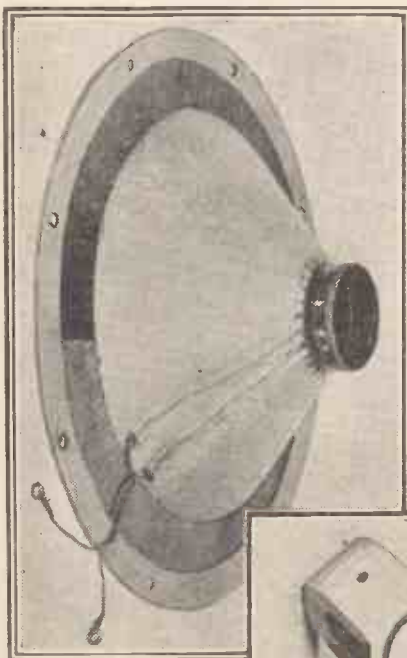


Balanced-armature units are very sensitive and give good results in conjunction even with the smaller types of sets.

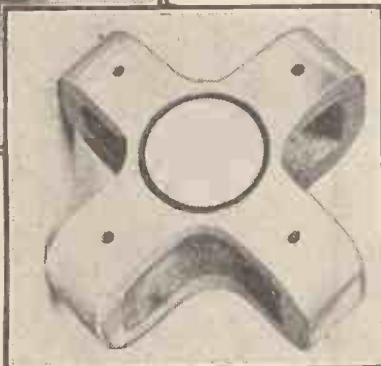
The front edge of the cone should not touch the front of the cabinet.

Remember that you need not follow these dimensions to the letter; they are only meant to serve as a guide, and are dependent upon the make and type of unit used. You can, if you wish, use a larger cabinet, but don't make it smaller than the dimensions I have given.

Now I am going to pass on to loudspeakers in general, and I want to tell you something about the way they work.



These two photographs show the permanent magnet and the complete cone assembly of a moving-coil speaker. The air gap can be clearly seen in the centre of the magnet.



As many of you probably know already, there are three main types, and these are: the balanced-armature moving iron, the inductor, and the moving coil.

Fig. 1 represents the balanced-armature method.

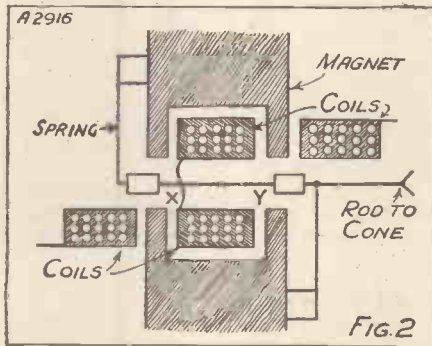
X Y is a soft iron armature which is pivoted between the pole pieces (usually laminated) of a powerful permanent magnet.

Surrounding the armature is a winding of fine wire called the "speech" coil in the figure. The two ends of this winding are connected either directly or indirectly to the loudspeaker terminals of the set.

### Attracted and Repelled.

The armature remains in a central position all the while there are no varying currents due to speech or music passing through the "speech" coil. Directly varying currents caused by the broadcast programmes commence to flow through the

## INDUCTOR PRINCIPLE



In the inductor type the driving rod is compelled to move to and fro parallel to the pole-pieces by the action of the two spring strips.

coil the armature X Y becomes a magnet and is therefore attracted by one pole of the permanent magnet and repelled by the other, depending upon the direction of the current passing through the coil.

### Always Horizontal and Parallel.

Attached to one end of the armature is a light metal coupling which imparts every movement of the armature to the driving rod of the cone.

Another popular type of unit is that known as the "inductor." I have endeavoured to illustrate the principle in Fig. 2. Here you have two steel pieces X and Y joined together by a rod, one end of which is attached to the cone.

The "speech" coils are connected in series, and when a current flows through the windings from the end nearer the cone, i.e. through the top coils, the steel piece Y tends to move so that it is disposed centrally in relation to the magnet pole pieces in its immediate vicinity.

When the current is reversed X moves in exactly the same way, but the to and fro motions of the cone driving rod are always horizontal and parallel to the pole pieces, since the two springs to which the rod is attached permit no other movement to take place.

Finally we come to the type of speaker popularly known as the moving coil.

In this type we have a powerful magnet which can be either energised or permanent.

The principle is the same in each case, and for the purposes of explanation I will refer you to Fig. 3.

First, there is a large magnet having a small annular air gap.

Mounted on the magnet is a supporting frame.

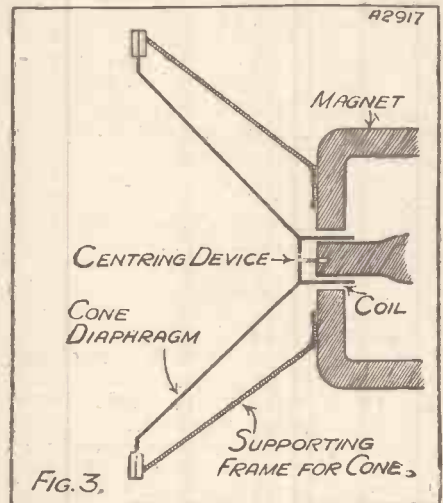
Referring to Fig. 3, we see the cone is held in position at its periphery by the supporting frame and at its apex by a "centring" device.

Let me explain still further. The cone has to move backwards and forwards like a piston in order to produce the necessary sound waves in the air. Right!

Then, obviously, if the cone is to be free to move at all frequencies it must be suspended by some means which permits unrestricted motion, and this is achieved by suspending the cone on a surround of flexible material.

At the apex there is a flexible "centring" device which keeps the coil in the centre

## A POPULAR TYPE



An essential feature of a moving-coil speaker is the accurate centring of the coil in the air gap, without restricting the free movement of the cone.

of the annular gap and prevents it from touching the sides.

The fine wire coil is wound upon a rigid former of insulating material, and the two ends of the windings are taken, by means of light flexible leads, across the cone to the secondary terminals of an output transformer.

### Piston-like Motion.

When the varying currents in the output stage of the receiver pass through the coil it moves to and fro in the air gap formed by the magnet poles, and so imparts a piston-like motion to the cone.

Provided the design allows for a free movement of the cone, the musical frequency response is definitely better than most other types of speakers; but in order to achieve high sensitivity and also to keep the price down by using small magnets, the clearance gap between the coil and magnet poles is sometimes cut down to very fine limits.

# STATIONS WORTH HEARING

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

THE new "big noises" on the medium wave-band are already making their presence felt. At the moment of writing neither Munich nor Leipzig appears to have worked up to the full output of their new transmitters, except on odd occasions when every available watt is in use experimentally.

It will not be long, though, before both of them are in full blast, and I forecast that these will be very shortly amongst the strongest of all the transmissions that reach us from the Continent.

## A Packed Patch.

Leipzig will have 150 kilowatts at his disposal, or 25 per cent. more than either Prague or Warsaw. He is thus by far the biggest station in Europe. Munich is rated at 60, but the wavelength is particularly favourable for distance spanning, as may be realised when the volume obtainable from the 18.5 kilowatt Budapest is considered.

Before so very long Vienna's new transmitter will come gradually into operation on 517 metres, and when this has happened there will be no less than five alternative

programmes regularly available within the small band of wavelengths between 500 and 550 metres. The stations concerned are Florence, Brussels No. 1, Vienna, Munich and Budapest.

The little band contains also two other stations of considerable power in Sundsvall (10 kilowatts) and Riga (15 kilowatts). Both of them are occasionally well heard, particularly in the more northerly parts of this country. They are well worth trying for on favourable nights, for I have often had good reception from them.

Another station which is coming into prominence just now after a long period during which he was rarely to be heard is Lyons Doua, which operates on 466 metres. The station is not to be well heard on every night, but during the week immediately preceding the writing of these notes full volume loudspeaker reception was obtained on three evenings.

## Paris and Bordeaux.

May I call your attention to Paris P T T on 447 metres? Two other stations actually share this wavelength, both of them Norwegian relays. The power of one of them

is 350 watts and that of the other only 80 watts, and as a rule they do not interfere at all.

The Ecole Superieure is one of the most surprising stations in Europe at the moment. Rated at only 700 watts, he frequently provides excellent loudspeaker reception in this country at ranges well over 200 miles. Add him to your list of captures if he does not already appear in it.

Next, remember to try for Bordeaux Lafayette on 304 metres, just above the North National. Bordeaux is a 13-kilowatt station, and his programmes are very well heard at the present time, provided that the receiving set is selective enough to eliminate the North National.

## Some More Good Ones.

I mentioned Budapest, or Csepel, recently. In case you have not yet tried for him he is working on 210 metres, just below Newcastle. If your set will tune down to that wavelength you will not have much difficulty in finding him for the volume is usually considerable.

If, by the way, your set is moderately sensitive you may find, rather to your surprise probably, that you can hear several of the little Swedish relays down towards the bottom of the medium wave-band. Though most of them use only 250 watts, they often come through with surprising strength. Jonkoping is one of the best of them. The name, when next you hear it from the announcer is pronounced rather like "Yehnehping." Another is Gavle (pronounced "Yayvly").

Two other stations that you should try for are Bucharest on 394 metres (just below the Midland Regional) and Belgrade on 430 metres (just below Stockholm).

R. W. H.

I HAVE been taking advantage of the spell of bad weather and dull radio conditions to rebuild the whole of my transmitting gear. In the course of this somewhat arduous job I have been trying hard to disprove the theory that tidiness and efficiency do not go together.

The old transmitter was certainly as efficient as I knew how to make it, but the most kind-hearted visitor to "the shack" could not call it tidy. The new affair, on the other hand, is totally enclosed in a large frame to keep it dustproof, and looks rather like something lifted out of Rugby or Brookmans Park.

## The Tidy Transmitter.

The queer thing is that, as far as meter indications go, it is even more efficient than the other. As it has only been completed for two hours as I sit down to write these notes, I have not yet had a chance of trying it out "on the air," but everything seems in order so far.

Incidentally, this spasm of rebuilding has brought home to me more than ever that the "compleat wireless-man" has to be a jack-of-all-trades with a vengeance. During the week I have been a wireman, insulation-tester, carpenter (plenty of that!), and jobbing gardener (repairing damage done while altering aerial!).

## SHORT-WAVE NOTES



News and views regarding an exciting and fascinating waveband.

By W. L. S.

As I have had a lot of enquiries for a simple transmitting circuit lately, I am writing a short description of my own gear with full circuit details. This is under way at present, but the Editor's drawer is so full that no promise can be made about dates. "K. S. B." (Cheltenham) and others, please note.

"F. T. C." has been good enough to pass on information about the station P L L, recently made the subject of a query from two or three readers. P L L is Malabar, Dutch East Indies, and works on 22.06 metres.

The indefatigable "W. W." of Exeter, whose old log holds all records up to the present, has heard so many new stations recently that he has sent in an even better and brighter list. Among the stations

that he has heard are the following that do not seem to be mentioned by many readers. I am listing them in case they are of interest to those who are looking for new worlds to conquer.

L S Y, Buenos Aires, 14.27; H B J, Geneva, 20.6; W 9 X A A, Chicago, 25.34; E A R 58, Tenerife, 41.6; V E 9 C L, Winnipeg, 48.85; C M C I, Havana, 49.5; and Bucharest, 50 m.

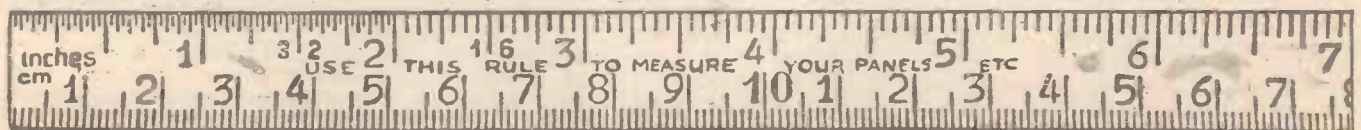
I should like to remind readers that I would still appreciate lists of stations heard, as I want to classify them under various localities. At present the South-West of England fairly romps away with it, what with "W. W." and "W. H. R." of Plymouth, as well as a number of less ambitious people.

Does this mean that their receivers are abnormally good, or that conditions in Cornwall and Devon are particularly bright?

## "S.W." in S.W. England.

Next to that area comes London, which I have always suspected of enjoying much better conditions than most Londoners care to admit. It is fashionable nowadays to say that one lives in a "blind spot."

I have no delusions of this kind myself, and I am sure that S.E. and S.W. London are, and always have been, extraordinarily good spots except for patches of local screening.





# CAPT. ECKERSLEY'S QUERY CORNER



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

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

## FRAME AERIALS—POWER AND SENSITIVITY—SCREENING BY BUILDINGS.

### A Good Frame-Up.

G. T. (Wolverhampton).—"I have always been given to understand that a frame aerial is very inefficient compared with a good outside aerial. I am very keen to do away with my present aerial and to install a frame.

"Do you think my det. and 2 L.F. set would give good results from an aerial of this type?"

It is not necessarily true to say that a frame aerial is very inefficient compared with aerials as frequently met with, but it does not give the same pick-up as an aerial which can be fairly described as a good outside aerial.

The sensitivity of a frame aerial increases as the (presumably) square frame on which it is wound is made bigger and bigger. I don't think a det. and 2 L.F. would work particularly well with a frame aerial except on the local stations, and even then I should doubt whether you would get anything like the results that you at present get from the good outside aerial.

Why not have a try? It won't cost much to make up a framework of wood, say 4 ft. square, and wind it up with some wire and substitute it for the aerial. In case you do this I have drawn a little picture to show you how to connect the frame aerial, assuming the very simplest type of arrangement.

You had better use a bottom-bend detector for sensitivity, because this won't put any damping on the frame aerial. You can work in reaction in any conventional way, treating the frame aerial as the aerial tuning coil of a set.

### Handling More Power.

C. T. (Manchester).—"I am thinking of changing my output valve to one of the super-power class.

"Am I right in assuming that I shall receive more stations than was the case when I used a small power valve?"

No, the fitting of a super-power valve does not increase the range of the set, at any rate, noticeably.

The point is this. A loudspeaker absorbs power. This loudspeaker power must be supplied by the last valve of the receiving set.

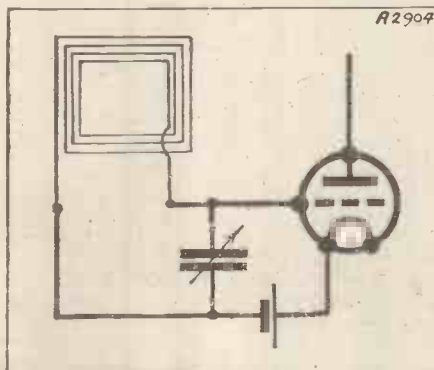
The loudspeaker demands more and more power as the frequency which it is reproducing is lower and lower. If the valve feeding power to the loudspeaker is not

great enough then it is usually arranged, or it maybe arranges itself, not, to give a full power at the low frequencies. This very often produces distortion, but not necessarily.

The super-power valve is one which has very probably a very low impedance and is able, both on account of this factor and on account of the fact that it can stand a high feed current, to furnish the required power to the loudspeaker at all frequencies right down to the lowest.

The sensitivity of a set can only be increased by arranging the valves in such a

## HOW IT IS CONNECTED



A receiver having no H.F. stages may be insensitive when used with a frame aerial. Capt. Eckersley advises, in such a case, the use of anode bend detection.

way that, from a given incoming signal, the loudspeaker is supplied with more volts. More volts will be applied to the loudspeaker by raising the value of the high tension and by using a higher magnification valve.

But if the volts output is increased the power demand from the valve is increased and so you would have to have a "super-power" valve, as it were, if you were going to increase both the sensitivity of the set and give the loudspeaker all the power it wants over the full range of frequencies.

There are thus three main divisions of output valve conditions:

1. Ordinary—where a moderate voltage is applied over a part of the spectrum but where the power supplied to the lower frequencies is cut down.

2. A super-power valve which supplies more or less the same voltage as given by the valve described under 1, but supplies this voltage over the full range of frequencies.

3. The super-super-power valve, as it were, where not only is the voltage higher than in cases 1 and 2, but where this highest voltage is fed to the loudspeaker at all frequencies.

### Screened Aerials.

R. C. (Islington).—"I have an ordinary three-valve receiver working on a small indoor aerial and results are very poor.

"I previously had this same receiver operating satisfactorily at my previous address on a similar aerial and wonder whether the trouble may be due to the building in which the receiver is now used, which is of the steel frame type of construction."

Certainly, if you use an indoor aerial in a steel-framed building you will get poor results.

It is well known that a metallic screen will prevent electric forces outside the screen from influencing anything inside the screen, and vice versa, electric forces inside a screen cannot be appreciated outside the screen.

With very high-frequency alternating electric forces the screen need not be so complete as when the frequency of alternation is slower.

Thus with the million or so vibrations a second used in typical wireless work, the forces inside a quite openwork screen are considerably less than outside that screen.

Even with the wide mesh of a steel-framed building there is a considerable diminution of force inside what is effectively a screen.

There is only one way to get over this difficulty and that is to push the aerial out of the window, suspending it as far as possible from the side of the building.

I suffer myself exactly as you do, and my indoor aerial would not work at all, so now I have to stick it out of the window, with the result that I am generally able to get reasonable signals.

THE MIRROR OF THE B.B.C.

By O. H. M.

## CHRISTMAS HOSPITALITY

AN UNEMPLOYMENT WEEK—SINGALESE FEATURE—"THE COUNCIL OF THE INFERNAL PEERS"—B.B.C. AND MARRIED WOMEN.

THERE is a great deal of discussion in the B.B.C. about the invitation which has been sent to all members of the staff to accept the hospitality of the Governors at either a dance on November 21st, or supper on December 2nd.

While the generous motive behind the offer is fully appreciated, it is felt that if the Governors had wanted really to mark the 10th Anniversary of Broadcasting in a way which would be most deeply appreciated, it would have been much better for them to have revived the Christmas bonus which was suspended last year because of the crisis.

These dances and banquets at all B.B.C. centres throughout the country are bound to be expensive, not only for the B.B.C. but also for the guests, even though they do not have to pay for their tickets. Many of the women members of the staff will be forced to buy new gowns; all will have to expend something to make their appearance exceptional, and this, it is rightly observed, will be a burden causing hardship.

I hope, therefore, that if the B.B.C. Governors go ahead with their laudably conceived festivities for the staff, they will bear in mind that no one who knows anything about the public-spirited devotion of the B.B.C. staff would cavil at the restoration of the "one week's pay" Christmas bonus, which has been interrupted only once in ten years, and then for reasons which were at least debatable.

### An Excellent Proposal.

That enterprising builder of talks, Mr. Lionel Fielden, is working on what seems to me an excellent proposal.

It is that, early in the New Year, the B.B.C. should contrive to put aside a whole week, so far as Talks are concerned, to be devoted solely to helping people to find jobs; enlisting support from all sections of industry, and publicising both the need of the unemployed of all classes and the opportunities of employment, either actual or potential. It seems to me that if this scheme is carried out in a practical way, it will do a lot of good.

### Interesting Songs.

I hear the Music Department at Broadcasting House is planning a programme of interesting Singalese songs by Surya Sena and Velun Devi.

### Organ Music in Plays.

An interesting experiment in the possibility of organ music as a dramatic incidental to plays will be tried on Thursday, December 1st, during the broadcasting of a production called "The Council of the Infernal Peers," which is being arranged by Mr. E. J. King-Bull.

This particular production, which is a scene complete in itself from Milton's "Paradise Lost," is regarded as particularly suitable for an innovation of this kind. Many listeners who are interested in the development of the technique of radio drama will look forward to this programme.

the idea of which comes from a performance of the Arts Theatre Club, more than a year ago, in which the late Peter Hannen played the leading part.

### The B.B.C. and Married Women.

I hear that the question of the employment of married women on the staff of the B.B.C. has recently been raised again with a good deal of consequential consternation among the hundreds of secretaries and stenographers at Broadcasting House who have husbands.

The problem is difficult because married women have always been employed by the Corporation and its predecessor, the old Broadcasting Company. Many of them have married during their service, when they had no cause but to think their jobs secure until they chose to relinquish them.

### Efficiency Only.

Whatever one's personal feeling may be upon the subject, these married girls have a strong claim to their posts, especially as some may have unemployed husbands, or are in the process of building their homes. There is the further point that some would have remained single had they thought that marriage would ever jeopardise their jobs, so that any hard-and-fast rule which might now affect them would be as unfair as any discrimination between the position of one woman and another.

My own view, however, is that the decision will be to determine the issue purely on a basis of efficiency.

## DO YOU RECOGNISE HIM?



You have heard him often on your set—Sandy Rowan, the Scottish comedian, who is here seen tuning in a programme on his own set at home.

## THE LISTENER'S NOTEBOOK

A rapid review of some of the recent radio programmes.

**I DARE SAY** there is in existence a prodigy—an infant, perhaps—with the amazing gift of being able to listen to three musical programmes played simultaneously, and yet able to listen to any one without suffering inconvenience from the other two. You see, there is something after all in being a prodigy.

If he is a wireless listener, his is a gift not to be despised. Two or three programmes at a time—not all at equal strengths—is an increasingly common experience these days on my set, at any rate!

'Tis true that some stations still stand in a position of splendid isolation, with the

happy result that their concerts remain pure and unalloyed. But it isn't true of all.

### That Impossible Inch.

For instance, I've about an inch of medium wave dial space that is quite useless to me unless I'm in the mood for some really first-rate noise. And, unfortunately, I am well aware that, if my set were really selective, I would be able to enjoy, in turn, each of those stations that are bunched together in that impossible inch.

Even with the isolated stations, big music can't escape the tendency to produce

(Continued on page 624.)

# PLANNING A 50-KILOWATTER!

"MY opinion," said a leading engineer of an organisation which has built many Continental broadcasters, and which is building the two new Empire stations on the 5XX site, "is that the average listener would do well to know more about transmitter technicalities, because then he could take a livelier interest in new International wavelength schemes."

## The Listener's Viewpoint.

I was interviewing him on the topic of designing new high-power foreign stations, and I anticipated trouble in following technical talk about decibels, modulation percentages and so forth!

Instead, I found him very anxious to explain, from the listener's point of view, how big power stations are planned.

"Right at the start," he continued, "we have to consider the listener's point of view. There is the question of how much power can be used in any district without swamping local sets, and also the depth of modulation. I ought to ask you what you mean by a 50-kilowatter! Many people have confused ideas.

"It is only comparatively recently that the Union Internationale de Radiophonie has set the standard of aerial rating, so that when we say a station has a power of 50 kilowatts, we know exactly what is meant.

## Modulation.

"I won't delve into modulation technicalities, but it is a generally accepted fact that the more deeply modulated a station is (that is, the more deeply the speech is impressed on the carrier-wave), the more interference it

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If you don't know what goes on behind the scenes in designing new high-power broadcasting stations, then read Our Correspondent's interview with a leading engineer.

\*-----\*

causes. In our stations we always modulate to the full depth of 100 per cent.

"Critics object that with very many receivers the detector introduces a second harmonic when the carrier is modulated to the full depth of 100 per cent, but although this is true in many cases, the result is far less objectionable, generally speaking, than the defects of low percentage modulation, including the cutting down of musical light and shade, 'blasting' due to amplitude distortion, and the relative increase of heterodyne strength over the local carrier strength.

"I hope you can follow me in this little technical argument, because if there were

a central control over modulation, some European stations would not be causing half the trouble they do. You see, from the very start, we have to consider the listener's end, and not just put up aerial masts and a mike and hope for the best!"

"What about quality?" I asked. "Is the average broadcaster better in frequency reproduction than the average set?"

## Down in the Bass.

"Why, sure. Transmitters such as the Standard 50-kilowatter handle a band of frequencies from 30 to 10,000 cycles, and the amplitude distortion does not exceed three Transmission Units at any frequency within this band. I'm afraid there aren't many receivers which go down in the bass to 30 cycles and are still free from distortion.

"Now, let's get down to the actual design.

"When you build a new receiver, you don't have to consider where to house it.

You probably already have a cabinet which will fit it, and the position in the room is predetermined. Not so, though, with a 50-kilowatter.

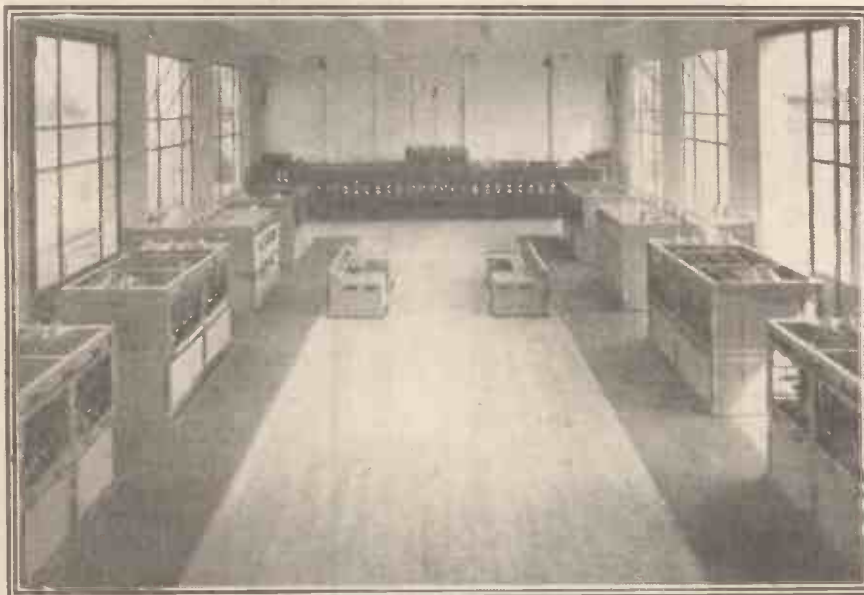
## Extra Rooms.

"Several months before the station is to be 'on the air' we have to be in touch with architects to plan the building which will carry the new broadcaster. At the very least a building to house a broadcaster of this size must be about 50 ft. wide and 100 ft. long. There is not only the transmitter itself to be considered.

"The building must have at least nine extra rooms for the water-cooling

(Continued on next page.)

## A TRANSMITTING ENGINEER'S "CABINET"



The building in which a large transmitter is housed is equivalent to the cabinet in which the constructor puts his receiver. Judging by this view of the Transmitter Hall at Brookmans Park, transmitter "components" have to be well spaced!

## PLANNING A 50-KILOWATTER

(Continued from previous page.)

plant, the emergency stores, valve store racks, emergency studio, landline apparatus, generators, and a little office for the station staff. There are five separate units in a big broadcasting station (take Brookmans Park, for example), and even leaving out the power-control switchboard, the actual transmitter gear needs a room 40 ft. long and 20 ft. or 30 ft. wide.

"Generators or H.T. rectifiers will take up about 200 sq. ft., and as the station is generally a good distance from the studio, and landline amplifiers are needed, about the same floor space has to be given to these. The total floor space needed at the very least for a 50-kilowatter is 3,825 sq. ft. You can't squeeze it into an attic, you see.

### Running Water.

"All modern transmitters are water-cooled, and with the Standard system a supply of about 40 gallons a minute at a head of 100 ft. is needed for water-cooling. A motor-driven pump, taking about 3-h.p. will be needed, or, as at Brookmans Park, distilled water may be used and cooled in radiators by running water.

"A station of this kind in full working needs twenty-nine valves, twenty of these being water-cooled. There will probably be another twenty or thirty valves in the landline amplifiers. That is why we must have a little room as a valve store.

"Another snag is that one can't just put up a station anywhere irrespective of local power lines. At full load, a 50-kilowatter will take about 250 kilowatts input. If the local power people can supply this, then well and good, but if not we must have motor generators, meaning about 1,500 sq. ft. floor area.

"We have to get absolutely pure D.C. for the big power valves, for otherwise listeners would notice a ripple in the transmission. That means having, if possible, a 6-phase supply. The 12,000 volts needed for the power valve come from a 3-phase double-star system feeding six water-cooled rectifier valves, each capable of handling 10 kilowatts.

"This is rather complicated, but it cuts down the amount of smoothing. As each of the big smoothing chokes is cooled by 80 gallons of oil, it means a big saving if we can cut down the amount of smoothing.

"Then we have to plan the best way to mount the panels. The power switchboard on which are the relays controlling the whole transmitter is built into a wall, where possible, so that all the live switch gear is in a room behind the switchboard panels and a safety gate is put on the door here so that there is no fear of anybody being electrocuted.

"It takes several weeks to build the transmitter panels and switchboards, for these are of slate bolted to duralumin framework.

### Landline Overhauls.

"Nowadays, when a new high-power broadcaster starts up, it is generally on the site of a smaller outfit previously working. Landlines to the studio are generally in existence, but when the new engineers come

along with the transmitter which goes down to 30 cycles without distortion, then the landlines generally have to be overhauled.

"As an instance of this, just think of the work which the Post Office has put into the four sets of lines going from London down to Brookmans Park, and of the trouble which the C.F.R. engineers had at Radio Paris with the 23-mile long landline. These lines usually cut off the bass.

## SEARCHING FOR A STATION SITE



Before selecting the site of a powerful broadcaster, careful tests are made of likely locations. Here you see the B.B.C.'s portable 2-k.w. transmitter finding the best place for Daventry's successor.

"At Radio Paris they built a special tube of aluminium to carry the studio lines. Filter circuits are built into telephone exchanges every few miles along the conduit to balance out the stray capacity, and so prevent the bass notes being lost."

## GOLDEN RULES OF RECEPTION

Practical advice on operating your receiver

It is incorrect to suppose that an indoor aerial need not be installed with the care for correct insulation that is usually given to the outdoor aerial.

Although indoor aerials and leads are sometimes successfully run behind picture rails, etc. this is not good practice, and both indoor aerial and lead-in should be spaced away from the wall on stand-off insulators if maximum possible efficiency is to be obtained.

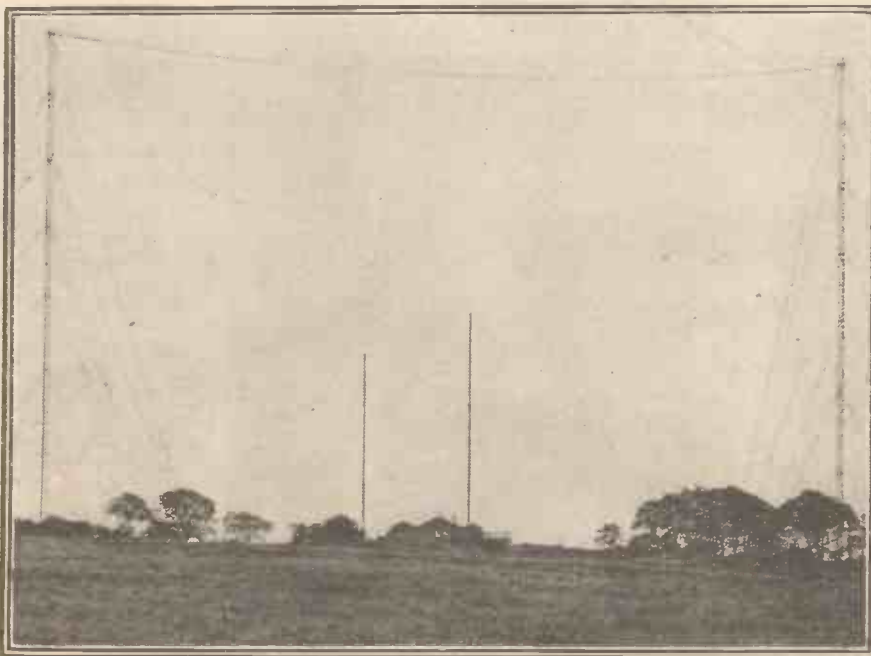
The most economical way to buy H.T. supply is to find out how much anode current your set takes and purchase a battery which is rated to give this amount of current without distress.

The high-tension drain on a battery may be measured by inserting a milliammeter in the set's H.T. negative lead, or by calculation from the data supplied by the valve makers.

Never allow an H.T. battery to be in service in an exposed and uncovered position, as any metal object such as scissors, knitting needle, cigarette case, etc., placed upon it will result in serious shortening of its useful life.

One of the golden rules of good maintenance is to switch off L.T. before changing the grid bias, especially of power and pentode valves. Immediate and serious damage is likely to ensue if this precaution is not taken.

## "GOOD-BYE TO ALL THAT"



The planning of high-power transmitters sometimes means the end of old favourites. The two B.B.C. stations at Daventry, which you see above, are shortly to be replaced by a new twin broadcaster planned to be erected near Droitwich.

**TELSEN**

# DUAL - RANGE COILS



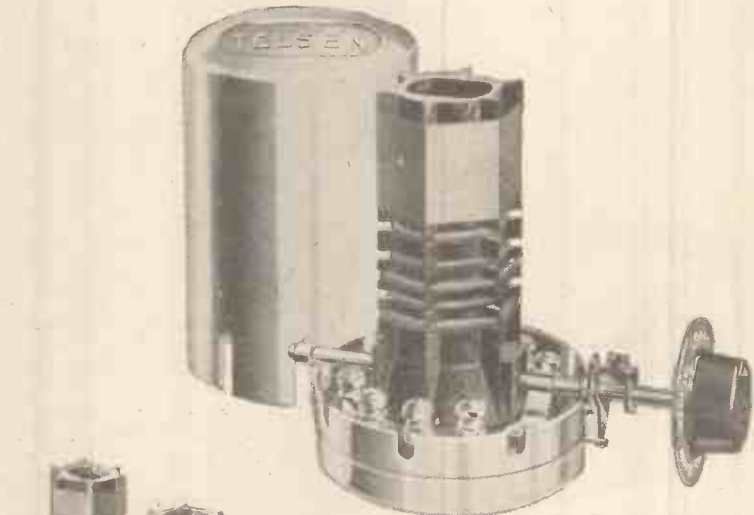
## TELSEN DUAL-RANGE AERIAL COIL

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**



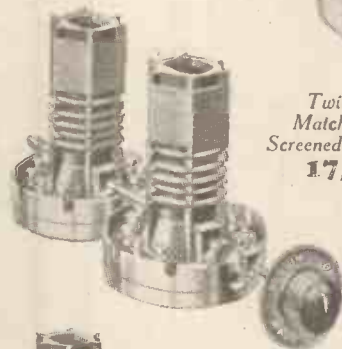
## TELSEN H.F. COIL

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**

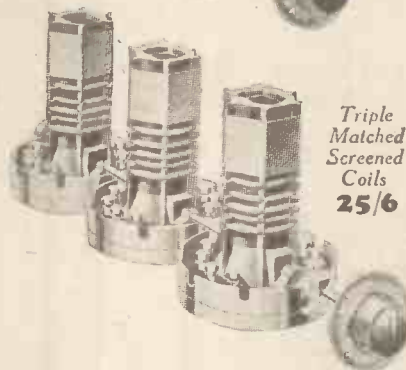


## TELSEN SCREENED COILS

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 **8/6**



*Twin Matched Screened Coils*  
**17/-**



*Triple Matched Screened Coils*  
**25/6**

*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.*

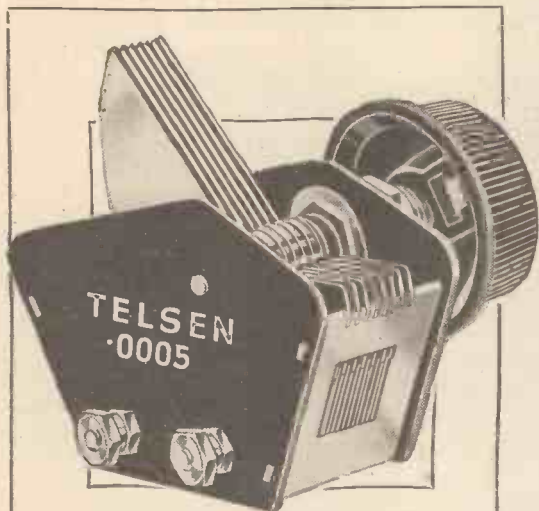
# TELSEN

**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

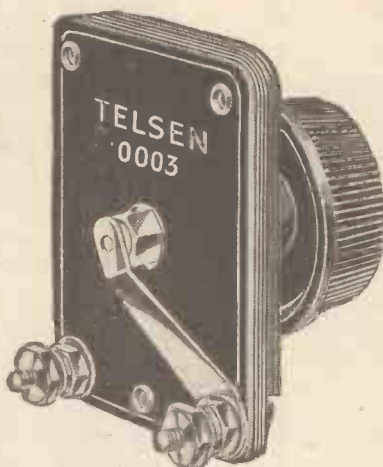
New design of great rigidity and exceptional compactness, ensuring the utmost efficiency in use even where space is very limited. The well-braced vanes are interleaved with a minimum of the finest solid dielectric, giving absolute accuracy of tuning. Supplied complete with knob.

In capacities .0005 and .0003 2/6

## 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.

In capacities .0003, .00015, and .0001 - - 2/6



## TELSEN REACTION CONDENSERS

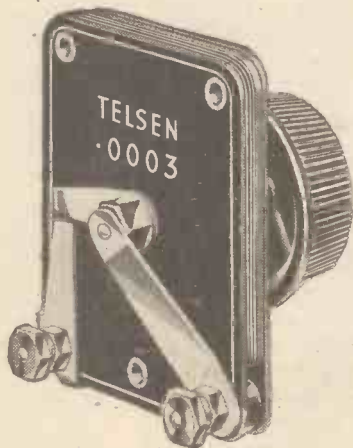
In capacities .0003, .00015 and .0001 2/-

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.

Capacity .0003 - 2/3



# TELSEN

RADIO COMPONENTS

**TELSEN RADIO COMPONENTS ARE 100% BRITISH**

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



# RECOMMENDED WRINKLES

## CONDENSER "EARTHING"— A PICK-UP HINT—FOR TRUE DRILLING — LONG-RANGE OPERATION.

The fact that a comparatively large hole such as this is needed sometimes produces a certain feeling of perturbation in the minds of potential constructors.

How are they to ensure accuracy? In nine cases out of every ten, the centre punch method of marking off the centre is insufficient in itself, since a large drill when held in a hand brace required something more than this to prevent it from "wandering."

The problem is not a difficult one and the drill will not "wander" if a "pilot" hole is drilled through the panel first of all.

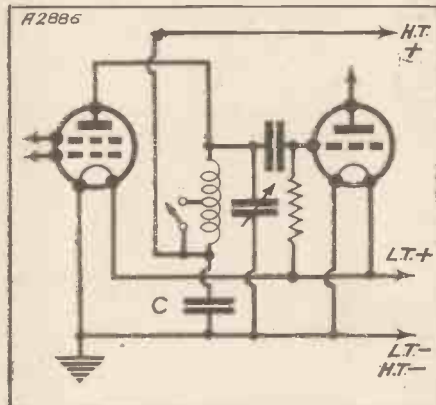
A  $\frac{1}{16}$  in. drill will suffice, and this procedure will ensure an accurate hole being drilled "dead true to centre" through any thickness of ebonite up to  $\frac{1}{4}$  in.

WHEN "canned" coils are used in a receiver having S.G. stages, it is permissible to omit the interstage vertical screens if the tuning condensers are spaced or provided with small screens.

In some cases using the "parallel feed" circuit instability is caused by the H.F. choke coupling with the H.F. grid wiring. By adopting the earth return tuned anode circuit shown this fault may be rectified.

The anode current of the H.F. valve flows through the anode coil, the variable condenser moving vanes are connected to earth and the tuning circuit is completed by the fixed condenser C.

### EARTHING A TUNED ANODE



The condenser (C) connected thus acts as the earth return for the anode coil.

This arrangement may be used if a gang condenser is used and if H.F. de-coupling is required it is only necessary to insert a resistance in series with the lead to H.T. +

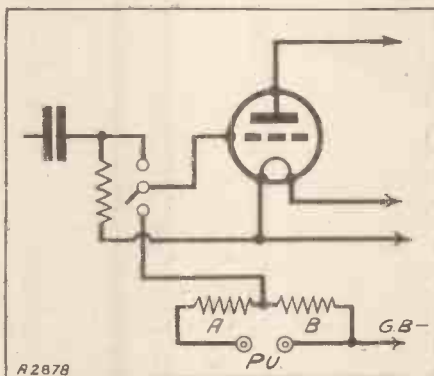
### REDUCING PICK-UP INPUT.

THE voltage of different pick-ups varies quite considerably; some, in fact, give so great a voltage that the first valve is overloaded. This is particularly the case when the detector is used as the first amplifying valve on the gramo side.

Where economy is a consideration a variable volume control need not be used, two resistances of the spaghetti type being exceedingly useful for the purpose. Simply connect them together and take the joining point to the grid of the first valve. The two outside ends go to the pick-up, one end

also being taken to the negative grid-bias tapping.

### BALANCING RESISTANCES



A and B are the resistances by which a potentiometer effect is obtained.

The total value of the two resistances in series should be about 100,000 ohms, and, according to the ratio of one spaghetti to the other, so will be the ratio of voltage across grid and filament to that of the pick-up.

For example, if A and B are 50,000 each, the voltage on the grid is about half of the pick-up.

If A is 25,000 and B 75,000, the voltage is about three-quarters.

Conversely, A being 75,000 and B 25,000, the voltage will be one-quarter.

### A DRILLING TIP.

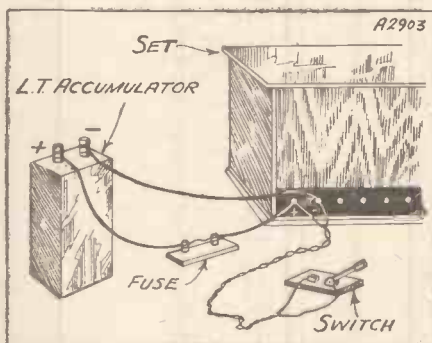
VARIABLE condensers, wave-change switches, and other modern panel mounting components are usually secured to the panel by a single hole about  $\frac{3}{8}$  in. or  $\frac{1}{8}$  in. in diameter.

### CONDENSER CONNECTIONS

Don't strain the moving-vane's flex lead—it sometimes gets broken and held by only one or two strands, which may cause noisy reception.



### "REMOTE" POSSIBILITIES



The fuse and switch connections described below.

### REMOTE CONTROL

THE accompanying diagram shows a very good temporary expedient for switching off a set from a distant point.

A piece of light fuse wire is connected between two terminals on a small panel, and the fuse so formed inserted in series with one of the leads from the L.T. battery to the set.

A length of twin flex is then connected to both L.T. terminals, and the other end connected to the terminals of an on/off switch.

"Switching on" then momentarily shorts the L.T. battery, "blows" the fuse and breaks the L.T. circuit to the set, thus "switching off" the set.

Of course, when once switched off by this method, the set cannot be switched on again unless the fuse is first repaired or the normal arrangements of the battery connections restored.

Incidentally, no damage can be done to the accumulator.

## NOTES FROM THE NORTH

A review and criticism of events in that important region north of the Trent.

By OUR NORTHERN CORRESPONDENT.

THE comic spectacle of the B.B.C. supporting a legal contention that a broadcasting studio is not a place of public entertainment has been amusing us in the North of England. It arises out of the leasing by the B.B.C. of new premises in Leeds.

When, some years ago, this building ceased to be a place of worship and passed into the hands of a firm of clothiers, its former Quaker owners inserted into the deeds a clause that the building should never be used as a theatre, cinema, place of public entertainment, or for any "noisy trade," so long as the Quakers continued to occupy an adjoining building.

### Amusing Paradox.

They are still using the next-door premises, and now the B.B.C. is busily transforming their old Meeting House into studios where concerts, vaudeville, plays, etc., will be produced for the entertainment of the public that listens in.

Does this infringe the ban?

Well, according to counsel's opinion, which has been taken by the B.B.C., a broadcasting studio is not legally a place of public entertainment so long as the public is not admitted indiscriminately. When, as in the case of the public Chamber Music concerts at Broadcasting House, London, the doors are thrown open to the public, the situation is changed (whether or not a charge is made for admission is immaterial).

The new Leeds studios will provide accommodation for only a small audience, and by discriminating who shall be privileged to attend the B.B.C. will keep on the right side of the ban. Its studios will not be (legally) "places of public entertainment"!

This, of course, simply confirms the opinion that some unjust critics have been expressing for years!

Let it be understood that there is no quarrel between the B.B.C. and the Quakers in Leeds. The legal paradox has given amusement to both sides.

### The Repertory Theatres.

The B.B.C. Regional directors are not all made of the same stuff. The policy of one may differ materially from that of another. This is all to the good, for it helps to check that tendency to standardise ideas and methods which is a deadly weakness in British broadcasting.

When I pointed last month to certain enterprises of the Midland and Scottish regions, I did not imply (as one reader seems to imagine) that the North Region should copy these innovations. On the contrary, I am heartily in favour of each director ploughing his own furrow, subject

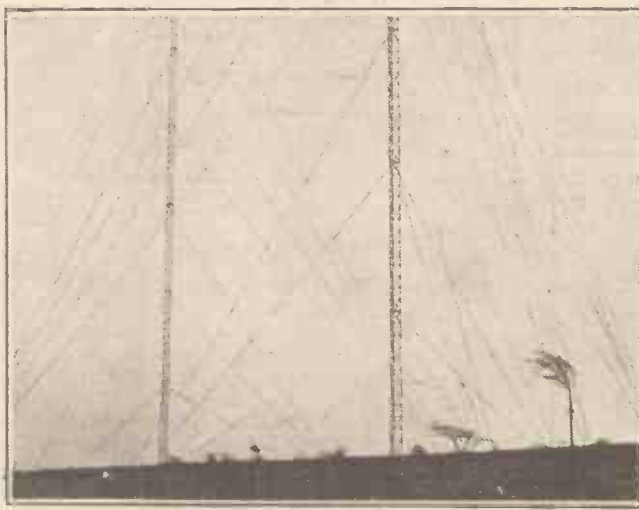
to certain respects in which co-operation between the Regional directors is beneficial to the programmes.

### Trained for Broadcasting.

An instance of differing methods is provided in Radio Drama. The Midland Region is actively associated with the repertory theatre movement in Birmingham. The North Region, on the other hand, decided some time ago to discontinue its co-operation with "repertory" and "little" theatres, and to create instead several companies of players trained specially for broadcasting.

The Yorkshire Radio Players made a welcome reappearance in the Leeds studio this month, unfortunately without Florence Gregson, who was too busily occupied in the film of "The Good Companions." The Newcastle Radio Players were also broadcasting recently in a

## WEATHERING THE STORM



The new Scottish Regional Station at Falkirk is being tested—by the weather! It is to be hoped that the B.B.C. engineers have designed the masts to withstand Scottish gales.

historical play, "Admiral Collingwood," but neither play nor performance was satisfactory.

### Newcastle Troubles.

I am told at Newcastle that the discontent about the programmes put out by the local transmitter (a mixture of Regional and National items) has been exaggerated, and that it is really confined to a minority of confirmed grouse.

On the other hand, the change of Newcastle's wavelength to 211 metres has caused considerable trouble on Tyneside. Radio dealers inform me that a great many sets have had to be altered (in many cases sent back to the makers) because they were unable to tune down to this wavelength. The change has also reduced the effective range of the station.

Calling at Moorside Edge I found the

engineers "decoking" one of the big Diesel engines. The huge cylinder head had been lifted by a crane, and the pistons taken out and decarbonised, just as you and I decarbonise our motor-car engines.

### Behind the Scenes.

One of the four engines is taken down every three months, so that each engine gets an overhaul once a year.

The enormous amount of maintenance work at the broadcasting stations is not appreciated by the average listener. At Moorside Edge every piece of apparatus is regularly overhauled according to a strict schedule. The aerials are dropped twice a year. Once a month a man ascends each of the masts and examines the steel-work, guys and insulators.

All of which work must be done when the station is not transmitting, which, in these days of long programme hours, is a severe limitation.

It is not generally known that the masts, each 500-ft. high and 30 tons in weight, can be lifted bodily from the ground by hydraulic jacks. The lift is only a fraction of an inch.

### Staff Changes.

Congratulations to Mr. J. B. Clark on his appointment as Assistant Director of the new B.B.C. Empire Broadcasting Service. Before coming to Manchester, where he has been for several years principal assistant to the North Regional director, Mr. Clark was at the Cardiff station. When he makes his departure for London his desk will be taken over by Mr. Fitch, formerly station director at Plymouth.

The vacancy at Manchester due to the appointment of Mr. E. L. Guilford to be station director at Newcastle is to be filled by Mr. Aubrey Herbert.

### Good Music.

The arrangements for relaying orchestral and choral concerts in the North this winter are proving highly successful. The conductors and artistes at these outside concerts are of the highest rank, and the choral singing is an especially distinguishing feature for the North Regional programme; for nowhere in these isles has

choral singing been brought to such a fine art as in Sheffield, Stoke, Leeds, Manchester and Huddersfield.

## FOREIGN FACTS

News about broadcasting in four of the principal European countries.

The powerful Italian station at Florence, on 500 metres, uses a quarter-wave T-type aerial, suspended from two 310-foot towers.

Among the suggestions for Spain's new Regional scheme are relay stations for Bilbao, Coruna, Malaga, Murcia, Saragossa, Valladolid, and Vigo.

In Germany the radio licence fee is substantially reduced to unemployed persons.

Radio L. L., the popular French station on 570.4 metres, has been forbidden to relay on short waves.



# 70 Stations to choose from—

Grenoble (PTT)	Rabat	Brno	Bratislava	Lahti
Wlaco	Dublin	Brussels No. 2	Halsberg	Radio Paris
Budapest	Katowice	Milan	Turin	Konigs
Sundsvall	Radio Suisse	Poste Parisien	Lillo	Wuats'rhsa
Riga	Midland Reg.	Goteborg	London	Daventry
Vienna	Bucharest	Genoa	National	National
Brussels	Toulouse	Cardiff	Horby	Eiffel Tower
Florence	Lwow	Bordeaux	Gleiwitz	Warsaw No. 1
Prague	Scottish Reg.	North National	Trieste	Motala
North Regional	Algiers	Tallinn	Belfast	Moscow
Langenberg	Stuttgart	Hilversum	Nurnberg	Kalundberg
Landessender	London Reg.	Bournemouth	Cork	Popoff
Rome	Graz	Newcastle	Pecamp	Oslo
Stockholm	Barcelona	Plymouth	Kaunas	Kiov
Moscow	Strasbourg	Swansea	Huizen	Leningrad

When you build a **SKYSCRAPER**  
 THE ONLY SET YOU CAN BUILD  
 YOURSELF EMPLOYING METALLISED  
 S.G. VALVE, HIGH-MU DETECTOR  
 AND ECONOMY POWER PENTODE

Here's a list of stations! Actually logged by a constructor at the first time of trying out a newly-assembled Skyscraper! What a record! What endless nights of entertainment! And everybody who builds the Skyscraper gets results like this—hundreds of appreciative letters prove it!

Never before was there such a set within the reach of the home constructor. Never before such power from any battery set. Never before so many stations as the Skyscraper brings in. It is the only set on the market that you can build yourself employing Metallised Screened-Grid, High-Mu Detector and Economy Power Pentode Valves. No factory—however well equipped—can build a better receiver. No manufacturer, however large, can produce a receiver whose results will surpass those you will get from the Lissen Skyscraper you build yourself. It is the only battery kit set that can deliver such power—yet the H.T. current consumption is far less than that of the average 3-valve set.

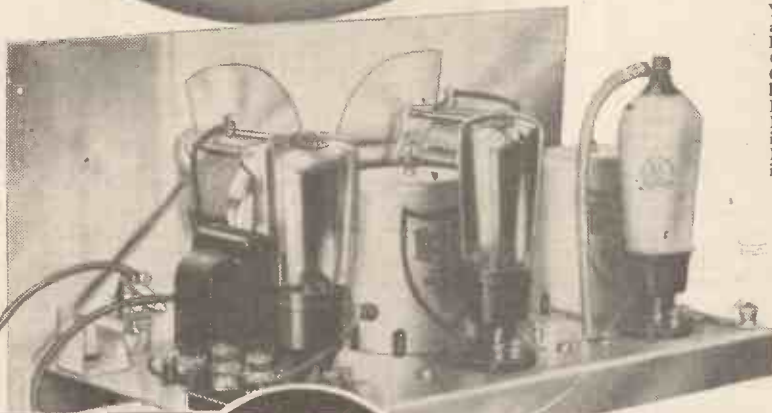
**GREATEST CHART EVER PUBLISHED!**  
**GREATEST SET EVER BUILT!**

Lissen have made the building of the Skyscraper extremely simple for you. Elaborate care has been taken to ensure your success by giving in the Skyscraper Constructional Chart such detailed instructions and such profuse illustrations that everybody, with no technical knowledge or skill at all, can build it quickly and with complete certainty of success.

You buy the Lissen Skyscraper Kit, complete with valves, a Lissen Metallised S.G., a High-Mu Detector, and a Lissen Economy Power Pentode Valve, and the price is only 89s. 6d. Or you can buy the Lissen Walnut Console Skyscraper Cabinet and Loudspeaker combined as illustrated. It holds all batteries, and accumulator and loudspeaker as well. It makes everything self-contained. A special Pentode Matched Balanced-armature Loudspeaker of great power is supplied with the cabinet, and the price of the Skyscraper Kit, complete with valves and this cabinet and loudspeaker, is only £6 5s.



COMPLETE WITH CABINET AND LOUDSPEAKER **£65** or 11/6 deposit and 12 monthly payments of 10/6.



KIT COMPLETE WITH METALLISED S.G. HIGH MU DETECTOR & ECONOMY POWER PENTODE VALVES

**89/6**

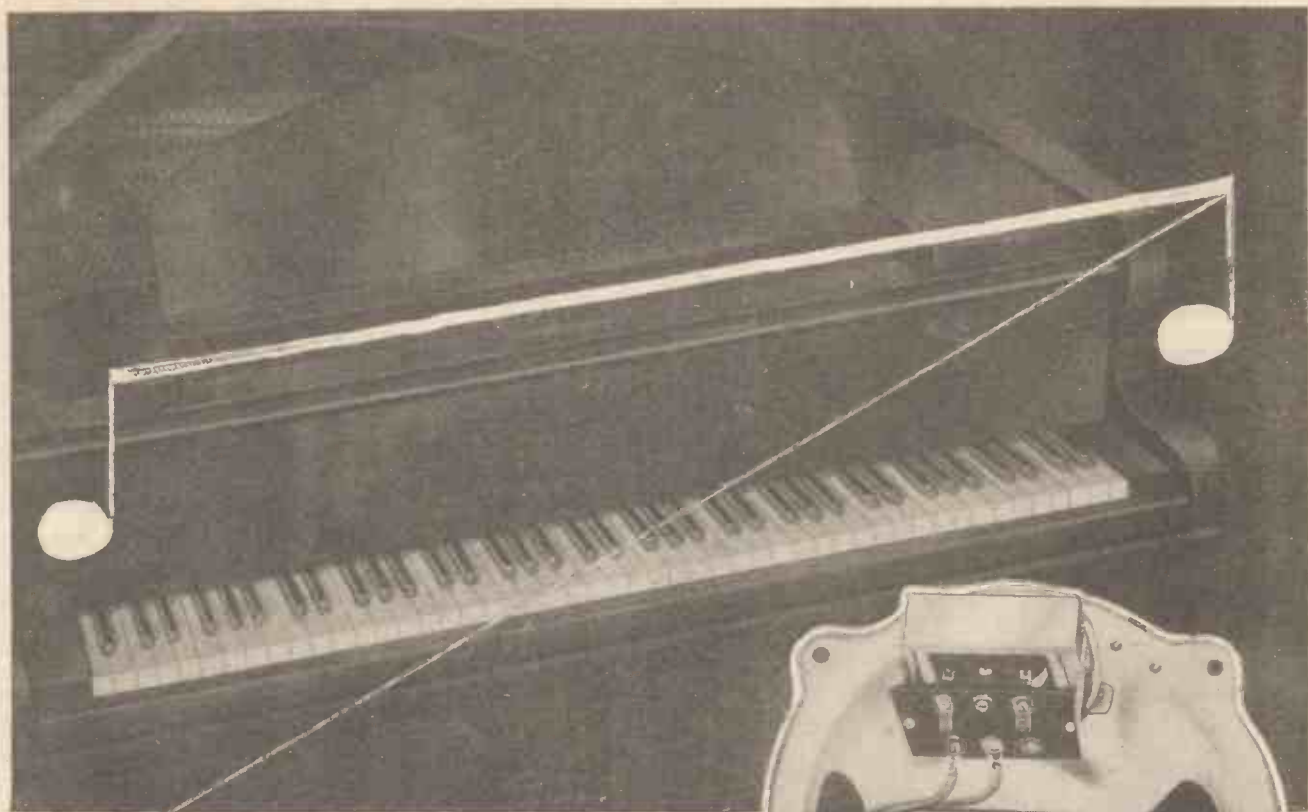
Or 8/6 deposit and 12 monthly payments of 7/6.

**GREAT LISSEN CHART FREE**  
 ASK YOUR DEALER OR POST THIS COUPON

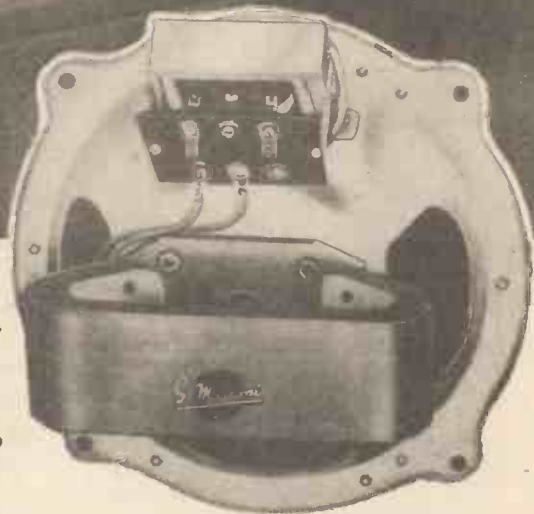
**LISSEN SKYSCRAPER KIT**



TO LISSEN LTD., Dept. P.W. 11, WORPLE ROAD, ISLEWORTH, MIDDLESEX.  
 Please send me FREE copy of your Skyscraper Chart.  
 Name.....  
 Address.....



*from deepest bass  
to highest treble*



Here, at last, is 'big unit' performance at 'small unit' cost—here is a new, large Permanent Magnet Moving Coil Unit, surpassing the most expensive types in performance, yet costing only 49'6.

Marconiphone Model 95 handles the output from the largest receiver with consummate ease. It's unprecedented breadth of tone provides a degree of realism which must be heard to be appreciated, the response at both ends of the scale being extended well beyond previous standards. Sensitivity is extraordinarily high, equalling the best cone speakers; the universal input transformer is immediately adaptable to any set, while the complete unit can be mounted on cabinet-front or baseboard as desired.

- 1 Massive cobalt steel magnet of permanent efficiency.
- 2 Full-size universal input transformer.
- 3 Specially impregnated self-centering cone.
- 4 Ultra-rigid rustless steel chassis.
- 5 Generous air-gap, increasing reliability and eliminating clatter.
- 6 Rustless, copper-plated pole pieces.

*just released*

**MARCONIPHONE** MODEL '95'



*-at forty nine and six*

# RECEIVERS OF RENOWN



## No. 11.—MACNAMARA “THE GOLDEN VOICE” RECEIVER

A New All-Electric Receiver for A.C. Mains.

**I**F you won £30,000 in a sweepstake, how would you spend it? This theme, with variations, appears every year in the newspapers, but so far no one seems to have had the idea of bringing the competition nearer home by asking for suggestions as to the best way of spending, say, £15.

Were such a competition to be started we very much suspect that a large number of competitors would elect to spend the money on the Telsen Macnamara “Golden Voice” Receiver. Not only because it would be hard to find better value for money anywhere, but also because, with this receiver, the Telsen Electric Co., Ltd., has brought everything that is good in electric radio within the reach of Mr. Everyman.

### Unsurpassed for Efficient Results.

In the days when really good receivers were few and far between it was not too difficult a task to select outstanding models. But to-day, when there are no “bad” receivers, we are obliged to apply such stringent tests that those which survive must be of the very highest order.

That the Macnamara “Golden Voice” should have passed through each and every one of these tests with honours is in itself sufficient proof that the brains and the reputation of the Telsen Company are behind this fine set.

The “Golden Voice” is an all-electric three-valve receiver designed for A.C. mains. It makes use of the Screened Grid, Detector and Pentode circuit which has now proved itself unsurpassed for efficient all-round results. But the designers have put all their knowledge into the refinements of this circuit so that it is not just “another three-valver,” but rather one of “the best three-valvers of its kind.”

The valves are of the indirectly-heated type suitable for mains voltages of 200/250 A.C. and the fourth valve in the receiver is employed for rectification.

### Silent in Operation.

We found that the model sent us for test and report was singularly hum free, and there was no occasion to make use of the “hum adjuster.” As the makers themselves say, “the hum adjuster need hardly be considered.”

In addition to the ordinary aerial, provision is also made for plugging in, at a moment's notice, a mains aerial incorporated in the set. This is useful in cases

where it is desired to work the receiver in different rooms.

Ganged tuning is, of course, provided with single knob control and a dial calibrated in wavelengths. The trimmer incorporated with the tuning knob makes that final little adjustment easy to obtain without delving inside the cabinet.

The controls are arranged on the front of the receiver below the speaker fret with a nice regard to appearance as well as to ease of operation.

On the left will be found the Selectivity control which takes the form of an aerial series condenser, self-shorting so that maximum volume can be obtained when necessary.

A two-way ganged wavechange switch occupies the centre position, and we found it particularly smooth and silent in operation. The reaction, on the right, is also remarkably

“Voice” on test we intended to keep a full log of the stations received at loudspeaker strength. But we were so carried away by the fascinating business of hearing the stations practically separate themselves from their neighbours, that our log was soon forgotten. But it was quite evident from our tests that the set could be relied upon to provide literally dozens of excellent alternative programmes, and more than that there is no need to say.

### An Excellent Proposition.

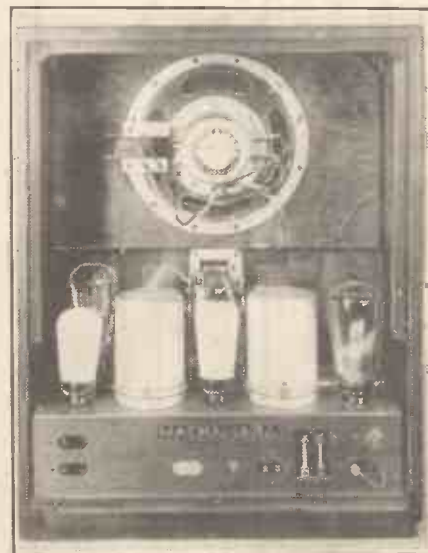
Two points we would like to pass on. The pentode provides an output of just over 2 watts to the built-in moving-coil speaker which makes listening to even the most distant broadcaster a pleasant, unstrained business. And the total consumption is less than 60 watts, or about that of the ordinary household lighting bulb.

There is nothing cheap about the Macnamara “Golden Voice” except its price. But quite regardless of price, it is a receiver which for efficiency and ease of control is outstanding, and it must necessarily be considered as among the very best receivers of the day.

Were its price twice as high we should praise it as an excellent proposition. As it is, we maintain that the Telsen Company could not have done more to provide the highest value for the shallowest pocket.

*(Continued on next page.)*

### THE LAST OUNCE



Expert refinements to the S.C., Detector and Pentode circuit have enabled the very last ounce of performance to be obtained from the receiver.

### TECHNICAL SPECIFICATION

**TYPE.**—All-electric table model receiver for A.C. mains 200/250 volts 50/60 cycles.

**VALVES.**—Four: Screened Grid, Detector, Pentode, and Rectifier.

**CONTROLS.**—Single-dial ganged tuning with trimmer; selectivity control; volume (reaction) control; and wavechange switch.

**SPECIAL FEATURES.**—Built-in moving-coil speaker of the mains energised field type; “hum adjuster”; provision for mains aerial, pick-up and external loudspeaker.

**POWER CONSUMPTION.**—53 watts.

**PRICE.**—Whitewood Cabinet Model 12 Gns.; De Luxe Model 15 Gns.

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

smooth and gradual—that is on the few occasions on which it is necessary to make use of it.

The mains “on-off” switch will be found in its proper place at the back of the chassis close to the fuses and the mains plug.

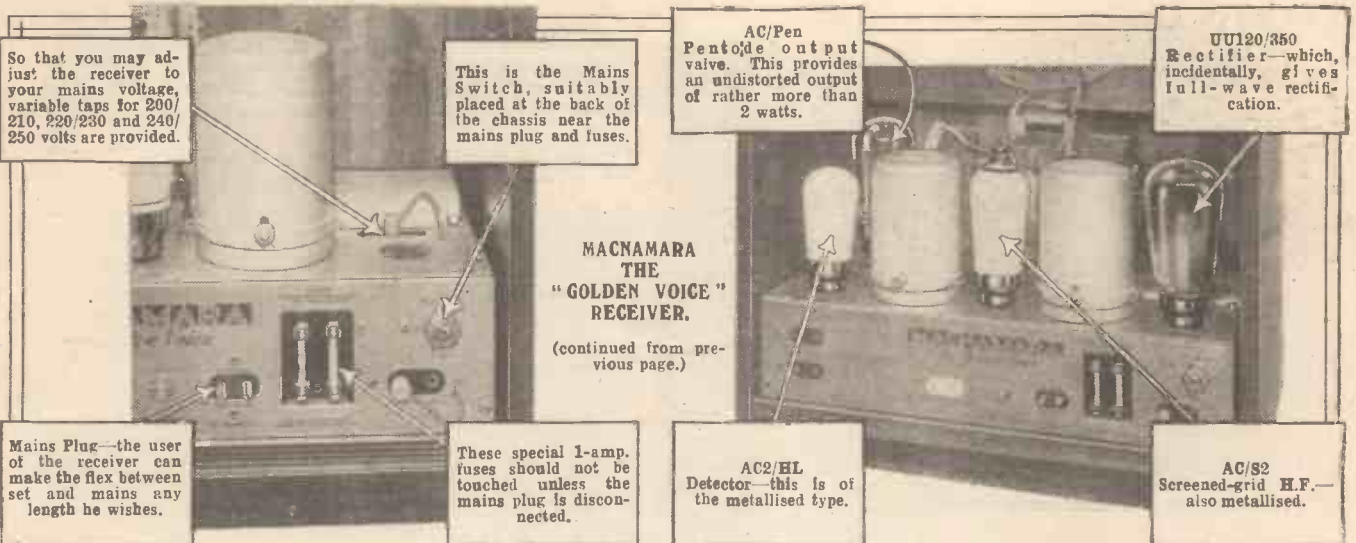
At the back of the chassis will also be found sockets for connecting pick-up leads and also for the use of an additional loudspeaker.

As we rather suspected before we took the back off the cabinet, the internal construction was evident of a carefully-thought-out design. Precision in every detail, handsome workmanship and extreme accessibility are the features of the design.

So much for the receiver and what it is—what of its performance?

As a general rule we set our face sternly against any liberal use of superlatives, letting a new receiver stand on its own results.

Quite honestly, when we put the “Golden



So that you may adjust the receiver to your mains voltage, variable taps for 200/210, 220/230 and 240/250 volts are provided.

This is the Mains Switch, suitably placed at the back of the chassis near the mains plug and fuses.

AC/Pen Pentode output valve. This provides an undistorted output of rather more than 2 watts.

UU120/350 Rectifier—which, incidentally, gives full-wave rectification.

**MACNAMARA  
THE  
"GOLDEN VOICE"  
RECEIVER.**  
(continued from previous page.)

Mains Plug—the user of the receiver can make the flex between set and mains any length he wishes.

These special 1-amp. fuses should not be touched unless the mains plug is disconnected.

AC2/HL Detector—this is of the metallised type.

AC/S2 Screened-grid H.F.—also metallised.

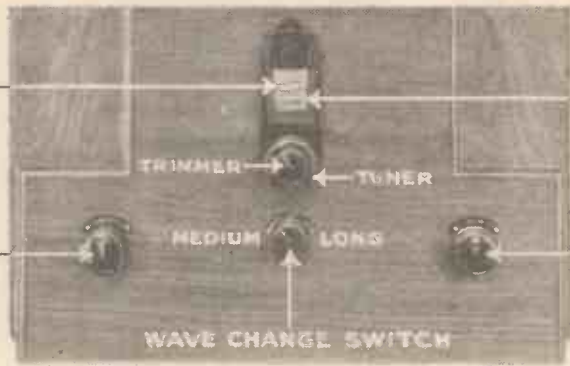
**TUNING ARRANGEMENTS**  
pictorially described.

The medium-wave stations are shown by wavelength on this half of the dial.

On this side are to be found wavelengths between 1,000 and 2,000 metres.

Station Separator, self-shortening, for big volume.

Volume Control, operating on reaction.



IF TWO STATIONS COME IN TOGETHER



TRIMMER TUNER

★  
These views of the front of panel give an excellent idea of the extreme simplicity of operation of this new three-valve receiver. It will be seen that a control is provided to meet every requirement of a really up-to-date design.



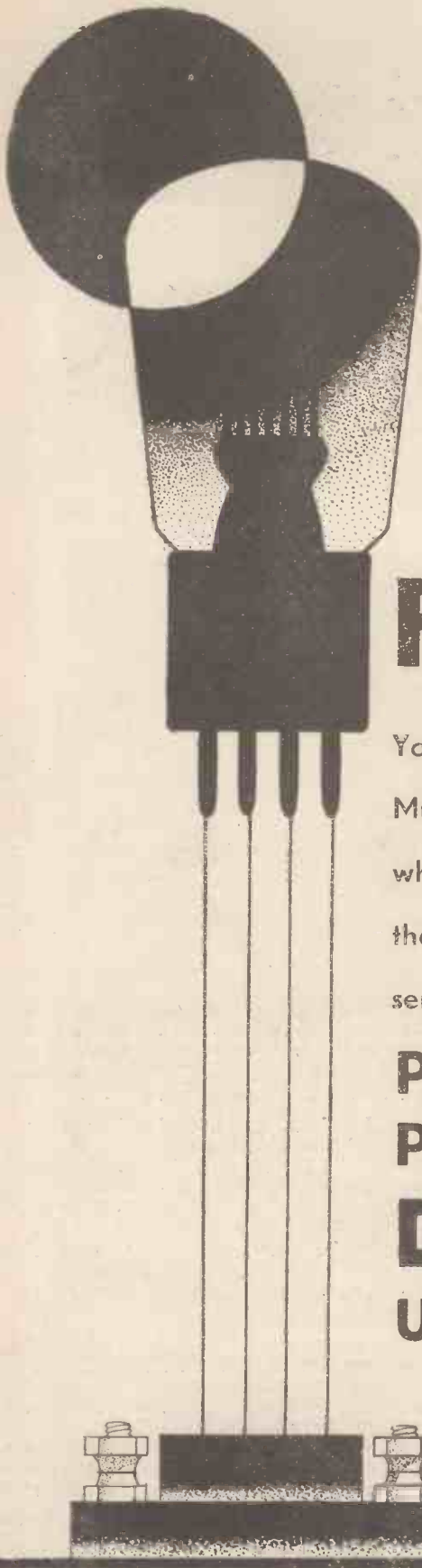
IF VOLUME IS NOT SUFFICIENT



TRIMMER

★ ★ ★  
Carried out in walnut, the cabinet makes a most handsome table model with an original speaker fret.

★



# FOR THE S.T.400

You remember the S.T.300? Here is its successor—and Mullard valves are again specified. There is a reason why Mullard valves are chosen by leading designers—their proved reputation for reliability and consistent service. The valves specified are:

**P.M.12A<sub>(MET)</sub> P.M.1HL<sub>(MET)</sub> P.M.2DX**  
**P.M.2A OR P.M.202**

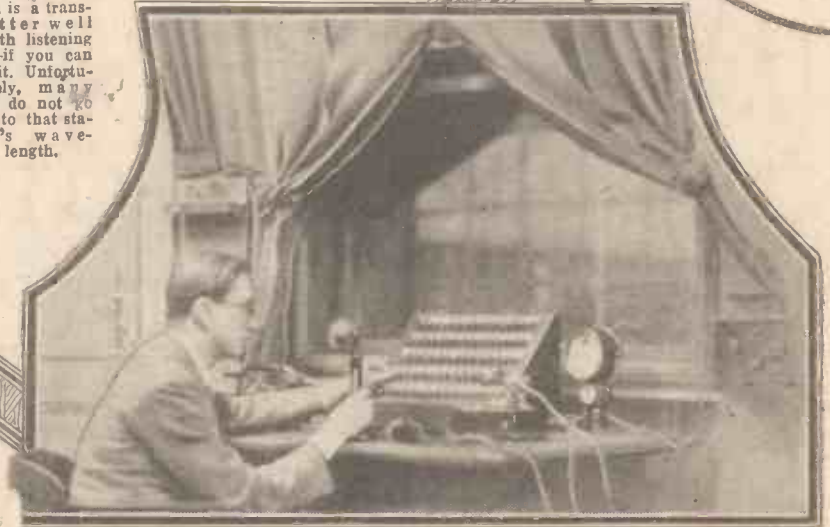
**DO IT NOW —**  
**USE**

**Mullard**  
**THE MASTER VALVE**



Far too many broadcast programs to inadequate tuning systems, arrangements to ensure that coverage of wavelengths that broadening band covered by broadcast receivers in use to-day that definitely getting powers. In future all new A-Z standard, a standard that

Vienna, on the left, is a transmitter well worth listening to—if you can get it. Unfortunately, many sets do not go up to that station's wavelength.



The main studio control-room of the Budapest station—one of the many that are not receivable by sets that do not pass the A-Z standard. Below, on the left, one of the "P.W." research engineers is experimenting with a simple home-made coil that is to cover an exceptionally wide band of wavelengths.



**D**URING the last year or so the waveband range of European broadcasting stations has been gradually widened, and by all the present signs the spread over the band from 170 to 2,000 metres is going to be further increased.

One of the British stations is likely to go down to 200 metres, and there are persistent rumours that another will be placed in the region of 580 or so. In any case there are transmitters of good programmes all over the band from 170 to 2,000, making the necessity of getting as wide a tuning range as possible a very vital one.

The whole object of having a radio receiver is to be able to tune in

broadcasting stations, but how many sets are there that can honestly be counted as making the most of even their present opportunities in the way of station-getting? No matter how many valves you have, nor how sensitive the set may be, it can only get as many stations as its tuning system will allow.

**How Many Stations?**

Sheer common sense, you will say. Yes, sheer common sense, but how many stations can your set get? I am not concerned with how many it does get, but how many it is possible to receive with the present tuning range it employs.

There are roughly 220 programme broadcasters in the European ether; how many of these can you possibly hope to get on your set?

Let us look into the question a little closer. Suppose that you have a three-valve receiver and the man next door has a four- or five-stage set. You will say at first glance that he will get more stations than you because he has a "better" set; because it has more valves. That may be

B  
K.  
ROG  
"P  
Wire  
Rese  
Depar

# A-Z SYSTEM

are being lost to set owners owing popular Wireless" is making elaborate its future set designs the maximum achieved to cope with the ever-increasing stations. There are a great many do not make the most of their station-popular Wireless" sets will conform to a will ensure maximum station-getting.



A distant view of one of the most interesting of Europe's -broa- stations.

By D. GERS, "Popular Wireless" Research Department.



You would not think that some receivers cannot receive Newcastle, whose offices and studios are shown here, but it is a fact that quite a number of present-day coils do not tune down to it. The Aberdeen station, whose studio is seen on the right, is another of the unfortunate broadcasters that are left out in the cold. Below on the right can be seen a "P.W." set undergoing the new A-Z tests.

right, or it may not. It depends on many things. If your set covers a larger waveband you will probably get more than he does.

What is certain is that both your set and his are probably missing a large number of transmissions that they need not miss. Those stations are being missed *compulsorily*. You cannot get them, however much you want to, nor if you try for a week or a month, or for ever. Why? Because you cannot tune up or down to them.

### Opportunities That Are Missed.

It is an amazing state of affairs, but a large number of receivers in this country (we are concerned with European broadcasting) are prohibited from receiving about 30 or more stations. Many will have to miss the opportunity of getting 40 or 50; not because the sets are insensitive, nor because they are unselective, *but because their tuning arrangements forbid the use of certain wavebands—wavebands on which are good, healthy broadcasting stations.*

These stations are nightly shooting their programmes into desert air as it were.

People are not listening to them, because they can't. Their sets are insensitive enough, they are sensitive enough but they won't cover the lengths on which those stations broadcast.

It is a peculiar state of affairs, but there it is.

Look at a full European broadcasting station for yourself how many you can hear on your present receiver because the receiver will not tune down far enough to bring them in.

I have been carrying out a number of tests with typical sets during the last few months, and I have been astonished at the number of programmes that are *verboten* to those sets.

One four-valver I tried brought in quite a lot of foreign programmes, but it omitted to get two of the *British* stations, besides a whole lot of further continentals that should have been easy meat to it. Why? Because the tuning range was restricted, as in

(Continued on next page.)



# THE NEW A-Z SYSTEM

(Continued from previous page.)

every other set I have tried or listened to since the days of plug-in coils.

Another set I tried gave wonderful results from about 180 to 486 metres, and also from 800 to 1,800. But look what it missed, a whole host of interesting stations—Prague, Florence, Brussels No. 1, Vienna, Riga, Munich, Sundsvall, Budapest, Wilno, etc.

The first set I mentioned had a tuning range that cut off before one got down to such important stations as Belfast, Bordeaux, Cork, Fécamp, Aberdeen, Newcastle, and so on. It went up well to about Budapest, but it would not go down.

What are the average ranges of the home-constructor receivers? Here are three typical lists of wavelengths covered. (A) 240 to 526, and 850 to 1,850. (B) 225 to 509, and 900 to 1,800. (C) 175 to 486, and 950 to 2,000.

### Very Misleading.

All have gaps that could with advantage be filled in, and at no more cost than at present. An illustration on this page shows pictorially what some of the various coils on the market miss (obviously they cannot be named), and from them you will be able to see how much handicap various sets have as a start on their station-getting.

The specified wave-range of a coil is misleading, too. Some of those tested and mentioned do not appear too bad on paper, but it must be remembered that the figures given by coil makers are usually those obtained on a wave-meter, and not in actual service in a receiver.

Thus such limiting factors as minimum capacity of the tuning condenser (which if it be a ganged assembly is particularly high owing to trimmers, etc.), and the capacity of the wiring are not accounted for. And these would put a higher limit on the lower calibration of each band.

### In Practice.

Also the fact that in actual practice the first and the last 5 to 8 degrees of the tuning scale are pretty well useless for station-getting is not taken into account. So if you have a coil whose laboratory wave-range is 220 to 510 (quite an average range), it is on the cards that the actual in-practice range will be 228 to 510, and the useful range more like 232 to 500.

It is possible to tune in stations that come

right at the end of the tuning scale, but it is not particularly easy and a great many set owners undoubtedly miss them. The specified tuning range of a set should take that into account, and should be arranged to overlap the ends of the ranges by a sufficient margin to allow those stations to be tuned in.

### A New Policy.

In future, POPULAR WIRELESS is subjecting all set designs to a number of very stringent tests which are devised so that we shall be perfectly sure that every receiver will cover the maximum amount of wave-band for its type.

You have read how many sets are incapable of getting such stations as Newcastle, Aberdeen, Vienna, Budapest, and others. This is due to no inherent fault in the circuit itself, but to the coil design, and in many cases to the variable condenser employed.

Gradually, but insistently, all sorts of inferior components have been creeping on to the market. Coils have arrived which on laboratory test will cover but from about 200 to 500 metres, while when they are connected into a set the restriction of range is worse, owing to the minimum capacity being increased by stray capacities of wiring, condenser trimmers, and so on.

In future, POPULAR WIRELESS is going to set its face against such coils, they do not cover enough of the wave-band to warrant their place in our sets.

Similarly condensers that come far short of the specified maximum capacity (as unfortunately many do) will be barred. We want as many stations as it is possible to get, and the only way to do this is to

arrange that the sets shall cover as many wavelengths as possible.

The ideal is a set that will go non-stop from about 170 to 2,000 metres, and this is likely to be a possibility in the near future, for several of the coil manufacturers are considering coils that will give this amazing range. But more of those later.

Stray capacity is a great cause of sets being unable to tune down; in which cases such stations as Fécamp and those two northern Britishers we have mentioned are lost. In future sets are to be tested scrupulously for any excessive strays, ganged condensers will come under special scrutiny and if the trimmers are militating against successful tuning ranges the condensers will be discarded for others.

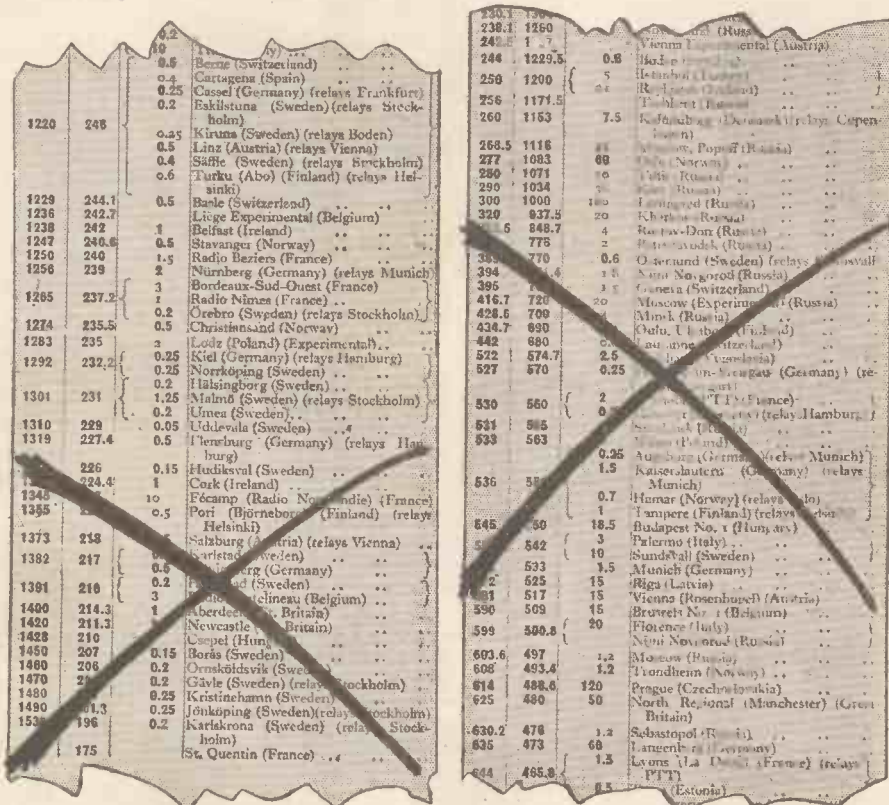
POPULAR WIRELESS is thus introducing a new era of set design. An era that will constitute a very marked step forward in the quest for perfect radio. Many sets will be designed and the details published wherein the full range of stations will be covered, the tuning will run from 170 to 2,000 metres dead.

### Laboratory Ranges Useless.

We use the expression "dead" because nowadays, although the coil may be listed as having a range of 200 to 550 metres, it is doubtful if this range is materialised when the set is built. Laboratory ranges are no good, we must work to practical figures, and that is how we are going to act in the A-Z system; a system that will ensure that every reader gets the last ounce out of his set; everything from A to Z.

Some of the preparations that we have made will be described in the near future, as will the new coils that are to give 100 per cent wavelength coverage, and readers can alter their present sets to the new system if they so desire. Diagrams will be marked to denote that the sets to which they refer have passed the A-Z tests, which will not only be concerned with the wavelength covered by the receiver, but also with the general efficiency and ease of operation.

## STATIONS OFTEN MISSED BY RADIO RECEIVERS



Results of tests on typical receivers are vividly portrayed in this illustration, showing how quite a number of stations are unobtainable on some present-day receiver designs. The stations usually affected are shown deleted from these reproductions from the B.E.C.'s official list.

### New Stringent Tests.

Naturally, the type of set will have to be taken into account, but no matter what the type, the receiver will have to pass the stringent tests that are being prepared and put into operation right away.

This method of set testing will safeguard the reader as regards the tuning limit and general efficiency of his receiver, ensuring that he will get the very best out of it.





*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.

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

The D.C. "Flex-Feed" specifies :

- 1 3 Meg.
- 1 500.
- 1 250.
- 1 30,000.
- 1 20,000.

## Graham Farish OHMITE RESISTANCES

**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 .005 mfd. to  
.004 mfd. .01 mfd.

**1/6** **1/6**

The D.C. "Flex-Feed" specifies :  
1 .01 Fixed Condenser.



# GRAHAM FARISH COMPONENTS

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

## HINTS ON HANDLING

# THE P.W. "SKY HAWK"

These notes on getting the best from the fine S.G., Det. and L.F. receiver described last week will be of interest and value to all owners of this class of set, as well as to builders of the "Sky Hawk" itself.

By a "P.W." Technical Staff.

THE meritorious simplicity of the design and operation of the "Sky Hawk" enables this article on how to handle it to cover points which also occur in many other receivers; and it is hoped that the various little niceties of operation to be discussed will assist not only "Sky Hawk," but many other S.G.-Det.-L.F. owners to coax the last ounce out of their receivers.

What are the chief factors of success in such three-valve reception? And how can they be assured in the varying conditions which are found in practice when a set is built and used in all sorts of localities—some near to powerful broadcasting stations and others "in the wilds"?

### Limiting the Local

First, as to selectivity. The listener who lives near a powerful B.B.C. station will be debarred from many delightful foreign programmes unless his set is capable of sharp tuning. Sharp enough to restrict that powerful "local" to just a few degrees of the dial, instead of "spreading" to a large proportion of it.

In the "Sky Hawk" selectivity is governed by the adjustable aerial tapping on the first coil unit. The plug for this can be placed in either the 1, 2, 4 or 5 socket of the unit, and the higher numbers give sharper tuning.

### Try Them All.

Generally an intermediate position—socket 2 or 4—is satisfactory, but they should all be tried in turn to see which one is best for all-round results.

And remember that the plug is very easily shifted, so if you go over, to, say, Eiffel Tower on long waves, or you want extra

power from a certain station, it may be worth altering the selectivity temporarily by means of the plug, and reverting to the former position when reverting to ordinary reception again.

In regard to the actual tuning of weak and distant stations the question of which two dials are of first importance, and which comes third in making the adjustments often puzzles the uninitiated.

Well, the rule for a set of this type is simply this: "Keep the tuning circuits

'in step,' and then use reaction if necessary."

When tuning dials are "in step" the circuits in question are adjusted to receive the same station, and this is more important than applying the last touch of reaction. But how is the inexperienced owner to know if his dials are keeping "in step"?

### The Right Procedure.

Simply by setting first the aerial tuning (left) to what he thinks is the correct position, and then listening carefully to the speaker as he rotates the H.F. (right) tuning dial.

At one point, and with a dial reading quite near to (but not necessarily the same as) that of the aerial dial, the set will be found to be specially "lively" and sensitive.

So leave the right-hand dial alone for a second, give a touch to the left-hand one (aerial) to get the desired station accurately

there, and then, leaving that alone, bring the right-hand dial "in step" again.

When the extra liveliness and punch prove that both tuning dials are set right, you can add a touch of reaction, and it will make a world of difference. But the rule is to get the tuning adjusted properly *first*.

Here is another point that would help many sets to better reception, watch the H.T. adjustment to the screening grid.

In some sets the plug is just fixed in the H.T.B. (or mains unit) at some hope-for-the-best voltage, and no attempt is made to get maximum sensitivity. But some valves need a bit of coaxing, with higher-than-usual or lower-than-usual voltage; so try adjusting this tapping when a weak station is tuned in, to see if you can improve your set in this way.

## LETTERS OF INTEREST

Capt. Eckersley on adapting a voltmeter for A.C., and a reader's suggestion.

The Editor, POPULAR WIRELESS.

Dear Sir,—From time to time in answering these many and varied queries that come to me I am bound to make mistakes, and I am equally bound to acknowledge the fact when I have done so.

It has been pointed out by the Radio Sales Manager of Ferranti Ltd., that on page 753 of the issue of August 20th I have committed an error, and I want as quickly as possible to rectify my mistake publicly.

A reader asked me how to adapt a moving-coil voltmeter for use with A.C., and I suggested inserting a rectifier in series with the voltmeter. It is pointed out that this rectifier will have to stand a full 500 volts across it because the voltmeter in question read up to voltages of this order. The writer of the letter, pointing this out, says that he is not aware that there is any rectifier which is capable of standing this voltage. That is where I take issue with him,—because I have seen a voltmeter in Australia actually used with a rectifier in this way, but the name and make of the rectifier I cannot recollect.

It was my fault not to point out that this voltage would in fact develop across the rectifier, and that the would-be user should specify this fact when ordering the rectifier. It would be of great interest if any of your readers could give me the name, make, and price of rectifiers suitable for this kind of work, because I am sure, having used one in Australia, they exist.

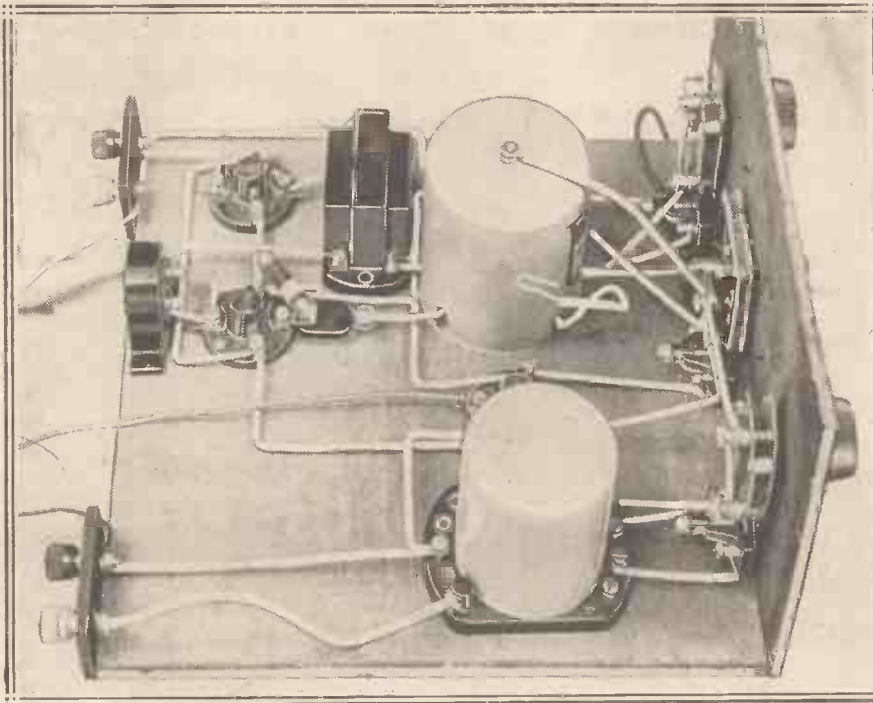
Yours faithfully,  
P. F. ECKERSLEY.

SHOULD "CROCODILES" HAVE TEETH?  
The Editor, POPULAR WIRELESS.

Dear Sir,—With regard to the handy and much used (especially by experimenters) Crocodile Clips, I think these articles would be greatly improved if the teeth were done away with and the gripping part made flat, but firm. My objection to the teeth is that they are apt to damage the wire to which they are attached, especially if the wire is of fine gauge, as is often the case. In some instances there is really no grip at all, as the fine wire simply lies between the teeth, thus making a loose or uncertain connection.

If the clips were made with tightly fitting and flattened surfaces about one-eighth of an inch wide, the grip would be the finest and no damage would be caused even to the finest wire. They would grip, but not *bit*.

Yours truly,  
A. J. WOOD.



## CANNED COILS CAN'T CAUSE CROSS COUPLING

By the adoption of self-screened coil units the rest of the wiring is rendered extremely easy, and yet there is no unwanted back-coupling.

Note the wire (coming from the Goltone coil unit) which is fixed to the anode of the S.G. valve when this is inserted in the valveholder that stands between the coil units.



**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 tuning 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

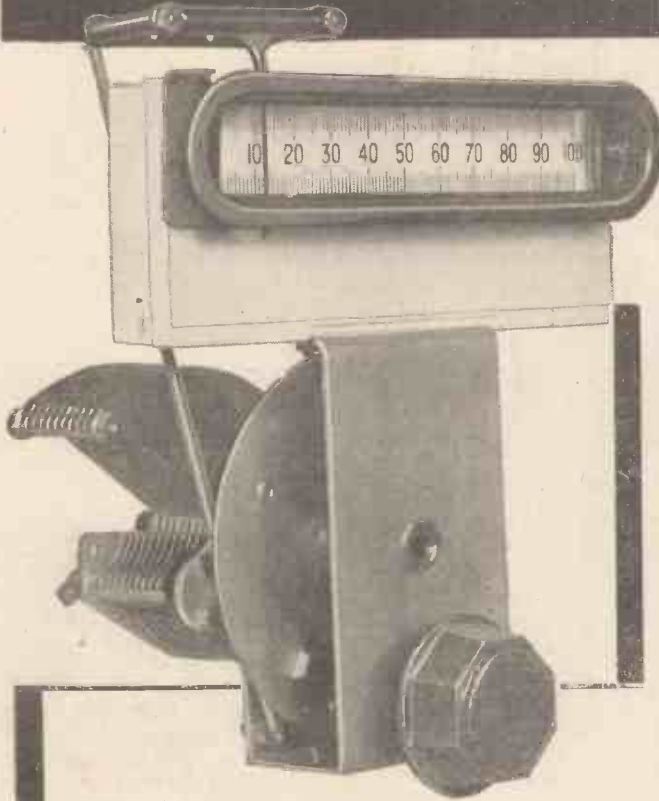
**2/-**  
EACH

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.

# THE PERFECT PAIR



Now, at a price no higher than you would pay for an ordinary condenser you can buy a Utility .0005 condenser complete with the Utility Straight Line Dial.

The Utility condenser is the standby of every discerning expert and amateur and needs no explanation. The Straight Line Dial makes every other type of tuning obsolete. A moving pointer traversing a stationary scale which is always in full view is surely the best method of tuning; but you can only get it with the Utility Dial.

From your dealer or post free from the Makers.

And look at the  
**PRICE**  
**9'6**  
complete as  
illustrated.

**WILKINS & WRIGHT LTD.**  
UTILITY WORKS, HOLYHEAD RD., BIRMINGHAM

London Agents:  
E. R. Morton, Ltd., 22, Bartlett's Buildings, Holborn Circus, E.C.4.

*Utility*

## The Most Up-to-date Book for the Boy with a Hobby!

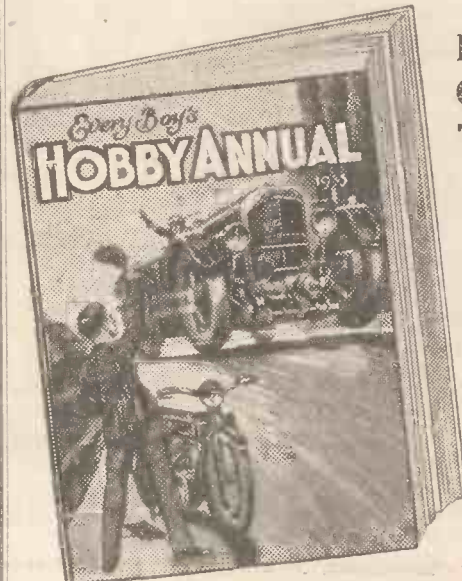
The fascination of discovering "How it Works" and "How to Make" is blended with lively talk about the world's most recent mechanical marvels in the HOBBY ANNUAL.



A Home Made

## MODEL SPEED BOAT

Any fellow can easily build this nippy model speed boat by following the directions in the 1933 HOBBY ANNUAL. This splendid book is packed with brightly-written articles on practically every hobby and subject appealing to the boy of to-day. There are interesting articles on stamp-collecting, model railways, wireless, woodwork, ships, aeroplanes, motor-cars, and so on. Every boy who is keen on making things and finding out how things work will want the HOBBY ANNUAL. It is profusely illustrated with hundreds of photographs and drawings that show "how" in the simplest way. There are two large folding photogravure plates. Make sure of a copy.



Buy Your Copy To-day

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**" . . . how glad I am at having bought it!"**

"I have just purchased one of your Standard Permanent Magnet Speakers, Type S.S.P., and I am very pleased to say how glad I am at having bought it. I tried it out against four other makes and none would handle it like the S.S.P."

H.E. (Blackburn.)



**THE**  
**Standard**  
**PERMANENT**  
**MAGNET**  
**SPEAKER**

Here's a typical appreciation of the *Standard* Permanent Magnet Speaker! Fit one in your set and you'll be just as satisfied. At the price, there's no speaker to touch it—and remember, it's built by *Standard*—the makers of the first "quality" speaker.

**Type S.S.P.**

**Standard Permanent Magnet Speaker Chassis (as illustrated.)**  
List Price, including Transformer, 41/6.

**Energised Types, from 30/9.**

Write now for the *Standard* Loudspeaker Chassis leaflet and particulars of *Standard* sets and Micromesh valves.

**Standard Telephones and Cables Limited**



(Radio Merchandise Dept.),

**St. Chad's Place, 364, Cray's Inn Rd., London, W.C.1**

Telephone: Terminus 6255.

**Designed on a**  
**NEW PRINCIPLE**

to give  
**LONGER**  
**LIFE** and  
**HIGHER**  
**AMPERE**  
**HOUR**  
**EFFICIENCY**



Type E.L.M.4.  
45 a/h capacity  
Price 8/-



Type E.L.S.7. 60 a/h capacity. Price 12/6

Type E.L.9. 80 a/h capacity. Price 12/3



The new Ediswan "balanced capacity" accumulator cell is an entirely new development. Careful re-designing of the positive and negative elements to ensure an exact electrical "balance" between them obviates the uneven charging inevitable with "unbalanced" accumulators and greatly prolongs their life. Consequently they are especially suitable for slow discharge work.

Every feature of the new Ediswan cell bespeaks attention to detail. British containers of clear glass, moulded ebonite lids, screwed vents, non-corrodible and non-interchangeable connectors and a carrier which fits neatly under a moulded projection of the glass container. In addition the E.L.S. types are fitted with "grease-cup" pillars to prevent acid creeping. See them at your radio dealers.

**EDISWAN**  
**EXTRA LIFE**  
**ACCUMULATORS**



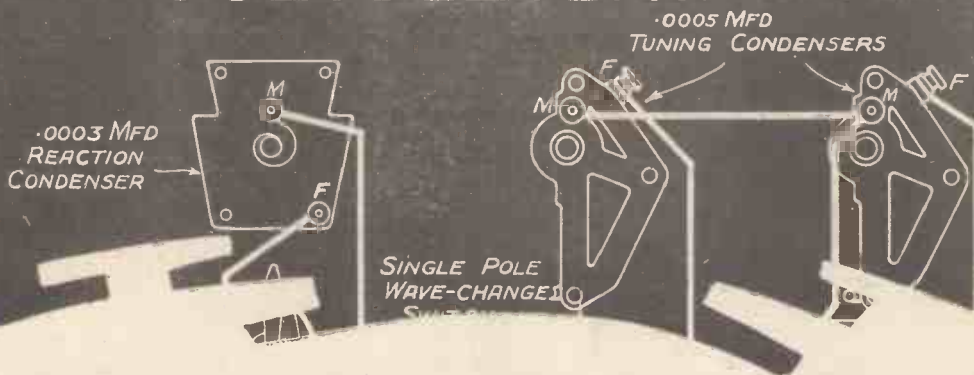
THE EDISON SWAN ELECTRIC CO. LTD.

155 CHARING CROSS ROAD, LONDON, W.C.2

B.197

**KIT KRITICISMS**

**FULL SIZE BLUE PRINT OF THE COLVERN P.W. "APEX"**



**A**MATEUR radio enthusiasts can be divided into two distinct classes—and I never can quite make up my mind to which I belong.

In the flat below mine there is a man who has been building sets for nearly ten years, and every set he builds is going to get more and more stations and reach out farther and farther into the ether. He gets a lot of fun out of logging fifty or sixty stations in an evening, but he doesn't worry much what the programmes sound like.

**Lot to be Said for "D.X."**

Then there's that cousin of mine who lives at Golder's Green. He is always ringing me up to come and listen to some new loudspeaker on a sixteen-foot baffle, and very nice it sounds, too. But he never wants to listen to anything except the "locals"—Rome, Prague and Lwow might never exist.

It's all very difficult, isn't it? And with every new set I test I find myself changing my mind as to which is the most enjoyable—distance or quality.

But I feel that anyone who builds the version of the famous POPULAR WIRELESS "Apex," from the blue print which Messrs. Colvern have prepared for home constructors, will feel that there is really a lot to be said for "DX" work!

"Coils by Colvern" has become as familiar a phrase to the radio enthusiast as "Cigarettes by Abdulla" is to the theatre-goer. And such a reputation is not achieved without very good reason.

Being one of those much-to-be-pitied flat-dwellers in—more or less—the heart of London, I boast no long and efficient outdoor aerial. Being, moreover, high up on the third floor my earth must perforce put up with the water-pipe which may, or may not, eventually reach the ground.

**Literally no Interference**

Consequently, while my conditions could not, with any stretch of the imagination, be called favourable, I am in an ideal position to give a severe test to the selectivity of any receiver.

\* \* \* \* \*

Last week Mr. Peter Simple dealt with the first of the two commercial versions of the "Popular Wireless" "Apex." Below he reviews the "Apex" as seen through the eyes of Colvern, Ltd.

\* \* \* \* \*

Listeners will know that Leipzig with its new power of 150 kw., and Frankfurt, which is now putting over its programmes much louder on Leipzig's old wavelength, provide additional troubles for the long distance man.

But I could find no trouble at all with the Colvern "Apex." There is, literally, no interference at all with any of the principal stations. All the British stations, Nationals and Regionals, naturally come in really well, but for my particular neighbourhood the bag of foreigners is really first class.

**A Generous Offer**

I make no claims for "forty or fifty stations on the medium wave-band"; I

will offer a handsome prize to the man who can show such results with my aerial and earth!

But I will say that the Colvern "Apex" has not only given me stations where no stations have been before with a three-valver, but has also, in many cases, provided two separate programmes out of what has, up to now, been a cacophony of unpleasant noise. Even I can want no more than that.

**The Small Things That Count**

I have made mention so far only of Colvern coils in this excellent kit. And very naturally, because it is primarily the efficiency and accuracy of the coils which provide the results.

But no receiver, however well its coils may be wound, can give good results if such things as switches and resistances are not up to the mark. I am pleased, therefore, to see that Colvern switches, and Colvern resistances have both been incorporated in the design.

It's the seemingly small things that count, and Colvern standards have been maintained throughout the receiver.

And what of the building? you may ask. The Colvern "Apex" kit differs every little in its essentials from the original POPULAR WIRELESS circuit; it would cease to be the "Apex" if it did.

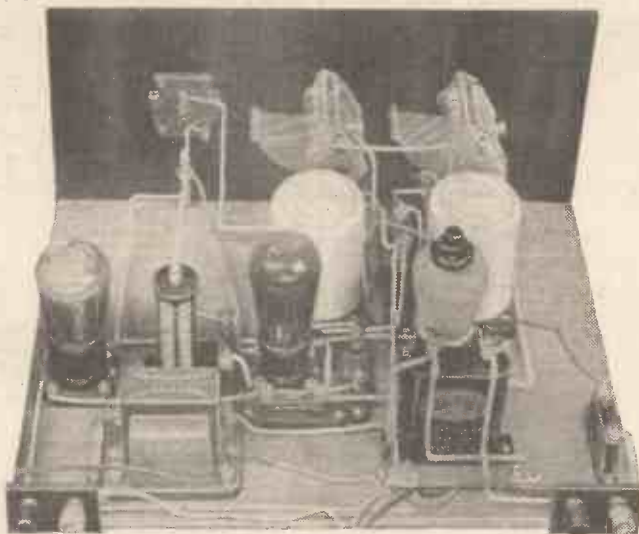
**Defying the Pessimist**

Every alteration, down to the last screw, is clearly shown in the special blue print which is supplied free as a part of the kit.

Only the other day a man told me that he would never be able to build a set from "one of those blue print affairs." Actually, of course, he had never tried; but I defy even this pessimist to go wrong when he has the Colvern "Apex" blue print in front of him and the components at his elbow.

However you look at it, the Colvern "Apex" is a most worthy addition to the ranks of kit sets, and a credit in its performance to the name of Colvern.

**THE HEART OF THE SET**



You will find no difficulty in recognising the Colvern coils in this photograph of the "Apex." On the right behind the S.G. valve and the condenser may be seen a Colvern strip resistance.

**THE BATTERY THAT POWERS THE SET**

**CONTROLS THE TONE**

**EVER**

**READY**

**WIRELESS BATTERIES**

**FOR LONG LIFE & PURE TONE**

Regd.  
Trade Mark.

The advertisement features a black and white illustration of two men smiling and looking at a large Ever Ready battery. The battery is a tall, rectangular unit with a dark front panel and a lighter-colored top section. The words 'EVER' and 'READY' are prominently displayed on the battery's front panel in a stylized, bold font. Above the battery, a line drawing of a human head is shown in profile, with lines indicating the flow of energy from the battery to the head. The text 'THE BATTERY THAT POWERS THE SET' and 'CONTROLS THE TONE' is written in a bold, sans-serif font across the top of the illustration. At the bottom of the battery, the words 'WIRELESS BATTERIES' and 'FOR LONG LIFE & PURE TONE' are written in a smaller, bold font. A small 'Regd. Trade Mark.' logo is located at the bottom right of the battery.

THE EVER READY CO. (GREAT BRITAIN) LTD., HERCULES PLACE, HOLLOWAY, LONDON, N.7

**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 CHOKE

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 CHOKE

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.	<b>5/-</b>
100 H. @	3 m.a.	8 m.a.	

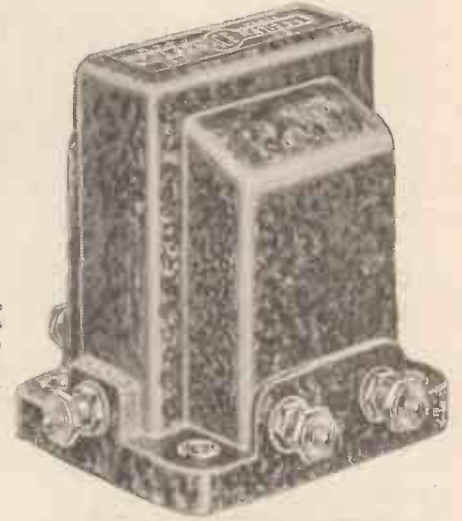
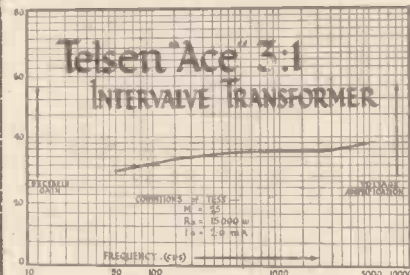
## TELSEN OUTPUT CHOKE

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"

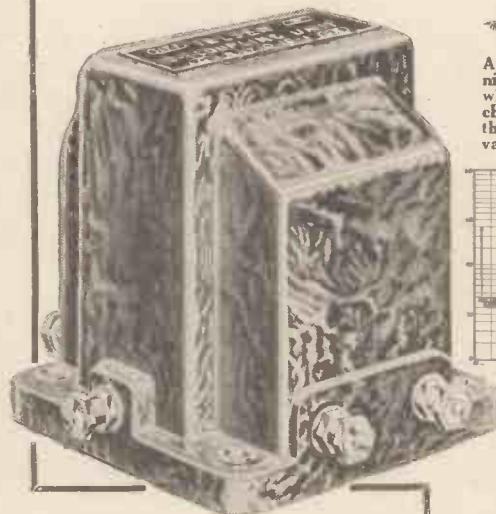
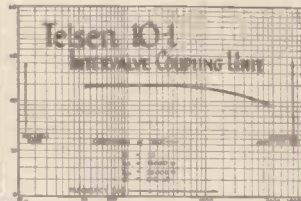
The Telsen "Ace" is eminently suitable for Receivers where highest efficiency is required at low cost and where space is limited. As its characteristic curve will show, it gives a performance equal to that of the most costly transformers. Ratio 3-1

**5/6**  
Ratio 5-1



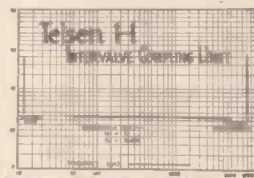
## TELSEN 10-1 INTERVALVE COUPLING UNIT

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**



## 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**



## 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**



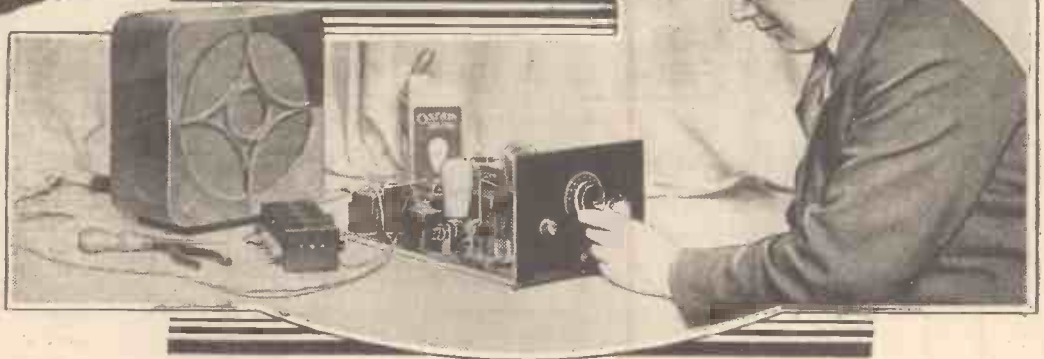
# The "D.C. FLEX-FEED"

TWO VALVES

"ALL ELECTRIC"

ALL YOU WANT!

BY THE "P.W."  
TECHNICAL STAFF.



NOT so long ago, the term "all-mains" as applied to sets was almost synonymous with "A.C." Very few users of D.C. employed their mains to supply the L.T. (unless via a trickle-charger) as well as the H.T. supply.

The ideal two-valve for all-mains D.C. working. It gives you big volume on near and far stations, and also plays your records for you. Just the set D.C. users are looking for!

But that is all changed now. The user of D.C. mains is just as anxious for an all-mains receiver as the user of A.C. mains.

The change has, of course, been brought about by the introduction of indirectly-heated D.C. mains valves, with characteristics just about as good as for the excellent A.C. indirectly-heated mains types. Thus

nearly all those advantages which were once the monopoly of the man with A.C. mains now accrue to those on D.C. as well.

Quality is Right.

Without doubt, this desire on the part of D.C. users to be as much up to date and "in the swim" as their "A.C. brothers" accounts for the number of readers of POPULAR WIRELESS who have requested the publication of a D.C. "Flex-Feed" since they read in the September 17th number of the A.C. version of this receiver. The advantages were very patent, and being in no wise lessened by the change to D.C. it is the ideal two-valve all-mains D.C. receiver.

You can get plenty of foreigners on it, and you can also get plenty of volume from it on distant stations as well as locals. And the quality is right; it is just as good on record reproduction as radio, too.

But don't expect to find the circuit nearly identical with the A.C. version, apart from

the power supply components. You must remember that a properly designed D.C. set is not necessarily simply an A.C. set

2 VALVES.—Osram D.H. and Osram D.P.T.; or Marconi D.H. and Marconi D.P.T.

LOUDSPEAKER.—Blue Spot, Ferranti, Marconiphone, Baker's Selhurst, Celestion, W.B., Epoch, B.T.H., Ormond, R & A, Lanchester, Igranic, Clarke's Atlas, H.M.V.

RECOMMENDED AERIAL AND EARTH EQUIPMENT.—Electron "Superial"; Graham Farish "Filt" earthing device.

arranged to be run on direct-current mains.

No, its design is by no means so simple and straightforward as that—would that it

(Continued on next page.)

## THE PARTS WE USED—AND SUITABLE ALTERNATIVES

- 1 0005-mfd. tuning condenser (Lotus slow-motion Log condenser, Lissen, Cyldon, J.B., Ormond, Polar).
- 1 00015 differential reaction condenser (Keystone, Lotus, Telsen, J.B., Ready Radio, Igranic, Ormond, Polar, Peto-Scott.)
- 1 L.F. coupling unit (Bulgin trans-coupler, Benjamin Transfeeda, R.I. Parafeed).
- 1 Cosmic Dual-Range coil (Wearite, Ready Radio, Lewcos, Sovereign, Goltone, Peto-Scott, Tunewell).
- 1 Compression type pre-set condenser, 0001-mfd. max. (Sovereign, Polar, Telsen, Igranic, Goltone).
- 1 0001-mfd. fixed condenser (Lissen, Telsen, T.C.C., Ferranti, Dubilier, Sovereign, Goltone, Igranic, Graham Farish).
- 1 3-meg. grid leak with terminals or tags (Graham Farish, Dubilier 1-watt type, Igranic, Lissen).
- 1 3-point push-pull switch (Ready Radio, Tunewell, Telsen, Lissen, Wearite, Peto-Scott, Graham Farish, Goltone, Bulgin).

- 3 2-mfd. fixed condensers (Telsen, Ferranti, Lissen, T.C.C., Dubilier, Igranic, Peto-Scott, Formo).
- 1 2-mfd. fixed condenser (Dubilier Type B.B., or see above).
- 1 4-mfd. fixed condenser (Dubilier Type B.S. 500 v. D.C. Test, or see above).
- 2 4-mfd. fixed condensers (T.C.C., Type 250 v. D.C. working, or see above).
- 2 2-mfd. fixed condensers (Dubilier Type 9200 non-inductive, or see above).
- 1 1-mfd. fixed condenser (Telsen, or see above).
- 1 Radio-gram change-over switch (Ready Radio, Bulgin, Tunewell).
- 1 0-500 milliammeter (Goltone Type R25/244, Ferranti, Bulgin, Sifam).
- 1 Smoothing choke (R.I. Hypercore DY22, Igranic, Wearite, Varley).
- 1 01-mfd. fixed condenser (Graham Farish, Dubilier Type 670, Lissen, Telsen, T.C.C., Ferranti, Dubilier, Sovereign, Goltone, Igranic).
- 1 H.F. choke (Lissen Disc Type, Telsen W.75, Graham Farish, Igranic, Lewcos, Peto-Scott, Ready Radio, Wearite, Varley, R.I., Goltone, Sovereign, Tunewell, Magnum).

- 1 500-ohm resistance (Graham Farish "Ohmite," Dubilier).
- 1 250-ohm resistance (Graham Farish, Dubilier, 1 watt).
- 1 30,000-ohm resistance (Graham Farish, Colvern Strip, Dubilier).
- 1 20,000-ohm resistance (Graham Farish "Ohmite," Dubilier).
- 2 Five-pin valveholders (Lissen, W.B., Telsen, Lotus, Benjamin, Bulgin, Graham Farish, Igranic, Clix).
- 1 Pentode output choke (R.I. Pentomite, Tunewell, Varley).
- 1 Twin fuseholder (Bulgin Type F11).
- 1 Mains plug
- 1 Terminal block (Belling & Lee).
- 2 Indicating terminals (Belling & Lee Type B, Bulgin, Clix, Igranic, Ealex).
- 1 Cabinet for 10 in. x 7 in. panel and 10 in. x 16 in. baseboard (Canco, etc.).
- 1 Panel, 10 in. x 7 in. (Permeol, Goltone, Peto-Scott, Wearite, Becol).
- 1 Baseboard, 16 in. x 10 in.
- 1 Piece of .034 in. copper foil, 10 in. x 16 in.
- 4 yds. of Systoflex and 5 yds. of 18-gauge tinned copper wire (Goltone, Wearite).

**THE D.C. "FLEX-FEED"**

(Continued from previous page.)

were! The receiver must be considered as a whole; every component from the series-aerial condenser to the fixed condensers of

the output filter have a certain bearing on all the others.

That is why you will find such differences between the two sets as pentode output valve instead of ordinary; a non-screened coil in one and a canned in the other, and differing methods of varying the selectivity. There are reasons for them all, although, unfortunately, we have not room to go into these reasons here.

Before commenting upon the one or two points in the construction which need mention, I will go over the main features of the circuit. After all, the circuit is the real pedigree, or passport, or whatever you like, of a set, and shows at a glance its true merits.

**Varying Selectivity.**

To start with, there is a pre-set condenser in series with the aerial lead, which enables fine variations in selectivity to be made, and also makes it possible to adjust the set to varying aeriels. If it is found unnecessary, which is quite likely with small indoor aeriels, the flex lead is joined to the side of the pre-set which is wired to No. 1 on the coil.

Once the necessary adjustments have been made for selectivity there is no need for them to be altered in the usual way. Sometimes, however, it is useful to cut out the pre-set, by moving the aerial flex, when working on long waves, even when the pre-set is found helpful on medium.

All the power required comes via the flex lead, and the set is thus remarkably easy to maintain. Its running costs will make no appreciable difference to your electric light bill!

In the grid circuit of the detector valve is the change-over switch for going from radio to gramophone. It is the only switch there is on the set, since switching on and off is achieved by the switch controlling the socket or plug into which the set is plugged.

Wired between the heaters of the two valves is a milliammeter reading 0-500 milliamps, which indicates whether the set is getting sufficient L.T. or not. The valves employed are of the .25 ampere type, so that the correct reading for the meter is about half-way, or 250 milliamps. This meter also serves to indicate whether the set is connected to the mains in the right direction.

Coupling between the two valves is by a parallel-fed-transformer unit, and decoupling is provided in the detector's H.T. lead.

**Suitable Tone.**

An output choke with four tapings enables the speaker to be matched up with the output valve, so that a suitable tone is obtained. All four taps should be tried to ascertain which suits your speaker best, but remove the mains plug before you make the change from one tap to another, and so avoid all possibility of shocks.

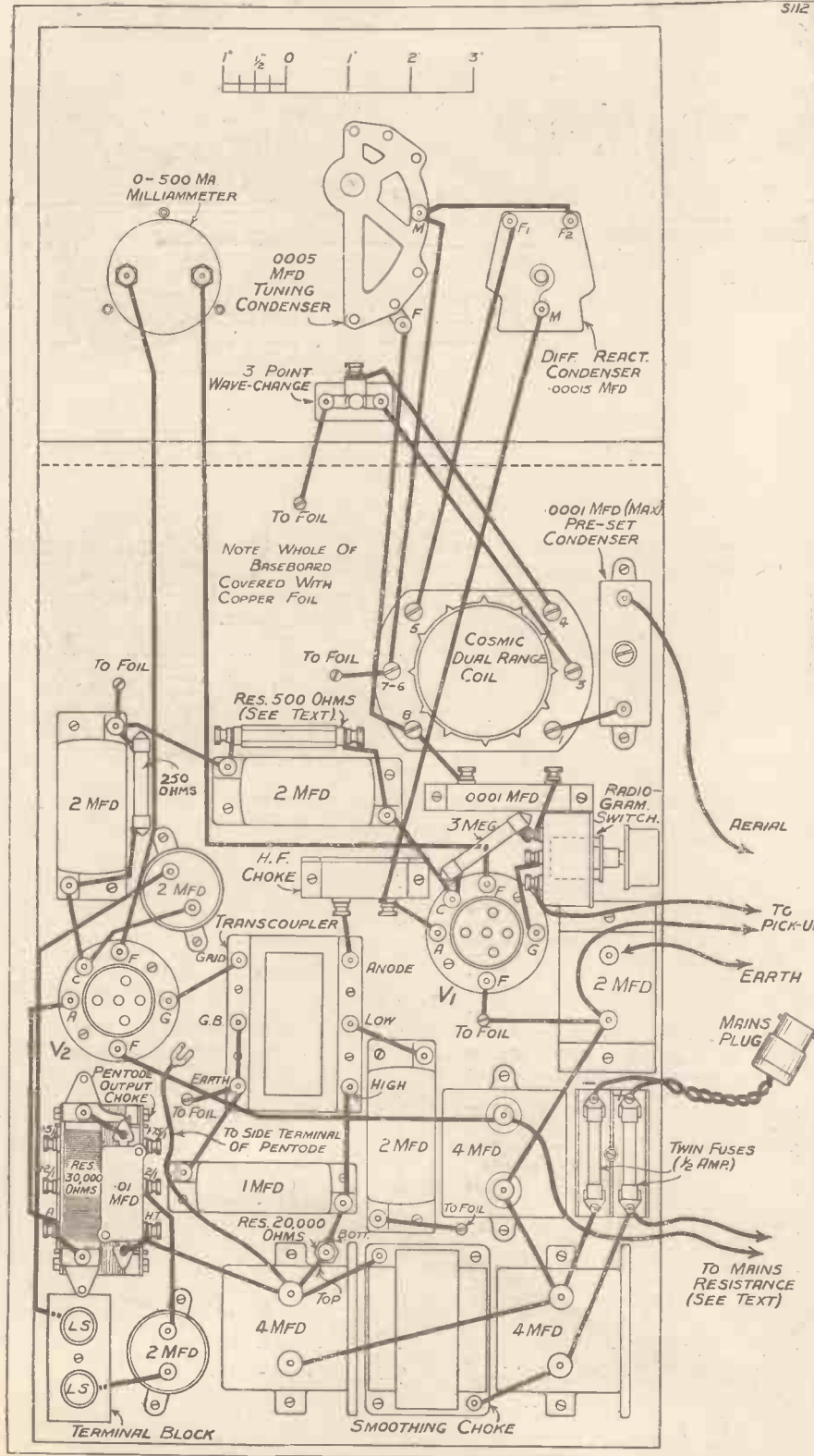
Finally, so far as the circuit is concerned, note the 1/2-amp. fuses, one in either mains lead. These protect both the set and the house fuses if anything "goes wrong" and a short is set up; and they are very easily changed. Incidentally, an extra safeguard is to insert a .001 mica condenser of high-voltage-test type in series with the aerial lead, externally to the set.

There's nothing what ever fearsome about the constructional work. It's just as easy as a battery two-valver, but, of course, there is more of it, which is quite natural since it really constitutes a complete H.T. and L.T. mains unit over and above an ordinary battery set.

The diagrams you will find easy to follow. Panel drilling dimensions are given in one practical diagram, while the other—the wiring—shows just how to arrange the parts

(Continued on page 610.)

**NO BATTERIES—JUST A MAINS PLUG**





**I** *t has happened*

**A PLATE-LESS  
ACCUMULATOR**

**R** *evolution at a stroke*

**TWICE THE LIFE  
PER CHARGE**



Your present accumulator—a cumbersome glass box loaded with heavy “plates,” and of small capacity. Your next—a simple cylinder, relatively light, and lasting twice as long on every charge! What a change over! By eliminating the wasteful, structurally weak, “plate” idea, the Block Accumulator, power-source of a new day, gives 80 amp. hours instead of the 40 you would expect, and of course lasts much longer. Will not run down when not in use. British, too—Faraday’s collaborator, John C. Fuller, dreamt of it, and through Fuller’s son and grandson Britain retains the honour of its final perfection. See one to-day at your dealer’s, in its beautiful, richly coloured Bakelite case. Booklet gratis.

*The*  
**B L O C K  
A C C U M U L A T O R**

2 VOLT AMP : 80 HOURS • 7" CAPACITY  
CHOICE OF BEAUTIFUL HIGH COLOURS

Advertisement of Block Batteries Ltd. (Sole Patentees), Abbey Road, Barking, London, E.

# THE D.C. "FLEX-FEED"

(Continued from page 608.)

on the baseboard and how to connect them up.

The whole of the baseboard is covered with copper foil before any components are screwed down. This foil is made use of for a number of the "earthed" points, all of which are marked "TO FOIL" in the wiring diagram. Clamping the wires under round-headed brass screws will do the trick; for no soldering whatever is needed in the construction of the D.C. "Flex-Feed."

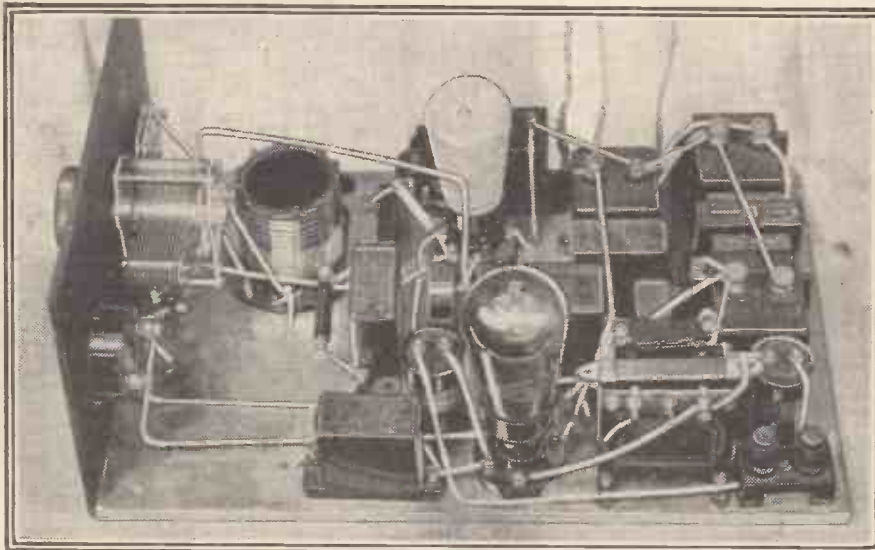
The only terminals on the whole set are those for loudspeaker, all the other external connections being taken direct to the necessary points. Holes or slots for these leads should be cut in the sides of the cabinet, which is home-made and of what may be termed the lid type.

That is to say, it has no bottom, just two sides, a back and a top, and fits over the set outside the baseboard and panel. Screws passing through the sides into the baseboard hold it in place.

In the left-hand side, looking at the set from the front, a round hole should be

### COMPACT AND ACCESSIBLE

Remarkable ease of construction—considering what the set will do—is attained by a carefully planned layout, shown in this photograph and the wiring diagram on a preceding page.



### A GOOD ALL-ROUNDER.

Among the features of the circuit are selectivity control to suit various localities and aerials, radio-gram switch and tapped output choke for matching the loudspeaker with the output valve. A double-pole fuse is also incorporated in the design.

cut opposite the knob of the radio-gram switch so that this may be turned while the "lid" is in place.

This component, by the way, is carried on a special bracket screwed to the baseboard.

On this side of the cabinet and outside, the heater resistance should be fixed.

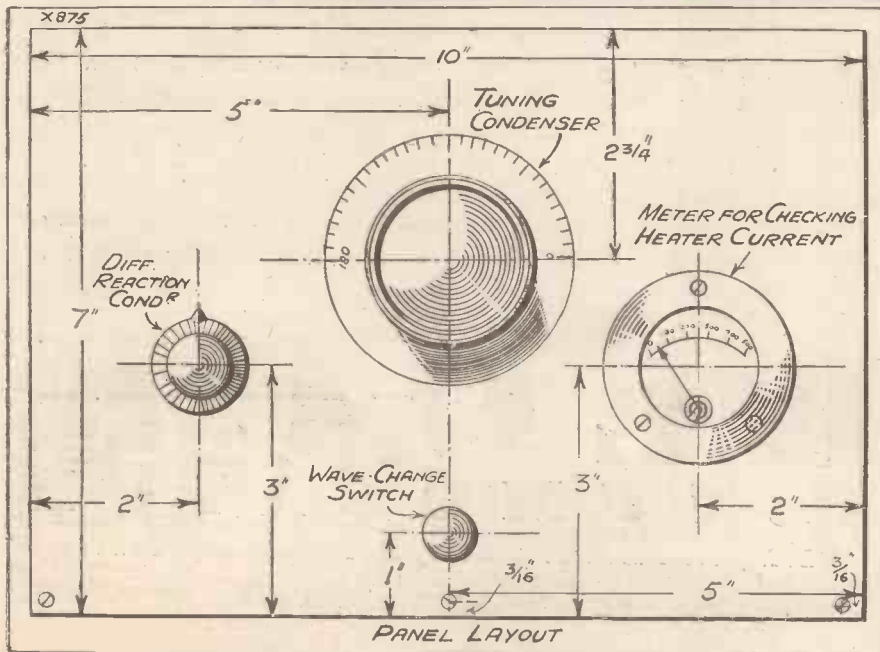
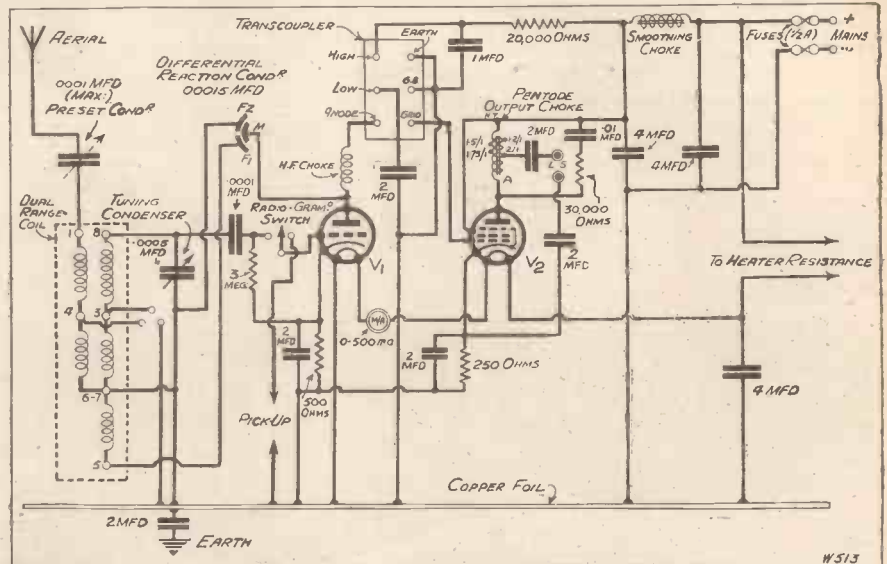
There are four terminals on this resistance, one marked "2 valves" and the other three marked in mains voltages. One of the leads marked "TO MAINS RESISTANCE," on the wiring diagram (it does not matter which) is taken to the end terminal marked for two valves, while the other is joined to the terminal of the remaining three which is marked with the voltage nearest to that of your mains.

### The Wrong Way Round.

Incidentally, this must be around 200 volts, otherwise a sufficiently high H.T. voltage will not be available to work the set properly. If the set does not work when you first connect up, it is most likely because the mains are applied the wrong way round.

This can be altered immediately by reversing the plug or adaptor in its socket. Although an adaptor for fitting into an ordinary lamp socket is shown in the diagram, a power or "electric-iron" point with a two-pin plug can be employed so long as it is controlled by a switch.

# PICK-UP PROGRAMMES WITH PENTODE POWER



Just the two operating controls—with a wave-change switch, and a meter for checking heater current—but the set has a tremendous range.

# ALL-WORLD ALL-WAVE RADIO

Build the Meteor S.G.3 and you are guaranteed at least thirty stations. Many users get as many as sixty to one hundred. The design was based on the famous S.T.300 circuit and gives huge volume on home and foreign stations. In addition you have the fascination of receiving ultra-short-wave stations from all over the world. **HUNDREDS OF MARVELLOUS TESTIMONIALS ALREADY RECEIVED.**

**METEOR S.G.3 KIT.**

Complete Kit of Parts with full instructions.

**£3.15.3**

or 9 monthly payments of 9/9.

**METEOR S.G.3 MODEL "A"**

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

**£8 : 17 : 6**

or 12 monthly payments of 17/-.

**METEOR S.G.3 MODEL "B"**

Complete Kit of Parts with set of three Mullard Valves (metallised Screened Grid, Detector and Power) with full instructions.

**£5 : 7 : 6**

or 10 monthly payments of 12/6.



**OBTAINABLE FROM ALL LEADING RADIO DEALERS**

## BUILT IN 20 MINUTES

'303' KIT  
**47/3**

Complete Kit of parts with full instructions. Deposit of 9/6 and 5 monthly payments of 9/-

**'303' MODEL "B"**

Complete Kit of Quality Components with set of 3 Mullard Valves, with full instructions.

**£3 : 10 : 0**

Or 7 monthly payments of 11/9

The simplest Detector-2 L.F. Set ever designed. Gives superb moving-coil reproduction and an excellent choice of home and foreign programmes. Incorporates wonderfully efficient dual range coil fitted with the unique four-in-one control—On-Off, Wave-change, Selectivity and Volume Control all operated by one knob.

**'303' MODEL "A"**

Complete Kit and Valves as above with beautiful walnut cabinet fitted with new type of moving-coil loudspeaker

**£6 : 17 : 6**

Or by 10 monthly payments of 16/-.

**COUPON.** To **READY RADIO LTD.** (Book Dept.), Eastnor House, Blackheath, S.E.3.

Please send me free copy of the Meteor S.G.3 and 303 Book containing full instructions, plans and photographs showing how to build these two wonderful sets. Also tell me about your REGISTERED USERS' SCHEME. I enclose 1½d. stamp to cover postage.

NAME .....

ADDRESS .....

P.W.14

# READY RADIO

## FROM THE TECHNICAL EDITOR'S NOTE BOOK

# TESTED AND FOUND-?



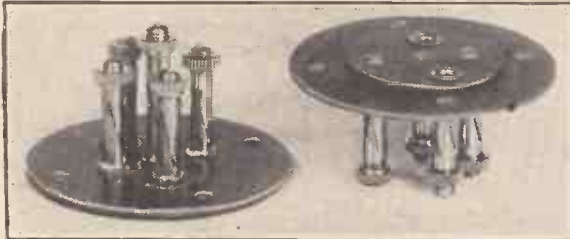
### CONCERNING CHASSIS SETS

THE chassis method of set construction is now quite universally employed by British manufacturers, although it was standardised in America years ago.

And Messrs. Lectro Linx state that 90 per cent of the firms in this country employ Clix chassis-mounting valveholders.

So far, however, constructors have not accorded chassis home-assembly designs

### THE CLIX VALVE HOLDERS



The four- and five-pin "Clix" chassis-mounting valveholders.

the welcome they extended to the ordinary baseboard schemes, though I must hasten to add that there are commercial chassis kits which have achieved considerable success. But that is a different matter.

However, it is a wide subject, and I cannot adequately cover it in a few paragraphs. Suffice it to say that we have chassis well in our minds and have always done so.

In the meantime it should be noted that Lectro Linx have four- and five-pin chassis-mounting valveholders fitted with screw terminals and thus suitable for use in home-constructor sets.

### T.C.C. FIXED CONDENSERS

If you choose fixed condensers for an A.C. set in accordance with the normal working voltages encountered in it, you neglect a very vital factor.

And that is that there will be surges of current rising to perhaps fifty per cent above the normal maximum. It is true that these "peaks" will be of comparatively

short duration, but they can break down condensers easily enough.

Therefore, as the Telegraph Condenser Co. has explained in recent advertisements, it is not sufficient to select condensers on nothing more than "working" voltages.

In their type 87 range, the figures at which the condensers will withstand peak voltages are quoted.

Thus the following information is provided:

"Tested to 1,500 volts D.C. Suitable for a continuous working voltage of 400 D.C. Designed to withstand peak voltages up to 650."

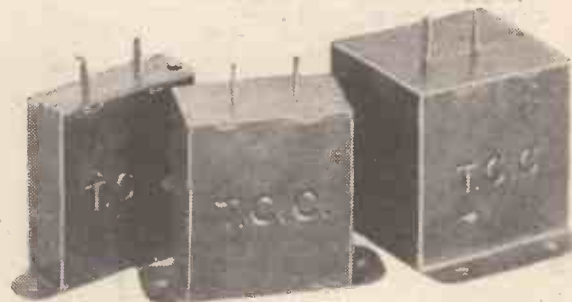
And, finally, these T.C.C. condensers are retailed at most competitive prices. We have no hesitation in recommending their use for all smoothing purposes, for they are sound, guaranteed components.

### INEXPENSIVE "BLUE SPOT" SPEAKER

"P.W." readers will all know the famous Blue Spot 66R loudspeaker unit. It is an aristocrat of the electro-magnetic class, and is able to handle anything from the small outputs of two-valvers up to really big powers with excellent fidelity.

This fine unit is available in a complete instrument (the 45R) having a tasteful and well-finished oak cabinet, at the attractive price of 52s. 6d. It is a speaker that "P.W."

### TESTED FOR HIGH PEAK VOLTAGES



A twelve months' guarantee of dependable service and accuracy is given with every T.C.C. condenser.

readers should hear before making their decisions as to their new speakers this season.

The fact that it is not a moving coil should not be allowed to prejudice them. They should hear it up against *any* speakers of similar price rating which are available.

### THE UTEX TIME SWITCH

This is for use with an alarm clock. The clock is set to strike at a certain time, and when it does so, the switch is operated and the receiver either switched on or switched off according to the setting of the device.

It can quite easily be fitted to any ordinary alarm clock and its action is positive and reliable. There are other uses for the "Utex," for it can be employed for switching on an electric kettle at the same time as the clock wakes you up!

### GOOD VALUE FOR MONEY



The Blue Spot 45R Loudspeaker.

Again, motor-car lights or electric signs can be brought into action at a predetermined time.

It is an inexpensive gadget and the model for battery radio sets costs 3s. 6d. The high-tension type is priced at 5s. 6d. And for 7s. extra in either case the switch is supplied mounted in a clock already to place in immediate commission.

The idea of a time switch is not new, nor is the adaptation of an alarm clock for the purpose, but the "Utex" is the first device in my knowledge to make the fitting up of a time switch an inexpensive and easy job for all.

### THE "3 IN 1"

This is made by the Parade Electrical and Radio Co., and comprises a small magnetic compass fitted with a winding making it a quite sensitive little galvanometer.

Thus it can be used as a pole-finder. It is built into a neat wooden base of adequate size on which are mounted the two necessary terminals.

It retails at 1/-, and the constructor should find it a useful gadget for circuit testing, etc.

There is **NOTHING**  
 you can do that  
 will so **CERTAINLY**  
 improve your radio  
 as to give it the  
 pure power of a

**LISSEN**  
**H.T. BATTERY**

**NEW VALVES  
 ARE NECESSARY  
 BUT  
 NEW BATTERIES  
 ARE  
 MORE SO!**



## TRADE JOTTINGS

By G. T. KELSEY

### The Valves Will Not Mind

I WAS interested to learn that radio is to play an important part in the great South African aerial tour for which purpose Sir Alan Cobham left this country at the beginning of the month. Sir Alan plans to visit over 70 centres in the course of the tour, which is being carried out in an endeavour to popularise aviation.

A public address van is to accompany the fleet of 'planes, and messages transmitted from this van to the 'planes will be relayed to the public, but the real tit-bit is the dancing aeroplane which is being taken with the convoy!

I gather that this particular machine literally dances in the air to music broadcast to it by the public address apparatus on the ground, for which exacting purpose it is fitted with Osram valves. Much as I like flying, I'm glad that it is the Osram valves (and not me) that are to be in the 'plane!

Incidentally, talking of Osram valves, I am reminded to tell you that the G.E.C. people have just published a handy little booklet which tells you all about the new range. It is available under the postcard scheme.

(No. 5)

### Named After Ferranti.

I am sure that most readers of "P.W." will be familiar with the brilliant career of the late Dr. Ferranti, who was, of course, the founder of the well-known Manchester

organisation, and so there is hardly any need to reiterate it here.

But what I am pleased to record here is that a graceful compliment has just been paid to his memory by the directors of the London Electric Power Company, with whom, in an indirect way, Dr. Ferranti was associated for many years.

Their new boat, which was launched at the Burntisland Shipbuilding Yards at the

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

end of last month, has been named the s.s. "Ferranti." Appropriately enough, the launching ceremony was performed by the wife of Mr. V. Z. de Ferranti, son of Dr. Ferranti, and present chairman of the company.

### Speaker Units for Constructors.

With a properly designed cone unit, and adequate baffling arrangement, the margin between this and some of the standard moving-coil types of speakers is nowadays almost imperceptible. Obviously, the unit in the cone speaker is the deciding factor to a very great extent, but that such units are available was proved beyond all doubt when I heard the new Blue Spot range.

I am telling you all this because the makers of the famous Blue Spot products have recently produced an attractive folder in which their range of loudspeaker units is described, and if you are interested in the home-construction of a speaker, you would do well to have a copy by you.

### A New Type Accumulator. (No. 6)

It isn't often these days that one is able to "burst into song" concerning something really new in the way of accessories for battery-operated sets, and consequently when something does come along I am only too glad to pass on the news.

It concerns the introduction of an entirely new accumulator by Block Batteries, Ltd., of Abbey Road, Barking, and although I have not yet seen our Technical Editor's report upon this new accessory, I must admit that its appearance has impressed me very much.

This new accumulator is tubular in shape, and it is contained in an attractive bakelite case. Despite the fact that it is 80 ampere-hour capacity, it is only half the weight per ampere-hour of the present standard types, and it is therefore extremely compact in size.

I am anxiously awaiting our T. E.'s report, for at the modest price of 11s. 6d. it strikes me as being a remarkable proposition.



## MORE POWER FOR YOUR SET

Convert the ordinary receiver into a strikingly effective modern set by incorporating these new British General Dual Wave Coils. Enormous improvement in both power and selectivity. Wiring diagrams free. Aerial & Anode models (suitable for ganging) ... **9/6**

FROM ALL DEALERS OR DIRECT

### BRITISH GENERAL

MANUFACTURING CO., LTD.  
BROCKLEY WORKS,  
LONDON S.E.4

## What's born in the record comes out via the Mark III



# 30/-

Much has been written and talked about the marvellous ability of the electrical pick-up to reproduce music which was never suspected on the record. Perfectly true, but the real test for a pick-up is to reproduce the record as it was originally recorded. It takes a Bowyer-Lowe Mark III to do this.

Send for Catalogue.

## BOWYER-LOWE & A.E.D. LTD.,

DIAMOND WORKS, BRIGHTON


## ALL applications for Advertising Space in "POPULAR WIRELESS" "MODERN WIRELESS" and "WIRELESS CONSTRUCTOR" must be made to the Sole Advertising Agents, JOHN H. LILE, Ltd., 4, Ludgate Circus, London, E.C.4.

Phone: City 7261.

## ELECTRADIX MICROPHONES

MAXIMUM EFFICIENCY AND LOWEST PRICE

For Home Talkies, Public Address, etc.



No. 11, Solo pendant, massive brass case, 6/6 Marconi Hand, 15/-  
No. 12, Ring Pedestal ... 12/6  
Announcers' Scotland Yard type 65/-  
Deaf Aid Sets 12/6  
High Ratio Transformers, 3/6, 5/-, 7/6. Photo Cells, R.C.A. Talkie type, UX867, at quarter price, 25/-, Brit. Talk Pies., King type, 15/-.  
Fultograph Picture Recorders. Not many left of these new £22 kits, with diagrams, at 32/6.  
Telescopes. Cooke monocular prism RF, with 9-mile distance scale, 7 1/2 in. long, weight 3 1/2 lbs., sale 15/-.  
Tee Vee Units for converting 6 v. L.T. to H.T. A.C. Browns 2 v. to 80-v. D.C. Superseder. No H.T. battery needed for radio sets when this fitted, 37/6.  
Permanent Magnets, Tungsten steel. Powerful horseshoe, 5-in., No. 1 is 1 lb., 2/6; 4-in., No. 2, 1 lb., 2/-; No. 3, 3-lb., 1/6; No. 4, 1 lb., 1/- 4 claw 4 lb. cobalt for M.C. Speakers, 15/-.  
Dynamos, double current, L.T. and H.T., 6-v. and 200 to 500-v. 12-in.—5 1/2-in. Weight, 17 lbs. Ball-bearings. Ex. W.D. bargain, cost £15, sale 22/6 to clear. 110-v. Fan Motors, 10/-.  
Bargain Parcels of dismantled sets, etc., useful experimental oddments, etc., all post free. 10-lb., 7/-; 7 lb., 5/-. Jewelled first-grade meter movements with magnet, 5/- each.  
For 1,000 other bargains send addressed envelope for new Sale List.

## ELECTRADIX RADIOS

218 Upper Thames Street, London, E.C.4

TRANSFORMERS.—Large quantity of genuine Erickson Transformers. New and guaranteed, list price 17/6 each. Ratios 2-1 and 4-1. Our price 3/3 each, carriage paid U.K. Cash with order. Don't waste time. Save money whilst you can!—Pioneer Radio Manufacturing Co. Ltd., Goptic St., New Oxford St., W.C. Museum 9607. Trade inquiries invited.

PLEASE be sure to mention "Popular Wireless" when communicating with Advertisers. THANKS!

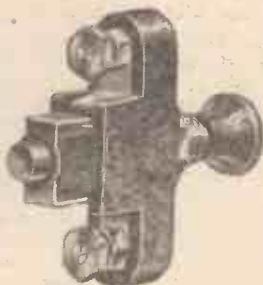


# TELSEN

## H.F. CHOKES, PUSH-PULL SWITCHES & VALVE HOLDERS

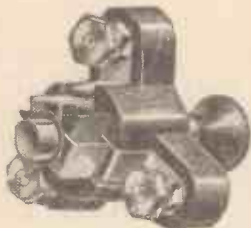
### TELSEN TWO-POINT SWITCH

For use as battery switch, or as wave-change switch, with the dual-range S.W. Coil unit. Employs a "knife" type self-cleaning contact, and a positive snap action, a series gap reducing self-capacity to a minimum ... **1/6**



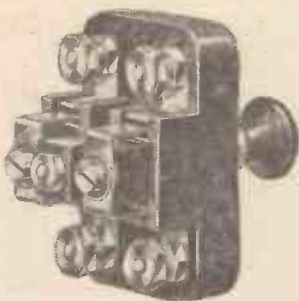
### TELSEN THREE-POINT SWITCH

The perfect wave-change switch for use with a dual-range aerial coil or for breaking L.T. and H.T. currents simultaneously ... **1/3**



### TELSEN FOUR-POINT SWITCH

Highly suitable for use in wave-changing on two coils or an H.F. Transformer, or for switching pick-up leads or an additional speaker. ... **1/6**



### TELSEN VALVE HOLDERS

An improved range of valve holders in both solid and anti-microphonic types. Employ special contact sockets of one-piece design with neat soldering tag ends and terminals. Extremely low self-capacity.



Solid type  
4 pin .9d.  
Solid type  
5 pin .1/6

Anti-Microphonic  
4 pin . . . . . 1/6  
Anti-Microphonic  
5 pin . . . . . 1/3



### TELSEN STANDARD H.F. CHOKE

Covering the entire broadcast band, and occupying only the minimum of baseboard space, the Telsen Standard H.F. Choke has proved deservedly popular ever since its introduction. With an inductance of 150,000 microhenrys, a resistance of 400 ohms, and an extremely low self-capacity, it is highly suitable for use in reaction circuits, and is constantly being specified in this respect by the leading set designers . . . . . **2/6**

### TELSEN BINOCULAR H.F. CHOKE

In H.F. amplification, the performance of a choke is of supreme importance. Where the very highest efficiency is the primary requisite, the Telsen Binocular H.F. Choke is the inevitable choice. It has a high inductance of 250,000 microhenrys, with a very low self-capacity and a practically negligible external field (due to its binocular formation). It is from every point of view the ideal choke—and where high-class circuits are concerned definitely **5/6** the essential choke



# TELSEN

## RADIO COMPONENTS

# TELSEN RADIO COMPONENTS ARE 100% BRITISH

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



# RADIO TUTORIAL

All Editorial communications should be addressed to the Editor, POPULAR WIRELESS, Tallis House, Tallis Street, London, E.C.4.

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

The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the 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

### WHY WAS IT UNSSELECTIVE?

J. L. (Huddersfield).—"Happening to mention to a friend that I was on the look-out for something to make old-type sets with plug-in coils selective, he put me on to adding a separate 'tuner,' as recommended, he said, by the B.B.C. Manchester office

"He sent me the circuit, consisting of plug-in coil and '0005 tuning condenser across it. Aerial and earth terminals joined to the ends of the coil, and a new 'A1' terminal connected to the fixed vanes of the '0005 through a small condenser.

"Being so simple, I made it up at once, but I do not find it at all satisfactory. There is certainly some improvement, but nothing like I expected to find, and as it stands it is hardly worth the extra trouble of tuning a second dial.

I would not have minded that if I could get the very sharp tuning which it is supposed to give.

Can you tell me where I have gone wrong? I have arranged the coil well away from the coil in the set, and connected up as follows:

Lead in to A on the new unit. E on this to E on the set and to the earth wire. And finally the A1 terminal on the unit (the one connected to the small condenser) to the old aerial terminal of the set."

The circuit and connections are all right, and if you allowed plenty of space between the coils, as

(Continued on page 618.)

## 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) About what power is used in the London Regional's aerial, reckoned in horse-power?  
\* \* \*
- (2) Which would be the better wavelength for reliable long-distance reception—550 metres or 205 metres?  
\* \* \*
- (3) Of two condensers, identical except that one has mica between its plates and the other only air, which would have the higher capacity?  
\* \* \*
- (4) What is Ohm's Law (for direct current)?

**BUILD THE**

**35/-**

**"SKY HAWK"**

*Described in November 12th issue*

**WITH "GOLSTONE" COMPONENTS**

**and enjoy inexpensive but efficient Radio Reception**

The outstanding performance and excellent finish of "GOLSTONE" COMPONENTS lead to their specification in most circuits published by the Technical Press.

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Type G.G.R. for intervalve Coupling.

For modern receiver designs, "Golstone" Screened Coil units will meet all requirements. Made in 5 types to suit every modern circuit.

**MATCHINGS**—Special attention has been given to this point to ensure successful ganging. The maximum permissible variation is  $\pm 1$  per cent, although the average is rarely more than  $\frac{1}{8}$  per cent.

Price for all Types, EACH

Obtainable from all first-class Radio Stores. Refuse Substitutes If any difficulty write direct.

**5/9**

**"GOLSTONE" Milliammeter (Type R25/244) specified for the D.C. "FLEX FEED"**

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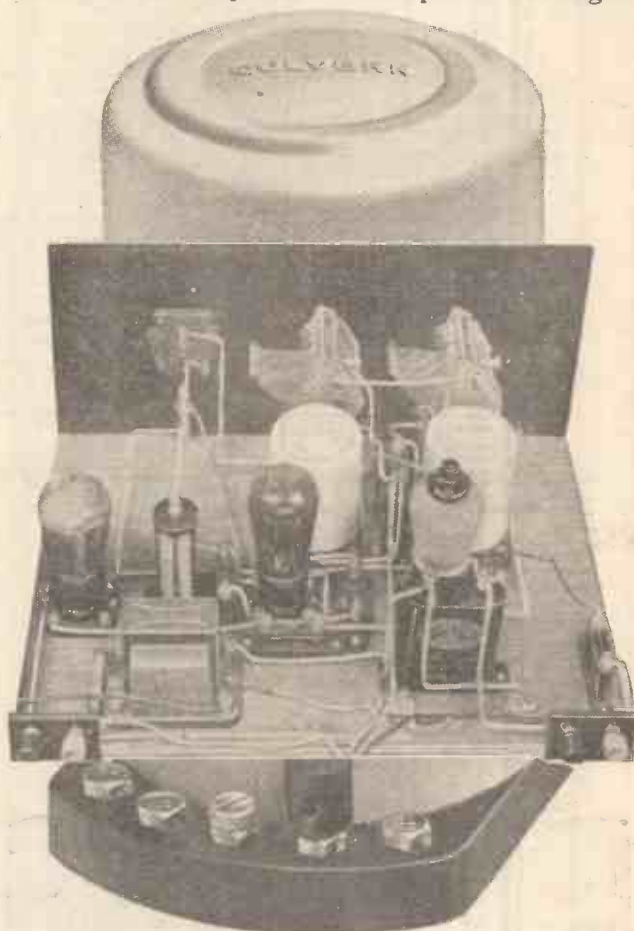
MY PRESENT SET IS..... P.W.2

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**COLVERN LIMITED**  
MAWNEYS ROAD, ROMFORD, ESSEX

## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 616.)

stated, it is almost certain that your trouble is in using too large a condenser for the coupling via the A1 terminal.

You call this a "small" condenser. How small? Possibly even a neutralising type condenser has too much capacity for the job, and most of the pre-set type have far too high a minimum. The B.R.C. recommend a maximum value of not more than 00002 mfd. for this, and probably your poor results are due to using something with a much higher minimum capacity than that.

If you can take some of the vanes off your present coupling condenser or get one of much lower capacity, we think you will find that the method is quite as selective as you desire.

### WHICH CHOKE FOR WHICH?

F. M. (Newhaven).—"The S.G., Det., L.F. I have in mind would employ parallel feeding for L.F., and for H.F. the S.G. would have an H.F. choke in the anode circuit, with a condenser-coupled tap from this down to the detector grid coil.

"The detector also would use an H.F. choke with differential reaction, the idea being a really good long-distance circuit, to use up the parts I have on hand.

## THE ANSWERS

TO THE QUESTIONS ON PAGE 618  
ARE GIVEN BELOW.

1. Just over 67 horse-power, in the aerial.
2. The longer wavelength would be much less subject to fading than the shorter.
3. The one with the mica dielectric.
4. Current (amps) =  $\frac{\text{E.M.F. (volts)}}{\text{Resistance (ohms)}}$

DID YOU KNOW THEM ALL?

## "P.W." PANELS, No. 98.—BRUSSELS No. 2.

The Brussels No. 2 station works on a wavelength of 338.2 metres. Its power (like that of Brussels No. 1 on 509 metres) is 15 kilowatts.

"Brussels No. 2" always announces and transmits Flemish programmes.

The usual hours of working are 12 noon to 11 p.m. Closes down with the Belgian National Anthem ("La Brabançonne").

"Included in these are two H.E. chokes, one of good quality, and the other—well, not so good. I don't know whether to put the good one first, in the S.G., or second, where it will have to look after reaction, which is more important?"

You should put the good one first, its high impedance and low self-capacity being of greater importance in the S.G. stage than they would be in the detector's plate circuit.

### A QUEER TUNING SHIFT.

A. T. (Kenya).—"I have been a subscriber to 'P.W.' for some years, but so far have not addressed a question to you, for the simple reason that I usually find the answer to any problem of mine, either in the form of a reply to someone else, or in some other way appearing sooner or later in your columns.

Here, however, is a point for an explanation of which I should be grateful. I use at present what 'W.L.S.' referred to the other day as a 'Bitza' set for short waves—Det. and 2 L.F. transformer-coupled stages.

I have been experimenting with different types of valves in the third position, and I find that the dial position of any given station varies as much as 8 or 10 degrees when I substitute, say, a Tungram L414 for the S.P.414 of the same make. The L valve pushes the reading higher up.

"In investigating this matter I used each of these valves as detector (admittedly not

their proper function!) in my one-valve, and found just the same phenomenon. No doubt there is some simple explanation which I should be glad to hear. Both stages are decoupled and there is a choke-transformer output filter."

(Continued on page 620.)

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

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

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Approved by  
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SOVEREIGN scores again—this time with Screened Coils designed and made to incorporate the latest and best principles known in Coil Manufacture. Suitable for use in S.G., Ordinary H.F. or Detector Stages. Accurate windings, air-spaced, ensure minimum loss and maximum efficiency. Special connections at base afford three varying degrees of selectivity. Carefully designed Aluminium cans cover the complete coil, conveniently placed slots affording easy connections. The Sky Hawk is cheap and efficient to build—assure results by using Sovereign as much as possible.

These coils may be used for Aerial or Anode. See Blueprint.

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BLUEPRINT  
GIVEN WITH  
**SOVEREIGN**  
UNIVERSAL  
SCREENED COILS

# 6/6

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If you wish to see how simple and cheap the Sovereign Sky Hawk is to build, send us your name and address and we will forward you the Blueprint (No. 8) & Sovereign Components Catalogue. **FREE**

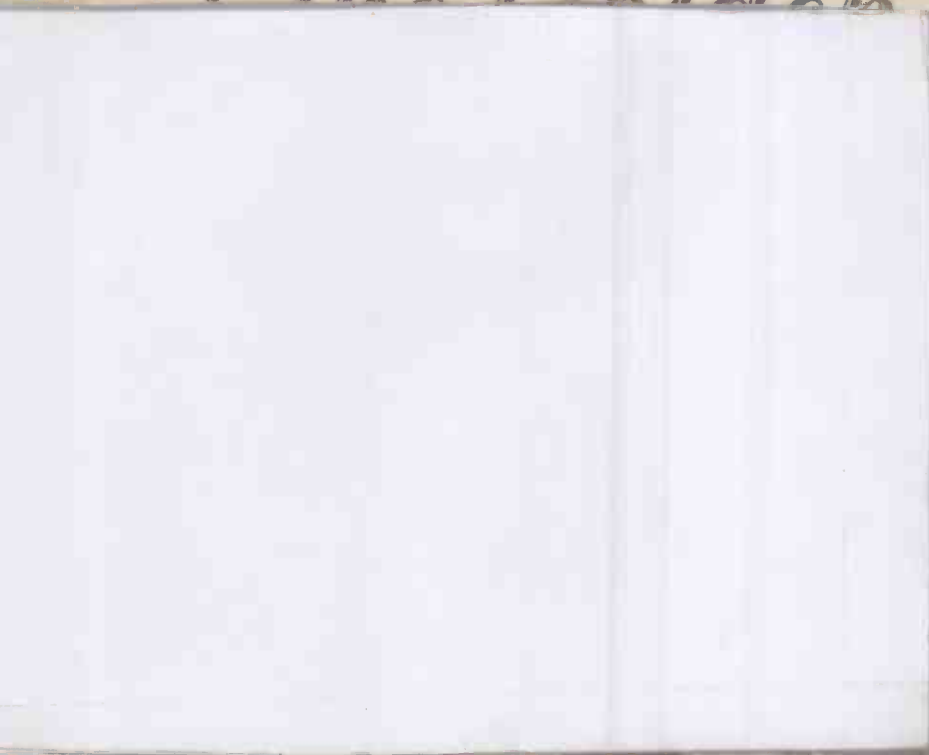
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A Sovereign Pre-set Condenser (0001-mfd. max. Type F. I/3d.) is specified in this set. Use Sovereign Components wherever you can—they're just as reliable for Mains Sets.

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# MACNAMARA

## The Golden Voice



duction and tonal realism as to immediately inspire the phrase, "The Golden Voice." Additional external speakers and a gramophone pick-up can be used if desired, sockets being provided for their connection.

**SPECIAL 'SEPARATOR' CONTROL**

A unique device of extreme value for adjusting the degree of selectivity when receiving both local and distant stations, with the unusual advantage that neither the tuning nor the fidelity of reproduction is affected. This control is also a valuable adjunct for varying the volume from maximum to a whisper, even on the local station.

**A JOY TO OPERATE**

Single knob tuning—Illuminated Dial marked in actual wavelengths. The essence of simplicity. Turn the dial to the wavelength of the station required—and there it is. Anyone can obtain a large number of stations. But so clever is the design that as experience is gained the large catch of the beginner is increased day by day.

**AERIAL NOT ESSENTIAL**

The principal home and continental stations may be received without the aid of an aerial, as a special device incorporated in the receiver provides for the use of the mains as an aerial. Thus only when a very large number of stations is required is an outside aerial necessary.

**CHOOSE YOUR CABINET**

The receiver is available in two models—in a beautiful superbly finished solid walnut cabinet of restrained modern design (No. 315) at 15 gns., and in a plain oak-framed (unstained) cabinet (No. 312) at 12 gns. Model No. 312 is produced for those who desire to refit the receiver in a cabinet to their own particular tastes and requirements, whether it be in type, design, quality or finish.

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**D**ESIGNED by the leading radio technicians, and built throughout of British components in Britain's largest radio manufacturing organisation, the **MACNAMARA** is the finest radio receiver of its kind ever produced. For it is as nearly perfect as human minds and hands can make it—not only in its amazing range, its remarkable selectivity and its absolute simplicity, but also in its glorious tone . . . that superb fidelity of reproduction which inspired the phrase "The Golden Voice" . . .

Hear it at your dealer's to-day. Until you do, you will never realise how much you have hitherto missed in radio reception, and how easily you can now afford to enjoy the best that radio can offer.

**MODEL 312** In a plain oak-framed (unstained) cabinet, produced for those who desire to refit the receiver in a cabinet to their own particular tastes and requirements.

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Manufactured by

# TELSEN ELECTRIC CO. LTD., ASTON, BIRMINGHAM

## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 618.)

When you say "different types of valves in the third position," we assume you mean in the output valveholder, and frankly we are somewhat stumped! For it is most unusual to get noticeable tuning shift as a result of changing the output valve.

Your second instance, when an output valve is used in the detector position, is nothing to be wondered at. The inter-electrode capacity of different valves varies considerably, and is bound up with the tuning capacity, so that alterations in the former might be expected to show up in the latter.

But unless you are using a very unusual circuit indeed the inter-electrode capacity of the output valve should not be bound up with tuning capacity in this way, even on the tricky very short wavelengths.

We forwarded your letter to "W. L. S.," who is always interested in these queer effects.

### 43 STATIONS ON THE "DECADE."

A. P. (Aberdeen).—"Re the 'Decade' Three set which I have now in use. I have logged 43 stations in all, including the long-wave stations in the list. I find that it is a great improvement in the tone and quality of music, and is a much better set than the 'Comet' Three which I had previously.

"One of my boys wants to know if an S.G. valve detector would be an improvement or could it be incorporated in the present circuit now in use, in the 'Decade' Three? He is at present at sea on a trawler, and asked me to write you on this point. He is a regular reader of your 'P.W.'"

"I have to thank you for your last letter which I received about the coil in the above set, and it is working splendidly, with the above result of 43 stations in all; and I am situated about a mile and a quarter from the Aberdeen transmitter."

We are glad you raised the question of fitting a screened-grid valve as detector, because there seems

to be an impression that this is likely to improve results with sets (like the "Decade") originally designed to employ an ordinary valve as detector.

This impression is not in accordance with the facts about using S.G.'s as detectors.

While it is true that an S.G. valve can be made to give extremely good rectification results it usually needs a special circuit arrangement; and so it cannot just be plugged into an existing set in place of the

usual detector (even though the necessary wiring change-over and extra H.T. supply for the screen is carried out correctly), and perform better than the comparatively low-impedance valve that it displaces.

If you went to the trouble of fitting in the "Decade" you would probably find your results were not so good as before, so we do not recommend the modification.



"We're Fluxite and Solder, the reliable pair, Famous for Soldering — known everywhere! Wherever there's Wireless — there you'll find US, We SOLDER ALL CONNECTIONS without any fuss!"

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

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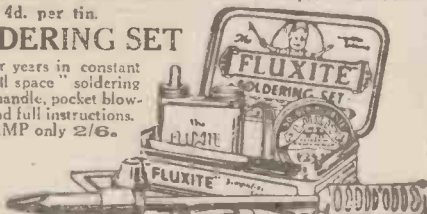
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Aerial H.F. 1st and 2nd Band Pass Coils with optional tapings.

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23/6



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P.W. 19/11/32

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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.

**Screen-Grid Bias.**

WITH an ordinary screen-grid valve you do not, as a rule, employ grid bias, but if you make slight alterations so that you can introduce a certain amount of grid bias, you may find that this will give you greater selectivity.

This can be done by putting a grid-bias battery between the L.T. negative and the aerial tuner. Generally, you will find that the amount of grid bias required for best results is very small, less than the 1.5 volts of a single dry cell of the ordinary type.

I should mention that this grid-bias battery should be shunted by means of a small fixed condenser of about .1 or .2-mfd. capacity. The grid-bias battery referred to should, needless to say, have its negative terminal connected to the aerial tuner, that is, indirectly, to the grid of the S.G. valve, and its positive terminal to the L.T. minus.

**Grid Leak and Anode Bend.**

The grid-leak detector has been subject for years to all kinds of criticisms owing to its alleged liability to cause distortion and there are many people who consider that the anode-bend arrangement is definitely superior in this respect.

On the other hand, the grid-leak detector arrangement has been so much improved that there is probably very little in it in these days as between these two methods. With the anode-bend arrangement there is, or should be, no grid current in the tuning-coil in the grid circuit of the detector.

In these circumstances the damping of the grid is very much reduced and consequently we get an improvement in selectivity. This effect, of course, varies in different conditions, but where the effect is pronounced it undoubtedly seems to point to the advantage of the anode-bend arrangement over the leaky-grid detector arrangement, where it is a question of cutting out unwanted stations.

The impedance in the anode circuit should be fairly high.

A low-frequency transformer of fairly low primary impedance may be used with an anode-bend detector if the resistance-feed method is employed.

**De-Coupling.**

When you use a set with, say, two stages of transformer-coupled low-frequency amplification you may get instability in the low-frequency stages owing to unwanted coupling. The proper method of overcoming this is, of course, to de-couple at various points, but before going to this trouble you may try the effect of reversing the connections on the primary of the first transformer or the secondary of the following transformer.

Sometimes this will do the trick without the need for going over the circuit and  
(Continued on next page.)

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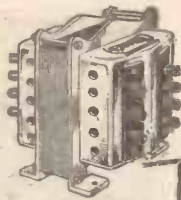
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## TECHNICAL NOTES

(Continued from previous page.)

finding out various points where de-coupling would be required. The reason why the changing over of the connections sometimes cures the trouble is because it causes interaction which is setting up the instability to interfere with itself, so to speak, and so to cancel out.

Try a Resistance.

Another dodge which you may try is to put a fairly high resistance across the secondary of the last transformer. If this resistance is not sufficiently high it will have the effect of reducing the volume by its shunting effect, but you should try two or three values until you get the best result, when the cutting down of the volume will be small, whilst the improvement in the quality should be quite pronounced. About a quarter of a megohm may be taken as a starting value and you can try variations above and below this amount.

New H.F. Coils.

Some years ago attempts were made to form the iron cores for low-frequency transformers by means of grains or particles of iron—such as filings, for instance—packed into a suitable container instead of the more usual solid or laminated core. The idea, you will see at once, was to break up the core into a number of very small pieces so as to frustrate eddy currents. It is, in fact, really an extension of the laminating principle.

The small particles were coated with shellac or wax or some other insulating material, so that eddy currents formed in any particle could not be communicated to neighbouring particles, each particle forming in a sense an electrical circuit entirely on its own.

The Granulated Core.

For some reason this idea never seemed to get much farther for a number of years, but just lately it has been taken up again and the system greatly improved. The iron is now divided into very fine particles indeed, and these are coated by a special process with an excessively thin coating of insulating material.

They are mixed with bakelite or other similar insulating compound and the whole mass is then moulded into a suitable shape for a transformer core. The process is not unlike that which is used in the making of gramophone records, where shellac and certain other thermo-plastic materials are mixed with barytes, which is a hard mineral powder.

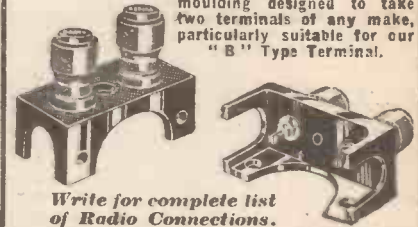
The barytes adds strength and solidity to the finished record, and the shellac coats the different particles of barytes and so keeps them separate. Of course, in the case of the record there are no electrical considerations involved but the actual process of making is very similar.

(Continued on next page.)

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With the Belling-Lee Bakelite Terminal Mount, terminals may be mounted anywhere, anyhow—vertically or horizontally. On the baseboard or screening box, the window ledge, wall or skirting board, etc.

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## TECHNICAL NOTES

(Continued from previous page.)

### Eliminating Eddy Losses.

This new type of granulated core can be used for high-frequency coils, and owing to the fact that the eddy current losses are reduced to an extremely low minimum, this arrangement gives us a means of increasing or varying the inductance of the coils and at the same time of keeping the coils very small indeed for a given inductance.

Coils made in this way can be ganged for tuning purposes whilst their actual size may be reduced as small as a quarter of the size of a corresponding H.F. coil with air core of the conventional type.

It looks as though this granulated-core principle is going to be a very important factor in the design of small, compact H.F. components in future.

### Electrostatic Speakers.

Several readers have written to me lately asking my opinion of the electrostatic loudspeaker as compared with the more conventional types. I have during the past few years had several different kinds of electrostatic speakers submitted to me, but none of them seem to have made their way effectually upon the market.

Just lately there is quite a good one, which was exhibited at the Radio Show—probably those of you who visited the Exhibition saw it and heard it there—and I should think it safe to say that electrostatic speakers will be still further improved and will in due course take their place permanently on the market alongside of the established types.

Certainly, from the theoretical point of view there is a good deal to be said for the electrostatic speaker since, in theory at any rate, the whole of the diaphragm is operated upon simultaneously. With the diaphragm of an ordinary electro-magnetic speaker the mechanical force of the armature is applied at the centre of the diaphragm and the rest of the diaphragm is only moved by reason of its relative rigidity.

### Rigidity.

I say "relative" because, in point of fact, the diaphragm is frequently very far from rigid, with the result that the marginal parts move to a much less extent than the central part where the force is applied. In some cases the marginal parts of the diaphragm may even move in the opposite direction to the central part, the diaphragm, in fact, being subject to what are known as "stationary waves."

The electrostatic speaker ought to be a relatively cheap affair, too, because the parts which go to its make-up are simply sheet materials and one might say that there are almost no working parts at all.

As regards the actual performance of these electrostatic speakers, I must say that in certain circumstances they seem very good, but I have not yet had the opportunity of testing them out thoroughly, as I hope to do before long.

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  - 12 EXIDE WH HIGH TENSION ACCUMULATORS** (120 Volts, 5,000 M/A). The cheapest and best High Tension Supply where Mains are not available. Cash Price £3/15/0. With **7/-** order
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**EDDYSTONE SHORT WAVE MANUAL**

**THE LISTENER'S NOTEBOOK**

(Continued from page 584.)

noise. I refer to a noise of their own creation, and not one from some outside source.

I think it has been clearly demonstrated why people still crowd to Queen's Hall, in all weathers, rather than stay at home and hear the identical thing via the loud-speaker. It has been proved that the broadcast version is not the identical thing.

At Loggerheads.

In big choral orchestral work it certainly is not. Whereas at Queen's Hall chorus dovetails harmoniously with orchestra, via the loudspeaker they seem alternately to impede one another, and in heavy passages particularly they seem to be at loggerheads.

In such a work as William Walton's "Balshazzar's Feast," for instance, this rivalry of parts was very apparent, and one was struck with the microphone's occasional incompetence to cope satisfactorily with a work of this class. One almost doubts the wisdom of attempting such broadcasts under existing unfavourable conditions.

It would be futile, I suppose, to suggest a ban on noises of this type. Rather should we hope for the production, some day, of a microphone that can deal competently with the many different timbres that constitute big, heavy music.

Their Pride and Joy.

Many are the ways in which obscure villages have jumped into fame. Sometimes it is due to an incident which the villagers would wish was forgotten; at others, the incident is of such a nature that it remains ever their pride and joy.

St. Hilary, Cornwall, would never have been known in the first place but for broadcasting. Their broadcast Nativity Play at Christmas, initiated six years ago, is an annual reminder to the world at large of the existence of this remote little village.

A natural simplicity is the keynote of all their productions, and the fact that the actors—a heterogeneous collection among whom are a farm-hand, a tin-miner, a butter-maker, and a postman—rely on actual local sounds for their "effects," instead of the usual contraptions of the Effects Department, has given these productions a charm of their own.

In their latest effort, "The Eve of All Souls," written, as usual, by Father Walke, they lived up to their reputation, which at present stands very high.

Reflecting Our Mood.

It was interesting to notice that on the special broadcast programmes for Armistice Day, "In Memoriam," though produced last year on the same occasion, was again included. A collection of poems recited to the accompaniment of Elgar's "Enigma Variations" seems to reflect so perfectly the mood we are all in on this particular day, that we welcome rather than disapprove of the repetition.

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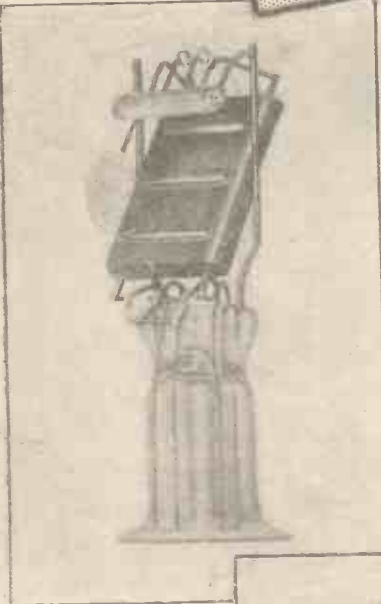
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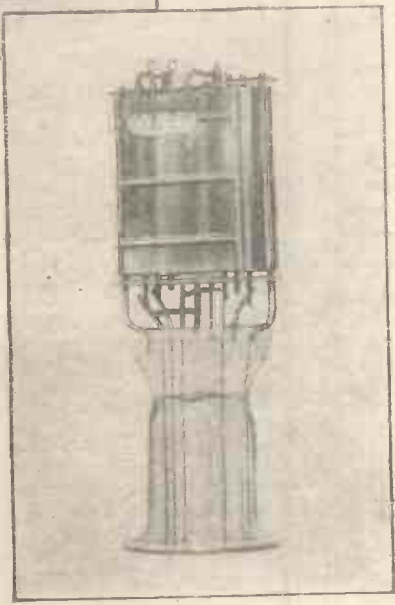
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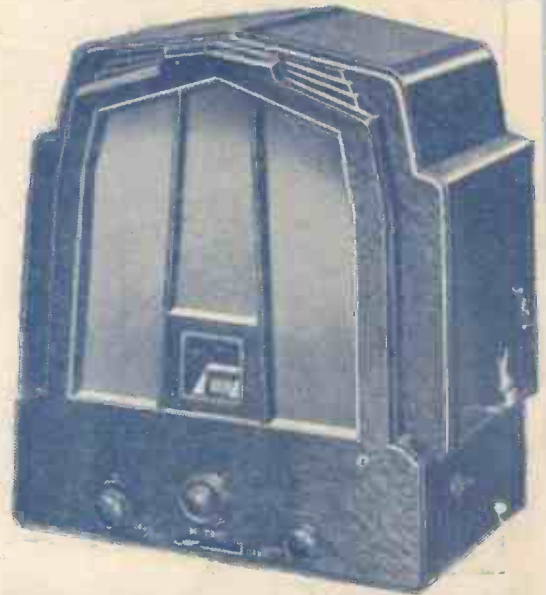
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