

# BUILDING THE EXTENSER "DUAL-RANGER" (See Page 679)

# Popular Wireless

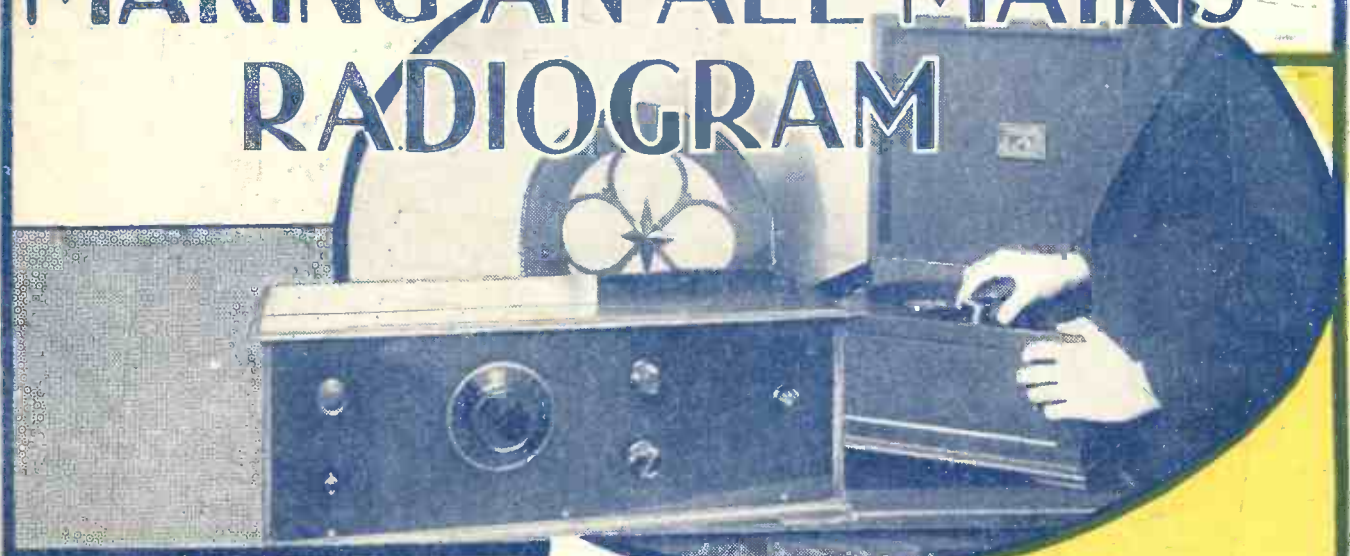
Every Thursday  
PRICE  
3d.

No. 494. Vol. XX.

INCORPORATING "WIRELESS"

November 21st, 1931.

## MAKING AN ALL MAINS RADIOGRAM



**MY NEW TUNER**  
by  
**CAPT. P. P. ECKERSLEY**  
M.I.E.E.

**ALSO THIS WEEK:**  
**YOUR H.T. SUPPLY**  
**SILENT POINT RECEPTION**  
 By Victor King  
**"P.W." SETS ON TEST**  
 By G. V. Dowding, Associate I.E.E.  
**THOSE O.B. DANCE BANDS**  
**THE NEW HEAVISIDE LAYER**

*Everything Radio from Ready Radio*  
 See pages 681 and 687.

# THESE ALLIES OF THE MOST SUCCESSFUL RECEIVERS—



REGD

## SPAGHETTI FLEXIBLE RESISTANCES

and the

# LEWCOS

Regd.

## SUPER H.F. CHOKE

ARE SPECIFIED FOR THE SUPER RADIO-GRAM RECEIVER DESCRIBED IN THIS ISSUE

LEWCOS Spaghetti Resistances have already proved their popularity. They are popular because their backing of over fifty years' experience in wire manufacture makes them supreme. Twenty different Resistance values from 300 to 100,000 ohms are made and range in price from 9d. to 1/6 each.

The LEWCOS H.F. Choke is generally recognised as an ideal Choke.

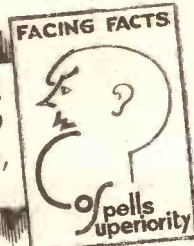
*A fully descriptive leaflet Ref. R.33, giving tested values and a diagram showing the performance of this choke as compared with other makes, will be supplied on request.*



THIS IS THE ACTUAL SIZE OF THE LEWCOS SUPER H.F. CHOKE PRICE 6/-



THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED Church Road, Leyton, London, E.10.



# HL2

METALISED



Further evidence of the supremacy of the new range of 2-volt Mazda valves is here in the metalised H.L.2. Extreme sensitivity joins with absolute stability, and its high amplification coupled with a comparatively low impedance renders it particularly efficient as a leaky grid detector or intermediate L.F. amplifier. The steep slope of the H.L.2 also makes it suitable for use as an anode bend detector.

Remember — this valve is a product of Mazda resources — Mazda engineering skill — Mazda research.

THE AMAZING

# MAZDA

THE  
BRITISH  
VALVES

## EDISWAN RADIO

ANOTHER  
BIG  
ACHIEVEMENT  
IN THE NEW  
MAZDA  
2-VOLT  
RANGE

MAZDA 2-VOLT RANGE

H.210	- 8/6	P.240	- 13/6
H.L.210	- 8/6	PEN.230	20/0
★ H.L.2	- 8/6	PEN.220	20/0
L.210	- 8/6	PEN.220A	20/0
★ L.2	- 8/6	S.G.215	- 20/0
P.220	- 10/6	★ S.G.215A	20/0
P.220A	- 13/6	★ S.G.215B	20/0

★ METALISED



THE EDISON SWAN ELECTRIC CO. LTD.

RADIO DIVISION:

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

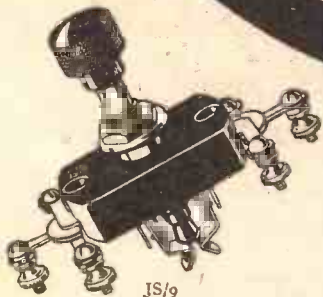


Switches may appear to play a comparatively insignificant part in a wireless receiver. If, however, their functions and positions are considered, it will be seen that sound design and construction are of paramount importance.

Most radio switches are entirely unsuitable for the high-frequency side of a receiver, where losses and bad and noisy contacts cannot be tolerated. With this in mind, J. Sieger, the famous radio engineer, has designed the new LOTUS Universal Switch. This is a unique rotary switch with self-cleaning contacts, which is provisionally patented by virtue of its design. The switch can be ganged in different ways, and is especially suitable for wave-change switching in any position.

**Type US/3 = 1/6**

*Send coupon for leaflet giving suggestions for use of the switch, and a copy of the LOTUS Component Catalogue. Every home constructor should have one.*



JS/9  
The LOTUS Jack Switch.  
D.P.D.T. 4/-



BS/20  
The LOTUS Battery Switch. 1/6



JK/3 The LOTUS Double Circuit Jack: 2/6



JP/1  
The LOTUS Jack Plug. 2/-

**FREE CATALOGUE.**

LOTUS RADIO LTD.,  
MILL LANE, LIVERPOOL.

Please send me free copy of your Component Catalogue and suggestions for the use of your Universal Switch.

Name.....  
(in Capitals)

Address.....

P. W. 21/11



**RADIO JACKS & SWITCHES**

LOTUS RADIO LTD. - MILL LANE, LIVERPOOL

# REMEMBER

If you want the finest reproduction, long life and the best all-round performance, you still must use



PRICES  
from  
11/6  
to  
30/-

FERRANTI LTD  
HOLLINWOOD  
LANCASHIRE  
London ;  
Bush House,  
Aldwych, W.C. 2

## FERRANTI TRANSFORMERS

The only transformers which are guaranteed to be, each and every one, within 5% of their published curves, not only in the laboratory, but in service.

**“Popular Wireless”**  
says so—Results prove it—  
**“Wearite” Components**  
for the **“Dual**  
**Ranger.”**

**WEARITE DUAL RANGE COILS**  
Used and recommended in all previous circuits.  
Price **12/6**  
(see special leaflet).



P.J.3



P.W. & M.W.  
DUAL RANGE

**WEARITE P.J.3. COIL**  
As specified for the “P.W.”  
“Dual Ranger.” Price **2/9**

**WEARITE H.F. CHOKE**  
A component with a very fine performance. It covers effici-



H.F.O

ently the remarkable range from 10 to 2,000 metres without any marked resonances. Price **6/6**

- Coil Quoit Former - - - **6d.**
- Panel, in Black, Mahogany or Walnut finish. Size 16x8 **7/6**
- 3-Point wave-change switch - **1/6**
- On-off switch (insulated spindles) - - - **1/-**

See our guarantee tag on every component.

Write for free illustrated list.

Have you seen the Kingston-Wearite Home Recorder?  
Write for special folder.

**WRIGHT & WEARE LTD**  
740, High Road, Tottenham,  
LONDON, N.17.

Phone: Tottenham 3847/8/9.

**WEARITE**  
**COMPONENTS**

# Do You Know?

Historical Signs—No 4



## The Sign of the Weasel

**T**HE pressing-iron or “weasel” was, from the middle ages until comparatively recent times, used as a symbol of craftsmanship amongst tailors. Proficiency in their trade was indicated by displaying the sign of the “weasel” from their premises — an assurance of skilled workmanship with the finest materials.

In the same way, to-day, “the condenser in the green case” is an accepted sign of a condenser that is the product of the skilled worker using the finest materials. Behind every T.C.C. condenser is the specialised experience of 25 years of condenser manufacture and design — your sure safeguard — your guarantee of downright accuracy and reliability.

Look for the initials  
**T.C.C.**  
on the condenser  
in the green case.

**T.C.C.**  
**CONDENSERS**

# 'ATLAS' WON 'W.W.' OLYMPIA BALLOT 1930

★  
**HERE'S THE NEW  
 MAINS UNIT WINNER  
 FOR THIS YEAR**



SPECIFICATION	CLARKE'S ATLAS
I Variable Tapping	0/100 V.
I " "	0/120 V.
I Fixed " "	150 V.
Output at 150 V.	25 m.A.
L.T. Trickle Charger	2, 4 & 6 V.
Charging Rate	0.5 A.
4 Grid Bias Tappings	1½, 3, 9, 16 V.
Guarantee	12 months
Price	£6-10-0
Yours for	10/- down

## "ATLAS" AGAIN!

**ALL-MAINS UNIT MODEL A.C. 290**  
 H.T., L.T. & G.B. from A.C. Mains

Registered Design No. 765,640.

For the second year in succession "ATLAS" have won the big "Wireless World" Ballot as the finest Mains Units at Olympia. Thousands of experts have voted this new "ATLAS" Unit absolutely unequalled for sheer excellence of design and value.

Ask your dealer for a demonstration and insist on "ATLAS," the expert's choice.

The new "ATLAS" Super Model A.C. 290 includes four Grid Bias tapping which are entirely independent of the H.T. supply, and perfectly smoothed by Electrolytic Condensers. Moreover, an exclusive "ATLAS" L.T. safety switching arrangement isolates the Receiver when Trickle Charging. A Double Adaptor combining a two-pin plug and lamp plug is fitted and a Tapped Input ensures the highest efficiency on 200/210, 220/230, and 240/250-volt mains. Incorporating Westinghouse Metal Rectifiers and fully guaranteed for twelve months. Size 10½ in. by 6 in. by 3½ in.

Cash Price **£6 - 10 - 0**

or 10s. down and 9 monthly payments of 15s. each.

### 4 OTHER NEW MODELS

2 new "ATLAS" H.T. Units at 52/6 and 59/6 and 2 new "ATLAS" All-Mains Units at 77/6 and 90/- respectively, are introduced for A.C. Mains. They include many remarkable features and are undoubtedly the finest value ever offered.

**H. CLARKE & CO. (M/CR) LTD.,**  
 OLD TRAFFORD, MANCHESTER  
 London Office: BUSH HOUSE, W.C.2  
 Phone: Temple Bar 7130

### FREE BOOKLET

H. CLARKE & CO. (M/CR) LTD.,  
 Eastnor St., Old Trafford, MANCHESTER.

Please send me free copy of "Power from the Mains," giving many valuable hints on how to convert my battery set to Mains operation.

Name (in Capitals).....

Address.....

P.W.21/11

"CLARKE'S"  
**"ATLAS"**  
 MAINS UNITS

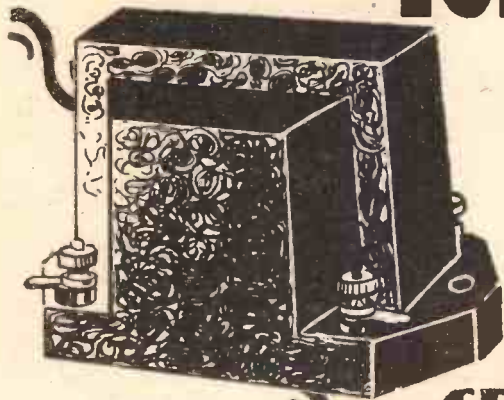
# Buy all the IMPORTANT PARTS from the LISSEN range—

## BUY LISSEN TRANSFORMERS-LISSEN CONDENSERS-LISSEN RESISTANCES

# LISSEN

You cannot do better than build throughout with Lissen parts. Particularly should you choose from the Lissen range those most important components whose values must be carefully balanced to work together in your set—condensers, transformers, resistances—get them all from the Lissen range of “parts that pull together.”

## Torex Transformer

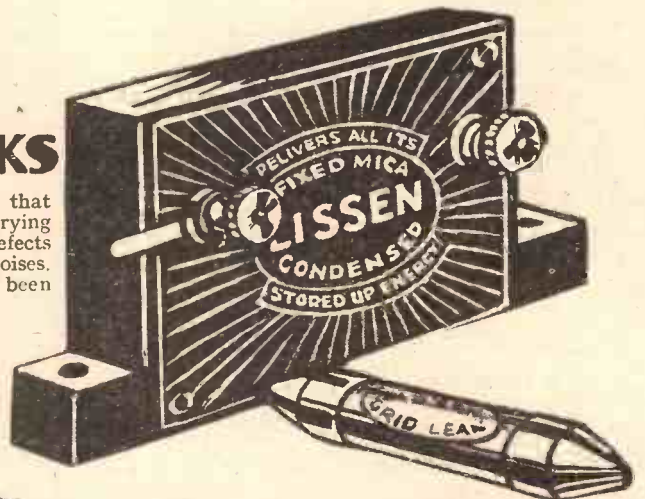


This Lissen Torex Transformer is a neat, compact component, in a moulded bakelite case which is hermetically sealed and completely insulates the windings. A small transformer, but a giant in performance. A low priced transformer, but with a mighty good curve. Price **5/6**

## LISSEN GRID LEAKS

It is of utmost importance that resistances should be unvarying in value and free from defects which may cause parasitic noises. Lissen Resistances have been tested by exposure to rain and sun and they remain constant and silent in use always.

All values **1/-**  
With terminals **1/3**



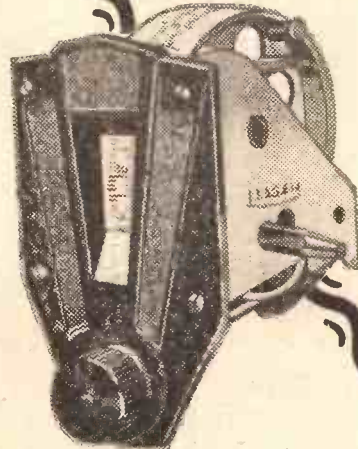
## LISSEN FIXED CONDENSERS

These Lissen Mica Fixed Condensers are leak-proof. They never vary. They deliver all their stored-up energy. Guaranteed accurate within 5 per cent of marked capacity. Can be mounted upright or flat. Grid leak clips included free with each condenser.

'0001 to '001 **1/-**  
'002 to '006 **1/6**  
'01 mfd. **2/-**

## NEW LISSEN ILLUMINATED DRUM DIAL

Fit this Lissen Illuminated Drum Dial to any set and at once you give it new distinction . . . the real “professional” appearance which every keen constructor aims at. The mechanism is robustly built and the drive is by tension gut, sure and pleasantly easy. Can be fitted easily to any condensers whether singly or in gangs. Price **8/6**



LISSEN LIMITED, Worples Road, ISLEWORTH—MIDDLESEX



# PILOT AUTHOR'S KITS

*Exact to Specification*

PETO-SCOTT FOR  
EVERYTHING  
NEW IN RADIO.

**CASH - C.O.D. - H.P.** *as usual*

## EXTENSER DUAL-RANGER

*As described in this and last week's issues.*

**KIT "A"** Less Valves  
and Cabinet

CASH  
or C.O.D. **£6-5-2**

or 12 monthly payments of 11/6

3 Valves as specified, £1-19-0  
Oak Cabinet, £1-17-6

### SPECIAL C.O.D. LINES

*Pay the Postman. We pay post charges on orders value over 10/-.*

- 1 Epoch J.1. Permanent Magnet Moving-Coil Speaker with 3-ratio input transformer. £2-5-0
- 1 Cydon 0005-mfd. double-drum drive Extenser type Ex 2T5. £1-19-6

Pilot Author's Kits are backed by Peto-Scott with a twelve years' reputation for trustworthiness and fair dealing. Remember, A PILOT AUTHOR KIT is cheaper than a substitute.

### MY S.G. FOUR As described Nov. 7th.

**KIT "A"** Less Valves and Cabinet **£5-6-10**  
or 12 monthly payments of 9/10

- We pay post charges on orders over 10/-.*
- 1 Oak Cabinet - - - - - 17/6
  - 1 set of valves as specified - - - - - £2-7-6
  - Ebonite Panel 18 ins. x 7 ins. (Ready drilled) - 5/6
  - Ormond Slow-Motion Condenser Special Short-Wave type with dials, the pair - - - - - 23/-
  - Igranite 5 meg. Volume Control - - - - - 5/-
  - Atlas Short-Wave Coils, the set of 4, as specified - - - - - 20/-

### COMET THREE FOUNDATION CIRCUIT

**KIT "A"** Less Valves and Cabinet **£4-0-0**  
or 12 monthly payments of 7/4

- We pay post charges on orders over 10/-.*
- 1 Oak Cabinet - - - - - £1-0-0
  - 1 Set of Mullard Valves - - - - - £1-7-6

*Any parts supplied separately. If value over 10/- sent car. paid or C.O.D.—all post charges paid.*

DETAILED LISTS OF PARTS for Pilot Author's Kits advertised in this page appear in our previous advertisements. **TURN TO THEM NOW.**

# POPULAR MANUFACTURERS' KITS

## V3 RADIO FOR THE MILLION

10/- DOWN and 11 monthly payments of 10/10

Screened-grid, Detector and Power. With valves, less Cabinet. **CASH PRICE £5.17.6** **10/-**

## OSRAM NEW MUSIC MAGNET 4

Two Screened-grid, Detector and Power. With valves and cabinet. **CASH PRICE £10.15.0** **19/8**

Balance in 11 monthly payments WITH ORDER of 19/8.

Finished instrument. Royalties paid. £11.15.0 Cash, or £2 deposit and 11 monthly payments of 19/6.

**TELSEN VICTOR 3 KIT—SEE PAGE 691.**

## COSSOR 234 EMPIRE MELODY MAKER

Screened-grid, Detector and Power. With valves and cabinet. **CASH PRICE 26.15.0**  
Balance in 11 monthly payments of 12/8. Finished instrument. Royalties Paid. **£7.10.0**  
Cash, or £2 deposit and 11 monthly payments of 11/-.

**10/-**  
WITH ORDER

## SIX-SIXTY CHASSIKIT BATTERY MODEL

Complete three gang band-pass tuning, S.G., Detector and Pentode. With valves less cabinet. **CASH PRICE 26.17.6**

Balance in 11 monthly payments of 12/7.

With **12/7**  
order

## SIX-SIXTY CHASSIKIT A.C. MODEL

Complete as above with A.C. Mains Valves. With valves less cabinet. **CASH PRICE £7.6.8**

Balance in 11 monthly payments of 13/5.

**13/5**  
WITH ORDER

## SPEAKERS

**AMPLION M.C.6 MOVING-COIL SPEAKER,** permanent magnet, with output transformer. Complete. Cash Price, £3:7:6. Balance in 11 monthly payments of 6/2 only. **Send 6/2 only**

**EPOCH A2 PERMANENT MAGNET MOVING-COIL SPEAKER.** Fitted with multi-ratio input transformer. Cash Price, £3:3:0. Balance in 11 monthly payments of 5/9. **Send 5/9 only**

**BLUE SPOT SPEAKER UNIT AND CHASSIS TYPE 100U.** Cash or C.O.D. £1:19:6. Balance in 7 monthly payments of 5/5. **Send 5/5 only**

**BLUE SPOT PERMANENT MAGNET MOVING COIL SPEAKER** Complete with input transformer. Cash Price, £3:15:0. Balance in 11 monthly payments of 6/11. **Send 6/11 only**

**MAGNAVOX PERMANENT MAGNET MOVING-COIL SPEAKER,** with 2-ratio input transformer. Cash Price, £3:3:0. Balance in 11 monthly payments of 5/9. **Send 5/9 only**

**ORMOND PERMANENT MAGNET MOVING-COIL CHASSIS (No. 464).** With input transformer. Cash Price £3:5:0. Balance in 11 monthly payments of 5/11. **Send 5/11 only**

**W.B. PERMANENT MAGNET MOVING-COIL SPEAKER P.M.3.** Complete with 3-ratio input transformer. Cash Price, £2:12:6. Balance in 11 monthly payments of 4/10. **Send 4/10 only**

**W.B. PERMANENT MAGNET MOVING COIL SPEAKER.** With 3-ratio input transformer. Cash Price, £4:5:0. Balance in 11 monthly payments of 7/10. **Send 7/10 only**

**PILOT PERMANENT MAGNET MOVING-COIL SPEAKER,** in handsome solid oak cabinet with multi-ratio input transformer. Cash or C.O.D. £3:15:0. Balance in 11 monthly payments of 6/11. **Send 6/11 only**

## ELIMINATORS

**ATLAS A.C. ELIMINATOR TYPE A.C.244.** Three tappings, S.G. Detector, and Power. Output, 120 volts at 20 mra. Cash Price, £2:19:6. Balance 11 monthly payments of 5/6. **With 5/6 Order**

**EKCO H.T. ELIMINATOR, TYPE A.C.25.** Tapped for S.G. 50/80 v. and 120/150 at 25 m/a. Cash Price, £3/17/6. Balance in 11 monthly payments of 7/1. **Send 7/1 only**

**HEYBERD H.T. ELIMINATOR TYPE D.150.** Tapped 60/80 v., 120 v. and 150 v. at 25 m/a. Cash Price, £4/6/0. Balance in 11 monthly payments of 8/-. **Send 8/- only**

**REGENTONE H.T. UNIT for D.C. Mains.** Type D.C.1. Adjustable S.G., Detector, Power Tappings. 25 m/a. Cash Price, £1/15/0. Balance in 7 monthly payments of 4/9. **Send 4/9 only**

## ACCESSORIES

**GARRARD INDUCTION GRAMOPHONE MOTOR.** (For A.C. Mains). Model 202. Mounted on 12-in. Nickel Motor Plate with fully automatic electric starting and stopping switch. Cash Price, £2/18/6. Balance in 11 monthly payments of 5/4 only. **Send 5/4 only**

**NEW B.T.H. "SENIOR" PICK-UP AND TONE-ARM.** Complete. Cash Price, £2/5/0. Balance in 11 monthly payments of 4/2. **Send 4/2 only**

## EXPRESS ORDER FORM

To PETO-SCOTT CO. LTD.,  
Please send me C.O.D., CASH/H.P.

for which I enclose  
Cash, H.P. Deposit £ s. d.

Name.....

Address.....

P.W. 21/11/31.

# PETO-SCOTT

PETO-SCOTT CO., LTD. Head Office: 77 CITY ROAD, LONDON, E.C.1. Clerkenwell 9406, 62 HIGH HOLBORN, LONDON, W.C.1. Chancery 8266. MANCHESTER: 33 WHITELOW ROAD, CHORLTON-CUM-HARDY. Phone: Chorlton-cum-Hardy 2028. NEWCASTLE, STAFFS., 7 ALBANY RD. Phone: 67190

**SEND 3<sup>d</sup> POSTAGE FOR NEW CATALOGUE**

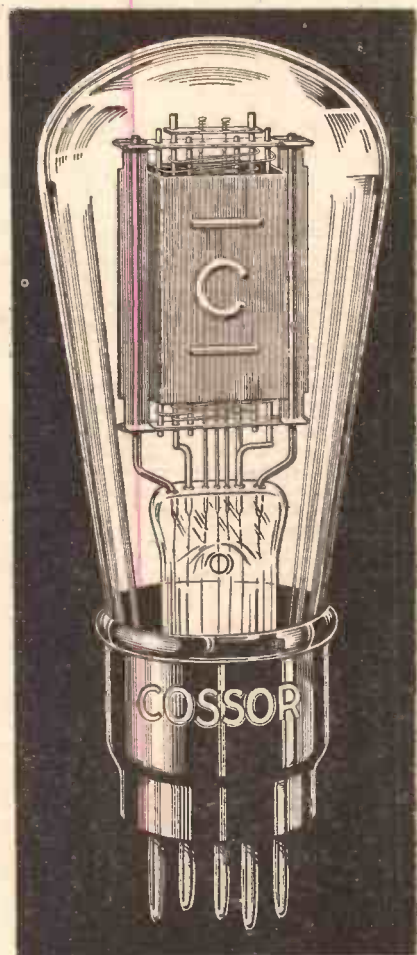
# Get FULL volume from 'weak' stations

YOU can considerably increase the volume given by your Receiver—merely replace the present output valve with a Cossor Pentode.

Cossor Pentodes possess the advantages of both power and super-power valves. They give considerably greater amplification than that afforded by a power valve—they give an even larger output than is obtainable with a super-power type.

By fitting a Cossor Pentode, therefore, you will be able to bring in at good strength those stations which are now only just audible.

Cossor Pentodes are available from your usual Wireless Retailer in types to suit Battery and A.C. Mains Receivers



— with a  
**COSSOR  
PENTODE**

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

To A. C. COSSOR LTD., Melody Dept., Highbury Grove, London, N.5  
Please send me free of charge a copy of your 72-page "Cossor Valve and Wireless Book" B11.

Name \_\_\_\_\_  
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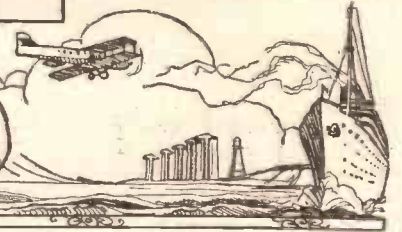
# Popular Wireless

**LARGEST NET SALES**



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.  
 Assistant Technical Editors:  
 K. D. ROGERS, P. R. BIRD,  
 A. JOHNSON RANDALL.



**AN UNEXPECTED HAUL  
 KIDS v. COPS  
 "CHINA WAS FIRST"  
 ANTI-RADIO LADY**

## RADIO NOTES & NEWS

**AMATEUR LOUDSPEAKERS  
 HOME THUMPERS  
 THE LIFE OF A VALVE  
 "BIKRADIO"**

### The Season's Sensation.

THE finest map of the world's broadcasting stations ever published! To put the matter in popular language, "They're all talking about it—amateurs, listeners, and also professional radio men." Even when it becomes out of date it will be a historical document worth keeping amongst your papers to make a sensation in years to come. It's given away with "Modern Wireless" for November, so get yours while the going's good.

### Radio Will be Represented.

IT is not uninteresting to note that radio will have, if necessary, at least two staunch protectors in the present Parliament. The President of the Radio Manufacturers' Association, Lt.-Col. Moore-Brabazon, is the member for Walsley, and Capt. Ian Fraser, C.B.E., Vice-chairman of the "Wireless for the Blind" Fund, is "in" for St. Pancras North. Capt. Fraser has been for some years the chairman of the B.B.C. Listeners' Organisations Advisory Committee.

### Wireless in the Air.

IF you happen to be in the vicinity of Haymarket, nip down Charles Street to Airways House, the West End headquarters of Imperial Airways, Ltd., and take a look at the window display which has been arranged to illustrate the importance of radio to civilisation. The exhibit shows the type of apparatus which is used in the air and is an object lesson in compactness of layout. By the way, the chain of wireless stations which is planned for use on Imperial Airways Cape to Cairo route is taking shape—Nairobi's station is ready for service.

### An Unexpected Haul.

WHILST fishing for small fry one of the Post Office "sleuth" vans caught a whale; no less than an unlicensed transmitting station. The naughty owner of the station, a Buxton man, ought to have known enough of the qualities of a direction-finding set to have avoided or overcome his temptation to barge, unlicensed and unshriven, into

the amateur band. It was, as he himself is alleged to have described the situation, "a fair cop." He was the victim of zeal, not a petty "pirate," not a miserable hunk trying to get the whole B.B.C. for nothing. The Post Office had refused him a licence to transmit on an open aerial. So he took it. And it has cost him £5. The P.O. may take his gear also!

like it. Such action is contrary to some darned law. So the kids were copped over and over again by the cops. Can't you see 'em scattering; stockings down, jackets flying in the wind? Up rises some young Washington and proposes that the gang shall intercept the cops' radio orders. Carried—*nem con!* So now, when the kids' S.W. set hears "Scout 21, to — and — streets and break up ball games," they pass the word to the field and so, when the cops arrive, all they see are the footprints!

### CONDUCTOR AT THE CONTROLS



This is Strokowski, conductor of the Philadelphia Symphony Orchestra, who is just as interested in the amplifying and radio end of a broadcast as he is in the actual baton-wielding in the studio.

### "China was First."

I AM getting a little tired of hearing about every new idea or invention, that the Chinese thought of it thousands of years ago. They have made precious little use of their marvellous notions, anyway. Talking of the German invention, the "Blattnerphone," by means of which a broadcast programme can be stored up for future use, we are reminded that a Chinese legend tells how the voice of a Chink's wife was sealed up in a bamboo tube and, later, when the tube was opened, came out again as fresh and dulcet as ever. A pretty story is one thing, but the apparatus to make it a reality is quite another. China may be full of magical ideas; Europe and America make the Oriental dreams come true!

### Anti-Radio Lady.

AN estimable married lady, writing to the "Evening Chronicle," deploras the effect of wireless upon what began as a perfectly good husband. I sympathise with her in her troubles, to a certain extent, and believe that the use of the best table knives as screwdrivers ought to be adequate grounds for a separation. But when the fair complainant bemoans the fact that "only last week the

### Kids versus Cops.

AND now for a variant of the story. It seems that certain American youngsters have, positively, the necessity of playing baseball on a certain vacant plot of ground in Rochester, N.Y., U.S.A. (Bless 'em—the young rips!) But the police don't

money put by for a much-needed pair of trousers went for valves," I am pained at such a display of ignorance. Can it be true that any person nowadays really thinks that a valve set can be operated by a pair of trousers?

(Continued on next page.)

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

## Amateur Loudspeakers.

FROM time to time I faithfully record the wireless "freaks" which are reported; the singing shovel, the melodious radiator, the symphonic dish of beans and so forth. I do not deny the truth of the reports. I merely say that the world is a rummy place and that I have myself suffered from a "singing" in the ears. The latest wonder is the pot of water on a stove in Highgate, which is said to have hummed the National programme. No—it was calling the kettle black!

## The Scotsman.

IN response to my little excursion into the Scots Doric on Oct. 17th, R. W. R. (Cambuslang) is kind enough to say that considering my unfortunate nationality

it was "quite decent." That's about as near praise of an Englishman as a Scot can stretch to! Very genial!

However, when he queries my use of the word "gude-wife," saying that it should be "guid-wife," I must point

out that I used the word on the authority of R. L. Stevenson, of whom I am a "100 per cent" admirer, in spite of his "unfortunate nationality." Nay, I will admit, generously, that R. L. S. has inspired and helped me more than any other author. I have passed R. W. R.'s remarks about Scottish radio to the proper quarter.

## Supporting Home Thumpers.

THE B.B.C. has announced that at Broadcasting House only British pianos will be used. Having made exhaustive tests of all makes they have chosen one as the type for their money, and some lucky manufacturer has had a fine order for enough instruments to cover the prospective requirements at headquarters and in the provinces. The announcement concludes with the statement that if an artiste wishes to broadcast on some other make of piano he can bring his own. Humorous dogs!

## Another Revolution.

THE last man to threaten me with a radio revolution was an Indian with a name like something on Turkish Delight boxes. No more has been heard from him, so probably he sold the theory to some Mahatma in return for a course in Home Spinning.

I now notice that "Tuner," writing in the "Yorkshire Observer," says of some new invention that it will probably

"completely revolutionise wireless theory and practice." One naturally expects, therefore, that the invention is fundamental and is somewhat taken aback on learning that it relates to a new type of inter-valve coupling.

I presume that a new type of carriage-coupling wouldn't do much harm to the theory of the loco-engine?

## "Ideas Drying Up."

UNDER this heading a writer in the "Whitehaven News" gives his idea of the future which awaits the staffs of technical radio journals; we have "a trying time ahead." 'Cos why? Because, he tells us, week after week, month after month we have to design new sets. That's all right; we like it! But, says this tragic comedian, "there is nothing new to describe." *Sez thou!* Well, if he watches "P.W." he will see what can be done. If he goes on in this pessimistic strain the time will come when he must confess that he cannot fill his column!

## Radio Benevolence.

ALL who are in any way interested in the Radio Manufacturers' Association will be glad to know how successful was the benefit performance of "Secrets" at the New Scala Theatre, which was given by

## SHORT WAVES.

### IMPOSSIBLE PEOPLE.

The B.B.C. artiste who would sing "In the Saccharine Futurity," instead of "In the Sweet By-and-by."—*Daily Mirror.*

In the opinion of Professor A. M. Low, it will be years before we can communicate with Mars.

This rather suggests that the planet must be on the telephone.—"Punch."

It has been suggested that the reason the B.B.C. Pronunciation Department has insisted on the final "e" in "pianoforte" being sounded is because certain critics have described the piano as a musical instrument which is being used as a tortress.

### GOOD 'EAVENS!

Mr. Thomas Evans, a native of Birmingham, has invented a radio device to detect when a person is telling the truth.

"Swimming around in a large open-air tank at Chelmsford are a dozen or so goldfish who depend upon broadcasting for their existence," we read in the "News Chronicle." We hope they're quite satisfied with their B-B-Sea!

A.: "That's fine music they're broadcasting now. I wonder who the composer is?"

B.: "There isn't one. It's the B.B.C. orchestra tuning up."

"The Celtic Players" on October 26th. A charming and accomplished company, and I think that the Stock Exchange Amateur Dramatic will have to look to its laurels. The proceeds are to be devoted to founding a Radio Benevolent Fund.

## The "Lives" of Valves.

MOST of us are familiar with the lengthy "lives" which are enjoyed by the best makes of modern receiving valves when used sensibly, but we do not hear so much about the "lives" of transmitting valves, and I was struck with some figures which Marconi's showed me. These figures were supplied by the Radio Society of Rio de Janeiro, and relate to Marconi valves used in their transmitter at station P R A A. Two valves, M.R.2, 6,146 hours;

one valve, L.S.5, 12,539 hours (in use since 1923!); three L.S.5 valves, 10,967 hours. All these valves are still in daily use.

## Can We Economise?

HOW can radio men economise? Personally, I have reduced my allowance and am paying the saving to my tobaccoist and brewer, but if you do not smoke or moisten your victuals with the proper kind of lotion, how can you cut down? Save "juice" and put, say, 0.03 of an electricity worker out of a job, eh? I suppose I might refrain from buying records of the music I hear and books which I learn of from "talks," but the saving would only go to help some financier a little quicker down the slippery slope!



## Radio to the Rescue?

I HAVE been so greatly impressed by the profound effect which radio broadcasting has exerted during the period of the pranks of the pound, that I am once more inspired to inquire whether it could not be used to help the country by announcements relating to trade or employment. I saw recently in the "Times" a letter from a firm which stated that it had had requirements which manufacturers here were either unable to satisfy or in which English houses were uninterested. Perhaps the publicity given was inadequate? The B.B.C. could help there.

## What is the Solution?

OF course, we must not have strings of advertisements mixed up with the B.B.C.'s usual programmes, but I keep on returning to the thought that in radio we have an incomparable means of conveying intelligence swiftly and cheaply to vast numbers of people simultaneously and that it cries aloud to be used for a purpose more vital—at present—than either amusement or instruction, namely, the improvement of trade. Now how can it be done?

## "Bikradio."

THAT is what we shall have next "season," mark my words. And my kid son is its pioneer. For three months we have suffered in this house from microphobia, with microphones and wire hanging about in festoons like lianas in the Matto Grasso of Brazil. Not a dark corner but therein one could feel a small boy, either sniffing impatiently or yelling, "Hello!" But the breeze has veered recently; veiled allusions to crystal sets and the "amateur band" have had to be severely ignored, and now—could I "fit a set on his bike?"



ARIEL.



# MY NEW TUNER

by

CAPT. P.P. ECKERSLEY M.I.E.E.

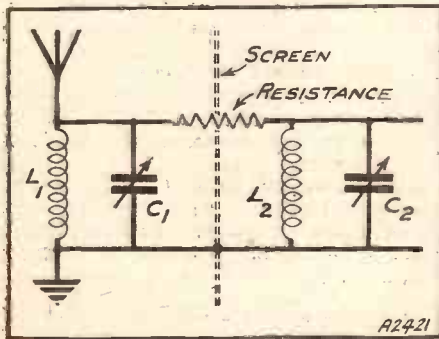


I SAID, last week, that I was going to go ahead and tell you something interesting about tuners and tuning.

I said that, in my opinion, while a tenkilocycle separation between the carrier-waves of transmitting stations was insufficient to give receiver designers a chance to make sets giving "perfect" quality, it was, nevertheless, enough for practical purposes provided the receiver designer looked more carefully into this question of selectivity.

Now I have designed a tuner or "coil" for your use which, price for price, is more selective than any other tuner that I or my POPULAR WIRELESS colleagues know about. This tuner, tested at Tallis House, gave, for instance, good signals from the North Regional station, using a detector and two-note magnifier after the tuner.

## A NEW PRINCIPLE



The "Eckersley" Tuner employs a resistance coupling instead of the usual capacity and inductance methods.

This is not very remarkable. It gave such signals, however, clear of side-band jamming from Langenberg at night. It gave such signals clear from mush. The quality was not "perfect" because it is impossible with present conditions to give perfect quality and freedom from mush and side-band jamming. (How can you reproduce all frequencies up to 10,000 cycles per second, which gives very good quality, when there is a strong modulated carrier-wave on 9,000 cycles?)

### It's Fundamentally Different.

The point about this tuner I have designed is that it meets modern conditions of transmission, and does the best possible that can be done in the circumstances

A wonderful new component which can make a simple set as selective as a multi-valver without sacrificing volume. That, in brief, is the "Eckersley" Tuner. It is the first device ever designed by Capt. Eckersley especially for home constructors.

brought about by the Prague plan. Furthermore, it does it at a low price.

Any tuner to satisfy modern needs must employ a coupled circuit. This tuner is a coupled-circuit tuner. The novelty and virtue of the device is that the coupling is done in a new way never before used. This method of coupling makes the tuner selective and very simple to handle.

My friend Rupert Carpenter was talking to me one day about the fundamental problems of receiver design. He said that he believed many problems would be solved if we used resistance coupling for tuned circuits.

I pondered his wise words. The result of my pondering was to suggest a rather novel method of using resistance coupling. The new tuner embodies this idea. The new tuner is patented by Rupert Carpenter and myself.

The theoretical diagram of connections, what the Americans call the schematic, is shown on this page. (It is, however, a skeleton circuit designed to show the principles of the tuner—the full "working" diagram will appear next week.)

### Gives Double Selectivity.

The aerial circuit is really a series-tuned circuit. (This may seem strange, but it's a bit complicated to go into all this.) If the condenser,  $C_1$ , is adjusted to a certain value, then the circuit is in tune with a certain frequency of carrier-wave—is "in tune" with the circuit it is desired to receive.

Thus the voltage at the top of the coil,  $L_1$ , is a maximum for the carrier-wave frequency, and falls off according as the side-bands differ more and more from the frequency of their carrier.

But the top of the coil,  $L_1$ , is connected through a large non-inductive resistance to the top of coil  $L_2$ .

If  $C_2$  is adjusted to make the second circuit in tune with the station to be received, then the impedance of that circuit from the top to the bottom of the coil (earth) is greatest for the carrier-wave and less as the side-band frequencies are more

and more removed from the carrier-wave frequency.

As the impedance of the second circuit decreases, so more and more volts are lost in the coupling resistance. But less and less volts were input to that resistance because of the selective behaviour of the aerial circuit.

So the coupled circuit is doubly selective to the carrier-wave and side-bands near the carrier-wave than to those outer side-bands and jamming stations separated by 7, 8, 9, etc., kilocycles from the station it is desired to receive. But this is fairly obvious.

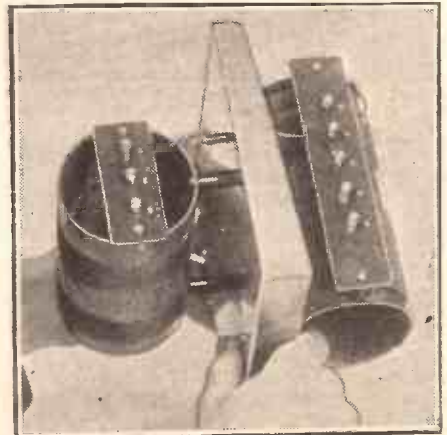
A further advantage of the tuner is that the two circuits do not interfere with one another when their tuning is altered, because there is that barrier of the resistance between them.

### Circuit Separation Too!

You know what it is with the usual coupled circuit. You tune the aerial and then "bring in" the second circuit. This upsets the tune of the aerial which is readjusted, which upsets the tune of the second circuit, which is readjusted—but the coupling is then too strong, so you alter that and then you have to alter the tunings of both circuits (which then affect one another) and you end up after ten minutes with plenty of mush, lots of side-band jamming, and you go back to the local station!

(Continued on next page.)

## THE FIRST COMMERCIAL VERSION



The very first commercial version of our Radio Consultant's new device.

## SOME RADIO RECOLLECTIONS FROM A CORRESPONDENT.

**B**ETWEEN those halcyon days of before-the-B.B.C. and the present time, there is a great gulf fixed, and our admiration of the progress which wireless has made may perhaps be tempered with an occasional fleeting regret for that delightfully uncertain era marked out in the annals of science as the heyday of 2 L.O.

Because discovery was then progressing on less standardised lines than those which now hold sway, innovations were apt to be of a more or less startling character, and a number of ephemeral "short-cuts" to perfection enjoyed a hectic, if circumscribed, popularity.

There was, for instance, the mass attack carried out by the members of the Oscillating Crystal brigade. The O.C. was, as many of my readers will remember, a battery-cum-detector affair designed to increase volume to an enormous extent at the cost of a few pence on a 4-volt dry battery.

The results claimed owed a fair amount to

capped by another reader, who wrote to say that he could testify to the accuracy of all this, *as he was one of the crowd.*

The five-valver of eight years ago was a very different proposition from that of to-day—the valves very often perched on the top of a flat panel, and flanked by an imposing array of rheostats, D.P.D.T. switches, and little knobs of various import. I have before me now an illustration of a five-valver which was the proud possessor of fourteen controls. Many a young enthusiast of to-day would wonder how on earth the sets of that type and age were ever handled—and there must have been a certain amount of luck in it, after all.

### Did you Buy One?

It is extraordinary to recall how wireless was at first slated as being "just a craze," and a nine days' wonder, particularly when we bear in mind the fact that only a few short years have sufficed to bring about this change.

In 1924 the experimental side was making great strides, and a fine business was done in Constructors' Licences (at 15s. apiece), which entitled one to become a constructor of wireless receiving apparatus, as distinct from a mere listener-in. "provided that no parts manufactured elsewhere than in

junk heaps with one last, fond glance, and a sigh for the solace they have yielded us.

But one thing at least they still do; they are a signpost on the road of radio progress, and it is by them and their later brothers that we may follow the growth of our attainments and perhaps, forecast a little of what the future has in store for us.

## MY NEW TUNER

(Continued from previous page.)

In the new tuner you just bring one (the second) circuit into tune, and then you bring the other (the aerial) into tune and there you are. The coupling between the circuits remains reasonably constant over the whole band of wave-lengths because the impedance of the second circuit tends to remain constant.

Another "general" advantage of the device lies in the fact that I have not been in the least ashamed to make the coils reasonably big. You cannot have an omelette without eggs.

You *must*, if you are to meet the conditions imposed by the Prague plan, get proper selectivity, and you cannot get proper selectivity with tiny little high-resistance coils unless you make an elaborate and costly tuner. It's no use pretending you can overcome fundamental laws, you cannot!

### The Question of Cost.

And last, but not least, *this tuner has been designed to a price.* It is thus necessary to discard refinements. The point is that fundamentally you have got something really sensitive, really selective, cheap and very simple to handle, and if it does not give "perfect" quality (because you *must* cut off top to eliminate mush), what set which simultaneously gives selectivity does give "perfect" quality?

I do not apologise for the result. I am proud of it. Everybody who has heard the result is amazed at the "cleanness" of the resulting quality, the selectivity and the ease of tuning.

(Ed. Note: Next week Capt. Eckersley will give further details regarding his amazing tuning device. No reader should miss these details which are *exclusive* to "P.W.")

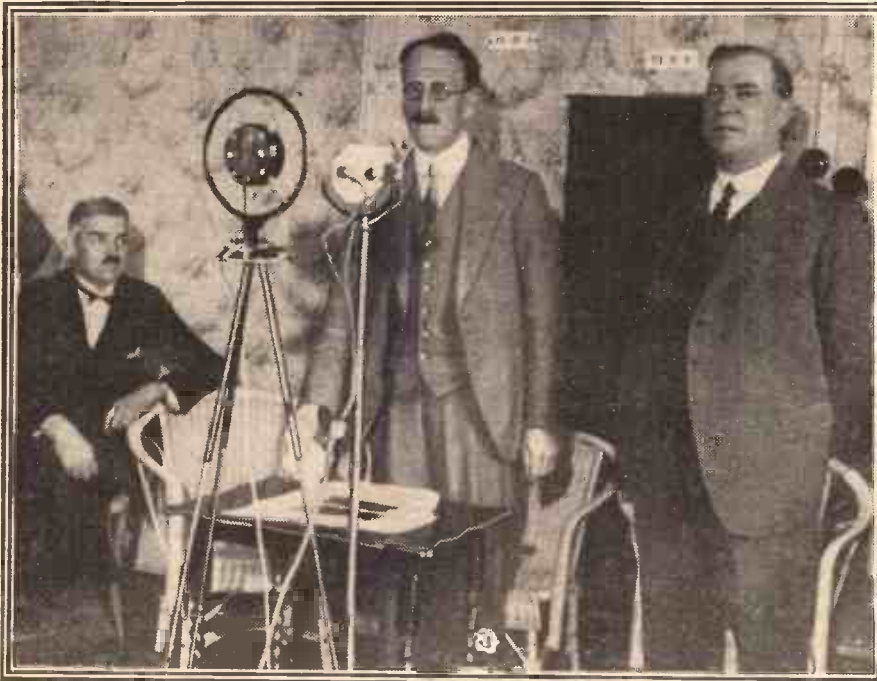
## FINISHED IN FABRIC

A cabinet-making hint.

**A**N alternative for those who have, as they think, made a ghastly finish of their cabinet, and who find leatherette and rexine too costly, is cotton fabric or linen. A study of various textures will repay the time spent. (There should be no need to pick out alternative threads with a pin.)

After pasting on, stain or paint to the required colour. Thick paint will be found beneficial for moulds or where overlapping is essential, and several under-coatings will bring any lower surface to a level, but—while the last coat of paint is still moist—an odd piece of material should be pressed firmly to it, to provide the same grain or texture. W. W.

## RADIO RELAY SERVICE OPENED AT EXETER



The Mayor of Exeter officially declares the new relay service to 500 subscribers to be open. Afterwards the National Programme was switched in instead of the microphone.

a judicious admixture of local conditions and enthusiasm, and finally got to be quite beyond the credence of the most hopeful.

### That Crowd!

It was, I recollect, just at the height of O.C. popularity that one humorist wrote to "P.W." explaining how he had hooked up fifteen O.C. circuits in a row, and tuned in a military band with sufficient volume to smash all the windows in his house, and draw an enormous crowd into his front garden, there to stand entranced at the cataract of melody.

This was a good story, but was ably

Great Britain and Northern Ireland are knowingly used in the receiving apparatus."

At that time, there was, of course, a very active B.B.C., possessing no less than eight broadcasting stations, and we had emerged from that period of barbarism which was characterised by the solenoid and the coherer.

### "Good-bye, Bright Emitters."

These things are passing into the limbo of the Forgotten, and our home-assembled variable condensers of the massive vanes, our bright-emitter valves, and our favourite pieces of Hertzite are being cast upon the

# Around Scotland with a Portable



By LESLIE W. A. BAILEY.

Most tourists might have considered the weather "off season" for holidays, but our contributor apparently found the conditions pretty good for radio.

I WENT alone to Scotland, and anyone bound on a long motor tour in solitude is hereby strongly recommended to take a good portable wireless set. It is as satisfactory a travelling companion as a select human being whose ideas and moods are well tuned to one's own, though it packs into less space and costs less on the bill of the trip, but it has this advantage—that its voice can be silenced at the touch of a switch.

Sometimes, as when the solemn grandeur of the Scottish mountains seems to hush one into dumbfounded silence, the tongue of even the best attuned colleague can wag to one's annoyance!

A wireless set, at the same time, never tires (so long as its batteries are attended as they should be). At the end of a long day's motoring, when a human companion might be weary, the portable is ready to entertain, to bring the news to whatever outlandish spot one has reached, to forecast the weather for to-morrow's trip.

## An Ideal Companion.

Motoring into Scotland from the North of England, I was interested to observe the strength at which the new North Regional station came through, and to compare its volume at different distances northwards with that of the London Regional station.

Sometimes the set, a four-valver, rested on the seat beside me and entertained me when I stopped by the wayside; at other times it was heard in hotel bedrooms and sitting-rooms.

One Sunday morning, en route from Edinburgh to Dundee, I stopped by the roadside and listened to that strange mixture of religion and military pomp, the Military Sunday service held annually in York Minster.

The cyclists, hikers, and motorists who passed my little two-seater Triumph must have thought it strange to hear a blare of trumpets issue forth from somewhere beside the driver, or to catch the strains of bands and congregation singing "God Save the King" as they whisked past along the high-road from Edinburgh to Falkirk.

It is near to Falkirk that the B.B.C. is erecting a new high-power station. I heard

the York Minster service through the Edinburgh transmitter, but this has comparatively low power, and, so far as I could tell by keeping the set working beside me as I motored away from Edinburgh, the effective range is only 10 miles or so.

## The "National" Stand By!

The other Scottish transmitters, at Glasgow, Aberdeen and Dundee, are also low-powered, and throughout Scotland as a whole, apart from these centres, the great standby for wireless reception, until Falkirk opens, is Daventry 5 X X.

I crossed the Forth at historic Stirling and set the Triumph's nose forward for Perth and Dundee. This road has banked bends to an extent that I have never seen in England, and driving along it gave a feeling of real safety, even when the surface was wet.

At Dundee the "portable" came into action again. I listened to a concert from the North Regional station, which, as the wireless waves fly, was a good 200 miles away. The "kick" with which it came through astonished me. The volume was better than it is 100 miles from the transmitter, at such places as Newcastle-on-Tyne. This "skip" effect was noticed several times.

Next morning I travelled on to Aberdeen,

along a coast road which skirts two or three remarkable little fishing villages where a mere rift in the rocks has been seized upon as a harbour and where the cottages seem to be almost tumbling off these rocks into the sea. How the fishing smacks make such a scanty crevice of shelter in rough weather I cannot imagine.

At Aberdeen the "skip" effect was more extraordinary than ever. I had observed at Edinburgh that the London Regional transmission came over 400 miles much better than it was received in Yorkshire, at half the distance from the transmitter. Now, at Aberdeen, I found that the London Regional station was still received at good strength, with a minimum of fading, and the North Regional station gave notably better service than it does in north Yorkshire and Durham.

## Long Waves Least Affected.

Long wave-length stations are not so susceptible to these irregularities. I had already found Daventry a reliable transmission, and next day I was able to test this station in the Highlands.

My business took me from Aberdeen to Glasgow, but, having a full day in which to do the journey, I mapped out a run diagonally across Scotland, through high passes of the Grampians, instead of taking the conventional main road route.

And so from Aberdeen the Triumph hummed cheerfully along the lovely road that winds by Dee-side. Through Banchory and on to Aboyne, with forests closing in on the highway and rugged hills towering on either side of the narrowing Vale of Dee, and so to a point where the road runs high above the river, in which a couple of fishermen were patiently awaiting for trout to bite, and where the towers of Balmoral Castle peep through the trees on the other

## "THROUGH THE GRAMPIANS"



A snap taken by our correspondent of his car. Note the portable set standing on the bonnet.

(Continued on page 710.)

THE MIRROR OF THE B.B.C.

By O.H.M.

**WHAT ABOUT EMPIRE BROADCASTING?**

THE REGIONAL SCHEME—THE B.B.C. AND IRELAND—THE WORLD SPEAKS.

I HAD become impatient about Empire Broadcasting. Letters which reached me from the Dominions and Colonies made it distressingly obvious that there had been grave lack of courage and statesmanlike view in handling this Empire Broadcasting business.

More than two years had elapsed since the B.B.C., on its own confession, had acquired all the knowledge and experience which could be expected from the experimental short-wave station operating from Chelmsford.

Britons overseas have suffered the humiliation of having to recognise the superiority of every foreign short-wave service. Meanwhile, be it said to the credit of the B.B.C., they had made valiant endeavours to secure agreement among the Government departments concerned and with the administrations Overseas for an equitable allocation of the expenditure involved.

But by this road there was no goal. Official procrastination seemed to triumph. Now at long last the B.B.C. has decided to get the job done and leave the Government Departments to continue their barren discussions. But I shall not be entirely satisfied until I have more information on such details as the actual date of opening the Empire service.

**The Regional Scheme.**

Wave-length difficulties and interference problems notwithstanding, the B.B.C. goes on with its Regional Scheme very much on the lines originally suggested by Captain Eekersley, (P.W.'s. Chief Radio Consultant) who was Chief Engineer of the B.B.C. when the important decisions about alternative programmes were taken.

The next instalment is the new National Transmitter for Scotland, which is being rapidly constructed, under the eagle eyes of Messrs. Ashbridge and Tudsbury, at Westerglen, near Falkirk.

I am told that this station will be ready to inaugurate its twin-wave service about the middle of 1932. When this is in being, it will be a happy complement to the enterprise begun with the establishment in Edinburgh of Scottish Broadcasting House, which is already recognised as the artistic and literary centre of the Scottish capital.

**The B.B.C. and Ireland.**

I hear from Belfast and from Dublin almost simultaneously of a new scheme for closer coordination of the broadcasting of the two centres. Of course, Mr. Beadle, the B.B.C. representative in Belfast, has been for some time on friendly terms with his opposite number in Dublin and there has been a useful occasional exchange and pooling of programme facilities.

But this has been done without regular arrangement or official recognition. The new idea originates in Dublin where the economic problem appears to be more urgent than it is in Belfast!

The Free State people have a plan for creating an "All Ireland Broadcasting Company" which would make an arrange-

ment with the B.B.C. of equal value to North and South.

Personally, I have advised my friends in London and Belfast to desist forthwith from this enterprise. By leaving things as they are, real co-operation and friendliness will develop almost unconsciously; the introduction of a formal plan would at once set in motion the perverse influences always ready to wreck cooperation in Ireland.

**The World Speaks.**

Someone at Savoy Hill (or it may be someone outside Savoy Hill) has struck a brilliant idea to make the Christmas Day programmes really outstanding by the

**HOW IT ALL BEGAN!**

This is a photograph of Faraday's historic coil with which he demonstrated for the first time the electro-magnetic effects on which all wireless is based.

inclusion of an item which, if its details work out as is hoped, will stop millions of people eating mince pies, hold up the parlour games, and bring a general pause in the Yuletide festivities.

At 9.20 p.m. Savoy Hill, through Commander Stephen King-Hall, will ask the world how it is spending, or has spent, Christmas Day. And the various replies will be broadcast.

You will remember that some months ago Commander King-Hall gave a broadcast talk in which he introduced the novelty of holding a conversation with the captain of a liner in mid-Atlantic.

The conversation was carried on between the London Studio and the liner by means of land lines and wireless telephony, all of which, by an ingenious arrangement of the gadgets in the B.B.C. Control Room, was radiated by various broadcast transmitters.

This briefly is the plan of the programme to be carried out, but on a much more extensive scale, on Christmas night. Telephone conversations will be held with as many parts of the Empire as can be arranged, beginning with several from the British Isles.

There must, of course, be one with a lighthouse keeper, another with a Scottish shepherd away up in a Highland glen—lonely folk to whom our thoughts always fly in times of family gatherings and home rejoicings.

A talk with one of London's real East-End Cockneys brings a different note, and then away we go a thousand miles to hear about the festivities aboard the "Majestic" in mid-Atlantic, and what our kinsmen are  
(Continued on page 708.)

**FOR THE LISTENER**

By "PHILEMON."

Those B.B.C. criticisms, talks and reviews are excellent in their way—but are they badly timed?

WHO listens to the National programme between six o'clock and eight o'clock? I usually do so myself, so that I cannot have any personal complaint about it. But I often wonder who is listening with me.

The majority of listeners are working people who have just got home from office or workshop, tired after the day's work. I do not imagine that many of them are listening; for the fare provided is not exactly the sort which would be welcome to a jaded and fretted mind.

At first there is the News. At 6.30 the Foundations of Music; at 6.50 a critical talk on books, or plays, or films, or perhaps a lesson in French or German; at 7.10 another talk, on the Countryside, or on the Surprising World, or more books.

At 7.30 there is another talk of an edu-

cative character, such as "What is Wealth?" or "Can Democracy Survive?" I find it a good dish; but I do not think it is a very appetising dish to set before a man who has been wrestling all day with such things as accounts and customers, or is dog-tired with manual labour.

**Not Much for Him!**

I came across a man the other day who was very disgruntled about it. He lives in the West Country. I happened to be lecturing down there, and was billeted with him for the night.

He was a working man. He left home at six in the morning and got back at six in the evening. There was a wireless set in the house, and naturally that suggested a topic of conversation for that rather awk-

(Continued on page 708.)



# MAKING AN ALL MAINS RADIOGRAM

Telling you how to convert an all mains A.C. receiver into the most elaborate of mains radiograms, complete with electric motor for turntable and automatic record-changing device.



**N**OBODY can nowadays honestly dispute the fact that the death knell of the acoustic gramophone has been sounded, and that the electric reproducer is more and more coming into its own.

This is a logical sequence of the ordinary development of radio reception and the linking up of the two industries of radio and gramophone must inevitably take place to a very great extent.

### Electrical Reproduction.

A few years ago the man who wanted some form of "mechanised" music in his home (other than the pianola or automatic organ) would buy either a radio set or a gramophone. Probably he would make the radio set, if that were his choice.

Now, however, the two can be obtained in combined form and the home constructor especially is asking for his sets to be "provided with pick-up," so that electrical record reproduction can be carried out, using his own acoustic gramophone or a separate motor and turntable.

In a few years then, very big strides have been made in the realm of radio and gramophone and the radiogram receiver has definitely come to stay.

### About Those Extensions.

But, such a set must of necessity be more expensive than either the radio set or the gramophone taken separately, whether they are bought ready made, or are home constructed, and for the man with a not particularly-deep pocket (and whose pockets are deep nowadays?) the easiest way to set about obtaining a radiogram receiver is to make it in two halves.

First of all he will choose a good radio receiver design, one incorporating a pick-up switch, and capable of providing decent quality reproduction. He will build this and for some time use it solely as a radio-set, secure in the knowledge that when the time comes and the income tax permits, he will get a motor and

turntable unit, and a pick-up, link the two to the set and have a first-class radio gramophone.

With a good battery-driven set and a clockwork gramophone motor really good results can be obtained, but the man who has the greatest advantage is he with electric light supply.

**NO NEEDLE TO CHANGE EACH TIME  
NO MOTOR TO WIND  
AUTOMATIC RECORD-CHANGING**

Not only will a D.C. or A.C. receiver be more economical to run, but it will give more power and the mains will, in addition, enable an electric gramophone motor to be used.

This in itself, may not seem a particularly striking advantage for, after all, the winding

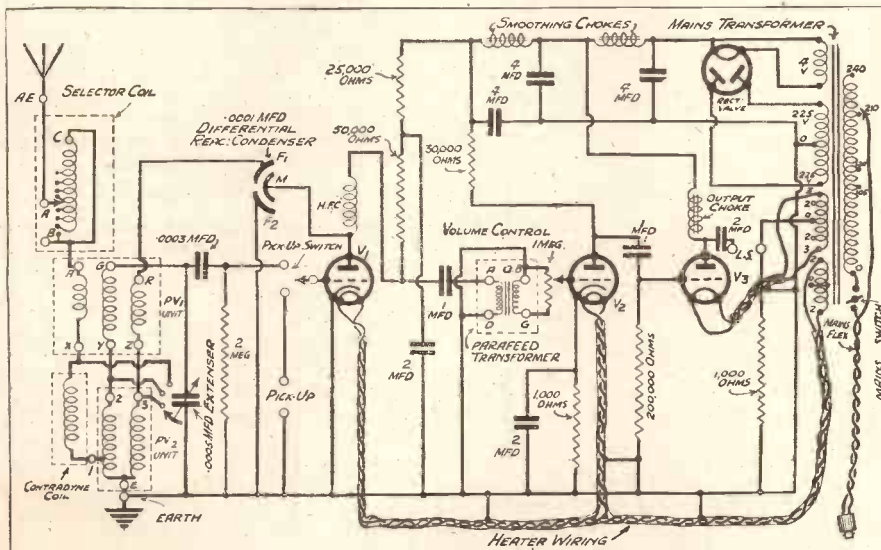
Radio can then be switched on and left while the listeners are in a room some distance away from the set. This sort of thing cannot be done with a radiogramophone because of the need to change records every few minutes, unless—

—Unless you use an automatic record changer.

### All Done for You!

Herein, in our opinion lies the great advantage of the home-made radiogramophone; and it is an advantage that is a very real one. You can take an ordinary, decent mains set—such as the A.C. "Pop Vox" published in "P.W." No. 483,—link it up with a remote loudspeaker system, add at your leisure an automatic record changer and pick-up unit, and you have, by instalments as it were, a first-class radio gramophone, that will play radio as long as broadcasting is in progress and will give a 25 or 30 minutes selection of gramophone music without any attention whatever. And, if you use the new H.M.V. Automatic Record Player, it will switch off the gramophone side of the outfit at the end of the selection quite automatically. There is no rushing to the instrument to change needles or records or even to switch off, and for the man who likes music at mealtimes, while he is dressing, or in his bath, or in fact, at any time, such a radio gramophone holds out possibilities that cannot be obtained at anything like the price or with anything like the freedom of choice by another means.

### A TYPICAL TYPE OF SUITABLE CIRCUIT



This is the circuit of the A.C. "Pop-Vox," described in "Popular Wireless" for Sept. 5th. This or a similar class of set is ideal for mains radiogram work.

of a clockwork gramophone motor is not such a very tedious job.

But there is a point we have not yet brought forward. It is this:

In many homes extension leads are run from the set to loudspeakers in rooms perhaps at the other end of the house.

### Not Expensive.

Your set part you chose to suit your own pocket, your own ideas as to quality and power of reproduction, and you build up the outfit in your own time.

The "His Master's Voice" Automatic Record Player (Model 117) is the most reasonably priced unit we have seen. It consists of a perfectly finished table-type of  
(Continued on next page.)

## MAKING AN ALL-MAINS RADIOGRAM

(Continued from previous page.)

gramophone motor and pick-up unit, and for the 18 guineas which it costs, you get a first-class electric motor and turntable, an excellent pick-up (H.M.V.'s best) and the special changing device, volume control and button changing scheme which enables you to change a record without having to hear it right through, all in a most attractive walnut finished cabinet.

Long specially shielded pick-up leads are provided for connection to the radio section of the outfit, and ten or twelve-inch records can be played at one loading.

The actual building of the radiogram receiver into one unit must, of course, be left to the individual who will be guided by his own requirements.

### The Cabinet.

It could be incorporated in a console type of cabinet, or separate radio and gramophone cabinets of the table type can be employed. This can be safely left to the ingenuity of the constructor.

We have mentioned the A.C. "Pop-Vox" as a suitable receiver for use with the automatic record changer, and, indeed this receiver is ideally suited to the purpose.

The theoretical circuit and the list of components required are given here, and as we said before further details about the set itself can be had on reference to "P.W." (See Nos. 482 and 483)

### Control Connections.

Experienced constructors, however, and "P.W." numbers a very great many among its readers, will not need the wiring diagram and lay-out of the original set, but will prefer to modify it somewhat to suit their own requirements as to shape and

size, and will be able to work straight from the theoretical.

In the A.C. "Pop-Vox" the mains are controlled from a switch on the panel. By paralleled leads for the set side of the switch this could be made to control the record changer if desired, but there is no real need even for this slight complication for the changer has its own control, and merely requires to be connected up to a convenient light or power plug, and its pick-up to the set in order to put it ready for operation.

### 10-inch or 12-inch Records

And what is more this unit need not be within five or six feet of the set as most conveniently long pick-up leads are provided. These are shielded and have a third

## HALF-AN-HOUR'S PRE-ARRANGED PROGRAMME



The special H.M.V. gramophone desk takes eight 10-inch or eight 12-inch records, so that you can arrange quite a pleasant little programme, put the records in place, and then leave the "works" to do the rest.

tag at the end for connection to the earth terminal of the radio set. The connections of the apparatus are very easy then: the changer and the set go to mains, the aerial and earth and loudspeaker are connected to the set in the usual way, the two blue pick-up tags or plugs go to pick-up terminals, and the black tag or plug goes to the earth terminal of set.

The changer is loaded with 8 ten or twelve-inch records, the dial indicator placed to "8," the front button pressed, and off we go.

Volume can either be controlled on the set, or by the volume control on the H.M.V. automatic record player.

It is all so very simple that anyone with mains and a radiogram receiver should make the automatic outfit his goal of radiogram perfection.

### Where D.C. is Used.

We have discussed A.C. mains so far, but obviously the same thing applies to D.C. mains provided a D.C. radiogram receiver is available, and, of course, a D.C. model record changer is necessary.

You could, if desired, use the changer with a battery-operated radiogram receiver provided you had mains to operate the changer. (This cannot be had in the clock-work variety, and so its use is restricted to those having some form of electric light supply.)

The cost of running such an outfit is negligible, and though the 18 guineas for the H.M.V. automatic record player may seem a lot of money, the very great facility that it offers makes it well worth the price asked. Until you have used one of these fascinating units you can have no idea of the blessing it is not to have to rush up every few minutes to change a record, or stop the gramophone motor.

Automatic record changing is the thing of the future, and with a unit offered at such a reasonable price, thousands of keen set owners will be converting their apparatus and fitting up a home-made automatic radiogramophone.

### How It Works.

By the way, for those who are interested in the technicalities of the record changer the following details may be appreciated.

The operation of the mechanism is extremely simple, the eight records (either 12- or 10-inch type) are stacked on a platform consisting of two sliding arm erections, the records being located correctly by an extended central spindle; the sliding arms release one record at a time, which falls vertically on to the turntable.

During the changeover a switch cuts out the pick-up to eliminate the sound of the needle being lowered on to the next record.

The time taken to change records is about 12 seconds, while the button on the front of the changer allows any record to be changed at any point during the playing. At the end of the series of records the whole thing switches itself off. The latest H.M.V. pick-up (type 15) is used, so that the quality of reproduction is of an extremely high order.

## SELECT YOUR COMPONENT MAKES FROM THIS LIST.

- |   |   |  |
|---|---|--|
| 1 Panel 21 in. by 7 in. (Permoal, Peto-Scott, Sovereign, Wearite, Becol Goltone).                       | 1 2-meg. leak and holder (Lissen, Ediswan, Ferranti, Igranic, Telsen).                                    | 2 1,000-ohm Spaghetti resistances (Lewcos, as above).  |
| 1 Cabinet 21 in. by 10 in. baseboard (Camco, Pickett, Osborn, Peto-Scott, Ready Radio, Gilbert).        | 2 5-pin valve holders (Telsen, Lotus, Clix, Bulgin, Igranic).   | 1 200,000-ohm resistance (Graham Farish, Peto-Scott, Wearite).   |
| 1 Selector Coil (Goltone, Ready Radio, R.I., Wearite, Parex, Formo).                                    | 2 4-pin valve holders (as above).   | 1 Mains transformer (Igranic universal, Type B).   |
| 1 Single-pole double-throw switch (Wearite, Goltone, Igranic Ready Radio).                              | 1 H.F. Choke (Varley, Lewcos, Ready Radio).   | 3 Terminal blocks (Belling & Lee), Copper-sheathed cable for heater leads. Flex. Glazite, Jiffihx. Quickwire, screws, 2 oz. 24 D.S.C. wire for hank coil, etc. |
| 1 '0005-mfd. Extenser (Cylidon, Formo, Wave-master).  | 2 1-mfd. fixed condensers (Lissen, T.C.C.).   |  |
| 1 '0001-mfd. differential reaction condenser (Ready Radio or Telsen, Lotus, J.B., Formo, Cylidon, A.W.) | 3 2-mfd. fixed condensers (Lissen, Dubilier, Ferranti, Formo, Telsen, Igranic).                           |  |
| 1 1-meg. volume control (A.E.D., or R.I. Ready Radio, Wearite).   | 3 4-mfd. fixed condensers (Formo, T.C.C., Dubilier).  |  |
| 1 Mains switch (Bulgin, Igranic).   | 1 Parafed L.F. transformer (R.I.).  |  |
| 1 P.V.1 and P.V.2 Coils (Parex, Lewcos, R.I., Ready Radio, Wearite, Goltone, Formo, Peto-Scott.).       | 1 Output choke (R.I., Bulgin, Lotus, Wearite, Telsen).  |  |
| 1 Coil quoit (Peto-Scott, Wearite, Goltone, Sovereign).   | 2 Smoothing chokes (Wearite, Ferranti, R.I., Igranic, Varley).  |  |
| 1 '0003-mfd. fixed condenser (Dubilier, Goltone, Telsen).   | 1 50,000-ohm Spaghetti resistance (Ready Radio, Bulgin, Telsen, Sovereign, Peto-Scott, Igranic, Goltone). |  |
|   | 1 25,000-ohm Spaghetti resistance (Lewcos, as above).   |  |
|   | 1 30,000-ohm Spaghetti resistance (Bulgin, as above).   |  |

### THE VALVES TO USE.

For V1.—A.C. HL type (Cossor, Osram, Mazda, Eta, or Six-Sixty).  
For V2.—A.C. detector type (Six-Sixty), or A.C. HL type (Eta, Mazda, Cossor-Osram).  
For V3.—P.625 type (Osram, Mazda, Eta, Six-Sixty, or Cossor).

### RECOMMENDED LOUDSPEAKERS.

H.M.V. (Model LS7), British Thomson-Houston, Whiteley Electric, Undy, Celestion, Amplion, British Blue Spot.

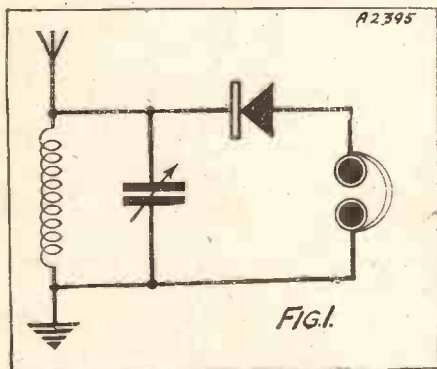


# HOW YOUR SET WORKS

**L**AST week we dealt with the question of tuning, and having got so far I expect you'll be asking how the incoming wireless waves are "detected." Well, I'm going to try and explain.

Before I make a start, it is as well for us to visualise what an electric current really is. I expect most of you have heard about molecules and atoms which were supposed to be the foundation of all matter. Well, these extremely small particles are themselves built of still smaller units called electrons.

## THE "BARE BONES"



The crystal detector, which is inserted between the aerial and 'phones, will allow current to pass only in one direction. Thus it is one-way currents only that reach the headphones.

The electrons are so tiny that it is quite impossible for them to be seen, even with the aid of the most powerful microscope in the world. It is when we make electrons flow along a conductor that we produce an electric current.

A "conductor," by the way, is any substance which will allow electricity to pass with comparative ease; while an "insulator" is a substance that offers a very high resistance to its passage. Copper, for example, is a very good conductor, but ebonite is a good insulator.

Returning to our wireless receiving aerial, let us consider the incoming waves from a broadcasting station. In a previous article of this series it was explained that they were "modulated" by the speech or music at the transmitting studio. We now have the job of detecting them.

### Currents that Change Direction.

Bearing in mind what was said about "modulation," you'll easily see that as the incoming currents keep changing their direction they are useless to us as they are. The effect of every pulse, or surge in one direction, is instantly "washed out" by

\* \* \* \* \*

**By FRANK BRIGGS.**

**Who tells you how a crystal receiver functions, and then, in easy stages, a one-valver with reaction. Next week there will be a concluding article dealing with H.F. and L.F. amplification.**

\* \* \* \* \*

the following pulse, which is in the opposite direction.

What we have to do, then, is to "rectify" them. Or in other words, change them into one-way currents.

If you refer to the accompanying Fig. 1 you will see the theoretical circuit for an ordinary crystal receiver. It consists of aerial and earth wires joined to a coil and condenser, with a pair of headphones and a crystal detector wired across the latter.

### Rectifying Property of Crystal.

It is the crystal which does the rectifying for us, as it has the property of allowing current to pass through it in one direction only. The result of this is that instead of getting the alternating current in the headphones—which would be the case if the crystal were left out of circuit—we get a series of surges *all in the same direction*.

These find their way through the headphones. In doing so they vary the strength of the magnets within the earpieces, and so the diaphragm vibrates in unison with the modulation.

The crystal has the disadvantage that it does not amplify. It cannot hand out more power than it receives from the aerial. It is for this reason that the valve is so popular. Not only is it a more sensitive detector than the crystal, but it also has tremendous magnifying powers, obtaining the extra energy, as it does, from the batteries associated with it.

### The Valve as Detector.

As to the rectifying property of the valve, it has a similar effect to the crystal. Also, it will allow electrons to pass in one direction only and the filament must be heated, no electrons whatever passing when the battery used for heating purposes is disconnected. The direction of electron flow is from filament to plate.

If you'll have a look at Fig. 2 you'll see a circuit for a simple one-valve receiver. The aerial tuning arrangements are the same as for the crystal set, but the aerial side of the coil is joined to the grid of the valve, through a grid condenser (the use of which I will explain later), and the headphones are joined in the plate circuit.

Let's just trace out what happens. Assuming that the high-tension battery is

connected and the low-tension has been switched on for heating the filament, an electron movement will start from the negative H.T. terminal along the wire in the direction of the arrow, until it reaches the junction with the filament circuit.

It will then move up to the filament proper, and this being heated, it will throw off the electrons in the direction of the plate. They cross the vacuum inside the valve to get to the plate, on their way they have to pass through the gaps in the grid.

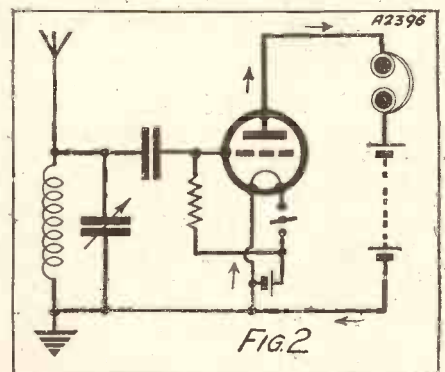
### Path of the H.T. Current.

After reaching the plate they continue in the direction of the arrows to the positive terminal of the high-tension battery. In passing from the plate to the H.T. positive terminal you'll see that the current has to pass through the headphones.

I mentioned just now that the electrons on their way from the filament to the plate had to pass through the meshes of the grid. It is upon this point that the working of our receiver depends.

The grid of a wireless valve produces an effect similar to a tap in the middle of a long

## VALVE RECTIFICATION



In this circuit the valve has replaced the crystal detector. Its main advantage over the latter is that it amplifies in addition to detecting, or rectifying.

pipeline. When the tiny modulated impulses arrive on the grid from the aerial, they have the final effect of altering the steady flow of electrons which is normally passing through the valve. The best way to visualise this is to refer to our pipe line and tap analogy.

The flow of water through the pipe represents the current which is passing from filament to plate, and the tap corresponds to the grid. If you turn the tap partly off and on again, the water will be controlled at the far end of the pipe in accordance.

(Continued on next page.)

## HOW YOUR SET WORKS

(Continued from previous page.)

In the same way when the electrons from the aerial arrive at the grid, they control the current through our headphones. The result is that the telephone diaphragms vibrate and a sound is heard.

### The Grid Condenser and Leak.

One of the functions of the small condenser between the aerial and the grid is to prevent the coil short circuiting the high resistance (or "grid leak") which is connected from grid to filament. This "leak" provides a path of the right resistance for the grid current upon which the proper working of the valve depends.

From a valve detector it is possible to get much stronger signals than with the ordinary crystal receiver. This is because the tiny "radio" currents control the much larger H.T. current through the headphones. By altering the circuit slightly, however, it is possible to get a larger output still.

If you have a look at the circuit in Fig. 3, you'll see that it is similar to Fig. 2, but the lead between the plate and headphones has been broken and a small coil inserted. This coil is then coupled to the aerial winding to enable it to feed back some of the energy in the plate circuit into the grid circuit again which has the effect of greatly increasing sensitivity.

### What Reaction Does.

The arrangement referred to above is known as a "reaction" coil, and it is the means whereby we can strengthen programmes on our receiver which would otherwise remain unheard. Up to a point, the nearer the reaction coil is brought to the aerial inductance, or the more turns of wire it has, the more energy will be fed back

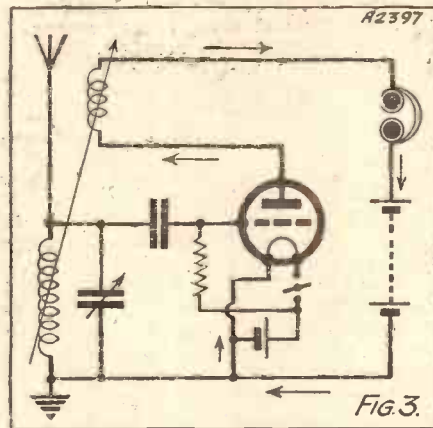
through the valve, and the louder will be the results.

### Reaching the Limit.

Unfortunately, we cannot increase indefinitely, for as you probably know from experience, a point is finally reached where we can get no further increase in strength, and the set bursts into continuous oscillation. When your receiver is in this state it is really acting like a small transmitter, and for this reason you should always refrain from causing it to oscillate more than you can possibly help.

If we wish to get still greater amplification from our set, the only way to do so is to add another valve. This time, however, the

## GIVING IT A "BOOST"



This arrangement is similar to that shown in Fig. 2, with the exception that a reaction coil has been added. By means of this coil it is possible to feed back to the input circuit some of the energy from the plate which increases sensitivity.

valve will not have to work as a rectifier, but as an amplifier. I am afraid there is not space to deal with this in the present article, so we shall have to leave it until next week.

## THE AMAZING GROWTH OF BROADCASTING.

Some figures which show how rapidly the number of radio licence holders is increasing.

THE fact that the number of licensed listeners has now passed the four million mark seems to have escaped attention during the excitement of the General Election.

Actually the four millionth licence was taken out in the second week of October, when the campaign against wireless pirates was at its height. To-day the total number of licensed listeners is round about 4,100,000, a figure which is expected to grow to 4½ millions by the end of the year and 4½ millions by next March or April.

### Colossal Figures.

This year has been the most amazing for the growth of licence figures in the whole history of broadcasting. In the first eight months, before the "pirates" were tackled at all, the normal rate of increase exceeded that of 1930. The following are the approximate figures of fresh licences taken out each month:

January .. .. .	109,000
February .. .. .	70,000
March .. .. .	57,000
April .. .. .	47,000
May .. .. .	39,000
June .. .. .	46,000
July .. .. .	29,000
August .. .. .	34,000

Thus by the end of August the number of licences in round figures stood at 3,844,000, compared with 3,413,000 at the beginning of the year.

### Effect of the P.O.'s Warning.

September brought another huge increase of over 60,000, but this was due partly to the Post Office warning that the campaign was about to be instituted against wireless pirates, who, it was estimated, numbered 100,000 in the London area alone. At the end of September the licence figure was approximately 3,904,000.

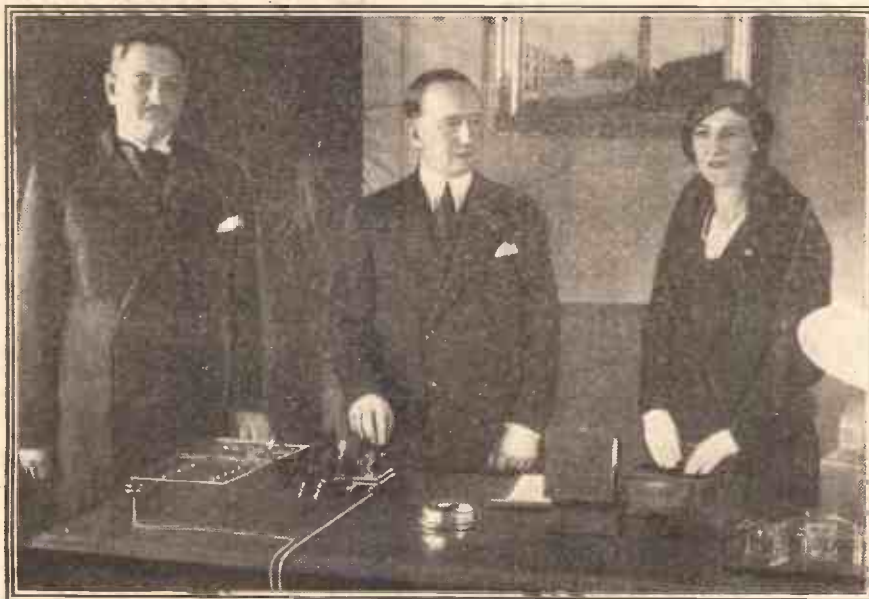
Immunity from prosecution was hinted at to those who, before October 1st, paid just over 2d. a week for "the cheapest and best entertainment in the world," and then came the big drive by the Post Office "hush hush" and detector vans, whose efficiency in discovering pirates had previously been doubted.

### Not Enough Licence Forms.

The scare was complete and the results truly astounding. So great was the rush that many Post Offices ran out of licence forms, and it was soon apparent that October, which last year showed an increase of 30,000 on the figures for 1929 was going to be a wonderful month.

The first week alone brought in 72,000 additional licences, mostly taken out in the London area, and before the end of the second week the total had increased to 82,000 for London and 110,000 for the whole country. So that with two weeks of October still to go the figure stood at something like 4,014,000.

## MARCONI LIGHTS A LAMP IN RIO FROM ROME



The Marchese and his wife are here seen in Rome. Marconi is in the act of pressing a key to light an electric lamp in Rio de Janeiro, Brazil, on the occasion of the inauguration of the huge statue of Christ in that city.

# -that count most for Efficiency

in the P.W.

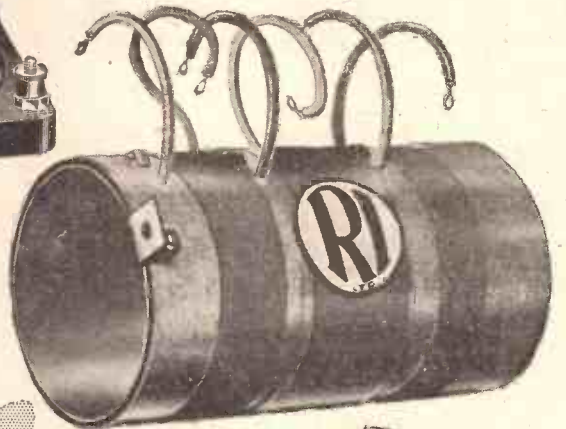
# DUAL RANGER



**R.I.**  
DUAL RANGE  
COIL



**R.I.**  
DUAL ASTATIC  
CHOKE



**R.I.**  
P.J.3  
COIL



DUX  
The Leader

**69**

## On Your Four Fingers

You may count the components which in their respective services are absolutely imperative to the success of the Dual Ranger. They are made by R.I., the acknowledged scientists and pioneers in Radio for over 28 years.

Ask your dealer or write to us for technical leaflets and the R.I. 1931/2 catalogue.

### **R.I.** Dual Range Coil

R.I. present the most amazing precision and accuracy in this coil. Bakelite moulded throughout, every coil is subjected, before release, to exacting laboratory tests on inductance bridge and wavemeter.

**12/6**

### **R.I.** Dual Astatic Choke

N. P. L. Curves show absolute freedom from resonant peaks, and choking is effective over whole band of broadcasting wavelengths. Reproduces perfectly, with fullest amplification all effective frequencies.

**7/6**

### **R.I.** DUX Transformer

The transformer for the million. Credited by the technical press with a performance equal to transformers at many times its price. Published technical facts are a guarantee of performance before purchase. Amazing primary inductance of **30 HENRIES**

### **R.I.** P.J.3 Coil

This precision made coil conforms absolutely to the correct standard specified by the designers, and can be relied upon to give absolutely trouble-free results.

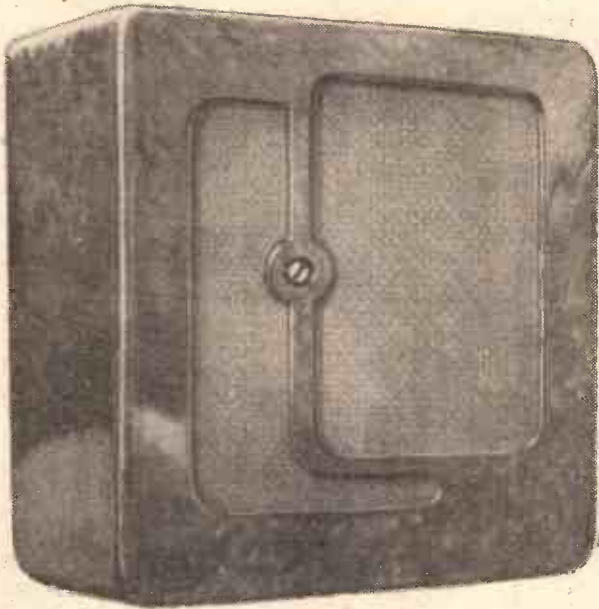
**2/6**

**COMPONENTS ARE BEST FOR SET BUILDERS**



# 'SNAP'

## THE NEW GRAHAM FARISH SPEAKER



The 'Snap' Speaker Unit which is also sold separately at any Dealers' is utilised in this Cabinet model.

If you went to the Olympia Radio Exhibition and saw on the Graham Farish Stand a demonstration of the Graham Farish Unit, you must have seen also the large number of people who stood amazed at this practical demonstration of the pioneer work of the British manufacturers.

Great advances have been made, during recent months, in the research of cobalt steel magnet production, and it is entirely due to this laboratory work that Graham Farish Ltd. can now market an efficient Cabinet Speaker at this remarkably low price.

Owing to repeated demands for a low price Cabinet Speaker, this new 'Snap' Model has been produced by Graham Farish Ltd. at the pioneer price of 21/-.

The case, being moulded in highly-polished Bakelite in various wood finishes, is of a bold and attractive design, and will be found to harmonise with any scheme of decoration.

Great attention has been paid to the details of the Unit itself, which employs a cobalt steel magnet of a very high flux density, which will handle a wide range of frequencies without a trace of rattle or distortion, and giving a volume which is only equalled by the tone.

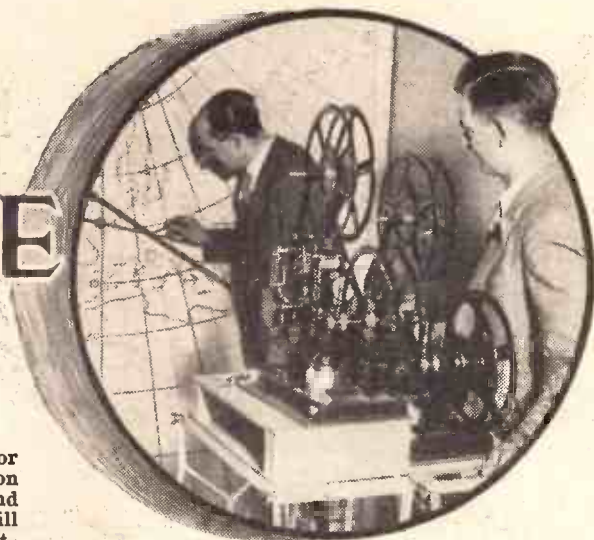
One other point which may serve to illustrate the care lavished by Graham Farish Ltd. on their productions is that a screw head setting nut is used in place of the usual knob adjustment. The advantages of this are, that once set, the Speaker cannot get out of adjustment, and the slot in the screw head being designed to take a coin makes adjustment a simple matter.

# 21/-

**GRAHAM FARISH LTD.**  
**BROMLEY • • KENT**

# THE NEW HEAVISIDE LAYER

By A SPECIAL CORRESPONDENT.



Working in a laboratory at King's College, in the Strand, Professor E. V. Appleton, F.R.S., Wheatstone Professor of Physics at London University, has proved the existence of an upper Heaviside Layer and measured its height above the earth. Knowledge of this second layer will prove of great importance to designers of Beam stations and other short-wave transmitters. Professor Appleton himself believes that waves below about 40 metres would be practically valueless without the aid of the layer he has discovered.

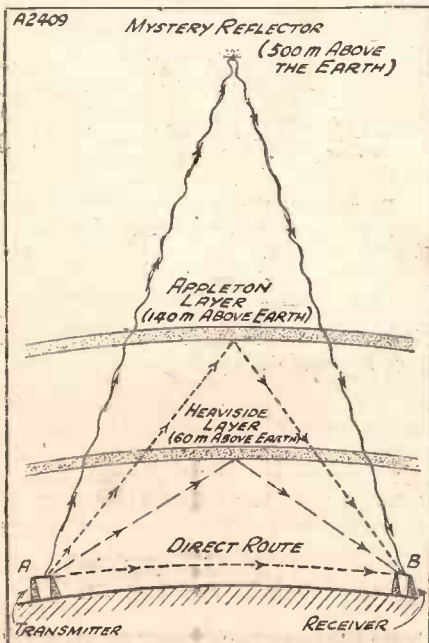
AFTER visiting the Radio Research Station at Slough, where details of the new Heaviside layer were revealed to members of the British Association, I have come to the conclusion that Professor Appleton is a real ruler of radio waves.

He seems to be able to do just what he likes with them, for he can "shoot" bundles of waves at and through and in between the two layers and make them "bounce" back again to earth as easily as a child can make pebbles ricochet across a pond.

## Watching the Waves.

Sometimes he makes the waves bounce up and down between earth and the Heaviside layer four or five times, and whatever they do he records their movements on a strip of sensitised paper.

## THE FOUR ROUTES



Showing how the four sets of waves were believed to have travelled.

The Heaviside layer, as most listeners know, is a region of ionised gases high above the earth. Normally, wireless waves cannot pass through it, but are reflected downwards.

This fact is of great importance to long-distance broadcasting on medium wavelengths, but for short-waves the action of the Heaviside layer is somewhat different, and until Professor Appleton made his discovery of a second layer above the Heaviside layer, scientists were unable satisfactorily to explain how such enormous distances were covered by very short-wave transmitters.

Professor Appleton has shown definitely that waves below about 40 metres pass right through the original Heaviside layer and carry on straight up to a second and previously unknown layer.

This layer, he states, is more intensely charged with free electricity than the Heaviside layer and therefore reflects better.

Very briefly, this is what happened when Professor Appleton radiated a dot on 30 metres from a transmitter in central London:

The waves went out evenly in all directions, but on a recording instrument attached to a sensitive receiving set at King's College he picked up four separate dots—three of them echoes of the original! The dot had travelled to the receiver by four different routes. These were:

- (1) By the direct route; which naturally took the shortest time.
- (2) By way of echoing, or reflecting off the Heaviside layer, thus taking a fraction of a second longer than if the direct route were taken.
- (3) By reflection from the upper, or Appleton layer.
- (4) By reflection from some spot in space about 500 miles above the earth. This is a mystery echo which the Professor can at present make no attempt to explain.

A record of these four dots was shown to the British Association, and it is here

reproduced in Fig. 1. It was made by a recording instrument fitted to a receiving set. On the thick black line you will see the first dot recorded as a little peak "G."

This is by the direct route from transmitter to receiver.

Then comes the echo "E," from the Heaviside layer, followed by the echo "F<sub>1</sub>" from the Appleton layer or upper Heaviside layer, and finally some time afterwards, the mystery echo "S."

The zig-zag line beneath was put on, as a timing mark, while the record was being made. The zig-zags are in 1/1000ths of

## THE MYSTERY ECHO

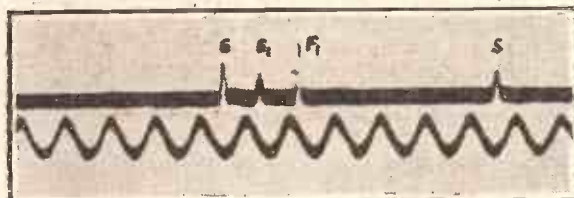


Fig. 1. A remarkably clear record showing how a single transmitted dot was received four times on a receiving set less than half a mile away. The dot travelled by four different routes: "G" by the direct route from transmitter to receiver; "E," as an echo from the Heaviside layer, and "F<sub>1</sub>" as an echo from the upper or Appleton layer. The fourth echo, "S," is a complete mystery.

a second, so, by seeing how long each echo took to arrive, it was quite simple for Professor Appleton to calculate the distance travelled by the dot on each of its four journeys.

He was thus able to show that the Heaviside layer was about 60 miles high and that the Appleton layer was about 140 miles high.

## An Unknown Quantity.

The mystery echoes had come from about 500 miles above the earth and are the most puzzling feature of his experiments, for no hypothesis can be made to suit them. "I don't think there is another layer above the upper one," Professor Appleton told me. "But," he added, "this mystery echo does at least show that we are able to send a message right through the layers into space."

Professor Appleton tried further experiments on different wave-lengths which show that the Heaviside layer reflects wireless waves which strike it both below and above.

# THE EMPIRE STATION AT LAST!

By G. B.

Some details of the implications of the recent decision to establish Empire broadcasting on a satisfactory footing.

THE Empire is to have a British short-wave broadcasting station at last.

For years the matter has been discussed. At the Imperial Conference the representatives of the Colonies and Dominions argued the matter but no decision was made.

As usual, the question of finance could not be satisfactorily settled.

So nothing was done, and G 5 S W continued. But at last a definite decision has been made and work on the new short-waver will begin almost immediately.

The Dominions and the Colonies have not yet unanimously decided how far they will assist the undertaking, but the B.B.C. have taken the bold course of proceeding with it without further delay.

What the B.B.C. says.

The following official statement has been issued by the B.B.C. :—

"The B.B.C. announces its intention to proceed immediately with plans for the erection of a short-wave Empire Broadcasting Station.

"For some time the Corporation has been in consultation with Government departments concerned, and the subject was discussed with the last Imperial and Colonial Conferences. Difficulties of financing such a service on a permanent basis have so far postponed the development of the experimental service from Chelmsford (G 5 S W), but the need in the Imperial sense and the strong desire expressed from all parts of the Empire, in particular from the Crown Colonies, have determined the Corporation to proceed without further delay.

"The object will be to give as many listeners as possible in all parts of the Empire a programme from the home country at hours when it is most convenient for them to listen, but details of the times of operation will depend upon the results of experiment and upon the demand.

"Technical arrangements include the use of several wavelengths, which will be chosen so as to provide the best reception under the varying conditions which obtain in the Dominions and Colonies. The station will be at Daventry, and construction will begin shortly."

Cost of the Station.

An official at the B.B.C. told a "P.W." representative that the financial estimates for the new scheme were:

THE IMMEDIATE OUTLAY.	
Capital expenditure on new station	£40,000
YEARLY EXPENDITURE.	
Engineering maintenance per annum	£7,000
Programme expenses (apart from news) per annum	34,000
News (estimated) per annum	1,500
	£42,500

Programme costs have been estimated in

the above on the principle that the Empire service should pay for special items and a proportional share in ordinary programme expenses. The initial capital for building the station will probably be borrowed.

Programmes for All Parts.

Details of the special programmes which will probably be organised to fit in with the difficulties of suiting the clock throughout the world include:

Colonial afternoon programmes, with extracts from the home afternoon programmes and a special news bulletin; an African programme, which would coincide for the most part with the home evening programme; an Australian programme to be performed in the mornings; a Canadian programme, to take place after midnight.

## JUST LOOK AT THAT!



Visitors to a store in south-west London interested in a demonstration of television apparatus.

Discussion of the scheme has been going on since 1927, when the B.B.C. inaugurated the limited short-wave experimental service through Chelmsford. The idea was supported enthusiastically by the Colonial Conference in June-July, 1930, when a resolution was passed recommending that 5s. from every licence fee in the Colonies should be devoted to the Empire service.

It is some years ago now since the B.B.C. arranged with the Marconi Co. to broadcast a limited Empire service from G 5 S W, the Chelmsford short-wave station.

Admittedly the service has been experimental, but it is also admittedly high time we had a first-rate permanent short waver, giving an uninterrupted twenty-four hour broadcast service.

At the moment, 5 S W only broadcasts between 1 and 2 p.m. and 7 p.m. and mid-

night, excluding times when news is transmitted.

Several short waves will be used by the new Empire station, when it is ready to go on the air in a year's time.

They will probably be within the 20-30-metre band. 5 S W, at the moment, is working on 25.53 metres.

As the estimates show the yearly cost of maintaining a full service from the new station will be about £42,000—or, roughly, £4 an hour.

There can be no doubt that the Empire on a whole will greatly benefit by the B.B.C.'s courageous decision to go ahead with the new station. The Empire cannot fail to gain by a service which links together all parts of the British Empire and keeps them in constant touch with the Mother Country.

## STORM STOPS THE NORTH REGIONAL

From Our Northern Correspondent.

IS our North-country weather more than the B.B.C. bargained for when the North Regional station was designed? On a recent evening the aerial of the

North Regional transmitter was so severely handled by a gale over the Pennine Hills that transmissions were stopped for nearly two hours.

The aerial was repaired and for the rest of the evening broadcasting was carried on without interruption.

During the night, however, the gale again wrought havoc, and the following morning found the North Regional aerial down-lead broken and several other wires also down. The transmitter was unable to carry out its usual morning broadcasts and from 10.15 a.m. to 12 noon the North National transmitter deputised for it.

By noon on the second day of the storm the engineers had repaired the damage. Their experience on the previous evening when the aerial was suddenly devastated by the high wind will never be forgotten.

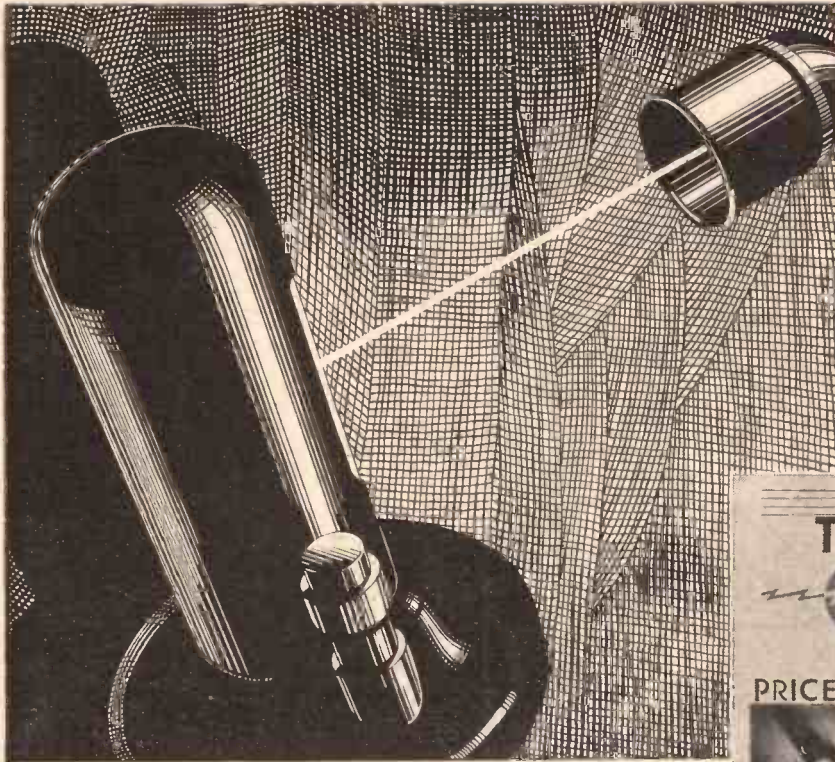
Heroic Work at Moorside Edge.

They had to go out into the darkness and storm, and the thousands of listeners who were waiting and wondering what had happened knew nothing of the heroic work which was going on.

The masts and aerial at Moorside Edge were designed to withstand the very high winds that were expected on this hill-top 1,200 ft. above sea level.

This was the first storm of the season, and evidently it found a weak spot in the design. The B.B.C. must take steps to avoid a recurrence of this trouble, as such storms are not uncommon in winter on the Pennine Hills.





## The Most Amazing Scientific Study Since Radio

Light, so controlled that it can work a burglar alarm—switch on radio by the mere entrance of a person into a room—count automatically—start and stop machinery: that is Raycraft. Its applications are absolutely unlimited, everybody will have many different uses for it; all practical, all interesting. It is sold in the form of a kit set very similar to a home-constructed radio set and can be built by anybody in less than an hour, or it can be fitted complete at a small extra cost by your electrician.

After many years of experimenting with Light Control Apparatus the discovery of a new method of treatment of Selenium has led to the production of the Raycraft Bridge. The Raycraft Bridge is a compact and easily handled apparatus having all the properties of the large Selenium Cell, but produced at a price within reach of everybody's pocket. A simple and inexpensive apparatus works a relay or switch in conjunction with the Raycraft Bridge. The relay thus becomes a light-controlled switch that can do all those things usually done by pressing a button or turning a switch, but doing them automatically in response to the light signals which have affected the Raycraft Bridge. The light beam controlling these signals may be visible or invisible at will.

Complete instructions and blue prints for building the set are given in the "Raycraft Book"—an interesting and well-illustrated magazine which gives details of some of the many uses of Raycraft. As everybody will have different uses for it, we are offering a prize of £5c in the "RAYCRAFT BOOK" for the most interesting and practical application devised by a user.

The price of the kit, complete except for valve and batteries, is £3 17s. 6d.

The price of the Raycraft Projector is; Battery Model, £1 2s. 6d. A.C. Mains Model, £1 15s. 0d.

# RAYCRAFT

AUDIOVISOR LTD.,  
28, Little Russell Street, London, W.C.

**THE RAYCRAFT BOOK**

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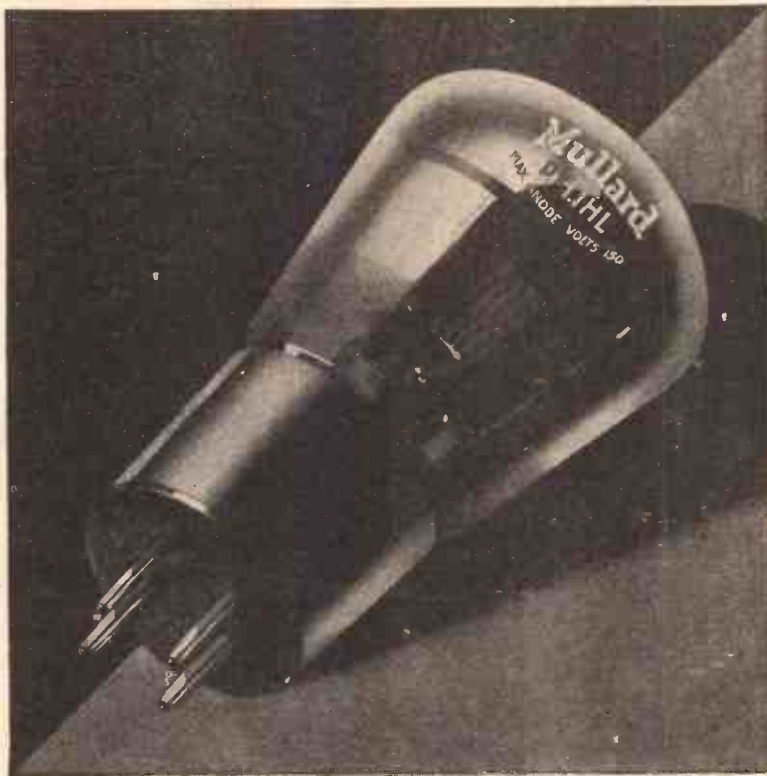
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Address .....

P.W. 21/11/31



# P.M.1HL THE GENERAL PURPOSE VALVE

The Mullard 2-volt range has established itself by the flawless performance of each type. This high standard is attained by constant research and improvement. The P.M.1HL, the Mullard 2-volt general purpose valve, now appears with greatly improved characteristics, and a corresponding gain in sensitivity. It can be used as an H.F. amplifier in stages not employing screened-grid valves, as a detector, or as an L.F. amplifier. Fit one to-day in your receiver.

**PRICE 8'6**

**MADE IN ENGLAND**

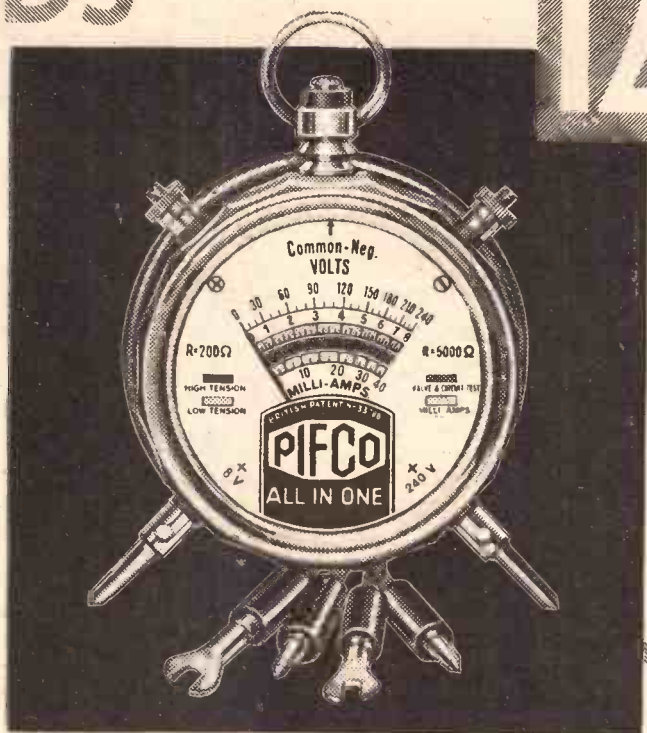
**Mullard**  
**THE MASTER VALVE**

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

Arks

THOUSANDS  
OF RADIO  
ENTHUSIASTS  
USE THIS  
AMAZING  
LITTLE  
RADIOMETER

12/6



DO YOU!

It will enable you to carry out the most comprehensive tests without having to call in expert technical advice. The "All-In-One" Radiometer is the constant standby of radio enthusiasts all over the country. With its aid the swift and certain testing of Valves, Circuits, Batteries, Components becomes absolute simplicity. No need to be puzzled about a fault when you've an "All-In-One" Radiometer. This little instrument will instantly diagnose the trouble.

The Pifco "All-In-One" Radiometer is patented throughout the world. There is no instrument made anywhere like it. You must have one to secure the best reception.

The "All-In-One" Radiometer is offered in two types: the Standard Model at 12/6 for Battery Operated Sets only, and the De Luxe Model at £2/2/- the Super High Resistance pattern, which is also suitable for Electric Receivers and Mains Units. Ask to see them at your radio dealer TO-DAY.

**PIFCO**  
**ALL IN ONE**  
**RADIOMETER**

Obtainable at all Stores and good-class Radio Dealers. Booklet free from Patentees: Pifco, Ltd., High Street, Manchester.



The SHERLOCK HOLMES of RADIO

The NEW DE-LUXE HIGH RESISTANCE MODEL

£2/2/6



## FROM THE TECHNICAL EDITOR'S NOTE BOOK.

# Tested and Found-?



## "WAVEMASTER" VARIABLE CONDENSERS.

OF a bunch of "Wavemaster" condensers, made by the Webb Condenser Co., Ltd., that I have before me as I write, I find it difficult to pick any one out for special mention. They are all very good pieces of work, and each has its individual points of attraction.

But I think on the whole I prefer "Polished Minor," which is one of the best little variables that has passed through my hands. It is constructed throughout of hard, solid, polished nickel-plated brass and the assembly is particularly robust. It is, indeed, quite hard to make the moving vanes touch the fixed vanes even by the application of force. And yet the action is smooth.

There is an extremely small quantity of solid dielectric in the structure, so that losses are reduced to a negligible degree.

The "Bakelite Slow Motion" condenser has excellently moulded bakelite end plates

## THREE GOOD COMPONENTS



A group of "Wavemaster" Condensers.

and, complete with knob and dial, costs only 5s. 6d. The slow-motion movement is, in my opinion, as near perfection as any that will ever be devised.

The ratio is approximately 16 to 1, and the most minute adjustments can be obtained without any backlash or other mechanical failing whatsoever. It is possible to use this "Wavemaster" .0005-mfd. condenser even in a short-waver without it being difficult to tune in the stations; more than which need hardly be said!

It is a pity that the Webb people cannot give us a free and easy direct drive in combination with their slow motion, but

I suppose that is asking too much. However, their direct drive is quite manageable.

There is a "Wavemaster" bakelite condenser without slow motion which retails at 3s. 6d.

## MODERN TIME-KEEPING.

I have had the opportunity of examining one of the new Ferranti electric clocks. It is designed for A.C. mains, which are time controlled. (All those constituting a part of the grid system, and many others are, I believe.)



The Ferranti Electric Clock.

Consuming only about three penny worth of electricity per year, the Ferranti electric clock is entirely automatic. Its mechanism is driven by the A.C. mains current and its time-keeping qualities are those of the time-controlled mains supply itself! It is a beautifully made device, runs without noise, and should last a lifetime.

Should the mains at any time be switched off, it is quite easy to re-set the hands of the clock, for there is an adjusting device at the back which enables this to be done.

There is a very large second hand and this points the time to a second, to be read at a glance at a distance.

So altogether the Ferranti electric clock is a most interestingly practical article.

## THE "CONSTRUCTOR'S FRIEND."

It is advisable when making your cabinets, coils and fixing ebonite to wood to use an adhesive that you can thoroughly depend upon. This is, of course, a small point in the construction of your set, but it is the small things that can cause annoyance.

The use of Seccotine is recommended when an adhesive has to be used. It sets like a rock and is as strong as riveting. It is quick and easy to apply and needs no heating.

Seccotine is obtainable everywhere in tubes 4d., 6d., and 9d. An interesting booklet describing some of the uses for this product may be obtained from the manufacturers: McCaw, Stevenson & Orr, Ltd., The Linenhall Works, Belfast.

## SOVEREIGN RADIO COMPONENTS.

A new catalogue dealing with these popular products is now available to all who care to apply for it.

## A USEFUL GUIDE.

The catalogue which Messrs. Peto-Scott

recently issued is so comprehensive in its nature that constructors should welcome it as a most useful guide to the leading radio components and accessories which are on the market.

## THE NEW "UNDY" UNIT.

I have already tested an "Undy" speaker and found it good.

But since then I have received one of the new 8-pole type complete with chassis. This attractive ensemble retails at 50s., and the unit alone can be purchased for 28s. 6d.

The device is built on very substantial lines, and is now equipped with tapplings so that it can be quickly matched with output valves of different impedances.

I have given it a series of careful tests under different conditions, including those

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

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

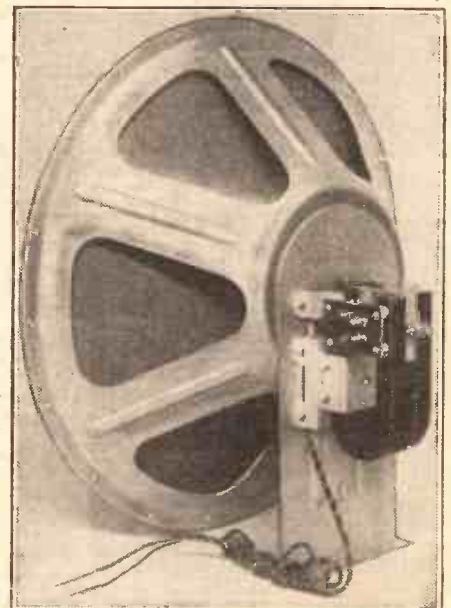
And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are, therefore, framed up in a readily readable manner free from technicalities unnecessary for that immediate purpose.

which it is most likely to meet in the hands of the average constructor, and throughout it behaved exceptionally well.

Note the adjective, it is intended to convey an emphasis, for the new "Undy" unit really is good.

I have no hesitation at all in saying that for sensitivity and evenness of response I consider it is right at the top of its class.

## THE "UNDY" SPEAKER



An "Undy" 8-pole speaker unit and chassis.

# Radiogrand



## TELSEN "RADIOGRAND" L.F. TRANSFORMERS

take a pride in a superiority which has stood the test of time. In design, in finish, and in performance they delight expert and amateur alike—thanks to skilled engineering principles of construction and the most stringent up-to-date testing methods. Fashions change, but the Telsen "Radiogrand" stands four square on the strength of its own perfection.

Radiogrand, Ratios 5-1, 3-1 .. ..	8/6
Radiogrand, Ratio 7-1 .. ..	12/6
Radiogrand, Ratio 1.75-1 .. ..	12/6

# TELSEN

## RADIO COMPONENTS

Send for the Telsen Catalogue and Circuit Booklet to The Telsen Electric Co., Ltd., Aston, Birmingham.

**THE LATEST**  
**"SQUARE**  
(REGD TRADE MARK)  
**PEAK"**  
**DEVELOPMENT**  
**CANNED**  
**COILS**



*Provisionally Protected.*

**3 GANG UNIT ON  
 BASE (as illustrated).**  
 List No. BP13,  
**37/-**

*For other combinations  
 see section B.C. of  
 Catalogue.*

The new "Square Peak" Canned Coils . . . the last word in selectivity and stability. . . Extremely adaptable, allowing the use of either band-pass capacity coupling, inductive coupling, or mixed filter. Completely screened. Each coil individually tested and matched to within 1 per cent. Special rotary wavechange switches with self-cleaning gold-silver alloy contacts. Switch control insulated between coils. Supplied, as illustrated, in sets of 3-4 coils assembled on aluminium base. Can also be obtained separately, as specified below, each coil complete with switch knob and ebonite coupling, ready for ganging in any desired combination.

**1st.**  
**PLACE**  
 Section 3 (tied)  
**"WIRELESS WORLD  
 COMPETITION"**

**THEY GANG TOGETHER**

BP 9 Aerial Band-Pass Coil . . . . .	11/6
BP10 Secondary Band-Pass Coil . . . . .	12/6
BP11 Interválve Coil (Tuned Grid or Tuned Anode)	11/6
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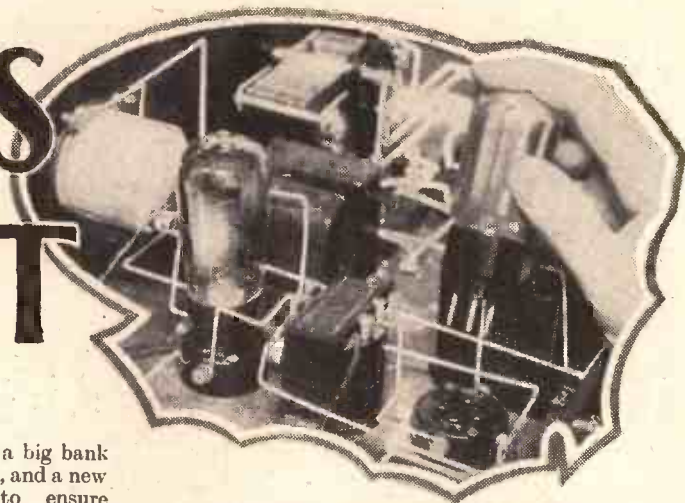
*Ask for leaflet B*

**Varley**

# "P.W." SETS ON TEST

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

A peep at "P.W.'s" Research Department at work.



THE "P.W." Research Department is divided into two sections, and these we generally refer to as "Productions" and "Testing." The first is concerned with investigation into new ideas, the trying out of new circuits, and the building of experimental and "publication" sets. The work of "testing" is to put new sets through their paces, and to test components and accessories.

## CONSTANT CURRENT



A D.C. system using large accumulators has been installed in "P.W.'s" Research Dept.

And it is with this latter section that I propose to deal in this article, for it is the one more intimately relating to our published set descriptions.

### Through the Mill.

I haven't any revelations to make, and I do not propose to claim that either our methods or our gear is as good as that of the National Physical Laboratory. But I hope to show that we do spend a considerable amount of time in carefully examining our receivers under scientific conditions before we "pass them for publication."

To begin with, I will briefly describe the apparatus we use. Tallis House is served by direct-current mains of 210 volts. Quite

recently we installed a big bank of large accumulators, and a new D.C. switchboard, to ensure constant D.C. currents of varying voltages.

These are available at various plug points on the test benches. Then there is a complete A.C. outfit, including a large Crompton rotary converter, which is bedded on concrete in one of our most distant rooms.

This converter is driven by the mains D.C. supply and feeds an A.C. output to an oil-immersed transformer. By means of a number of controls any voltage or frequency of A.C. can be obtained, so that our A.C. sets can be tested under all conditions as to power supply.

### Matching Your Mains.

The A.C. switchboard is provided with a number of "outlets," terminating in handily placed sockets and terminals on the test benches. Aerial and earth feeders are also conveniently disposed on these benches, so that several sets can be tested at the same time. As many as eight loudspeakers can be connected up at once, and the technicians can switch on any one by operating a central control switch.

There is an "output balancing" unit, enabling immediate changes in transformer ratio and choke-capacity arrangements to be made.

At a distant point we have a complete "artificial aerial" transmitter which can transmit either C.W. or telephony of any modulation percentage at any ordinary wave-length.

The power of this transmitter can be controlled within very fine limits and upon a calibrated basis, and this enables us to duplicate the conditions of almost any kind of distant transmission.

This particular outfit is extremely useful, for it makes us entirely independent of outside broadcasting for our testing material.

The transmitter is employed in conjunction with a valve voltmeter, with which the

exact amount of power picked up by the set on test can be accurately measured. It is not advisable to trust the human ear for such a job, as it is a most unreliable and horribly insensitive instrument!

But, despite our possession of the above-mentioned gear, it must not be thought that we do not test our sets on actual broadcasting at all. We regard such a procedure as being just as important as meter tests.

Therefore, every set "goes on air" under the kind of conditions it is likely to encounter in the hands of constructors. Dry H.T. batteries are brought in for H.T. and the results compared with those given when a commercial mains unit is employed.

### Certified Correct.

Different teams of valves are tried—and these range from teams of the most inefficient valves we can find, up to the most modern and most efficient ones we have in stock.

Sometimes there is a fair amount of urgency—there is a strong demand for a certain kind of set, and we are "rushing one through." But the rush, if such there

*(Continued on next page.)*

## OUR OWN BROADCASTING



This apparatus is, in effect, a miniature broadcasting station which retains a calibrated evenness of power output and frequency stability. It is used in conjunction with a valve-voltmeter for scientifically determining the efficiencies of sets on test. Also it makes it possible to duplicate the most difficult of distant-station reception conditions, as explained in the article.

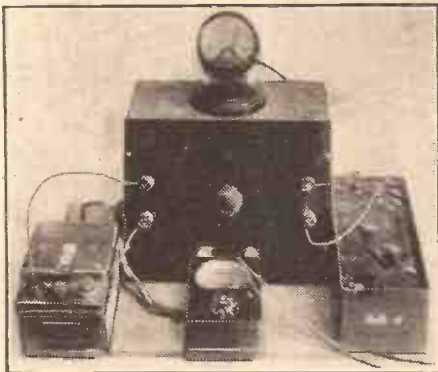
## "P.W." SETS ON TEST

(Continued from previous page.)

is, exists in and leaves off in the construction department—we never rush the final testing.

There is no hasty hooking-up, a quick run round the dials and a "that'll do" verdict about it. You see, every "P.W." set has to

### "P.W.'s" VALVE VOLTMETER



An accurate valve-voltmeter of special construction, which is used to measure the sensitivity and selectivity of receivers.

have a signed certificate before it can reach the hands of the draughtsman and photographer and art editor.

#### Pass-Out Procedure.

This certificate states that the set has passed exhaustive tests satisfactorily, and it has to be signed by both Mr. Johnson Randall, our Queries Editor, and myself. (By the way, these certificates are always available for inspection by our trade friends should they be interested in same.)

Every set, from the simplest crystal set to the most complicated multi-valver, is subjected to this ritual, and no considerations are allowed to stand in the way.

Even if the set is only a minor version of a previous design, say, a two-valve model of a popular "three," it must still earn its certificate. In fact, every single instrument you see described in "P.W." has its individual "pass-out check."

This scheme was inaugurated some nine months ago, and the idea behind it is similar to that which governs the double-key system existing in banks.

#### The "P.W." Way.

It is not that you do not trust yourself or any other one man to give the final "O.K." but you lay down a guarantee against any future contingency; staff members may come and go, but the system is unchangingly everlasting!

And there is this point, too—and here I am speaking for myself. The necessity to place one's opinion on permanent record, to sign a definite statement, tends to make one very, very careful. And if there remains just the tiniest shred of doubt, well—you don't sign, that's all, and the set goes back to the exasperated "productions" section once more!

Our present methods are based on nearly

ten years of concentrated experience; they are not perfect, nothing in the world is perfect, but we do believe we have now eliminated a major portion of whatever

### THE A.C. SWITCHBOARD



The "P.W." Research Dept. generates its own A.C., and several kw. of A.C. power of any cycles and voltage are always immediately available. The photo shows Capt. Eckersley switching on.

imperfections may have existed in the past.

As an illustration of our attention to detail, it may interest readers to learn that all the diagrams of our sets are inspected and checked by men who have had nothing whatever to do with the construction or testing of the sets, although it may be pointed out that this check is supplementary to a check on the part of the Research Department itself.

#### We All Benefit.

But don't think all these "rules and regulations" are regarded as irksome by individual members of the staff. There may be friendly grumbles when model after model of someone's "brainwave" is turned down at the final-testing stage, but everyone realises that it is vital to the ultimate benefit of "ours" that the most rigid standards of performance should be maintained.

### EVERY SET IS PUT THROUGH ITS PACES



One of the main set-testing benches in "P.W.'s" Research Dept. There are duplicated high- and low-voltage points for A.C. or D.C., duplicated aerial and earth feeders connected to aerial systems of varying characteristics, and, on the top shelf, you will see a number of loudspeaker terminals with a central control switch. Below is a multi-valve output unit, giving any desired arrangement of choke or transformer output.

### NEXT WEEK

Read all about  
the "P.W."

## "S.Q. STAR"

Our latest set, which has just  
passed its tests triumphantly.



# SELECTIVITY



## TELSEN DUAL RANGE AERIAL COIL

incorporates a variable selectivity device. Aerial coupling is reduced to the degree demanded by local conditions—local station interference is simply and efficiently avoided. Independent primary and secondary windings make it suitable for any position in the circuit. Wave-changing is simplicity itself—by a switch mounted on the panel. Price 7/6

Telsen H.F. Transformer and  
Aerial Coil .. Price 5/6

# TELSEN

ALL-BRITISH  
RADIO COMPONENTS

Send for the Telsen Catalogue and Circuit Booklet  
to The Telsen Electric Co., Ltd., Aston, Birmingham.

**T**HIS winter seems to be making up for the shockingly bad conditions that we had to endure during the travesty of a summer that we had in 1931. You are conscious now as soon as you switch on that the receiving set feels lively. With one

respectable stage of high-frequency amplification, for instance, station after station is heard as the dials are rotated without the need for more than the merest whiff of reaction.

It is interesting to notice how much earlier in the afternoon Continental stations are making themselves heard. There are of course a few on the medium waves that one can pick up with a sensitive set in broad daylight. Amongst these are Brussels No. 1, when he is in good form, Langenberg, and Hilversum.

But until recently it has not been possible to hear much of the other foreigners before dusk. Now a good few can be found quite early in the afternoon if a careful search is made. Amongst those worth attention in daylight are Breslau, Heilsberg, Brno, Stuttgart, Rome and Prague.

#### Daylight Results.

I am not saying that you will pick up all of these or even any of them every time you try, but the odds are that when conditions are not unfavourable you will hear something of several. It is just as well, by the way, to make sure before trying to get a station in the daytime that it is transmitting at the time.

## STATIONS WORTH HEARING

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

There is one hint that I would like to give long-distance enthusiasts about single-knob sets with ganged condensers. Trimming with these is very often done on some station situated about the middle of the medium-wave band. Sometimes this works very well indeed; sometimes it doesn't.

#### A Tip on "Trimming."

I have come across several sets recently that worked far better when trimming was done on a transmission with a wave-length in the neighbourhood of 300 metres. A method I suggest is this. Trim first of all on a middle station such as the London Regional or Toulouse, and then try stations both near the top and near the bottom of the band, making a note of the way in which they are received.

Next re-trim on, say, the North National or Hilversum and make a similar trial. Lastly, re-trim on a station further up the band such as Langenberg or the North Regional. You will be able to determine very quickly which trimming gives you the best all-round results and you can then adopt this. With band-pass circuits it is particularly important to find the right trimming-point, for if you trim on a station

with too high a wave-length you may find an annoying "double-humping" down towards the bottom of the medium wave-band.

On the long waves reception conditions are at present superb. Stations which are

completely reliable at any time when they are in operation are Oslo, Kalundborg, Warsaw, the Eiffel Tower, Radio-Paris, Zeesen and Huizen.

On the medium waves conditions are extraordinarily good, and the number of stations that can be logged on any evening is large. Budapest is now showing something like the strength that was his last winter. Even if he is not coming in well in the early part of the evening you can generally be pretty sure of receiving the jolly Tzigane music which he transmits as a rule between 9 and 10 p.m.

#### Good Ones to Look For.

Vienna, though varying to some extent, is returning to form, and Milan is generally worth trying for. Prague is a splendid transmission, whilst Rome, Stockholm and Beromunster are always there when required. Berlin Witzleben is often rather disappointing, but if you catch him on a good night you will find that he is well worth hearing. Dublin is showing much greater strength than of late. Others for your list are Belgrade, Katowice, Lwow, Hamburg, Barcelona, Goteborg, Gleiwitz and Trieste.

R. W. H.

**C**ORRESPONDENCE being distinctly on the up-grade once more, I rather think that the "stay-at-home" spirit proper to winter is arriving. At all events, the number of receivers being brushed up and fished out from dusty cupboards seems to be tremendous!

It is a distinct pity for us short-wave people that the summer should nearly always bring good conditions. I know too well that the best of reception conditions would not keep me indoors on a fine day (I am not speaking of the past summer, as you will note). Thus when we are compelled to settle down for a while it is rather a shock to find very little coming in.

#### Bother in Baluchistan.

Were all short-wave work easy, though, it would not be so interesting, so we will conclude the little grumble and proceed with the business.

Here is "H. A.," from Baluchistan, handing bouquets to "P.W." He has, however, one criticism—not a complaint—which is perfectly justified. He says that "P.W." quite rightly deals with the troubles of the London and Midland listener, literally surrounded by strong stations. This listener wants a set with razor-like selectivity, and sensitivity is really a secondary consideration, although naturally it is vitally important.

## SHORT-WAVE NOTES



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

By W. L. S.

Listeners overseas are not interested in the problems of the dweller in St. Albans who wants to receive Mühlacker; they want a "super-short-waver" that will overcome the bouts of bad conditions and bring in Big Ben and Jack Payne night after night without fail.

In short, they want a "Super-Quad" designed expressly for short-wave work, or, at any rate, a really good and powerful set, whether of the super-het. or "T.R.F." variety.

#### "My S.G. Four."

I know that at the time the letter in question was written, my own "S.G. Four"

was only in the air. Modesty prevents my making any "super-claims" for it, but I would suggest that it is a very suitable *type* of set for the overseas listener, with enough power in hand to be moderately reliable.

Further, when I have built a short-wave super-het with which I am entirely satisfied, I will lose no time in describing it fully. But the day may be a long way off!

#### The Other Extreme.

Now, to go to the other extreme, I quote a note from "A. W. S.," of Erdington, who wants a description of a good single-valver. "A. W. S." is a man after my own heart, for I now use a mere "single" myself, and derive much amusement from it.

It is by now so severely hotted-up that it oils up plugs when receiving the local station! Seriously, though, I will have to consult with the powers-that-be on the subject of producing a "one" for public exhibition. I believe they are already in favour.

"J. J. F.," of Sidecup, who will be remembered as putting up a good score in the short-wave competition, sends a good log of VK 2ME, and mentions that the station staff were particularly asking for reception reports to be forwarded. The address is Amalgamated Wireless of Australasia, York Street, Sydney.



# PHONE BALANCE



## TELSEN LOUD-SPEAKER UNIT

is the result of months of research resulting in a performance which for sensitivity and tonal quality gives complete satisfaction. The natural resonances have been adjusted so that a fine balance of tone results—depth without loss of crispness is its great achievement. Price 5/6

Telsen "Major" Chassis (Diam. 14½") Price 10/6

Telsen "Popular" Chassis (Diam. 11") Price 5/6

**TELSEN**  
RADIO COMPONENTS

Send for the Telsen Catalogue and Circuit Booklet to The Telsen Electric Co., Ltd., Aston, Birmingham.

# SILENT POINT RECEPTION

by  
**VICTOR KING**



No doubt many listeners cause interference with their neighbours' reception without realising it, and would be horrified to learn that they do so by working their sets in the way suggested in this article.

I DO not think there is the slightest doubt at all but that more distant-programme "records" are broken by "silent point" reception than by legitimate means.

As a matter of fact, I always have more sympathy for the neighbours of the man who claims "fifty stations on a simple two-valver" than admiration for the man himself. They suffer that he shall shine!

All the same, I believe that "silent pointing" is more often done in ignorance than in the full knowledge of what is happening, and that is the whyfore of this article.

### A Practical Test.

There is a common belief that there is always a squeak when a receiving set is oscillating, but that is not the case. If you have a reaction control I want you to try this experiment. (But don't do it during broadcasting hours, and make it snappy or you will have the Post-Office Squeak Van stopping outside your house!)

Twist the reaction knob right round until it is at the position of maximum reaction. Then turn the tuning dial until you hear the squeak of the "carrier-wave" of some telegraphy station.

As you approach this "carrier" you will note that the squeak is at first very high. Now go very, very slowly. The squeak drops in pitch until it becomes a grunt. Then there is a point where there is dead silence, and this is followed by a revival of the squeak, which starts as a low-pitched note, and then rises until it vanishes as a real top-of-the-ladder high-pitcher.

That point where there is no noise at all except, perhaps, a faint breathing sound, is the famous "silent point." But the set has not ceased oscillating.

### It Kills Quality.

A set in this condition is extremely sensitive, and by "silent pointing" you can pick up programmes of extreme weakness.

But the result is bound to be a distorted travesty of the real thing. It will have no programme value at all by comparison with properly received broadcasting. More-

over as I have already indicated, it will tend to interfere with the orthodox reception of the same station by neighbouring listeners.

It is not only possible, but, to my own knowledge, a fact that "silent pointing" is indulged in by many listeners even for the tuning-in of the local station when the sensitivity of their sets fails through batteries weakening or valves losing their emissions.

So that these and others can appreciate the ether mischief they cause by such tactics I will explain exactly what happens.

It must first be remembered that a broadcasting station uses an ether vibration of a definite wave-length, and that this is called its "carrier" or fundamental. That of the London National transmitter is 261.3 metres.

### When the Programme Starts.

When no music or speech is being sent out during microphone pauses, there is only that one wave in the ether. But as soon as speech or music is switched in, "side-bands" spread out on each side of the "carrier." These side-bands are additional wave-lengths and these differ from the "carrier" by exactly the frequencies of the notes of music being transmitted.

So when the London National is at work, it is only striking an average, as it were.

### S.G.'s STOP IT!



A receiver employing one or more S.G. H.F. stages is not likely to re-radiate and cause interference, however much its reaction control is mishandled.

In actual fact, there are hundreds of other waves slightly shorter and slightly longer created at the same time.

But the "carrier" is very much more powerful than its family of shorter and longer wave-lengths, and it is this that you "heterodyne" strongly as you tune your set in an oscillating condition (that is, if you do such an unneighbourly thing!).

When you get to the point where there

is no squeak, you have the morbid satisfaction of knowing that you are tuned exactly to the fundamental or "carrier" wave-length of the station. The slightest movement of the tuning dial to the one side or the other produces a rising squeak, and this denotes that you are getting "off tune" to an extent that is measurable by the pitch of the squeak.

### The Side-Band "Whiskers."

You see, the "carrier wave" of the station remains unchanged while you alter your tuning (if it is a good station), and your action changes the wave-length of the vibration that your set is sending out into the ether.

That is why next door will hear you at your nefarious work, if they are trying to listen to the same station, for they will be getting your changing wave mixed up with the legitimate ether disturbances. And they will get a changing squeak because any wave-length very close to the broadcasting station wave-length will set up a heterodyne—the difference of wave-length or frequency between two waves.

What, you might quite reasonably ask, has all this got to do with the distortion on your own set? Well, it's this way. Although when "silent pointing," your set is oscillating at exactly the same wave-length as that of the broadcaster's "carrier," it is "off beat" to these "whiskers" or side-bands that accompany the main wave.

So that you "heterodyne" with the side-bands. But this might or might not be so bad were it not for the fact that no broadcasting station can keep exactly and absolutely on its published wave during the transmission of speech or music. What variations there are will be small if the station is properly controlled, but they will be there. And for 100 per cent "silent point" reception, if there can be such a thing either physically or morally, you must have a 100 per cent stable transmission, and this there probably can never be.

### That Valley of Silence.

And as the station tends to slide above and below its "international setting," so, quite obviously, it slides in and out of the "valley" of silent pointing.

And little heterodynes are set up and make your loudspeaker reproduction what it ought not to be!

And as, remember, your set is, in your oscillating condition, a small re-radiating transmitter, this distortion is apt to be communicated to all others near by who are trying to listen to the same station, with disastrous results.

So, you see, the stunt is neither good for you nor for anybody else, and can, with advantage, be carefully avoided.

# HOW TO MAKE

# THE EXTENSER DUAL-RANGER

By G. T. KELSEY.

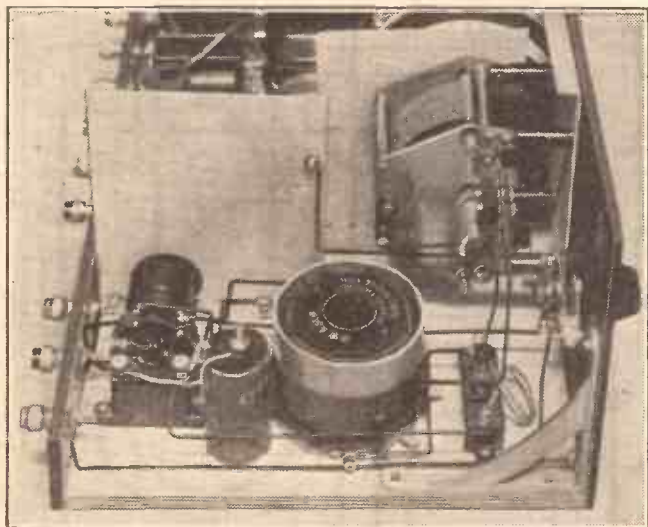
The full constructional and operating details of a magnificent loudspeaker receiver, the design of which is based on "P.W.'s" latest "star" circuit.



THE construction of the Extenser version of "P.W.'s" latest star set design—the "Dual-Ranger"—can confidently be undertaken by any reader of "P.W."

"That is all very well," you may find yourself saying, "but I'm only a newcomer to radio, and I've never built a set before." Newcomer or not, we make no exceptions.

## EFFECTIVELY SCREENED H.F. COIL



By using a simple but specially-shaped metal screen adequate stage separation is ensured.

The Extenser "Dual-Ranger" can be built by all. It is, in fact, an excellent "jumping off" set for those who have not previously tackled the construction of a set, and as for the "old-stagers," well, we cannot do better than to refer you to Mr. Dowding's interesting article last week.

Before we start to give you details of the construction of this set, perhaps it would be advisable to say a word or two about the tools that are likely to be required.

### Tools Required.

You will want a hand-drill, with drill sizes  $\frac{1}{8}$  in.,  $\frac{1}{4}$  in.,  $\frac{3}{8}$  in., and  $\frac{1}{2}$  in., a screw-driver, a gimlet, a fret-saw with some fine blades, a file or two and possibly a reamer. In the event of you not having a reamer, there is no need to buy one, because one

of the blades of a decent-sized pair of scissors will no doubt answer the purpose. All that we ask in exchange for this "tip" is that you will not disclose the source of your information if you happen to be caught red-handed using the best domestic scissors on ebonite!

### Don't Use "Junk."

With regard to components, possibly you may have one or two of the required parts in your "junk" box, but if the one or two parts in question are of doubtful quality, we advise you to leave them in the "junk" box and purchase a completely new kit.

be lightly scratched on, and if you cannot lay your hands on an old hatpin or large darning needle, a sharp-pointed nail will answer quite well.

When you have scratched your centre lines, mark off a distance of  $2\frac{1}{2}$  in. from each end of the panel on the horizontal one. These are the drilling centres for the differential reaction condenser and the .0005 aerial-series condenser.

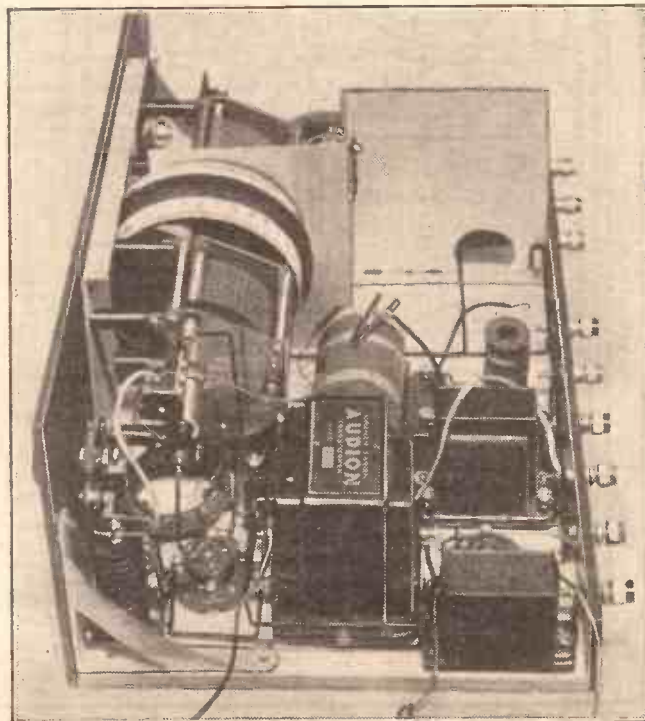
Another horizontal scratch should next be made parallel with, and  $\frac{3}{8}$  in. up from, the bottom of the panel. This should be intersected by two vertical scratches, one on each side of the centre mark at a distance of 2 in. from it. These mark the drilling centres for the pick-up jack and the L.T. switch.

### Panel Components.

Incidentally, before you drill any holes, if you are using panel components different from the ones used in the original set, make certain that they will not foul anything when mounted in the positions shown in our diagrams.

With regard to the holes for the panel (Continued on next page.)

## SAFE TO USE A MAINS UNIT



The inclusion of a carefully arranged output filter makes it possible for an H.T. unit to be used without the slightest "potential" trouble.

When you have collected the required components, take off your coat and prepare for work—or ought we to say pleasure?

First of all, lay the panel front downwards on the table, with an old duster or piece of rag between the two. Then mark on it the vertical and horizontal centre lines.

This panel marking, by the way, should not be done with a pencil. The lines should

# HOW TO MAKE THE EXTENSER "DUAL-RANGER"

(Continued from previous page.)

brackets, the distance between the holes in the actual brackets is not, in all cases, exactly the same, and much the best plan.

therefore, is to mark the drilling centres by placing each bracket on the panel and pricking through the holes.

### Fixing the Brackets.

Do this first with one bracket on one side and then use the other bracket for your template on the other side. But do not forget to mark your brackets left and right, and do not forget also that the bottom of each bracket does not go to the bottom of the panel. They should be mounted the

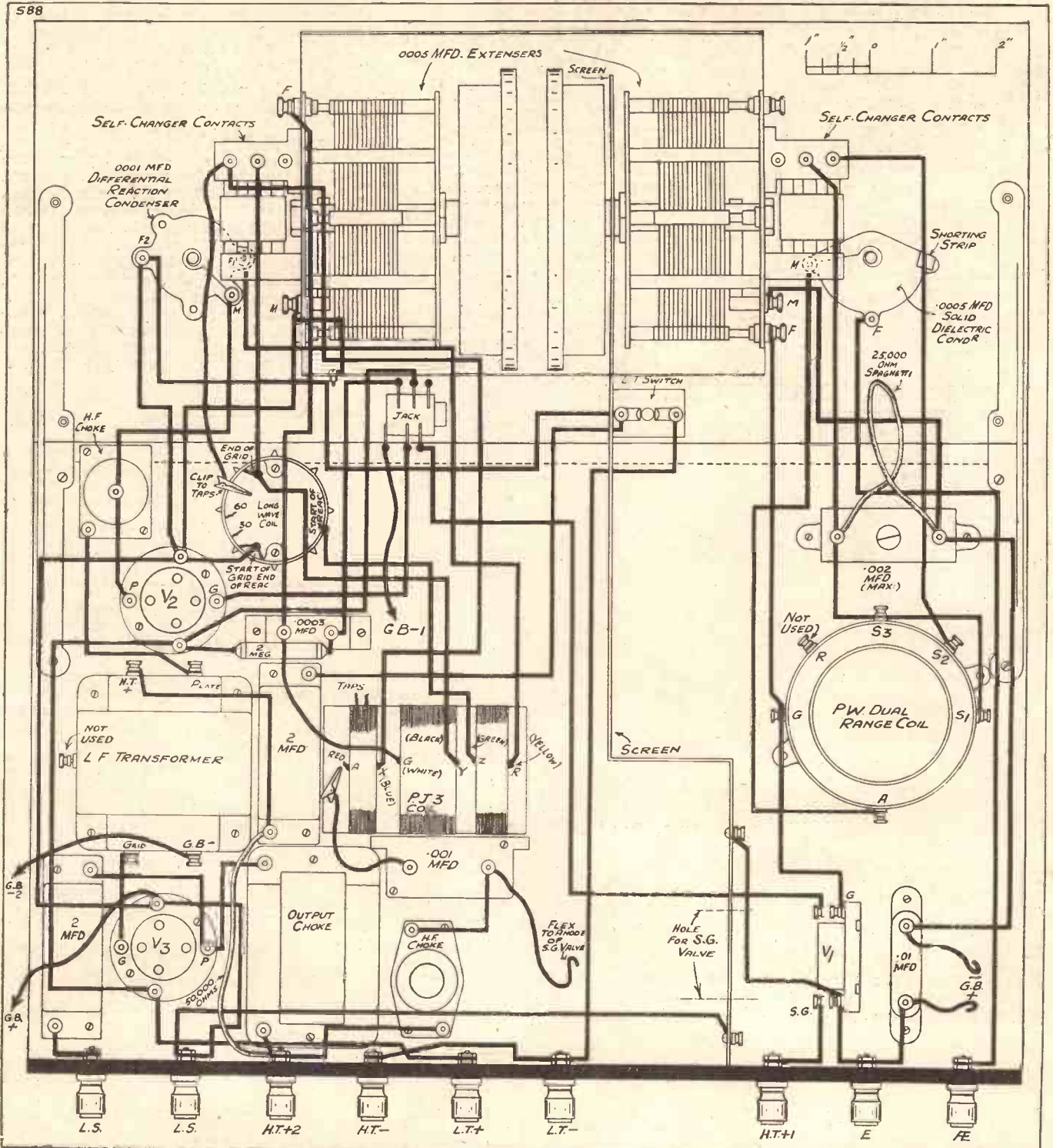
thickness of your baseboard (probably 3/8 in.) up from the bottom of the panel.

Before actually commencing to drill your panel, mark out the piece that has to be cut away in order to mount the double-drum Extenser. In this connection, you cannot do better than to use the template provided with the component.

There are just one or two things to watch when you arrive at the drilling stage. Make quite certain that the panel is clamped

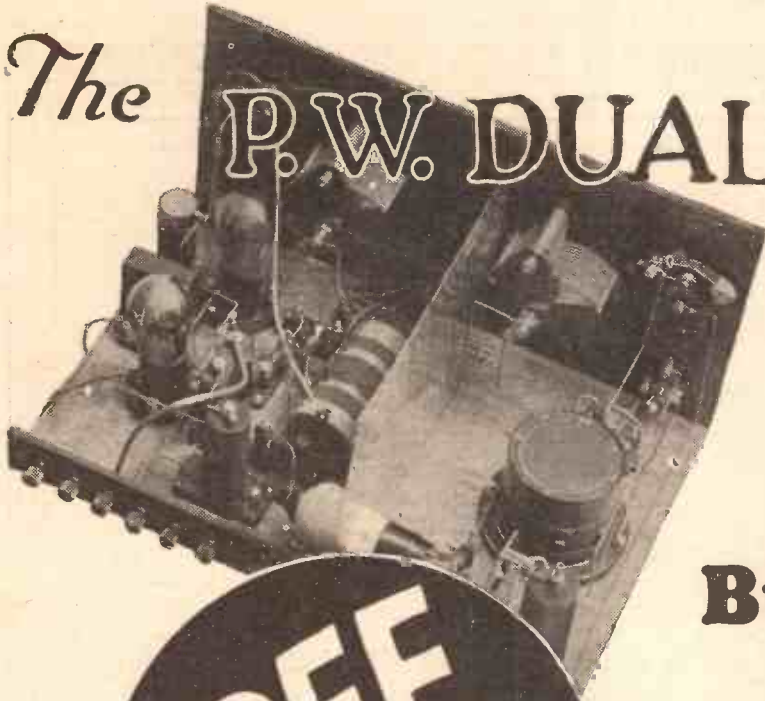
(Continued on page 682.)

## A SAVING IN BOTH COMPONENTS AND LEADS



The dual Extenser, besides rendering the set more efficient in operation and easier to handle, enables two wave-change switches and certain otherwise essential leads to be dispensed with.

# The P.W. DUAL RANGER



**KENDALL SAYS :**

*"Far ahead of the average receiver of its type. Selectivity exceptional . . . signal strength really extraordinary . . . outstanding performance . . . bringing in foreign stations with real ease and certainty. Strikingly easy to build and operate."*



**Build it with a**  
*Ready Radio*  
**Matched Kit**

**£3.19.9** or 7/6 down and 11 monthly payments of **7'6**

Complete Kit of Components including panel, cut and drilled to specification, and Jiffilinx for wiring (less valves and cabinet).

**Kit "B"—£5.18.9** Kit "C"—**£6.16.3**  
(With Valves less Cabinet). (With Valves and Cabinet).  
or 11/- down and 11 monthly payments of 11/- or 12/6 down and 11 monthly payments of 12/6

**IMMEDIATE DISPATCH**

**FULL-SIZE WIRING DIAGRAM**  
With Complete Instructions for Building and Operating **FREE WITH EVERY Ready Radio "P.W." DUAL-RANGER KIT**  
Can be obtained separately Price 1/- post free.



**TO INLAND CUSTOMERS.**  
Your goods are despatched Post Free or Carriage Paid.  
**TO OVERSEAS CUSTOMERS.**  
Everything Radio can be supplied against cash. In case of doubt regarding the value of your order, a deposit of one-third of the approximate value will be accepted and the balance collected by our Agent upon the delivery of the goods. All goods are very carefully packed for export and insured. All charges forward.

**DEMONSTRATION**  
HEAR THE  
"P.W." DUAL-RANGER  
AT OUR SHOWROOMS,  
159, BOROUGH HIGH ST.  
(2 minutes from London Bridge Station.)

**RECOMMENDED BATTERY AND LOUDSPEAKER EQUIPMENT**

- 1 Ready Radio Kit "C" . . . . . £6 16 3
- 1 Pertrix 120 v. Standard H.T. battery . . . . . 15 6
- 1 Pertrix 9 v. grid-bias battery . . . . . 1 6
- 1 Pertrix accumulator, type P.X.C.3 . . . . . 11 0
- 1 Blue Spot speaker, type 44R. . . . . £2 12 6

Any other makes can be supplied if required  
**COMPLETE KIT** as above

**£10.16.9** 20/- down and 11 monthly payments of 20/-.

**COMPLETELY ASSEMBLED**

**"P.W." DUAL-RANGER**  
with Cabinet and Valves, aerial tested, royalties paid.

**£8.6.8** or 12 monthly payments of 15/3

With Battery Equipment and Loudspeaker as specified above

**£12.7.2** or 12 monthly payments of 23/-

**KENDALL "P.W." DUAL-RANGE COIL**

Every Ready Radio Dual-Ranger Kit includes the famous Kendall "P.W." Dual-Range Coil; tested before dispatch under the supervision of its designer, Mr. G. P. Kendall. Price **10/6**

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

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Eastnor House,  
Blackheath, S.E.3.

**EASY PAYMENT ORDER FORM**

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

Please dispatch to me at once the following goods:

Please dispatch to me the following goods:

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

Name .....

Address .....

P.W. 21/11/31

for which I enclose first deposit of £

Name .....

Address .....

P.W. 21/11/31

## HOW TO MAKE THE EXTENSER "DUAL-RANGER"

(Continued from page 680.)

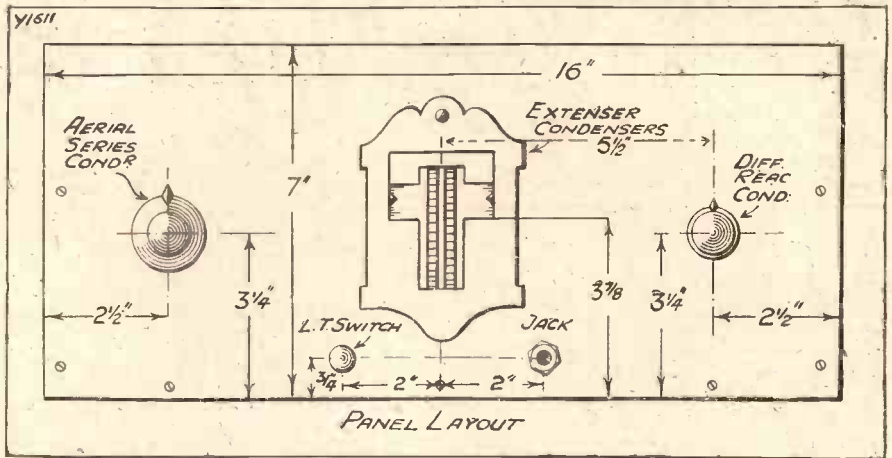
firmly to the table with an old piece of board between the panel and the table, and a couple of sheets of soft paper (newspaper will do) between the panel and the piece of board.

### A Drilling Tip.

If you don't happen to have a clamp, get someone to hold the panel while you drill it, because if it twists round when the drill reaches the other side, the surface may get scratched.

It is a good plan to make a small centre-punch mark at each of the drilling centres  
(Continued on page 711.)

## THE CONTROLS WHICH CATCH THE STATIONS



Although few in number, the symmetrically arranged controls contribute very fine adjustments of operating conditions.

## CHOOSE YOUR COMPONENT MAKES FROM THIS LIST

- 1 Panel 16 in. x 7 in. (Permeol, Becol, Peto-Scott, Wearite, Goltone).
- 1 Cabinet, to fit 10 in. baseboard, (Peto-Scott, Piekett, Camco, Gilbert, Osborn, Ready Radio).
- 1 .0005-mfd. double drum-drive Extenser (Cylidon).
- 1 .0005-mfd. solid dielectric condenser, (Ready Radio, Telsen, Astra, Wavemaster, A. W., Graham Farish).
- 1 On-off switch (Ready Radio, Telsen, Bulgin, Goltone, Lissen, Igranic, Lotus, Peto-Scott, Wearite, Graham Farish).
- 1 .0001-mfd. differential reaction condenser (Telsen, Ready Radio, Graham Farish, J.B., Lotus, Wavemaster, Formo, Astra, A.W., Lissen, Polar, Igranic, Dubilier).
- 1 "P.W." Dual-Range coil (any good make).
- 1 .002-mfd. max. compression condenser (Formo, Colvern, Telsen, R.I., Leweos, Polar, Sovereign, Goltone, Graham Farish).
- 1 .01-mfd. fixed condenser (T.C.C., Dubilier, Ferranti, Telsen, Graham Farish, Goltone, Formo, Ediswan, Igranic, Lissen, Mullard, Watmel).
- 1 .0003-mfd. fixed condenser (Dubilier, etc.).
- 1 .001-mfd. fixed condenser (Lissen, etc.).
- 2 2-mfd. fixed condensers (Telsen, Formo, Ferranti, Dubilier, T.C.C., Lissen, Hydra, Igranic, Helsby).

- 1 P.J.3 coil (Peto-Scott, Ready Radio, Formo, Wearite, Goltone, R.I., Parex, Melbourne).
- 1 Coil quoit (Peto-Scott, Melbourne, Wearite, Ready Radio, A.E.D., Sovereign).
- 2 oz. 30 D.S.C. wire for above.
- 1 2-meg. grid leak (with holder, if necessary) (Igranic, Gra-

- ham Farish, Ferranti, Telsen, Dubilier, Ediswan, Varley, Ready Radio, Lissen, Loewe, Leweos).
- 2 H.F. chokes (Sovereign, Ready Radio, R.I., Leweos, Graham Farish, Tunewell, Varley, Parex, Dubilier, Lissen, Lotus, Atlas, Wearite, Peto-Scott).
- 1 L.F. Transformer, medium ratio (Graham Farish, 1:4 ratio, Audion, Lotus, Telsen, R.I., Leweos, Varley, Goltone, Atlas, Formo, Ferranti, Igranic, Lissen).
- 1 50,000-ohm spaghetti resistance (Varley, Telsen, Ready Radio, Lissen, Igranic, Bulgin, Graham Farish, Sovereign, Peto-Scott).
- 1 25,000-ohm spaghetti resistance (Leweos, etc.).
- 1 Output choke (Ferranti, Leweos, Lotus, Telsen, Graham Farish, Tunewell, Wearite, Bulgin, Atlas, Varley, R.I., Lissen, Igranic).
- 2 Valve holders (Lotus, Telsen, Graham Farish, W.B., Igranic, Wearite, Lissen, Clix, Dario, Formo, Bulgin). (If pentode output is used one of these should be five-pin variety.)
- 1 Valve holder, horizontal mounting (W.B., Parex).

- 1 Terminal strip, 16 in. x 2 in.
- 9 Terminals (Belling and Lee, Igranic, Clix, Goltone, Eelex).
- Battery plugs (Belling and Lee, Clix, Eelex, Igranic).
- 2 Crocodile clips (Bulgin, Goltone).
- Jiflinx, Lacoline, Glazite, Quickwire.
- Flex, screws, etc.
- Metal sheet for screen, 11 1/2 in. x 6 in. (Ready Radio, Peto-Scott, Parex).
- 2 Panel brackets (Peto-Scott, Bulgin, Ready Radio).
- 1 Jack and plug (Igranic P.66, Lotus).

### ACCESSORIES.

- LOUDSPEAKER.—Amplion, Mullard, W.B., H.M.V., B.T.-H., Blue Spot, Celestion, Graham Farish.
- VALVES.—1 S.G., 1 Det., 1 Small Power, such as Mazda P.220 or small pentode (Osram, Mazda, Cossor, Mullard, Six-Sixty, Tungsram, Dario, Eta, Lissen, Fotos). (H.T. consumption of set is 14-16 milliamps.)
- BATTERIES.—H.T., 120-150 volts. Super Capacity (Drydex, Pertrix, Ever Ready, Magnet, Ediswan, Lissen, Columbia).

G.B., 1.5 or 9 cell for S.G. valve (as above); 9-15 volts for power valve (as above).

### ACCUMULATOR.

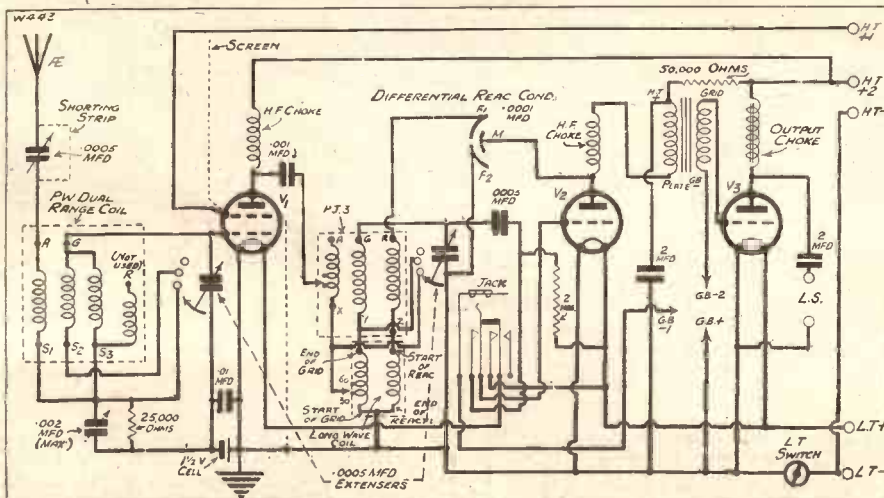
—Voltage to suit valves (Exide, Ediswan, G.E.C., Pertrix, Lissen).

### MAINS UNITS.

Ekco, Tannoy, Tunewell, R.I., Atlas, Heayberd, Lotus, Regentone, Formo.

(State voltage and type of mains, and give details of set when ordering.)

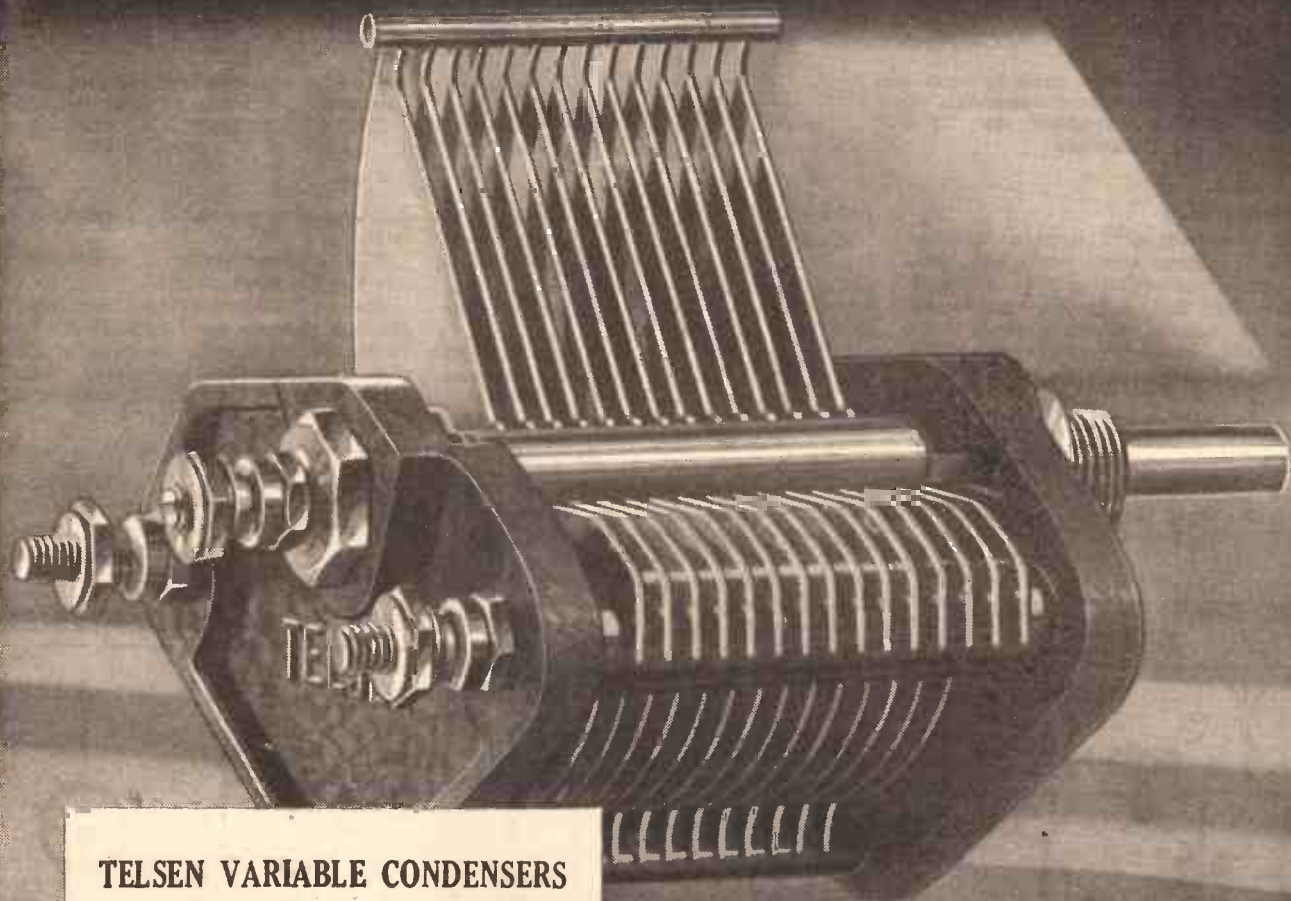
## THE RESULT OF INTENSIVE PRACTICAL EXPERIENCE



The Extenser "Dual-Ranger" circuit comprises a new combination of "P.W." features, each of which has proved its individual merits many times in actual practice.



# PRECISION



**TELSEN VARIABLE CONDENSERS**  
are built to give years of constant service. The frame is sturdy—braced by three solid pillars: the vanes are clamped at three points—distortion is impossible: the rotor is built into a rigid unit and the vanes are held at the ends—back lash and end play is avoided.

Telsen Logarithmic Variable Condenser  
in capacities '0005, '00035, '00025  
Price 4/6

Telsen Bakelite Dielectric Differential,  
Reaction and Tuning Condensers in  
all capacities. Priced from 2/-

Telsen Preset Condensers.  
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## TELSEN

ALL - BRITISH  
RADIO COMPONENTS

Send for the Telsen Catalogue and  
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Co., Ltd., Aston, Birmingham.

# CAPT. ECKERSLEY'S QUERY CORNER



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

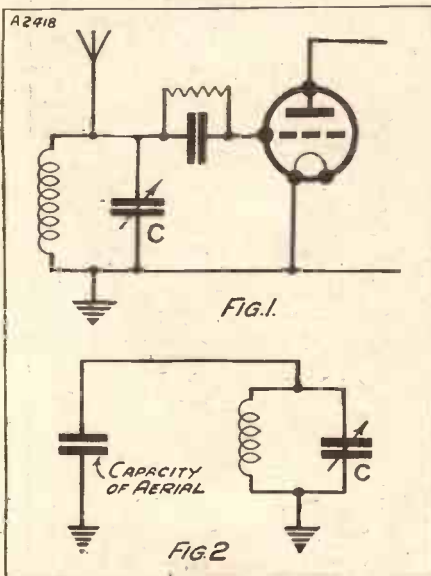
Don't address your questions direct to Capt. Eckersley: a selection of those received by the Query Department in the ordinary way will be answered by him.

### The Altered Reading.

J. F. (Dartford).—"I have a detector and 2 L.F. receiver which works very well indeed, but I notice that when I disconnect my aerial lead there is no difference in the volume of signals, although there is a marked difference in the position at which the station comes in on the tuning dial. Why is this?"

I suppose the circuit is like my Fig. 1, and when you disconnect the aerial and provided you move the condenser C to another adjustment, you get the signal. Well, it is simply that the capacity of the aerial to earth is in parallel with C, as in Fig. 2.

### WORKING WITHOUT AN AERIAL



This illustrates the curious effect noticed by a Dartford reader of "P.W."

If you remove the aerial you remove a capacity in parallel with C, and to pick up the station you've got to increase C until it alone is equal to its value with aerial connected plus value of aerial capacity. And how does your set pick up without an aerial? Quite likely partly via the earth lead and partly, and probably, mostly because the coil is exposed to the field of the transmission. The coil picks it up and the coil minus the aerial has a very low resistance, or damping, and can be made very sensitive, therefore, by means of reaction.

### Radio via the Mains.

BM/PD22 (London).—"Experiments are I believe being conducted with a view to devising a means of distributing received broadcast programmes to listeners via the electricity wiring system.

"If this were to become a practical proposition, I take it that a large amount of 'correction' would be required in order to ensure each listener obtaining good quality reception.

"Would such 'correction' be made at the listener's end of the system, or would it be possible for general correction to be applied to the system as a whole?"

But why correction? What is to prevent modulated high-frequency voltages being superimposed on the mains?

Mains are very high capacity? Yes, they may "look like 2 ohms" to a high-frequency of 1,000,000 cycles, but it only requires a power of 200 watts to establish a voltage of 20 volts across a resistance of 2 ohms. And if the 20 volts of H.F. is modulated, a single valve connected to the mains through an L.F. filter will work a loudspeaker.

No! That is not the difficulty; if difficulties there are.

### Does Lightning Come Down or Go Up?

L. T. (Keighley).—"Will you please tell me whether a flash of lightning always comes from the clouds down to earth, or if it sometimes goes in the reverse direction?"

If I put a tremendous pressure on a flat piece of stone between two steel plates, does the crack in the stone begin at the left-hand plate and go to the right, or from right hand to the left?

You mustn't think of a flash of lightning as something like a serpent which darts from out of the cloud to strike the earth or vice versa. There is really a tremen-

dous electrical pressure between cloud and earth.

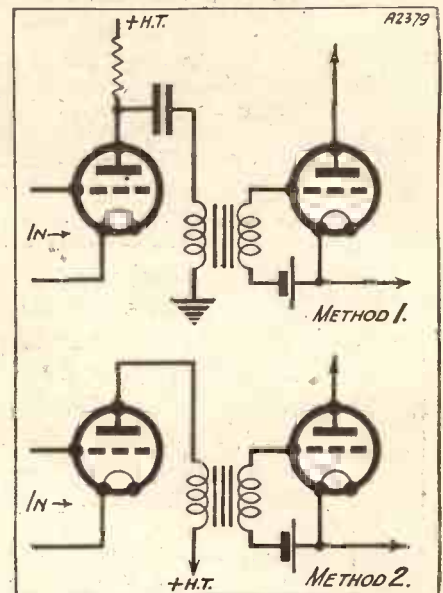
This pressure seeks to make the insulating air conducting.

The air withstands the strain but the pressure becomes more and more. Eventually the air cracks, as it were, almost simultaneously along one fissure and the current streams through the crack, heating it, burning it.

### "Resistance-Parallel Feed."

A. E. (Newcastle).—"Why is the method of using an L.F. transformer, known as resistance-parallel feed, or auto-coupling, claimed to give better results than the normal method of using this component?"

### SHUNTING TRANSFORMER



The two systems of connections referred to below.

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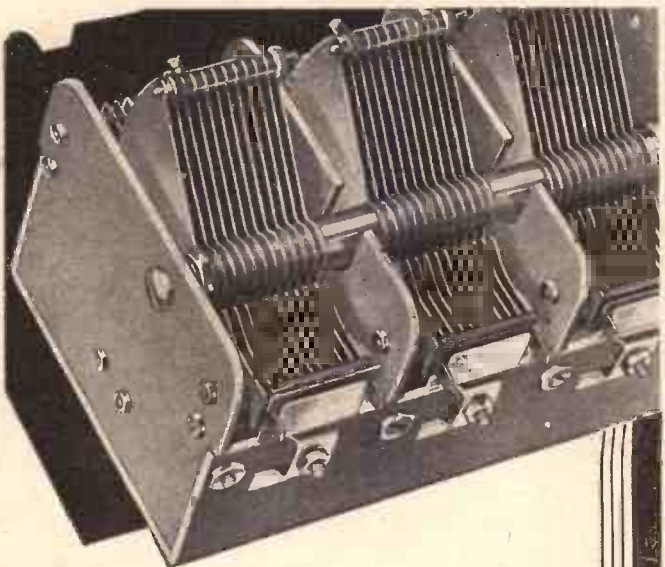
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# Those "O.B." Dance Bands

**P**HEW! That was some interview, them were! I seem to have spent the last four hours leaping out of taxicabs, marching into expensive hotels and restaurants, talking, dancing, and marching out again. Have you ever wondered what the leaders of those dance orchestras which entertain us after ten-thirty look like, and where they come from, and whether they themselves chant the choruses into the microphone and announce the numbers?

### Saw Them All!

I did, so I thought I'd pop round and see them all. With the result that in one evening I saw and spoke to Jack Harris of Grosvenor House, Ambrose of the May Fair, Roy Fox of the Monseigneur Restaurant, Maurice Winnick of the Piccadilly Hotel, and Clive Erard of the Amateur Dancers' Club. To say nothing of a trunk telephone call to Henry Hall, who began broadcasting with the Gleneagles Hotel band, and who is now being relayed to the world from the Midland Hotel at Manchester.

Ambrose was my first victim, and rightly so, for his May Fair orchestra is the highest paid in England, taking as it does £25,000 a year.

There are eleven musicians, and one is able to put in his bank at least £2,000 a year—to say nothing of money derived from gramophone records, stage appearances, and so on.

### A Hard Worker.

Oh, to work with Ambrose, that bespectacled double of Albert Sandler, now that the winter's here! Yet Ambrose began his career at the age of twelve by deputising for an absent fiddler for half-a-crown. As I write, it seems highly probable that he will be the first broadcaster to have two dance bands "on the air." He is arranging a new orchestra at Dorchester House, and so if you're a lover of rhythm listen in for it.

Although he should be quite hardened, he still has a terror of the "mike." "People will try to broadcast messages to friends,"

\*-----\*

They provide some of the most enjoyable fare provided by the B.B.C.—and here is a fine article telling you all about them.

By HAROLD A. ALBERT.

\*-----\*

he explained. "Once, I remember, we had to stop the broadcast and keep listeners waiting because some young men were so insistent in their demands that their voices should be transmitted over England. I have a horror of such upsetting of the programme. I have a horror, too, in a way, of letters from listeners, and I'm afraid that I'm a real criminal in this respect. I read the missives through, and then stuff them into my pocket for a fortnight—when my secretary asks for them and gives me a list of request items to play. Yes, I've had requests from as far afield as China. And I once had one from a Mr. Gandhi—but, as it turned out, he was not the gentleman from India."

tion. If a request arrives that is too late for inclusion in, say, this week's programme, it always goes into the next. If, for any reason, it cannot be played I write to the listener and explain just why. I believe, during my broadcast spells, in concentrating on the listener. I generally rehearse four or five times a month, and usually on a Thursday. On the preceding Monday there will be a special rehearsal complete with the announcements and the singing—I employ a man especially for this one job, to ensure perfection—and then I hold another rehearsal on the afternoon of the broadcast. Experience of broadcasting in both America and England has taught me that one should never put over anything that isn't really good."

### Humorous Moments.

"Microphone fiends? Well, I haven't really suffered. One provincial visitor who came to dance to my band had promised his friends that at eleven o'clock they would hear his voice over the radio, but his attempt to broadcast was a miserable failure. Rushing up to our dais, he caught hold of what he imagined to be the microphone, and bawled, 'Hallo, Bill! Hallo!' And made us all hysterical with laughter. You see, he was screaming into the tuba—to the great amazement of the man behind it."

## "WE ARE NOW GOING OVER TO THE MAYFAIR HOTEL . . ."



An action photograph of Ambrose and his band. You will find some interesting particulars about them on this page.

Mr. Ambrose should take a tip from Jack Harris, that slim American who has similar struggles with listeners' letters and with microphone fiends, but who doesn't allow these terrors unduly to worry him.

### Complying with Requests.

"I always comply with requests," he told me, "and I flatter myself that I've boiled the arranging of them down into a fine art. Every request is listed and played in rota-

ago, he broadcast a complete programme of half-forgotten dance music. The result was a batch of four hundred letters.

He pleads for listeners not to be too critical, however.

"Broadcasting is a terrific strain," he admitted. "I play the fiddle myself, and my fingers are almost numbed at the end of an hour and a half of it. What must the poor fellow who has continually to blow at

(Continued on next page.)

### Very Popular.

Maurice Winnick also believes that listeners deserve special attention, and his statistics certainly seem to prove that he is right. A short time

## THOSE "O.B." DANCE BANDS

(Continued from previous page.)

the saxophone feel like? It's all very well for a band to be fresh when they first begin to play, but it is most difficult to keep that appearance of freshness up. You've no idea how careful one must be—even over the announcements. I made a bad break the other day by saying, "We will now play 'When Your Hair has Turned to Silver By Request.'" Just a little thing, but it made all the difference."

### They Hail From Manchester.

Maurice Winnick, in case you are wondering, you readers who have seen his photo, is neither a Spaniard nor an Italian, although he is so tall and dark and handsome. He hails from Manchester, a city which seems particularly prolific in dance band men. Clive Erard comes from there, too.

Erard is tall and slim, and the baby of broadcasters among the dance bands. Actually, he is twenty-eight, but he looks twenty-two. His band is also small in size, its personnel numbering only eight against the usual eleven. But it's good—oh, boy, it is. It has to be. The Amateur Dancer's Club is the resort of the very best dancers in London—those few people who take Terpsichore really seriously. One might think from the name of their club that they were all beginners, but they are "amateurs" as compared with "professionals." And they dance in deadly seriousness. Heaven knows what would happen if the pianist struck a wrong note.

Erard has an eye for good dance music, too. A short time ago a listener sent him

Erard spotted that tune he hasn't had a moment's peace.

"Fresh songs arrive by every post, and what am I to do? I can't read them, not a tenth of them," he lamented. "As a matter of fact, I've given it up as a bad job. Every manuscript that I receive now promptly goes back."

### Once on the "Talkies."

Here I should mention Roy Fox, who was once pestered in a similar way by would-be film stars. This was when the world's only "whispering cornetist" worked on the Fox lot in Hollywood—all unknowingly, you have heard him in countless talkies. Every time that he left the studios, some eager female would grab his arm. "Hey! Mr. Fox, can you introduce me to your namesake?" In the end, Roy was reduced to creeping home in a Lon Chaney disguise.

"I'm a Californian, but I like broadcasting in London," was the trend of his interview. "Despite the fact that I have my trials and troubles. It seems that some things that are quite O.K. in the Californian idiom make very bad grammar in England. Consequently, whenever I make an announcement listeners get the idea that I'm uneducated and ignorant. I wish you could dispel the illusion."

I hope that I do. Believe me, Mr. Roy Fox is a thorough gentleman.

### Our Smallest Band.

Finally, a word for Mr. Henry Hall. His dance band, consisting of six players, is the smallest in the National programme. He began life as a serious pianist, played in the Artillery Band during the war, and is nowadays largely occupied in laughing at his fan mail. One enthusiast wanted "1812" and tunes from "Aida" to be played as a waltz. Another declared that she liked Mr. Hall's band from Manchester on Wednesdays better than the other one from the same station on Thursdays,

although she had no doubt that Sir Hamilton Harty was a good conductor. Yes, she was referring to the Halle Orchestra.

Henry Hall has one unusual point of view that should be recorded. You will never find singing introduced into his dance numbers.

### Cut it Out!

"The lyrics of some modern dance numbers are to be deplored," he said, "and nine people out of ten like the music better than the words. They can listen to the music subconsciously and get on with their knitting or reading. The wireless is in danger of being turned off when some throaty tenor announces that he is so terribly bloo-oo-oo-oo!"

That's that, I think.



A recent photograph of Clive Erard and his band.

a fox-trot in manuscript. Erard saw the potentialities in the thing, orchestrated it, and put it over the ether that very night. The next morning music publishers were clamouring for the world rights of the tune—and the listener-composer must now be making thousands. By rights, perhaps, I shouldn't tell this story, for ever since

## THOSE USEFUL METERS

By J.H.T.R.

I wonder how many of you possess a milliammeter? I don't mean just a rough instrument, but one suitable for reading up to say 5 or 10 milliamps in the anode circuit and showing clearly variations of 1 m.a. or less. If you are using any kind

### "FROM GROSVENOR HOUSE"



Jack Harris, whose band provides such swinging melodies from Grosvenor House, Park Lane.

of set other than the very simplest, and particularly if you are using an elaborate multi-valve set, you will find such an instrument very useful indeed.

As an aid to tuning, the milliammeter in the anode circuit is very helpful. Suppose the anode current when no signals are tuned in is 4 m.a. Then when signals are brought in, if strong, this may fall to say 2½ or 2 m.a., and this forms an indication of signal strength.

With band-pass filter circuits, in particular, it is very much simpler to tune by the aid of the meter and of course the more accurate the tuning the better the quality should be, other things being equal.

### Ganged Circuits.

Another case where the use of the meter is very valuable is when ganging is used. It may not be possible, by audibility tests, to tell exactly when the circuits are properly matched: but by means of the milliammeter you can match the circuits very conveniently since you get decreasing readings—stronger signals—as the circuits are brought into tune.

Since the overall reproduction and quality are closely bound up with the proper matching of the ganged circuits, anything that helps in getting accurate matching is obviously a great help.

There are many other uses to which a good milliammeter can be put and such an instrument is well worth having and taking care of.

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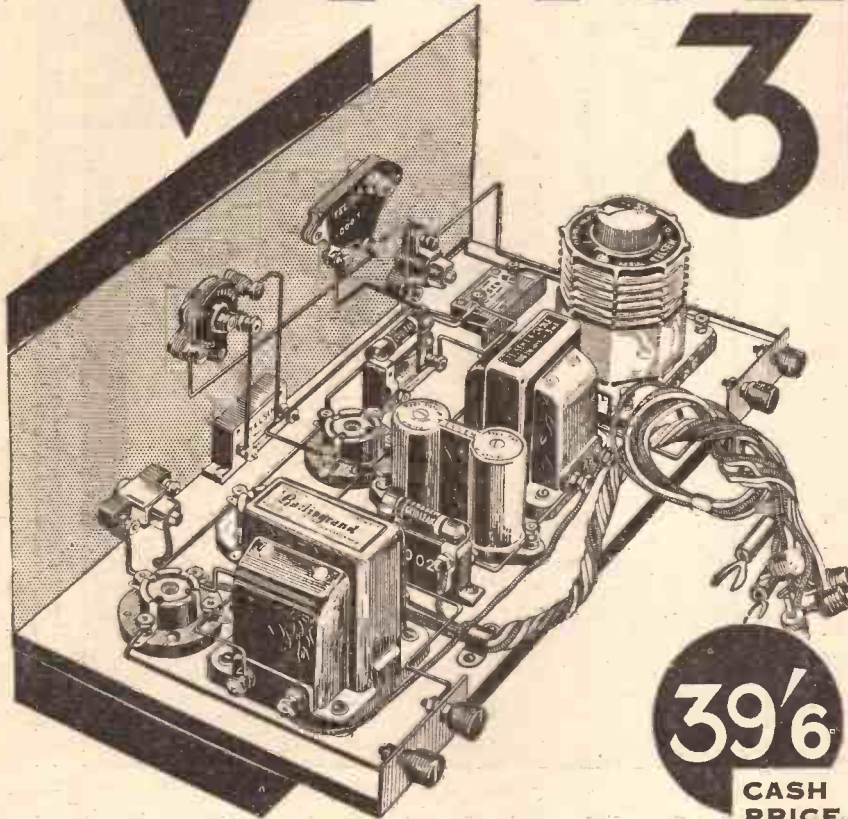


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# Your H.T. Supply

By R. W. HALLOWS, M.A.

A helpful review of the various systems of H.T. supply which will assist the constructor in the choice of that one which, in his own particular circumstances, will serve him best.

**I**N the early days of wireless the high-tension supply presented no great problem, for with the valves then in use there was no need to worry about the current so long as we had the volts. Early general-purpose valves had an average current consumption of about 1 milliampere apiece so that the 5 milliamperes at the 100 or so volts required by one of the rare five-valves of those days could be supplied easily by a high-tension battery made up of a number of flash-lamp refills joined in series.

## Use Plenty of "Power."

Matters are very different to-day, for almost everyone uses a loud speaker, and the great majority of people realise that you cannot have quality if you are miserly about the milliamps. Modern sets, too, are much more sensitive and it is essential for the best results that there shall be no great variations in the voltage or in the internal resistance of the source of H.T.

There are at least five different ways, now, of supplying high-tension current to the wireless set. The most popular is still the dry battery, though, nowadays, special batteries are made for the purpose and flash-lamp refills are not generally used.

Secondly, there is the wet Leclanché battery; thirdly, the familiar lead-plate accumulator; fourthly, the nickel-iron accumulator; and fifthly, the electric lighting mains harnessed by means of a battery eliminator or of a mains unit built into the receiving set. The man who has electric lighting mains can take his choice of any of the five methods, but others not so fortunate are limited to the first four.

Now let us see what are the pros and cons of the various ways of obtaining high-tension current. The dry battery is without question the simplest and least "fiddle-some" source.

## For Small Sets.

Provided that you choose your batteries with circumspection it is, to my mind, by far the best of all methods for sets requiring only a small amount of current. The initial cost of the dry battery is low, and it requires absolutely no attention.

The great thing is to see that the battery—remember, I am taking it for granted that you will have nothing to do with any batteries but those of the best quality—is of a capacity up to the work in hand. For first-rate results and economical running do not use a standard capacity battery for a greater load than about 5 milliamperes.

A heavier drain than this must mean a very big difference in the plate voltage

between the beginning and the end of an evening's run of, say, three or four hours.

## Cell Sizes.

If the load is greater than 5 milliamperes but not more than 10, choose a treble-capacity battery (I don't like "doubles," and many firms have dropped this size); from 10 to 15 milliamperes requires a super-capacity battery, and here a word of warning.

The real super- or quadruple-capacity battery is made up of cells measuring  $1\frac{1}{4}$  in. in diameter by  $3\frac{1}{2}$  in. in height. You can tell it by its weight, which works out at about 5 volts to the pound. In some makes batteries that are really treble

## MANY GOOD POINTS



As the author says, the "wet" H.T. battery has many points in its favour, and offers a most attractive alternative to "dry" batteries.

capacity ( $1\frac{1}{4}$  in.  $\times$   $2\frac{1}{4}$  in. cells) are described as supers.

The wet Leclanché battery has many good points. It is made in capacities approximately equivalent to those of the dry battery; a standard "wet," for example, may be used for the same loads as a standard "dry."

One of the good points of the wet battery is that when it has "run down" after its first charge you can re-charge it instead of throwing it away; but re-charging is not, as some imagine, merely a matter of re-newing the sal-ammoniac solution in the cells.

At every charge the positives, with their containing sacs, must be renewed and the zincs generally require renewal at every other charge. The dustbin, therefore,

receives at each charge a very considerable proportion of the components of the wet Leclanché high-tension battery.

Personally, I do not use any kind of Leclanché battery for loads exceeding 7 milliamperes. For battery-operated sets requiring more current than this I pin my faith to the high-tension accumulator.

## Almost Unequaled.

It is certainly more costly to install than any kind of primary battery, but the great point about it is that it supplies a potential that is unsurpassed for evenness. If you start the evening with 150 volts, the potential four hours later—provided that the battery is in condition and up to the load—will probably be rather better than 149.

The steady potential is due to the fact that the internal resistance of accumulators, which is remarkably low in the first instance, remains unaltered until a sudden rise, accompanied by a heavy drop in voltage, indicates that it is time for the battery to go for a refill. The advantages of a steady battery potential combined with low and almost unvarying internal resistance cannot be over emphasized.

Another form of high-tension accumulator is that made up of the Edison nickel-iron cells, which have iron positive plates, and nickel negatives, with an alkaline, as opposed to an acid electrolyte. In these batteries each cell has an E.M.F. a little more than half that of lead cells; the weight per cell of the nickel-iron battery is very much less.

The charging rate of lead accumulators is small and they are easily damaged if it is exceeded. The charging rate of the Edison type battery is at least five times as great, size for size, and in the most up-to-date type it seems almost impossible to cause damage by overcharging. Nor are cells damaged if allowed to stand in a semi-discharged condition.

## Remarkably Convenient.

There is a very handy type of nickel-iron accumulator H.T.B. made for wireless purposes. Each tray of cells is provided with a series-parallel switch.

When this is turned to the series position the tray gives an E.M.F. suitable for H.T. supply purposes; in the parallel position the cells are arranged in groups of four and they can be recharged direct from a 6-volt low-tension accumulator. The charge automatically "tapers" itself. The rate is rather high for the first hour or so, but falls off as the E.M.F. of the cells rises.

(Continued on next page.)

## YOUR H.T. SUPPLY

(Continued from previous page.)

And now for the battery eliminator or the built-in mains unit as a source of H.T. supply. Our manufacturers have had to labour under difficulties infinitely greater than that of any other country.

The reason is, first of all, that some places have D.C. whilst others have A.C. Until the "Grid" scheme comes fully into operation, such a thing as a standard voltage will not exist. D.C. supplies vary between 100 and something over 200 volts in different localities and the same is true of A.C.

In A.C. we have another snag—differing frequency. Here the periodicity in some places is as low as 25, while in others it is as high as 50. The unfortunate manufacturer has therefore had to produce a large variety of designs in mains units, whereas in a country such as the United States there is only one kind of current, A.C.; only one voltage, 110; only one periodicity, 60 cycles for the whole country.

### Those Varying Volts!

Nor are these the only troubles of the mains unit maker and user. The Board of Trade has very strict regulations about the permissible variations in the voltage supplied, but in some localities at any rate these are, to say the least of it, not very exactly adhered to.

It is surprising that in face of all difficulties our makers have turned out such a wonderful range of mains units of all kinds. They are delightful to use, since to bring the set into operation you have nothing to do but to flick over a switch.

Running costs are negligible and if you want to incorporate a really low impedance

power valve in order to run a big loud-speaker you can do so without any trouble. Certainly for the quality set designed mainly for first-rate reproduction of the local programmes and those of the more powerful foreign stations there is nothing to beat the mains as the source of high-tension current supply.

Another point about mains operation is that valves designed for direct-mains working have wonderful characteristics. The employment of the heater and cathode principle makes it possible to produce a screened-grid valve, for example, with an amplification factor some ten times as great as that which can be obtained from a battery-operated valve. By using the mains, therefore, for both H.T. and L.T. supplies you can get the very last ounce of efficiency out of your valves.

We have seen that every form of high-tension supply has its good points. How are we to find an answer to the question which forms the title of this article?

As so often happens with wireless problems, it is quite impossible to give one direct answer which will meet every case. Let us take first of all the position of the man without mains in his house.

Here, I would say, for any small set needing not more than 5 milliamperes you cannot do better than a dry battery of good make. For bigger sets, particularly if you value good reproduction, I would strongly recommend the accumulator high-tension battery, and of the two kinds available you must make your own choice.

From personal experience I know that a lead accumulator of good make is a very sound investment. For long-distance purposes where a very sensitive set is required there is nothing to equal the accumulator H.T.B., owing to its practically constant resistance and even voltage.

### The Man with Mains.

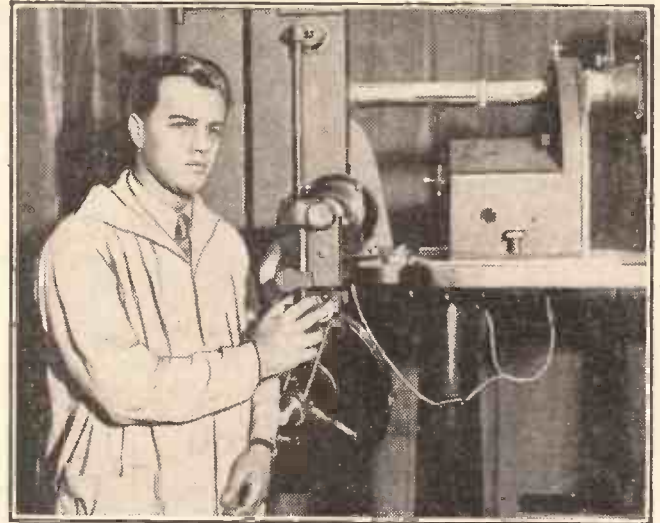
What about the man who has electric lighting mains in his house? Clearly his most economical course is to make as much use as possible of the mains.

For his big "quality" receiving set he will undoubtedly be wise in using the mains direct for both H.T. and L.T. supplies as well as for energising the field of his moving-coil loudspeaker. If he goes in for long-distance work, and particularly if he is a short-waver, he should cer-

tainly bear in mind the merits of the accumulator battery, for high-tension supply purposes at any rate.

The cost of fixing up a home-charger for dealing with the high-tension batteries is not great, but when you are working with a really sensitive set the perfectly even supply that comes from them and the complete absence of hum and of "batteryspherics" combine to provide the greatest of boons.

## WORLD'S YOUNGEST TELEVISION INVENTOR



U. A. Sanabria, the American inventor, with some of his latest apparatus. Great promise attends the efforts of this young man, and his results are becoming increasingly impressive.

To sum up, you will obtain satisfactory working from any modern form of high-tension supply, provided, of course, you do not go in for cheap-jack stuff. It is for you to decide just which kind of supply best meets your own requirements, and I would urge you to consider the advisability of using more than one source of supply, according to circumstances, if you have several sets designed for different purposes.

## SAVOY HILL— "TO LET"?

MANY people are wondering what will happen to the present headquarters building of the B.B.C. at Savoy Hill when the whole staff move into their new home at Broadcasting House next February.

I can tell you that no one knows at the moment. The position is that the B.B.C. has still a fairly long lease on the premises at Savoy Hill which it is anxious to dispose of.

The place is ideal for gramophone recording, even though the studios, on which many thousands of pounds have been expended, are not of the very latest type, while the office accommodation is good, if no longer adequate to the requirements of the Corporation.

I hear that the B.B.C. can dispose of its lease provided a suitable tenant can be found to take over the place as it stands.

The alternative is to put the premises in the same condition as when the Corporation took over, in which case the owners are willing to cancel the lease. The latter course will, however, mean a big expenditure, which the B.B.C. is naturally very anxious to avoid.

O.H.M.

## A "KNOTTY" PROBLEM!



Boy Scouts fixing up a loudspeaker at a recent London fête.

DX. 43

RADIO TIMES

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102 kc/s (1,554.4 m.)

PROGRAMME

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Conducted by  
STAFF

Every item's a better item  
if you've a **Drydex**

1.15 a.m.

1.30 TIME  
cast

1.45-11.0  
N

2.0

12.45

(Organist to the Society.)

Relayed from ALL SAINTS,  
MARGARET STREET  
Introduction and Passacaglia  
Reger

(Note on page 12)

Adagio ..... Lemarc  
Grand Choeur (7th) ..... Guilman  
Internozzo (Sonata) .....  
Finale .....  
Nocturne ..... Bonnet  
Minuet Scherzo ..... Jongen  
Fantasy—Toccata ..... Leslie Woodgate

Time Signal, Greenwich, at 1.0

1.30-2.30 Light Music

FRASCATI'S ORCHESTRA  
Directed by GEORGES H.  
From THE

3.30 Symph

Relayed from

THE BOURNE

Conductor,

EDA K

Persian Dan

Violin Conco

Allegro

Irish Symphony

Allegro

(Note on page

Time Signal, Greenwich, at

4.45 REGINALD NEW

At THE ORGAN OF THE BEAUFORT CINEMA

Relayed from WASHWOOD HEATH, BIRMINGHAM

Coronation March, The Prophet ..... Meyerbeer

Selection, The Desert Song ..... Ronberg

Sanctuary of the Heart ..... Keitelbey

Introduction, Act III, Lohengrin ..... Wagner

5.15 The Children's Hour

by ETHEL MALDEN

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Some  
Written, com  
produced by

ERNEST

Additional



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cert

(E (Sopra  
ORCHEST

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N CLIFFOR

No. 1 in C B  
Allegro; A  
Allegro

E and Orche  
r (Tell me u  
i) .....

(Octet) f  
struments .....  
Allegro moderato;  
with Variations; A  
two Trios; Finale;

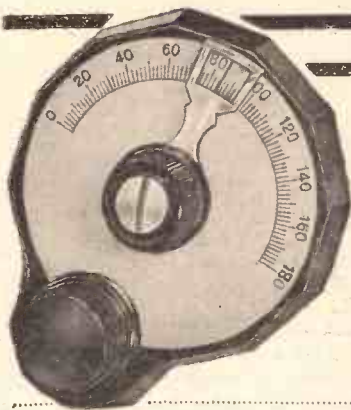
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7.30 A RECITAL OF GRAMOPHON  
By CHRISTOPHER STON  
ECHOES OF OPERETTA

8.0 A Second Helping  
of  
Crumkin P



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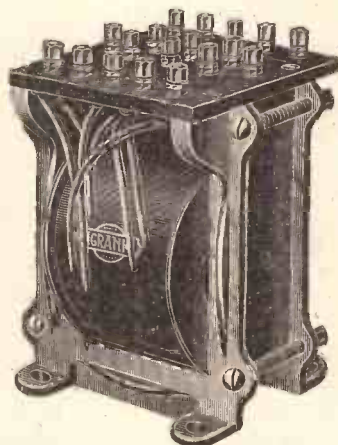
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**Mains Transformer**

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**ALL MAINS RADIOGRAM**

*in this issue*



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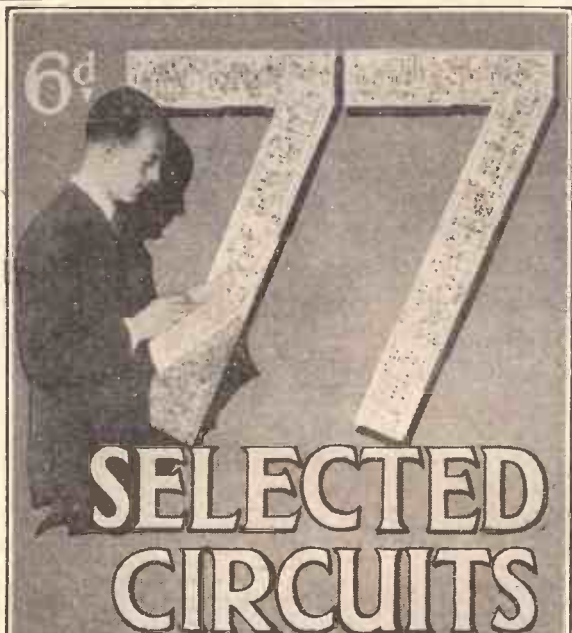
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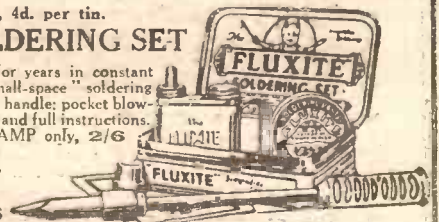
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The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of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

## QUESTIONS AND ANSWERS

### MILLIAMMETER CONNECTIONS.

H. P. R. (Farnham, Hants).—"I should appreciate some hints on how to connect a milliammeter to the last valve, to check distortion."

Bear in mind that the anode current must enter at the negative terminal of the milliammeter and leave at the positive terminal. Consequently, having disconnected the H.T. supply from the anode you should

connect the supply to the positive terminal of the milliammeter, then connect the negative terminal of the instrument to the anode of the valve.

In this way the instrument will read the actual current passing in the anode circuit of the last valve. When no signals are being received the needle of the milliammeter should, of course, remain steady, and it should also remain reasonably steady even when a programme is coming through. If it kicks about a good deal or flickers on loud passages, the set is distorting.

Generally you may take it that if the incoming of a loud passage causes the needle to kick to a higher value, the negative grid bias on the last valve is too high, whilst if the needle kicks down to a lower value the grid bias is too low.

When adjusting the value of the grid bias to the last valve, you should also bear in mind that the grid bias to the other valves may not be correct and may

consequently require adjustment at the same time. The instrument should be provided with a shunting or short-circuiting switch.

If these alterations do not have the effect of steadying the needle, it is probable that the set is being overloaded, in which case, of course, it is necessary to reduce signal strength.

Remember that alterations to the grid bias of the last valve must never be made whilst the set is "on," but the L.T. supply should always be disconnected first, by means of the filament switch.

### THE "FLEXI-COUPLING" SYSTEM.

A. L. W. (Wolverhampton).—"Not having seen the system used before, I should like to know how "Flexi-coupling," as used in the 'P.W.' sets, is able to give such good selectivity combined with strong results on the distant stations."

(Continued on page 700.)

## WHAT'S THE MATTER WITH THE SET?

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

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

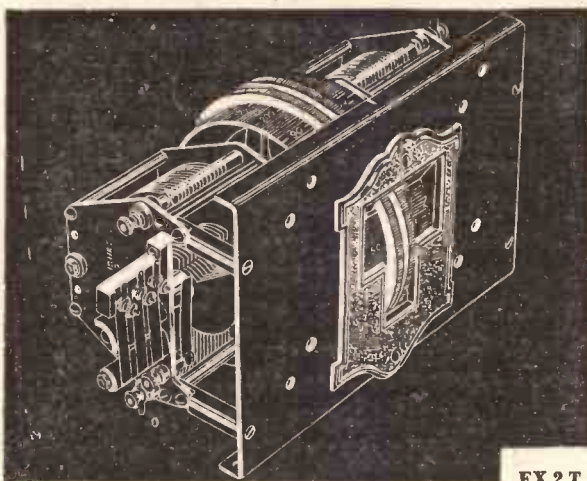
Full details, including scale of charges, can be obtained direct from the Technical Query Dept., POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

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# RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 698.)

The incoming signals from the aerial first pass through that portion of the "Selector" coil which is in use, and then make their way to earth through the "Flexi-Coupling" coil.

In doing so they set up a magnetic field around the latter coil, and thus they generate currents by induction in the main tuned circuit. This last consists of the coil and the tuning condenser, and when the signals appear here they are passed to the first valve and amplified by the others in the usual way.

The fact that the coupling coil which causes the signals to be passed through in this way is so small is significant. It indicates at once that something is going on here which is definitely different from the behaviour of the ordinary aerial coupling schemes.

This is pretty obvious, if you imagine what would happen if you coupled the aerial into an ordinary

receiver by means of a couple of turns of wire placed loosely round the tuning coil; selectivity would be pretty good, but range and volume could be very poor indeed.

Yet with "Flexi-Coupling" selectivity is still better than it would be with a normal set and similarly weak coupling, and range and volume are vastly increased!

Wherein lies the explanation of this seeming impossibility? Simply in the fact that our aerial circuit is now tuned to the wavelength of the station being received.

It therefore functions with greatly increased efficiency as compared with the usual untuned or "semi-aperiodic" arrangement. In this way it becomes possible still to get good (and even improved) range and volume in spite of our very weak coupling.

The gain in selectivity is evident; not merely is there the fact that we are using very loose coupling, but there is now an additional tuned circuit at work in the set.

We have suggested from one to three turns of "Flexi-Coupling." The question often arises: Might it not be possible to use many more and so get even more range and volume in localities where high selectivity is not so necessary? By analogy with the ordinary methods of aerial coupling this should be the case, but are we now dealing with a question of aerial coupling pure and simple?

Unfortunately for the suggestion, we are not. Instead, we are dealing with a question of coupling between two tuned circuits, not between a tuned and a semi-aperiodic circuit.

### A Limit to the Coupling.

Now, between two tuned circuits it is not possible to increase the coupling with advantage beyond a certain point. When that point is passed, not merely does selectivity fall off, but actual volume and sensitivity suffer as well.

This is quite a well-known property of coupled tuned circuits, but the reasons are rather involved, and you can take it for granted that a substantial increase in the degree of "Flexi-Coupling" is not possible without upsetting the general functioning of the circuit, regardless of selectivity.

Another interesting point is that the amount of coupling required for best results has very little to do with the size of your aerial.

Naturally, aerial size has something to do with the matter, because with a large one you can afford to cut the coupling right down and sacrifice a little of the possible volume in the interests of absolutely super-selectivity if you wish. The effect is now an indirect one, however, and it is definitely different from the state of affairs existing with ordinary "semi-aperiodic" aerial systems.

### FITTING A DECOUPLER WITHOUT ALTERING THE WIRING.

J. L. (Woodstock, Oxon).—"It is an old-fashioned Det. and two L.F., and is in perfect condition, but since fitting new valves it is too lively, and unstable. This I am told can be cured by decoupling the detector.

"Can this be done without interfering with the wiring inside the set? And what is the correct value of decoupling resistance to use with a 2-mfd. fixed condenser (on hand)?"

The actual decoupling of the detector can be done externally to the set if it is fitted with a separate H.T. lead to the detector. But we cannot guarantee that decoupling will have the effect you desire

(Continued on page 702.)

## TECHNICAL TWISTERS

### No. 88. Switching off the H.T.B. CAN YOU FILL IN THE MISSING LETTERS?

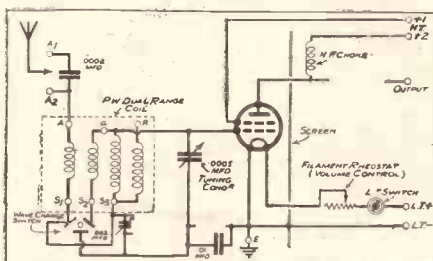
Usually no separate . . . . . is provided for H.T., the necessary disconnection being made indirectly by cutting off the filament supply.

Where insulation is virtually faultless this method is satisfactory, but if there is a possibility of leakage in the set it is better to . . . . . the H.T. Battery.

This is best done by inserting an On-off switch in its . . . . . lead. (It may be combined with L.T. switching, if desired, by means of a 3-pole switch.)

Last week's missing words (in order) were: Sulphuric; Specific Gravity; Hydrometer.

### MISSING LINKS, No. 22 AN S.G. H.F. UNIT.



This diagram shows the circuit of a simple H.F. unit, but three of the "components" have purposely been omitted. Can you fill them in correctly?

Look out for the answering diagram next week.

# SOVEREIGN FOR 'P.W.' SETS

You cannot do better than specify Sovereign Components wherever possible when building 'P.W.' Sets. Their reliability and moderate prices ensure for you the best of modern Radio. Recommended by the expert technical staff of 'Popular Wireless' is proof of their efficiency. Fit these components with confidence and notice the permanent improvement.

In addition to the Sovereign Components shown here, two Sovereign H.F. Chokes (3/6 each) are specified in the Extensior Dual Ranger this week. If you would like to know more about the full Sovereign range, or if you have difficulty in obtaining from your dealer, send direct to Sovereign for free Catalogue and name of nearest Stockist.

## SPECIAL 'P.W.' TUNING UNITS

### P.J. COILS

Wound exactly as specified by "Popular Wireless" with the added advantage of Sovereign efficiency.

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- P.J. Coil No. 3     •   2/-

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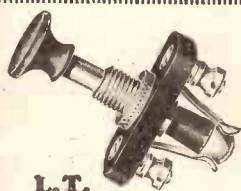
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## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 700.)

without knowing more than you tell us in your inquiry. However, there is certainly a likelihood of decoupling effecting an improvement in conditions of instability, and as the scheme is easily tried we recommend the following.

You need a resistance of about 25,000 or 30,000 ohms, and this must be connected between the detector's H.T. + and that lead's usual + terminal. (As you see, this is *external* to the set's actual wiring.) In addition, the 2-mfd. condenser must be fixed near, and one side of it must be joined to that side of the new resistance now connected to the H.T. + terminal on the set. The other side of the 2-mfd. condenser is then connected to the earth terminal (or, if preferred to E.T. neg., if that is joined to earth, as is probably the case), this completing the decoupling.

### WHEN THE SET IS LEFT SWITCHED ON ALL NIGHT.

S. R. (Taunton).—"If a set is not switched off at night, when the B.B.C. closes, but is left with valves alight and no programme coming through, does it use less current or more current than when receiving broadcasting in the ordinary way?"

"I ask this question because it is one I have never seen answered, and opinions even among people who ought to know seem very diverse. The general opinion of those I have talked it over with seems to be that a set must take a little more from the batteries when the loud-speaker is giving out a programme than it does when no music or speech programme is coming through. Is that right?"

No. There is no reason why more current should be taken when the loudspeaker is giving out a programme than when the set is switched on with no programme being received.

As a matter of fact most sets take slightly *less* current when tuned in to a strong station than they do when no programme at all is being reproduced.

This may, at first, seem rather surprising, but it can be proved by tests with suitable measuring instru-

ments; and it will be evident if we consider carefully the exact effect which the programme has on the current consumption of the receiver.

If we had an ordinary set with an ammeter in the L.T. lead and a milliammeter in the H.T. lead, and if we then arranged a switch to cut in or cut out the aerial, we could see the exact effect which switching on the programme would have.

Suppose we switched out the aerial (which would give us the "no-programme" condition) and measured the current consumption by the meters, assuming that both H.T. and L.T. are to be connected up and left switched on all the time.

With no aerial connected, that is in the "no programme" condition, the L.T. meter would read about 5 amps for an ordinary 4-valve set, and the H.T. would be, say, 20 milliamps. (These are figures that might occur in practice with a 4-valve comprising S.G. det. and 2 L.F. stages.)

If now the aerial were switched on, and a strong programme were received, the effect on the measuring

decreases by equal amounts (however quickly the changes take place) the mean or average current remains constant.

Hence not only is the L.T. current requirement unaffected by the programme but so also is the H.T. current drawn by all amplifying valves. Each valve will, as a matter of fact, have big changes taking place in its anode current, but every increase there is instantly negated by a decrease and vice versa, so that the average current will be constant.

### Where the Current Does Alter.

We must not, however, forget that this condition of equal increases and decreases applies to only the amplifying valves. It does not apply to the detector.

The detector's plate current does alter when a programme is being fed into the set.

In the ordinary set using a grid-leak-and-condenser detector arrangement, the effect of the programme is to *decrease* the average current in the detector's plate

### "P.W." PANEL. No. 46. TRICKLE CHARGING.

A modern variation of the old-fashioned method of re-charging an accumulator is "trickle" charging.

As the name implies, it is a small charge, but it is sufficient because of its long duration.

Its purpose is to supply just sufficient charge when the accumulator is "off" to balance the discharge during its working periods, and thus to keep it continually in tip-top condition.

A great advantage of the method is that it can be done at home, and usually without disconnecting the accumulator leads.

instruments would be very slight. Probably the high-tension would drop slightly, from 20 to, say, 19 milliamps, and the low tension would be exactly as before.

The reason that low tension remained unaltered will be obvious if we remember it is an ordinary direct current flowing through a resistance; and as the voltage (of the accumulator) and the resistance (of the filaments) are unaltered, the L.T. current will necessarily remain unaltered too, programme or no programme.

High tension current consumption is a little more complicated, because the anode currents do fluctuate continuously. But note this important fact—all amplifying valves should have *equal* increases and decreases of anode current, if they are to work without distortion. And if the current rapidly increases and

circuit, and so long as anything at all is being received there is a slight drop in the detector's anode current.

With an anode-bend detector, on the other hand, the totally different principle employed always results in a slight *increase* in the detector's plate current; and whichever method of detection is employed the alteration due to the programme is relatively slight because the L.T. of all valves, and H.T. of all amplifying valves, is constant.

To sum up, therefore, we can say that there is always only a very slight change, and its nature will depend on what kind of detector valve is used. The grid-leak-condenser type will result in a small decrease when a programme is being picked up, whilst the anode-bend type of detector will result in a slight increase of H.T. current.

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1,000 Lots.

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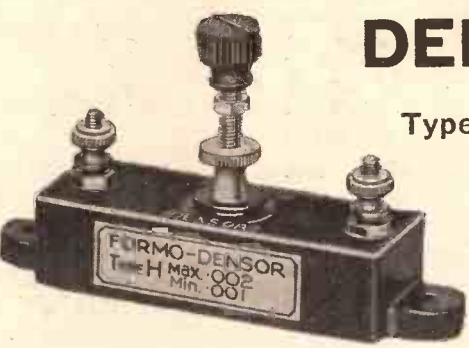
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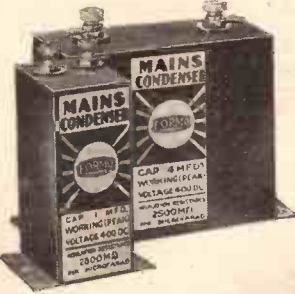


Type F, J, & G.

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Complete catalogue from:  
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GOLDEN SQUARE, PICCADILLY CIRCUS, LONDON, W.1.  
Crown Works, Southampton. See also page 705

## A RIGGER'S RADIO RESCUE

**A**N unknown rigger in the employ of the B.B.C. was the hero of the breakdown when the North Regional aerial was damaged by the gale on November 3rd. His name has not been disclosed, but the story of his courageous action is as follows:

The first time the aerial was damaged was in the early evening when a gale of 90 miles an hour was blowing. With electric torches the engineers inspected the aerial and it was eventually discovered that some strands of the down-lead had been broken and were flapping about vigorously.

### A Difficult Task.

Owing to the high wind it was impossible to gather the loose wires together, so a rigger was sent up the iron ladder which runs up the whole 500 ft. of the centre of the aerial mast. His task was to steady the halyard while the down-lead was allowed to drop towards the ground so that the engineers could join up the strands at the point where they were broken.

After an hour's work this was accomplished successfully. Meanwhile, the rigger was perched hundreds of feet up the mast with one hand gripping the rungs of the ladder and the other steadying the halyard so that it could drop as gently as possible. It was pitch dark and the wind was so strong that the engineers on the ground below had difficulty in maintaining their footing.

The feat of the rigger, without whose action the North Regional transmitter would have been unable to re-start transmissions, is a most remarkable one, and will certainly take a prominent place in the records of British broadcasting.

The comment of the B.B.C. upon it is: "The riggers employed by the B.B.C. are accomplished steeplejacks and often have dangerous tasks of this nature to perform."

A wonderful new book for boys is the **MODERN BOY'S BOOK OF AIRCRAFT**. It is published this year for the first time and its price is 7s. 6d. Dealing with aircraft and flying generally, it is crammed with thrilling and amusing personal narratives by practical aviators. There are four coloured plates and numerous photographic and other illustrations. Every "air-minded" boy will revel in it.

## TECHNICAL NOTES

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

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

### Importance of Inductance.

**I**N testing out a new L.F. transformer, one of the first things that gives you some sort of an idea whether it is likely to be good or not is an actual measurement of the primary inductance. Of course, this does not tell you everything about the transformer by any means, but if the inductance is good you know at any rate that the transformer has the first essential.

The second point is whether the inductance at zero or very small direct current falls seriously as the current is increased. Incidentally, the parallel-feed arrangement enables you to avoid the effects due to change in the permeability of the core.

### Bass Reproduction.

If the inductance is on the low side, it generally means that the bass reproduction, due to the transformer, will suffer to some extent. But there are two sides to this question. Sometimes beginners are apt to go in for a particularly good (and therefore, as a rule, rather more expensive transformer) when, in point of fact, the transformer is too good for the job.

Perhaps I can explain this more simply another way by saying that it is no use having several very strong links in a chain if you have one weak one. The strength of the chain, as the proverb goes, is the strength of its weakest link.

If some other component of the set, for instance the loudspeaker, is not of the highest quality, then it is not a great deal of use spending extra money on a particularly good transformer which in itself gives you better quality than the loudspeaker can reproduce.

There is, therefore, quite a considerable field for a transformer which, whilst having good characteristics, is not necessarily of the highest quality, but on the other hand is reasonably inexpensive. A transformer of this type fits in well with the needs of anyone making up an inexpensive receiver.

So if you are planning out your receiver to a price, it will quite probably pay you

(Continued on page 706.)



## These BRITISH H.T. accumulators guarantee unfluctuating power

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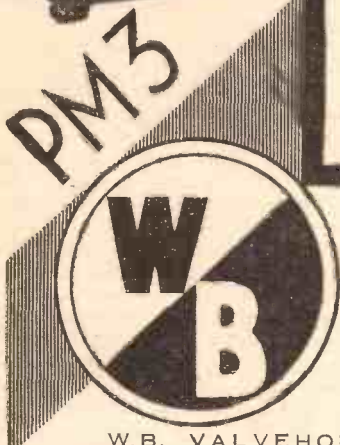
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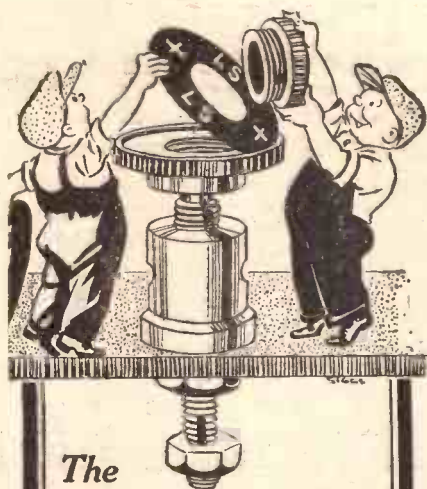
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## TECHNICAL NOTES

(Continued from page 704.)



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#### IMPROVED TYPE T2LC

The new T2LC terminal is similar to the old type but on the new model the indicating tabs are interchangeable. The head cannot be lost as it is non-detachable.

Here are the specifications :

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- (3) Pillar Terminal to take spade wire on similar connection.
- (4) 'Phone type terminal for connecting 'phone on similar ends.
- (5) Soldering tag to enable wire to be soldered if necessary.
- (6) Slot in shank to take square wire, so that soldering may be dispensed with.

PRICE 4½d. each

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The Eelex Testing Prods should be in every tool kit.

For testing sets with



intricate wiring, they prevent short circuits, and save you money in replacements.  
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to use a somewhat inexpensive transformer, as there are now several of these on the market which are quite good enough for general purposes and are really very good value for money.

#### A Curious Fault.

I had a curious fault in a set the other day, which took quite a little time to find. It is strange how when a fault does occur it never seems to fit in with any of the list of faults which are always scheduled for your guidance.

Like an accident, it never happens according to the book. In this particular case the set was an all-electric receiver using A.C. valves, and the particular valve which ultimately proved to be the cause of the trouble was an A.C. screened grid. The set simply went on strike, and although the valves were apparently O.K. no sound came through.

Perhaps I can short-circuit the story by saying that, after a lot of fiddling about, I found that the screened grid was not getting any voltage—I mean it was not getting any voltage from outside and was just assuming whatever voltage it picked up from inside the valve. Apparently the valve in these conditions had become completely choked, but on connecting the screen grid to its proper voltage again the set was immediately righted and everything went on perfectly.

#### Position of Speaker.

I think a good many people do not appreciate that the position of the loud-speaker in the room makes a great difference to the quality of the reproduction. If you have any doubt about this, attach a fairly long pair of leads to the speaker so that you can shift it about, and then try it in different positions.

Try it, for instance, in a corner of the room at the angle of the walls, then try it out in the centre of the room, then try it high up, say on the top of a cupboard, and then low down near the floor. You will be surprised how different the effect will be in the different positions.

If the room is fairly bare there may be a good deal of resonance, whilst if the room is heavily draped and with a thick carpet on the floor, there will be a lot of damping, and sound will be much deadened. I have known cases where the same loudspeaker has given an entirely different quality in one position in the room from that given in another position, so much so that you could scarcely recognise it as the same speaker.

#### Try a Baffle.

This applies particularly to the very high and the very low notes. It is, therefore, well worth while to test out all the possible positions in the room before you decide finally where the speaker is to be placed. Incidentally, it doesn't matter very much about putting the set in the same position as the speaker; the set can be tucked away in any position which is convenient for operating and the loudspeaker may be at some entirely different part of the room.

In this connection I should also mention that if you have a speaker which is deficient in the lower frequencies it may be worth

while to mount a baffleboard in front of the speaker, as you do with a moving-coil instrument. Sometimes this improves the quality very much, especially in the lower registers.

#### Developments of Screening.

It is very interesting to note the way in which screening, as used in receiving sets, has developed during the past few years. It does not seem very long ago since neutralising revolutionised receiving circuits and we began to turn our attention to the stray couplings between coils and other components. The next obvious step was the screening of coils themselves by means of removable covers, which are still with us, although they have gone through various modifications.

Before coils became so efficient as they are now, the need for screening was not so great, because there was not the same tendency to oscillation. The natural damping of the coils (which is another way of describing their inefficiency, acted as a stabilising factor.

But when coils and valves became so very greatly improved and in addition we had the screened-grid valve, then efficiency went up to such a degree that it brought in its train instability in the circuits and we were forced to look for special methods of screening if we were to gain the full advantage of the very high efficiency of our new components. Accordingly we turned to screened boxes and chassis-built receivers.

A further modification of this is the partition screens between condensers and the screening of the valves. The screened-grid valve is to be regarded, in a sense, as an arrangement for continuing the partition screens right through the glass bulb so that we get the screening effect not only outside the valve but also inside it.

#### Simplifying Components.

One important result of all these great improvements in screening is that the design of components has been again simplified. In the intermediate period, when we were improving efficiency but had not really learned how to rely upon separate partition screening, the design of our components tended to become relatively complicated, but as developments have gone on and as the burden of screening, so to speak, has been taken away from the components themselves and made a separate matter, so the design of the components has been simplified whilst their efficiency has been so greatly increased.

It is no exaggeration to say that developments in screening have been responsible for enormous improvements in the design of receivers, and particularly in the design of portable receivers and compact sets generally.

When building up a set it is often much easier to use coil and valve screens instead of covering the whole of the receiver in a metal box. This, at any rate, is the case for broadcast wave-lengths, but if you are making up a short-wave receiver it is rather a different matter.

#### Mains Aerial.

It is often possible to use the mains as an aerial quite satisfactorily, although a good deal depends upon the type of set you are using and upon the arrangement of the

(Continued on next page.)



**TWO BOOKS BY BROADCASTERS**

**M**ODERNIST writers would have us believe that the Great War produced a terrible disillusionment and bitterness of spirit in all those who played an active part in it. If they are right, "Uncle Mac" (Derek McCulloch) is one of the shining exceptions to the rule.

You must realise that if you have heard his cheerful, kindly voice on the radio. You will appreciate it the more if you buy "Gardening Guyed," which is published by Ivor Nicholson & Watson, Ltd., at 3s. 6d.

"Gardening Guyed" is good fun all through; it may not be first-class literature, but then, we do not suppose Uncle Mac intended it to be. Nevertheless, it deserves to be read carefully, for its humour is rather more than the superficial humour of the music-hall comedian. It is intelligent humour; indeed, in places, it reaches to the witty heights of Lewis Carroll in its deliberate nonsense.

And Will Owen has excelled himself in the provision of "Herbaceous Borders." By the way, we trust the B.B.C.'s chief Announcer takes to heart the advice that in February "Pink Hibberds will benefit from a rich mulch of Egg and Anniseed."

**"Radio Plays."**

No doubt L. du Garde Peach is quite right when he says that "The Path of Glory" is considered by many critics to be the best radio play to date, and that "Ingredient X" was good radio entertainment and did at the time mark a definite advance in radio technique."

But when again in the introduction to "Radio Plays" (George Newnes, Ltd., 2s. 6d.), Mr. Peach says: "A radio play has—or ought to have—more claim to permanent existence in printed form than any other kind of drama," we feel sure he does not fully appreciate the value of the B.B.C.'s contributions to his efforts—which he refers to as "complementary sounds—the fewer the better."

The book, "Radio Plays," reproduces five of Mr. Peach's "technical experiments," including the two above mentioned, "The Mary Celeste," and two others which, at the time of writing, have not yet been broadcast.

Candidly, we consider that they make thin reading. Divorced from clever tricks of "microphone atmosphere," we are of the opinion they fail to "get over." But we must admit that in the case of those one has heard broadcast, it is no difficult matter to recapture the all-important "effects," and for this reason many will possibly find "Radio Plays" interesting and enjoyable entertainment.

**TECHNICAL NOTES**

(Continued from previous page.)

parts. The aerial connection to the mains is usually made *via* a small fixed condenser between the aerial coil and one side of the mains. If the set is of the all-mains variety, then of course the connection is between the coil and the mains input to the set.

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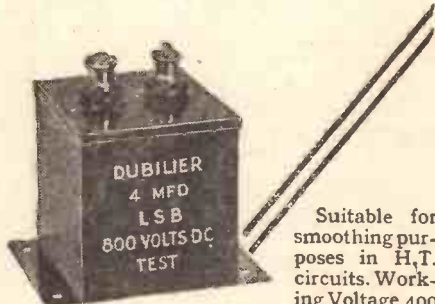
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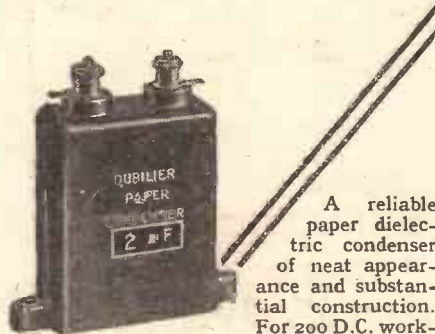
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## FOR THE LISTENER

(Continued from page 658.)

ward moment when strangers are feeling their way with each other.

It was not a very good set, but good enough, and I asked him if he used it much. He said it was "a good companion for the missis" while he was away at work, except that it made her try new cookery dodges which "mucked up" everything. I saw that he had a grievance. It was not long before it came out.

He said—but I really cannot tell you what he said, for he was one of those engaging fellows who call a spade a shovel!

In effect it was this. "I get back home tired. I haven't much to say. The missis hasn't much to say, either, having been cooped up in the house alone all day, though she does her best. I want something bright and amusing, something to take the taste of work out of my mouth, and cheer us up a bit. That's why we bought the wireless. We thought it would be just the thing. So it was in the earlier days; but now—good lord."

He picked up the copy of the official programme and opened it at the page for the day. It was about 6.15 p.m. "If we hurry," he said grimly, "we shall be in time for the Stock Exchange Report and the bulletin for farmers."

### The Thin House.

Then he went through the items up to 8 o'clock. I confess that, looking at them through his spectacles, I had to admit that there wasn't much that was "bright and amusing" in them. His voice was a crescendo of disgruntledness until he came to the 7.30 Talk, when he threw the paper aside, and said, "Adult Education" in a tone which might have offended Savoy Hill. "Napoo!" he said. "Round about here wireless is for the women. Most of the men have given it up. By the time anything interesting comes along we've got tired of waiting and have gone to the pictures. If it wasn't for the missis, who likes the Daily Service and the cookery and the Week in Parliament, we'd have sold the thing long ago and got a gramophone."

Some day we may have a chart showing the number of listeners at the loud speaker at different times of the day. It would be interesting. I should guess that there might be a fairly "thin house" between the hours of 6 and 8 p.m. Perhaps that is why they put the educationalists on at that time.

Personally, I have no complaint; for I am not overworked and I do not usually dress for dinner. But I have that working man down in the West Country a little on my mind since he spoke to me. I wonder if there are really many who feel about it as he does. And ought we to make a row about it?

## MIRROR OF THE B.B.C.

(Continued from page 658.)

doing in Newfoundland, in Canada, and how our cousins in the United States, from the eastern to the western seaboard, are all enjoying themselves.

Brief stops at the Niagara Falls, Ottawa and Vancouver, and we are off again to Australia, thence circling the world by way

(Continued on next page.)

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## MIRROR OF THE B.B.C.

(Continued from previous page.)

of the Red Sea (pausing to chat with "The Empress of Britain") the Mediterranean and Gibraltar. I shall have more to tell you about this fascinating programme when further details are finally fixed.

### Scottish Programmes: St. Andrew's Night.

Further details have come to hand about the special St. Andrew's Night programme which Scottish Broadcasting House is arranging for transmission from National as well as Scottish stations.

Personally, I think a brighter title could have been chosen for this programme than "A Sentimental Journey Through Scotland," because there is nothing which puts listeners "off" their broadcast fare so much as the impression that the comparatively few high spots in the programmes these days are all controlled by the high-brow element among the programme builders.

To those who know Galloway, Ayrshire, Deeside, the Highlands and the Western Isles, there is, no doubt, a good deal of sentimental association, but to others the characteristic music and speech to be relayed from these parts, as well as from Glasgow and Edinburgh, will be more of a novelty than anything else, to be enjoyed all the better if described in a little more cheerful way.

Scottish broadcasting is fast shaking down to the form it will take when the Regional transmitter at Falkirk begins operating next year.

Each of the existing studios at Glasgow, Edinburgh and Aberdeen will supply a definite quota to the programmes, and without laying down any hard-and-fast rules, Glasgow will generally be responsible for most of the dramatic work; Edinburgh will supply the majority of the musical programmes, especially as the public can be admitted to the large studio at Scottish Broadcasting House; while Aberdeen will continue to represent the North and the Highlands in all kinds of programmes peculiar to the area.

### Dinner to P.M.

The birthday dinner which was to have been given to Mr. Ramsay Macdonald by Scotsmen in London last month, and had to be postponed on account of the General Election, has now been arranged to take place at the Connaught Rooms on Thursday, November 26th. Many prominent people will attend, and their speeches will be relayed to National listeners.

### Two Bright Young Men.

Lance Sieveling and E. J. King-Bull are two members of the staff at Savoy Hill, part of whose work it is to introduce new methods into programme presentation. Some of their efforts have been very successful, and I think we can look forward to a couple of programmes for which they are individually responsible in next month's broadcasts.

The first is on Tuesday, December 1st, when Lance Sieveling will present a dramatised version of Gulliver's Travels.

Mr. King-Bull's programme has two performances, on December 17th and 19th for National and Regional listeners respectively, and is a revival of "Yes and Back Again."

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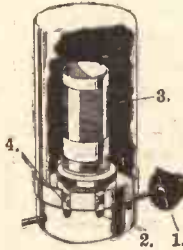
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  - Type S.S.3. H.F. tuner with reaction winding. **Price 8/6**
  - Type S.S.4. H.F. tuner without reaction winding. **Price 8/6**
1. Wave-change switch.
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BUY



BRITISH

M.C.47.

## AROUND SCOTLAND WITH A PORTABLE

(Continued from page 657.)

side, and the snow-capped mountains make a worthy background to the picturesque scene.

Here I stopped and tuned-in for the morning weather forecast, and the voice of an announcer away in London attracted a farm labourer out of a neighbouring plot of land and brought him to stand and stare, dumb-founded, at this mysterious box of tricks from which voices and music came forth.

Aberdeen station, 48 miles away, could be tuned-in only at a miserable whisper. Already the mountains were having their effect. So I tuned to the Daventry transmission which, thanks to its longer wavelength, is troubled less by attenuation over mountainous country.

### Through the Grampians

"Unsettled conditions," said the announcer. But I went on my way in high spirits, through woods of pine and birch, and spaces of open moorland, to Braemar, the very heart of the Highlands. Here the Grampians tower on every side.

Lunch over, the Triumph was swung southwards into the beautiful road up Glen Clunie, a road which boasts that it is the highest in Britain. Above the Devil's Elbow it attains an altitude of 2,199 ft. above sea level.

Here, amidst the towering silence of peaks rising to 3,500 ft. and higher, I tried what wireless reception is like when "sitting on top of the world."

The daytime is a bad time for such a test, of course, but it showed that in daylight, at any rate, Daventry is not only the best, but the only station that can be tuned-in satisfactorily in the Highlands.

You might say that whether wireless reception is good, bad or indifferent matters not at all in so sparsely populated an area as the Scottish Highlands, but if you do say that, go on this run yourself some day and have a look at the solitary farmhouses here and there along the way—almost every one has its aerial.

To dwellers in such isolated places wireless must take on values unknown to the townsman. In any case, for this reason or any other, you should some day take this run through the Grampians if you get a chance.

### Homeward Bound.

From the Devil's Elbow I followed the Braemar-Perth road down the wild and desolate Glen Shee, then switched off, instead of proceeding Perthwards, and cut along a narrow country way on to the road to Pitlochry—as wild a bit of road as any I saw that day.

Sheep were my only companions up there until the roofs of Pitlochry appeared. Through Aberfeldy I went to Loch Tay, along the road that follows the side of the Loch for some 18 miles, and so to Killin.

Another switch off southwards and Glasgow-wards, over the back of the hills to Loch Lomond—shall I describe that evening run, first the famous Loch peeping out ahead, then Ben Lomond rising magnificently from the waters, and then the run for 20 miles or more along the "bonnie, bonnie banks"? No, you must do it yourself.

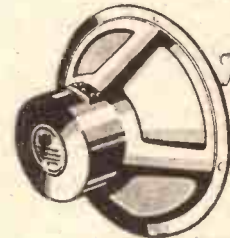
So to Glasgow, and the end of a perfect day—dinner, a comfy chair at my hotel, a pipe, and the portable gathering gay songs from out the ether.



I'm not arguing, I'm merely telling you that the

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SPECIAL SCREEN With hole 3/-  
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# HOW TO MAKE THE "EXTENSER" DUAL-RANGER

(Continued from page 682.)

to prevent the drill from "wandering." Use a nail if you haven't a centre-punch, but don't hit it too hard!

The piece that is required to be cut out in order to mount the double-drum Extenser is best removed with a fret-saw. If you use a fine blade, you won't find it at all a difficult job.

When the panel is ready, give the front surface a rub over with methylated spirits to remove the finger marks and then fix the brackets to it. It is a good scheme next to fix the panel to the baseboard before you mount any of the panel components.

When you have done this, secure the four small panel components first of all and then carry on with the mounting of the double-drum Extenser.

### Regarding the Screen.

Before you start to space out the components on the baseboard, you will find it best to make and fix the terminal strip to the back edge of the baseboard. It is also a good scheme to attend to the making and fixing of the screen before proceeding with the baseboard layout.

The cutting and shaping of the screen, from the point of view of the novice, is perhaps the most difficult part of the whole set. But even that is not difficult! In any case, if you take details of what you require to the nearest metal-working shop, they will probably do the whole thing for you for a matter of a shilling or so. (Alternatively, the finished screen can be bought complete at a very reasonable price.)

### But why not make it yourself?

The sheet of copper or aluminium required is 11½ in. by 6 in., with a ¾-in. flange on one of the long sides.

Before bending it to shape, cut a hole (with the fret-saw and fine blade) 1¼ in. in diameter with the centre 1¼ in. from one end, and at a height from the flange to suit the particular valve holder you are using for the S.G. valve.

At the other end of the sheet of metal, cut a wide lot 2½ in. deep in such a position that it clears the right-hand Extenser spindle (viewing the set from the back).

Before bending the screen to shape, first mark a vertical line at 4½ in. from each end of the screen, and cut a wide V-shaped piece out of the flange at the points where the two vertical lines meet it.

### Bending it to Shape.

The best way to bend the screen is by clamping it between two pieces of wood in such a way that the edges of the wood are at the place where the bend is to be made. By using this method, you will find it is possible to get a straight right-angled bend.

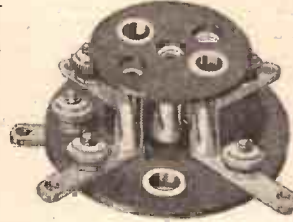
The flange, of course, is for fixing the screen to the baseboard, but take great care when fixing it to see that the screen does not touch any of the metal parts of the right-hand Extenser, with the exception of the screen against the panel.

When you are ready to do the baseboard component layout, make use of the back-of-panel diagram and the scale in order to determine the correct positions.

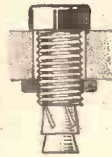
The long-wave H.F. coupling coil you can either obtain ready-made or wind it yourself.

(Continued on next page.)

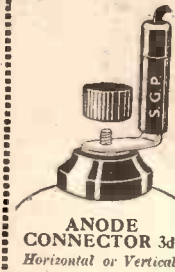
# CLIX



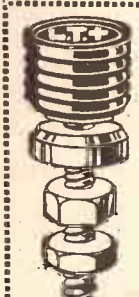
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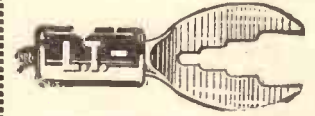


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**HOW TO MAKE THE "EXTENSER" DUAL-RANGER**

(Continued from previous page.)

As a matter of fact, it is a very simple coil to make, and all that you will require is a standard "P.W." coil quoit and about an ounce of No. 30-gauge D.S.C. wire.

Anchor one end of the wire through one of the sets of holes in the coil quoit, and wind on 50 turns. At the 50th turn make a loop in the wire three or four inches long, and bring the loop out to one side of the quoit.

**Winding the Coil Quoit.**

This is the reaction winding, and the loop just made is the common "end of reaction—beginning of grid coil" connection in the back-of-panel diagram.

Put a layer of Empire tape over this winding, and then proceed to wind on a further 30 turns. This point reached, make

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to "P.W." readers

**The "S.Q." Star**

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another loop, wind on another 30 turns, and bring out a third loop, and then complete the winding with 90 turns more.

The whole of the winding, including that of the reaction coil, must be in the same direction.

There is no need to make any attempt to keep the turns in regular layers when winding this coil.

When you have finished the coil you can proceed to mount it on the baseboard, and the set is then ready for wiring.

**No Need For Solder**

In wiring up the "Extenser" Dual-Ranger, you can, if you like, dispense with soldering altogether, and take your connections direct from point to point.

You need not concern yourself with right-angled wiring, but see that all leads are spaced as carefully as possible, and make sure that all the terminal connections are tight.

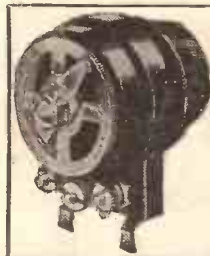
As you make a connection, tick off the corresponding wire on the back-of-panel diagram, and there is then very little likelihood of your making a mistake or omission. But to make absolutely certain it might be advisable for someone to give the wiring an independent check before you put the set on test.

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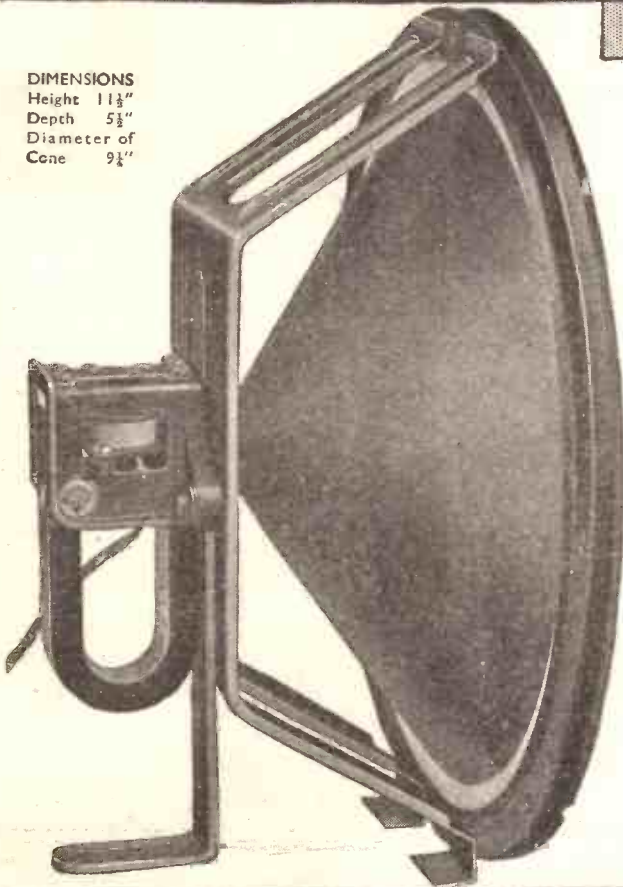
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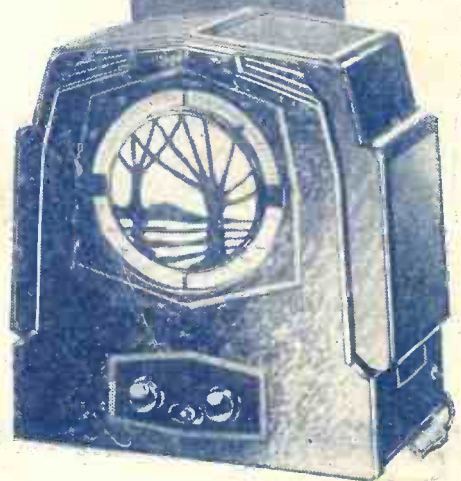
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