REGISTERED AT THE G.P.O. AS A NEWSPAPER

INTRODUCING THE "DUAL RANGER"

(See page 361)

Popular Wireless

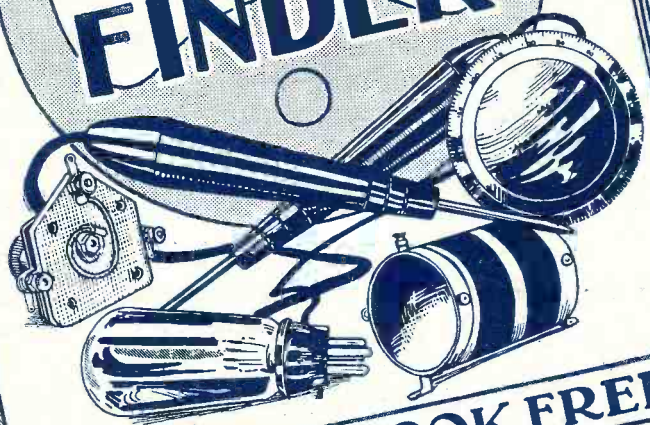
Every Thursday PRICE 3d.

No. 489. Vol. XX. INCORPORATING "WIRELESS" October 17th, 1931.

THE "P.W." GUIDE TO BETTER RADIO

VOL. 2

THE COMPLETE FAULT FINDER



SIXPENNY BOOK FREE

Our Second Free Gift! INSIDE

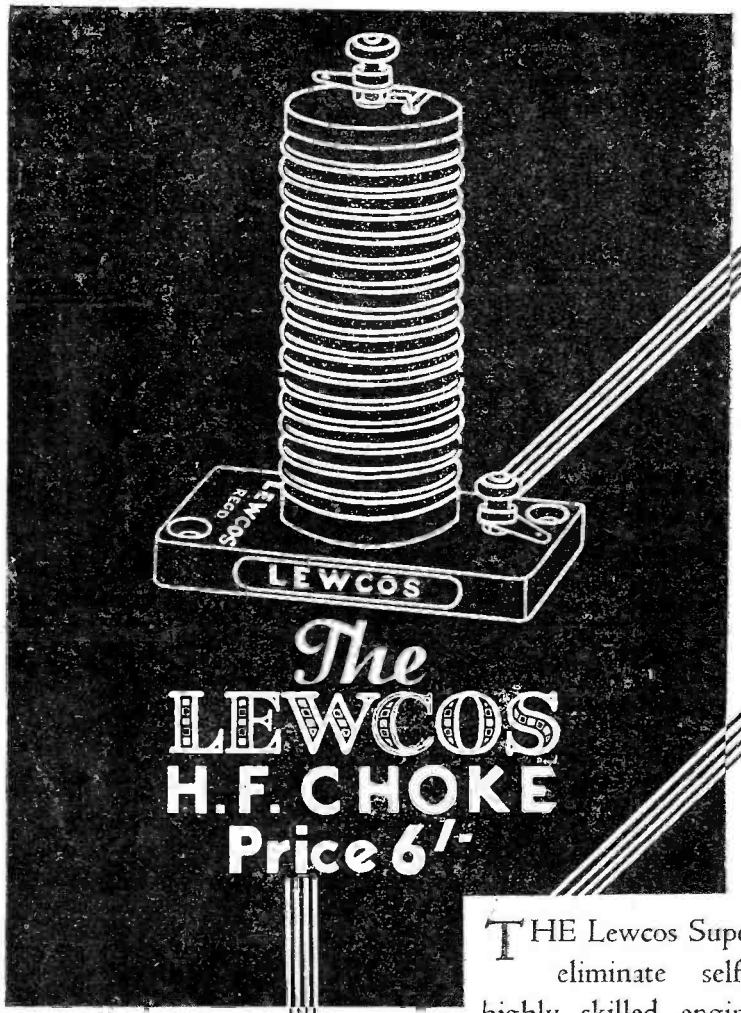
ALSO THIS WEEK

101 HINTS AND TIPS

JACK PAYNE'S POSTBAG

SPECIAL MANCHESTER EXHIBITION CRITIQUE

THE NEW MAINS VALVES



MADE BY MASTER-CRAFTSMEN

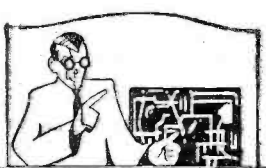
THE Lewcos Super H.F. Choke is specially constructed to eliminate self-oscillation. Scientific research by highly skilled engineers shows that this choke can be used with complete confidence in its efficient performance on all wavelengths from 20 to 2,000 metres.

The following are extracts taken from an appreciation by Industrial Progress (International) Limited, Bristol. "... the Lewcos H.F. Choke is, in our opinion, ***the most efficient choke we have tested*** ... and ***its design places it in the front rank of high-class components.***"

In short, the Lewcos Super H.F. Choke fulfils its purpose because it is constructed on a scientific basis with the best materials by master craftsmen.

Write to-day for a fully descriptive leaflet Ref. R. 33, which shows the choke curves and gives tested values.

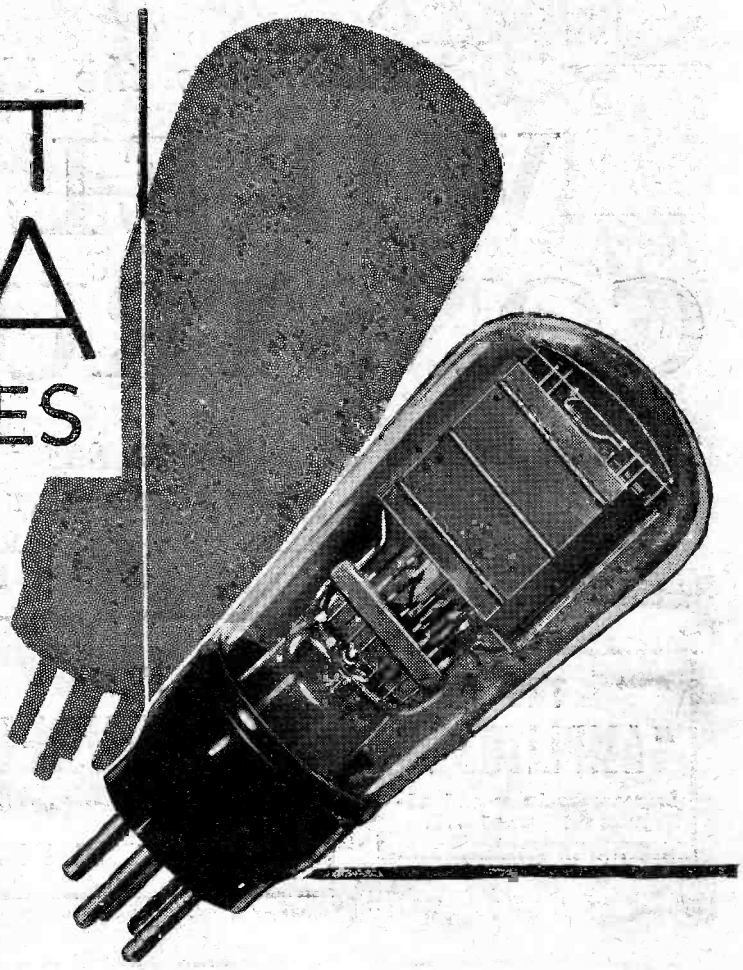
THE LEWCOS SUPER H.F. CHOKE IS SPECIFIED FOR THE "DUAL-RANGER" RECEIVER DESCRIBED IN THIS ISSUE.



LEWCOS RADIO PRODUCTS FOR BETTER RECEPTION

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED, CHURCH ROAD, LEYTON, LONDON, E.10

2 VOLT MAZDA MASTERPIECES



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

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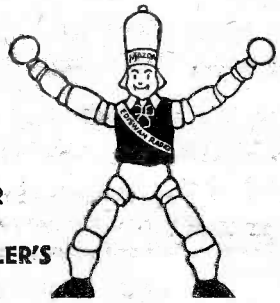


LOOK FOR "EDDY" IN YOUR DEALER'S WINDOW

Since 2-volt valves were made, never has there been so amazing a range as this — so much evidence of brilliant engineering — so many valves with outstanding characteristics. Instance the Pen. 220; or pentode, which at once presents the solution to the output stage problem in portable sets, for it gives an astonishingly large output for a combined screen and anode current of under 5 mA. It is a valve H.T. dry battery users have longed for. It is typical of all Mazda 2-volt valves. Mazda 2-volt valves, both metallised and clear bulb types, are sold by all good radio dealers.

MAZDA PEN. 220

Characteristics:

Filament Voltage - - 2.0 volts	Anode Current (Max) - 12 mA
Filament Current - - 0.2 amps.	Screen Voltage (Max) - 150 volts
Anode Voltage (Max) - 150 volts	Mutual Conductance - 2.5 mA/V

At Ea - 100; Es - 100; Eg - 0.

PRICE 20/-

THE AMAZING

MAZDA THE BRITISH VALVES

The Edison Swan Electric Co. Ltd. — AEI Associated Electrical Industries Ltd. — 155 Charing Cross Road, London, W.C.2

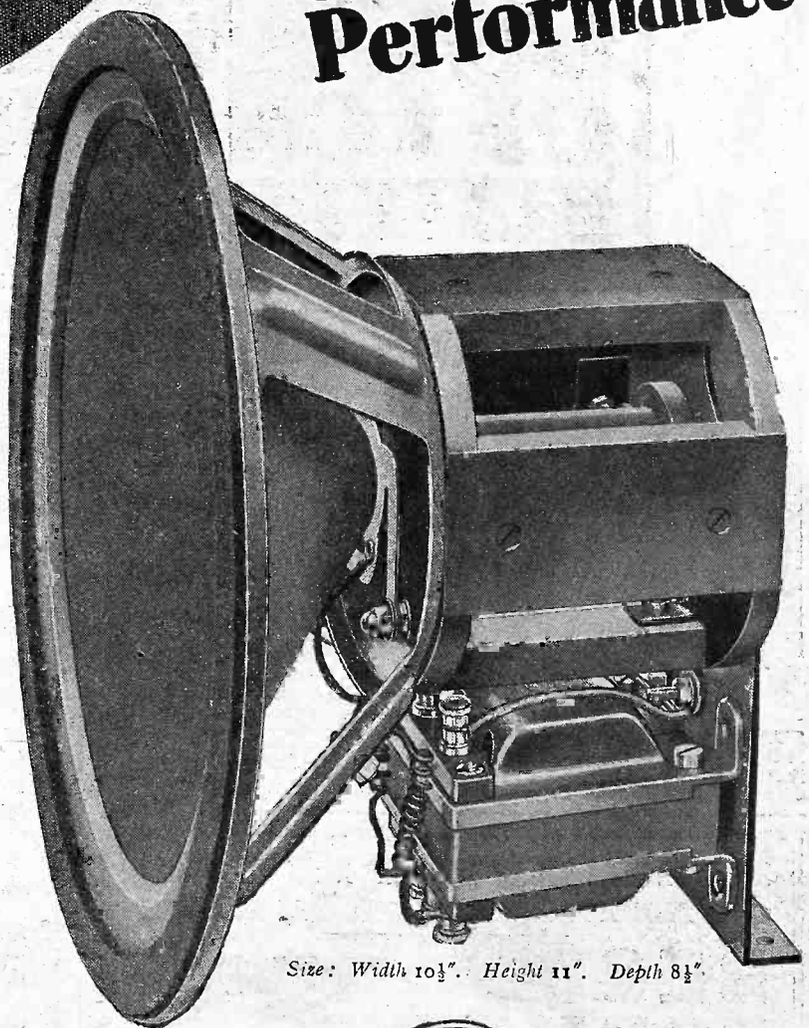
V135

A

An instantaneous Success

for high Quality & Brilliant Performance

The ORMOND MOVING COIL LOUDSPEAKER



Here, again, Ormond offer the home constructor the opportunity to make for himself a 'speaker,' equal to the most expensive products on the market, at a price well within reach of the slender purse. Gloriously natural tone is ensured by the perfectly balanced frequency response.

The construction is extremely robust, the whole being mounted as a complete chassis. The cone, speech coil and suspension are arranged to give a truly parallel action, to handle a heavy input without distress.

A speech transformer is incorporated, terminals being provided with alternative ratios for matching with the valve used in the output stage.
Cat. No. R/464.

£3:5:0

Size: Width 10½". *Height* 11". *Depth* 8½".

Also available complete in handsome figured oak cabinet. Height 16½ *in. Width* 16½ *in. Depth* 10½ *in. Cat. No. R/466. Price* **£4 19s. 6d.**

THE ORMOND ENGINEERING Co. Ltd.
Ormond House, Rosebery Avenue, London, E.C.1
Telephone: Clerkenwell 5334-5-6 and 9344-5-6.
Telegrams: "Ormondengi, Isling."

We are exhibiting at Stand 27 at the Manchester Wireless Exhibition

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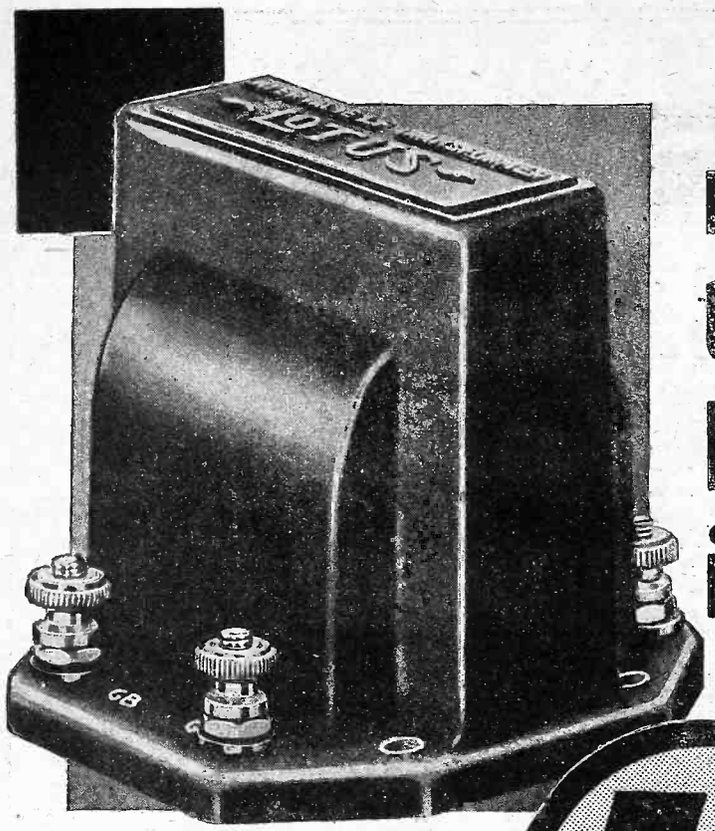
PUNCH POWER & PURITY !



not a cheap transformer but a sound instrument

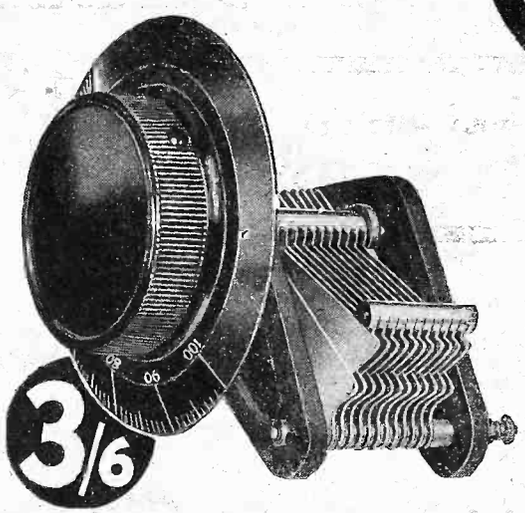
at a very 5/6 low price

All the leading set designers specify LOTUS. They know that for reliability and efficiency they are absolutely dependable. Follow the experts' lead; insist on LOTUS Components.

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

It is enclosed in a neat brown bakelite moulding, and the core is earthed through one of the fixing eyelets. Ratios 3-1 and 5-1. Type AT/1, Price 5/6.

Every home-constructor should have the new LOTUS Component Catalogue. Ask your dealer or write for your copy to-day.



THE LOTUS RIGID DRIVE LOG CONDENSER.

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

Capacities .0003, Type KC/3 and .0005, Type KC/5 **3/6** EACH

EXCLUSIVELY USED IN THE "DUAL RANGER"
described in this number.
One LOTUS Audio Transformer Type AT/1 featured on this page.
Two LOTUS Vernier Condenser Drives.

LOTUS RADIO, LTD., MILL LANE, LIVERPOOL.

LOTUS

RADIO COMPONENTS

EXPRESS KIT SERVICE

DUAL RANGER "B.P." THREE

READY FOR IMMEDIATE DELIVERY

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

The components contained in Pilot Author Kits are as chosen, tested and specified by the Technical Department of "Popular Wireless" and approved, therefore, by an established technical authority that you can trust implicitly.

PILOT AUTHOR'S KITS

Send 6d. in Stamps for NEW 116-page "Radio Buyers' Guide of 1932 Radio."

DUAL RANGER

CHECK this list of parts with the Author's specification, photographs and diagrams on pages 361-362 of this issue.

		s.	d.
1	Panel, 16" × 8"	6	9
1	Baseboard, 10" deep	1	6
2	**Telsen** ·0005-mfd. condensers with slow-motion dials	14	0
1	**Ready Radio** ·0005-mfd. solid dielectric condenser	3	6
2	**Ready Radio** 3-point wave-change switches	3	0
1	**Lissen** on-off switch	1	0
1	**Telsen** ·0001-mfd. differential reaction condenser	2	0
1	**"P.W."** and **"M.W."** dual range coil	12	6
1	**Goltone** ·002-mfd. max. compression condenser	1	3
1	**Igranic** ·1-mfd. fixed condenser	1	6
1	**Ferranti** ·0003-mfd. fixed condenser	1	6
1	**T.C.C.** ·001-mfd. fixed condenser	1	10
1	**T.C.C.** 1-mfd. fixed condenser	2	10
1	**R.I.** P.J.3 coil	2	6
1	**Peto-Scott** ready wound coil quoit	2	0
1	Screen, 10" × 7", with hole for S.G. valve	2	9
1	**Graham-Farish** 2-meg. leak and holder	1	4
2	**Lewcos and Varley** H.F. chokes	9	6
1	**Lotus** L.F. transformer, ordinary ratio	5	6
1	**Bulgin** 50,000 ohms Spaghetti resistance	1	9
1	Terminal strip, 16" × 1½"	2	0
1	**Bulgin** 25,000-ohm Spaghetti resistance	1	6
9	**Belling-Lee** Type R indicating terminals	2	3
	Glazite, flex, screws, etc.	3	0
1	**Bulgin** crocodile clip		2
1	1·5 G.B. battery for S.G. valve		9
	Author's Kit "A" Cash or C.O.D.	£4	8 2

KIT "A" Author's Kit "A" less Valves and Cabinet or 8/1 down and 11 monthly payments of 8/1 **£4 8 2**

KIT "B" Author's Kit "A" with Valves less Cabinet or 11/8 down and 11 monthly payments of 11/8 **£6 7 2**

KIT "C" Author's Kit "A" complete with Valves & Cabinet or 13/7 down and 11 monthly payments of 13/7 **£7 8 2**

"B.P." THREE

KIT "A" Author's Kit "A" less Valves and Cabinet or 10/5 down and 11 monthly payments of 10/5 **£5 13 1**

KIT "B" Author's Kit "A" with Valves less Cabinet or 12/11 down and 11 monthly payments of 12/11 **£7 0 7**

KIT "C" Author's Kit "A" with Valves and Cabinet or 14/6 down and 11 monthly payments of 14/6 **£7 18 1**

CHECK this list of parts with the Author's specifications, photographs and diagrams on pages 290-1-2 of last week's issue.

		£	s.	d.
1	Baseboard, 10" deep		1	6
1	Panel, 18" × 7" (drilled to specification)		6	0
1	**Lewcos** band-pass coil		12	0
1	**Utility** ·0005-mfd. double gang variable condenser	1	2	6
1	**Igranic** Vernier dial for same		5	0
1	**A.E.D.** volume control, 500,000 ohms		8	6
1	**Ready Radio** on-off switch			10
1	**R.I.** L.F. transformer, G.P. type, 7—1		10	6
1	**Ready Radio** H.F. choke		4	6
1	**Ferranti** output choke		7	0
1	**T.C.C.** ·0003-mfd. fixed condenser		1	6
1	**Dubilier** ·02-mfd. condenser (non-inductive)		2	0
1	**T.C.C.** ·01-mfd. condenser		3	0
2	**T.C.C.** 2-mfd. condensers		7	8
1	**Graham-Farish** 2-meg. grid leak and holder		1	4
1	**Varley** 100,000-ohm spaghetti resistance		1	6
1	**Ready Radio** 25,000-ohm spaghetti resistance		1	6
1	**Telsen** ·0005-mfd. reaction condenser		2	6
1	**Bulgin** fuse holder, with fuses		2	6
1	**Bulgin** two-way switch, Type S.86		2	0
1	Terminal strip, 18" × 2"		2	0
11	**Belling-Lee** Indicating terminals, Type R		2	9
	Glazite, wire, screws, etc.		3	0
4	G.B., 3 H.T. and 2 L.T. plugs, and 2 spade terminals		1	6
	Author's Kit "A." Cash or C.O.D.	£5	13	1

SPECIAL C.O.D. ITEMS FOR NEW "POPULAR WIRELESS" SETS

DUAL RANGER

2 Telsen ·0005 mfd. condensers with slow motion dials	14 0
1 Coil Equipment comprising "P.W." and "M.W." Dual Range Coil, Peto-Scott Ready Wound Coil Quoit, and 1 R.I. P.J. 3 Coil	17 0
3 Valves as specified: Metallised S.G., Osram H.L.2, and Mazda P.220	£1 19 0
1 Cabinet as specified	£1 1 0

B. P. THREE

1 Lewcos Band-pass Coil	12 0
1 Utility ·0005-mfd. Double Gang Variable Condenser	£1 2 6
1 Igranic Slow-Motion Dial	5 0
3 Osram valves (as specified): H.L.210, L.210, P.215	£1 7 6
1 Mahogany cabinet, with lift-up lid	17 6

PILOT RADIO KIT PRICE CHART FOR OTHER FAVOURITE P.W. SETS

ITEM NO.	SET.	KIT "A," less Valves and Cabinet.	KIT "B," with Valves less Cabinet.	Kit "C," complete with Valves and Cabinet.
50	P. V. STAR (*Author's Kit*)	CASH or C.O.D. £5 11 11 or 10/3 down and 11 monthly payments of 10/3.	CASH or C.O.D. £7 10 11 or 13/10 down and 11 monthly payments of 13/10.	CASH or C.O.D. £8 18 5 or 16/4 down and 11 monthly payments of 16/4.
51	P.V. PLUS (*Author's Kit*)	CASH or C.O.D. £4 7 8 or 8/- down and 11 monthly payments of 8/-	CASH or C.O.D. £6 6 8 or 11/7 down and 11 monthly payments of 11/7.	CASH or C.O.D. £7 6 8 or 13/5 down and 11 monthly payments of 13/5

★ *Any parts supplied separately if value over 10/-. Sent carriage paid or C.O.D. All post charges paid.*

EXPRESS ORDER FORM

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

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

Name.....

Address.....

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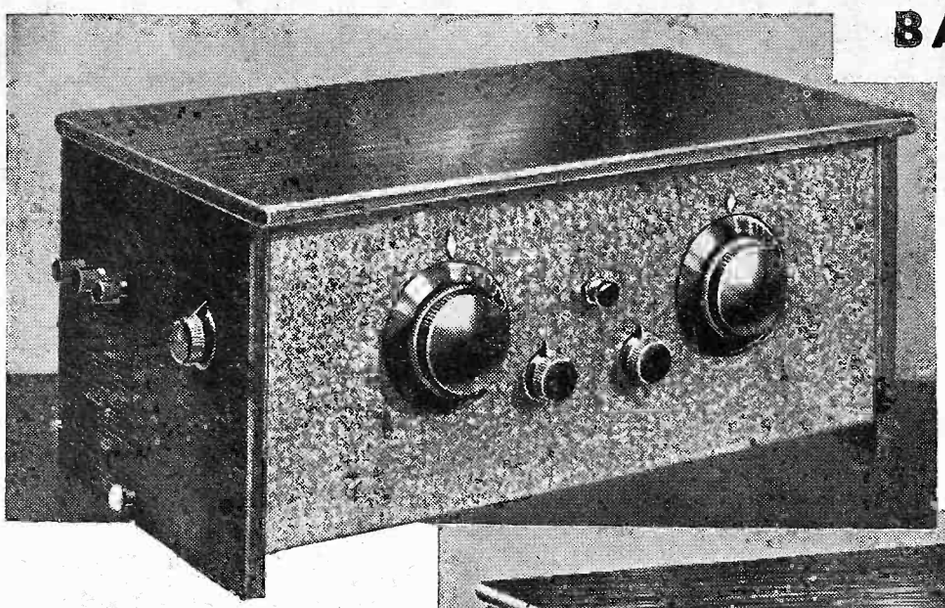
P.W. 17/10/31

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 ROAD



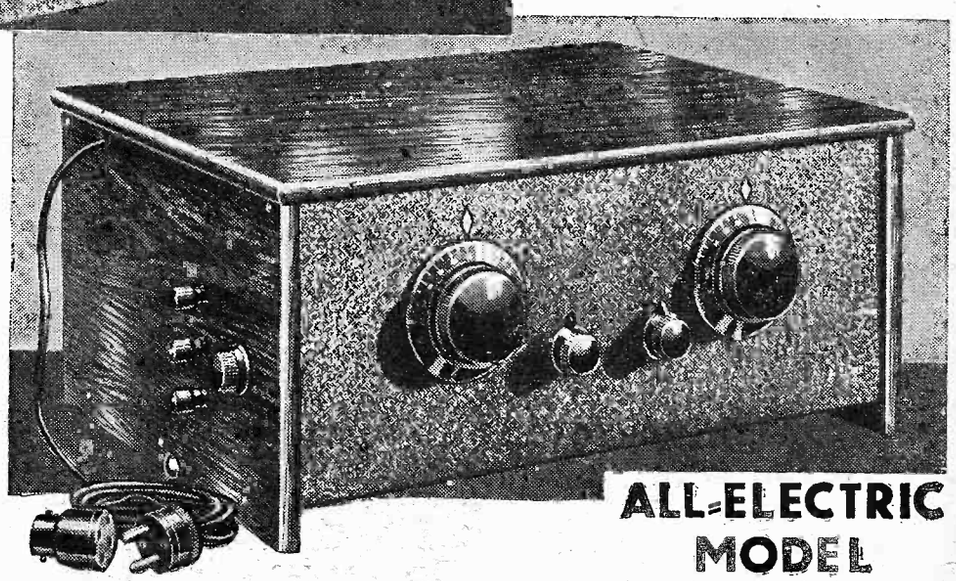
BATTERY MODEL

£6.15

Price includes latest types of Cossor Metallised Screened Grid, Cossor Detector and Power Valves, handsome oak cabinet and all parts necessary for home assembly of the complete Receiver (as illustrated at left) which is so simple that it can be easily built by anyone—even if they know nothing about Wireless.

Hire Purchase terms 15/- deposit and 9 monthly payments of 15/-

All-British —latest Screened Grid circuit



ALL-ELECTRIC MODEL

£9·19·6

Price includes handsome oak cabinet, latest type Cossor Metallised Screened Grid Mains Valve, Cossor Metallised Mains Detector, Cossor Mains Power Valve and Cossor Rectifier, Cossor Heavy-duty Mains Transformer, all the parts necessary for assembling the complete Receiver (as illustrated above) and full size Constructional Chart.

Hire Purchase terms: 20/- deposit and 10 monthly payments of 20/-

NO matter how much you pay you cannot buy a more powerful 3-valve Receiver than the Cossor Empire Melody Maker.

This remarkable Set incorporates all the most up-to-date features of design—latest screened grid circuit—completely screened coils — series aerial condenser — external wave-change switch and all-metal baseplate.

Its range is enormous. Its selectivity is remarkable. It will bring in all the main European programmes even while your local station is working.

The Cossor Empire Melody Maker is available in two types—Model 234 for use with batteries and accumulator and Model 235 which works from the electric light mains. Send at once for full particulars of the model that interests you—use the coupon below.

Use this coupon

To Messrs. A. C. Cossor, Ltd., Highbury Grove, London, N.5

Please send me free of charge a Constructional Chart which tells me how to assemble the Cossor ..... Melody Maker (Fill in type required, viz. Battery operated or All-Electric).

Name.....

Address.....

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P.W. 17-10-31

Cossor EMPIRE Melody Maker

MODELS 234 & 235

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

Popular Wireless

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Sir OLIVER LODGE, F.R.S.
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CAPT. P. P. ECKERSLEY, M.I.E.E.
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Assistant Technical Editors:
K. D. ROGERS, P. R. BIRD,
A. JOHNSON RANDALL.

RADIO NOTES AND NEWS

Authentic Anecdote.

I HAVE had the joy of beholding the most eloquent amateur I know silenced—almost dumbfounded—by one sentence. At an evening gathering of the clans he was demonstrating his new set and took a lot of pains to explain the principles of reception to a charming old lady relation whose understanding of science began and ended with magic lanterns. After tuning in various English stations he said that he would get some foreigners. He then changed the L.T. accumulator for a freshly-charged one and got Oslo, a fact which he proudly announced. Then dear old Mrs. "——" said: "But how does the *bottle* know what place you want?" I doubt if he'll ever live it down!

Night-Time—and Winter-Time.

WHICH reminds me of a moment I experienced at home the other evening not long after the transmogrification of Summer-time to that dark

CAPT. P. P. ECKERSLEY—

Builder of British Broadcasting Technique, Originator of the Regional Scheme, and Father of all "Twin" Stations!

stuff which I suppose we ought to call Winter-time. The stage was set for my aunt from Harrogate to listen to a Queen's Hall "Prom." concert, and I was anxious to make a good impression because her circle at Harrogate seems to regard "listening-in" as something like putting a penny in an electric piano in a "pub"! But the "background" was frequently occupied rather noticeably by our familiar Teutonic friend, and after a painful lapse of time Auntie took off her *pince-nez* and remarked: "How provoking! *There's a dog barking somewhere. How can dear Sir Henry abide it!*"

Strictly Business.

A VAST frivolling! Smother those guffaws in the rear rank and note that the Annual Re-union and Dinner for Officers, past and present, of the Wireless School, R.A.F., will be held, the pound frightfully sterling permitting (or nor permitting), at the Criterion Restaurant, Piccadilly Circus, on Saturday, October 24th, at 7 p.m. (G.M.T., Winter-time). Tickets, passwords and all other pertinent details can be obtained (or procured) from Mr. J. F. Herd, Ditton Corner, Datchet, Windsor.

How We Travel.

I AM deeply beholden to T. J. S. (Ontario, Canada) for pointing out that the "New York Sun" has published my challenge to Mr. John R. Carey to reproduce artificially the noise of an honest-to-goodness cat-fight. Be gum! we are getting there—and no error! I shall soon be challenging the President to make a noise like a dollar falling off the Gold Standard!

More Business.

BEFORE I pass to my weekly survey of radio "from China to Peru," allow me to say that the Harrow and District Radio Society, a newcomer to radio club

—"P.W.'s" Chief Radio Consultant

Answers readers' questions in our columns every week. And his technical articles appear only in "The Big Three"—"P.W.," "M.W." and "The Wireless Constructor."

history, is anxious to secure more members. To that end they have prepared an attractive syllabus, including cinema film displays, of undoubted interest and utility to amateurs. For details interested readers should write to the Hon. Sec., Mr. Ivor Davies, 47, Locket Road, Wealdstone, Harrow. I hope the whole school will join!

Can This be True?

I UNDERSTAND that the Russian violinist, Edward Soermus, is not allowed to broadcast in England because of the political opinions which he harbours. Let us be clear about this. If E. Soermus would be permitted by the Government to land here I do not see why he should not fiddle for the B.B.C.—if he is good enough and there are no British violinists out of a job. But if Mr. Soermus is considered by the Government likely to use some of his time here in

(*Continued on next page.*)

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

pro-Bolshevik (or anti-British) work, then the question of his broadcasting is a secondary matter and the exclusion of an undesirable alien is a primary one.

They Always Switch Off!

"WE are faced with the opposition of those who would regard broadcasting merely as a means of entertainment, who resent having any good material put before them, even though they could always switch off. *Their mind is a wilderness through want of care, the plough of wisdom never entering there.*" The italics are mine; the words Sir John Reith's.

Surely "entertainment" and "good material" can be synonymous? Why, the B.B.C. programmes themselves prove that. However, now some of us know what the head broadcaster believes about our minds!

Voice in the Night.

YEARS ago, so I heard, the proprietors of Madame Tussaud's used to offer money to anyone who would remain in the Chamber of Horrors for one night. I never heard of any takers But it has fallen to the night-watchman of "His Master's Voice" Modern Hall of Music. opposite Olympia, to get a jolt which I wager he will not quickly forget. That worthy had just settled down, on the night of Saturday-Sunday, September 19–20, to his job. Probably he was reading a murder mystery—when suddenly——

A Ghostly "Oh, Yeah."

SUDDENLY he heard a voice making a speech in American—and you know how frightful that is! Every hair erect, he crept off to investigate. Was it Al Capone exploding into the Radio Business, or Jack Diamond trying to land in England for a second time? Oh no! the row was coming from the new H.M.V. Model 531 Super-het Radio-gramophone, which some ass had left active, this remarkably sensitive receiver picking up the voice of an announcer thousands of miles away and pushing it out into the stilly night.

Borrowing and Lending.

THOSE famous words of William Shakespeare, "Neither a borrower nor a lender be" don't cut any ice in Helsingfors, it seems—for the Helsingfors station has just borrowed a wavelength from Spain!

It appears that Spain wasn't using her 368-metre wavelength, which is allotted to Seville. So Finland dropped Spain a polite note explaining that the listeners to Helsingfors programmes were being crazed by interference, and suggested that Spain's 368 metres was a very fine wave-length, and it was a pity to let it go rusty, and er—well, in short—what about lending it?

Spain, gallant as ever, said, "Sure thing, old top," or words to that effect, and so, for the time being, Helsingfors (or Helsinki if you like to spell it that way) is working on 368 metres.

The Scottish "Ideal Home."

I WISH that I had the time to go to the Kelvin Hall, Glasgow, to look over the Scottish Ideal Home Exhibition which has been organised by the "Daily Mail." Being a student of history I am thrilled at the list of historical exhibits which are on view there, some of which have never before been publicly shown in Scotland. I suggest that the Scottish ideal wireless outfit is a crystal set comprising a bit of native crystal, the gudewife's hairpin; the trophy of a raid on a telephone booth—and a forged licence. Na, na! Dinna twine wi' me, for I love ye like brithers, but I maun hae a wee joke.

SHORT WAVES.

After endeavouring to sleep for three nights with my windows open, I would like to meet the chap who said wireless would make for peace.—"Pictorial Weekly."

* * *

THE FINANCIAL CRISIS.

Patriotic Father: "I'm afraid you can only have threepence a week now, dear."

Bright Child: "But, daddy, Ramsay MacDonald said on the wireless that there must be no reduction in children's allowances."—"Punch."

* * *

FOR HUSBANDS.

"Check all connections. Permit no WIFE to make contact with metal of unit," we read in a contemporary.

We quite agree; radio is not women's strong point.

* * *

A bull recently rushed into a house and damaged a gramophone and many records. A reader wants to borrow it for his neighbour's loudspeaker.

* * *

COMPOSED ON A PACIFIC CRUISE?

The first new work will be, Gustav Holst's "The Coral Fantasia."

Anyway, it is better than a Chloral Symphony.—"Punch."

* * *

Daylight fading was a radio phenomenon not unknown to Shakespeare, apparently, for he remarks:

"Methinks it sounds much sweeter than by day."—(Merchant of Venice II. i.).

Query Answered.

MY "good young beans," J. G. and B. W. (Nottingham) enquire about certain stations. Here goes! GLSQ is s.s. Olympic; G 2 B A is an experimental station whose name I don't know; G B S and G B W are Rugby. I am sorry to learn from these two young radio rips that Nottingham is about as dead as cold mutton-fat where radio is concerned. Better take up chemistry, eh? But what boots it, so long as you have "P.W." and plenty of signals?

Watching the Wood.

THE Provincial Forestry Department is to build a system of look-out towers in Saskatchewan, Canada, each equipped with a complete radio station. All of these stations will be in communication with each other, with aeroplanes and base stations, the whole system being intended as an aid to the control of forest fires. I love reading Robert Louis Stevenson's account of how he deliberately set fire to a Californian forest. Strange aberration on the part of one who was generally so mindful of others.

Queer Radio Happenings.

YOU all know that I really do appreciate hearing from any of you on matters of general radio interest, radio jokes or queer radio happenings. But I would beg leave to remark that there is a growing tendency to address to me purely technical queries, sometimes in order to "try me out" and at other times, apparently, to get a reply in a hurry. Occasionally a certain query may attract me as being one which, in answering it, I can instruct or amuse the majority of Arielites, but as a rule all I can do is to pass the letter over to out technical people. So that's that. Have you noticed the posters on the buses, all about "Ariel" of a certain daily paper. Nobody spends all that money on your faithful Notist and News reporter! (*He doesn't need it. Ed. "P.W."*) Oh—quate!

In the Matter of Correspondence.

AND while on the subject of letters I might as well confess that what with these holidays and exhibitions and what-not, I have fallen behind with my letters; my pile of un-dealt-with correspondence now measures two feet, three bottles and a clothes-brush, from desk to yesterday's mail. Have a heart! All—or most—will be attended to as space, weather and opportunity permit, and I beg of you that you will not deem yourselves neglected if Ariel does not mention you. I am the Human Small tooth Comb. Gad! I've got one letter dated Feb., 1929, which I am determine to master so soon as I have learned Gaelic and Sankskrit.

Message to Traders.

I RECEIVE letter after letter from readers of "P.W." advertisements who complain, and with reason, either of delays in replies to their inquiries, or that no relies whatever are vouchsafed. Here's a typical instance. W. I. B. (Morden) during the six weeks preceding September 16th, wrote for lists to six British firms, three American firms, and one Austrian firm, all in Great Britain. *All the foreign firms replied by return of post. One* British firm did the same, two took a week, one a fortnight, and two took several days. Now, I ask "the trade," what is the good of employing the incomparable advertising medium of "P.W." if they do not follow up inquiries like bloodhounds?

ARIEL.

JACK PAYNE'S POST BAG

In this exclusive interview with a special representative Jack Payne tells you about the letters which reach him from "flappers," and would-be composers who send him their songs and lyrics.

IF the ability to attract correspondence from every quarter of the globe is any test of popularity, then Jack Payne of the B.B.C. is one of the most popular men in the world. Last year he *personally* received no fewer than forty thousand communications, most of them in the form of letters, but including a large and varied assortment of postcards, telegrams, radiograms, and cables.

Most people are inherently lazy in answering their correspondence. Film stars, for instance, rarely see their "fan mail," as it is called. They employ secretaries solely to answer the queries of their admirers, to send out photographs, and to carry out the thousand and one favours demanded of them through the post.

His Link with Listeners

That is a method which does not appeal to Jack Payne, and his personal letter bag is the largest in the world, far greater than any film star's. He believes in applying the personal touch, not to flatter the vanity of his correspondents, but to ensure that at all times he is fully conversant with the fluctuating opinions of his public.

He explained it to me in this manner:

"Wireless broadcasting is unique in that it creates public figures who are almost entirely out of direct touch with their public. You have only to reflect how important a part broadcasting now plays in national life to realise there must be many other wireless personalities in the same position as myself.

"Actually, the position is rather an anxious one. It is my business to fulfil public demand, and my only gauge of that demand is my letter bag. And in spite of the enormous number of letters I receive, I can never be absolutely certain they are fully representative of listeners' opinions. It is for this reason I welcome more and more correspondents, for the more letters I receive the more certain can I be of the accuracy of my gauge."

I asked him to detail the various sections of his mail and the work entailed in it.

"Before I arrive here in the morning," he said, "all my letters are opened for me by my office staff. They are arranged under various headings—listeners' letters, personal letters, music manuscripts, business communications, and so on.

"They total, I suppose, something like a hundred a day, but the number fluctuates according to the period of the year. During the summer, for instance, when so many people are away on holiday, the average is slightly less.

"I suppose Christmas is the busiest time for us. Then we may receive anything up to two hundred letters by the morning post.

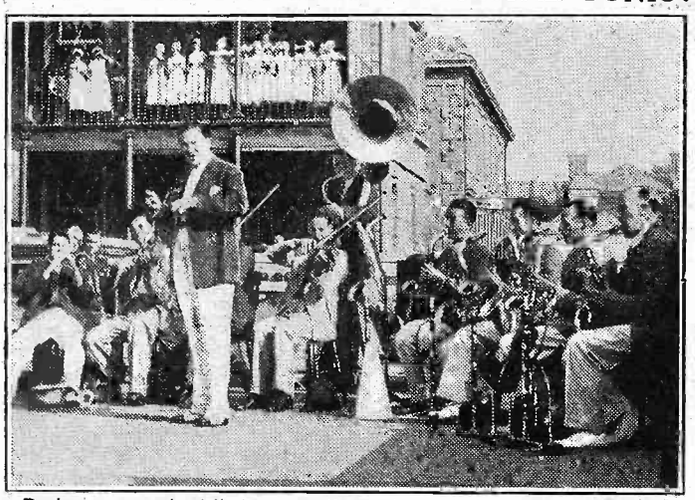
"Sergeant Flagg"—Ses You!

"Again, very often a new or unexpected item in one of our programmes will bring in a rush of letters. Quite recently, for instance, we broadcast one of our oldest comedy numbers, 'Sergeant Flagg,' just in the nature of an experiment. The result was astounding. Letters poured in from all over England, asking us to repeat it.

"Quite ninety per cent of my letters are from wireless listeners, and I am glad to say they are nearly all letters of appreciation. Occasionally the other sort come in from the anti-dance faddists. I scan their letters as eagerly as any, because if there is genuine criticism to be offered I am glad of it.

(*Continued on next page.*)

GIVING THE PATIENTS A MUSICAL TONIC!



During a recent visit to a south coast resort Jack Payne and his Merry Men entertained the patients and nurses of the local hospital with some of the latest tunes.

A MERRY BAND OF MUSICIANS

Here is another photograph of Jack Payne with his dance band. This time, however, they are seen in the studio in more conventional surroundings.

JACK PAYNE'S POST BAG

(Continued from previous page.)

"My correspondents cover every class of society. I receive elaborately typed foolscap pages and hastily scribbled scraps of paper. Some thirty or forty people write each day for my photograph, or a photograph of my dance orchestra.

Letters from Everywhere.

"And only yesterday I received a lengthy cable from America saying how well we had been received in one of the Southern States. I have, too, received cables and radio messages from Australia, New Zealand, Turkey, and India. If there is anyone who still doubts the world-wide success of British broadcasting methods, I would like them to spend a week dipping into my mail bag.

"Of course, there are plenty of 'query' letters—about a dozen a day on the average—'Who sang the chorus of such-and-such a song three weeks ago last Thursday?' 'Who are the publishers of this foxtrot or that tango?' 'Is the song copyright?' and so on."

For "Mrs. Jack" Too!

Jack Payne went on to explain that the letters that "got home" with him—and with his "boys"—were those he received from hospital patients. "Such letters," he said, "impress on us the importance of our position, and make us feel we are doing really worth-while work."

Practically every day brings a present of some sort to Jack Payne's office. And the surprising thing is this, the majority of them are not for Jack, but for his wife! Three or four times a week a bunch of flowers arrives; sometimes an ornament or a piece of embroidery.

"It is quite impossible to tell you how much Mrs. Payne and myself appreciate such tributes," said Jack—and he meant it.

There is only one type of letter which annoys him. It is that which he receives from "foolish flappers" and "sentimental spinsters"—the phrases are his own. They are an annoyance and hindrance in his work. So much so that quite recently he gave his manager orders to consign them all to the waste-paper basket without submitting them to himself.

Picture Puzzle Posers.

"I wish you would let the world know that I am happily married," he said, "and that I am too busy to be bothered with communications which have no bearing whatever on my radio work."

Quite abruptly he tossed a sheet of paper across the desk.

"Here is another type," he said. "Read it."

"Dear Mr. Payne" (ran the letter), "I am enclosing herewith two picture puzzles which I have found too difficult to solve. I feel sure you would like to solve them for me. Please send them back as soon as you have done them."

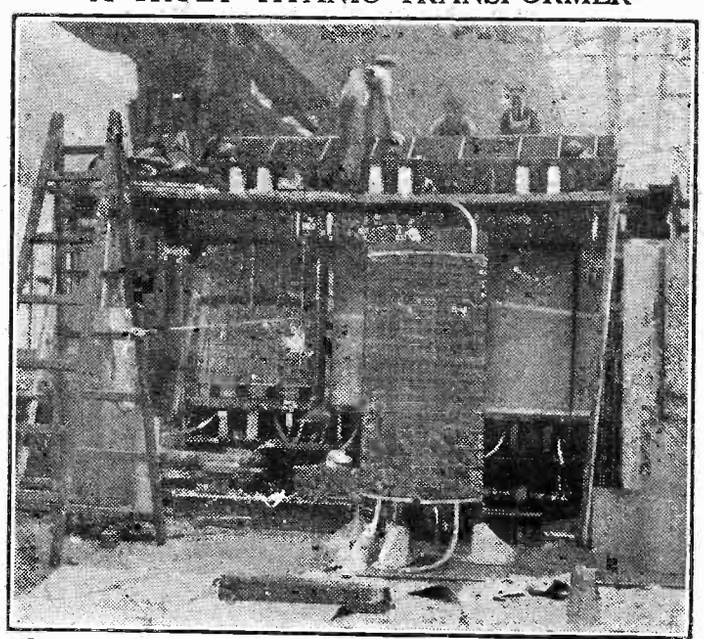
About a Hundred a Day!

Nearly a hundred manuscripts from would-be composers and lyric writers are sent to Jack Payne each week. Some of them are pathetic in the extreme; many are absurd and savour of a "leg-pull." One "lyric" I examined was written in pencil on a sheet of paper torn from an exercise book. There were not two rhyming words on the whole sheet.

Sometimes, however, "discoveries" are made. It is a fact that when Jack Payne's band broadcasts a new composition, even if the composer is quite unknown, he at once takes his place among the leading composers of the country.

Such is the value of Jack Payne to a song writer.

A TRULY TITANIC TRANSFORMER



In preparation for the "Grid" scheme the engineers at Messrs. Ferranti's works recently assembled this High-Tension Transformer which is to be used in conjunction with the new power distribution lines throughout the country.

AN INTERNATIONAL RADIO CODE

HOW STATIONS OF VARIOUS NATIONALITIES CONVERSE.

HAVE you ever wondered how it is that Radio Telegraph Stations situated in various countries of the world, and whose operators speak only their own particular language, manage to converse with one another? That it is done is a fact, and the old saying, "Necessity is the Mother of Invention," just about explains it.

A good example of this sort of thing is the case of a ship station, for in the space of a few days the operators on board may chat with fellow telegraphists of half a dozen or so different nationalities. Even though they know only their own tongue, they experience not the slightest difficulty in making themselves understood.

The secret of their success is a form of "international code," which was originally brought out by the International Radio-telegraphic Convention in 1912. Since that day it has been considerably enlarged and now consists of about 150 abbreviations.

All wireless stations are given a call sign, which really corresponds to a telephone number. What is more, they are all divided up into different classes and nationalities, so that an experienced person can tell at a glance the nationality of that particular station, whether it is on land or a ship at sea, or an experimental station.

Overcoming Language Limitations.

The call signs of all land stations are comprised of three letters, those of ships have four letters and experimental transmitters have a figure inserted after the first letter The first letter, by the way, denotes the nationality of the station in each case.

A ship coming up the English Channel often finds it necessary to call a French station, to report its position, etc. After the preliminary exchange of call signs for identification purposes, the operator on board the ship is now faced with the problem of telling the Frenchman at the other end how far he is away.

What does he do? He resorts to the famous International Q code, as it is called, and sends the three letters Q R B, followed by the number of miles he is away from the Frenchman. If he sends Q R B 120, every operator, no matter what his nationality, understands that he is saying, "The approximate distance between our stations is 120 nautical miles."

Similarly, the French operator may want further information, and send Q R D, or in other words, "Where are you bound?" The ship would then probably reply "Q R D London," which means "I am bound for London." So you see it is really a fairly easy matter for radio stations of different nationalities to understand one another.

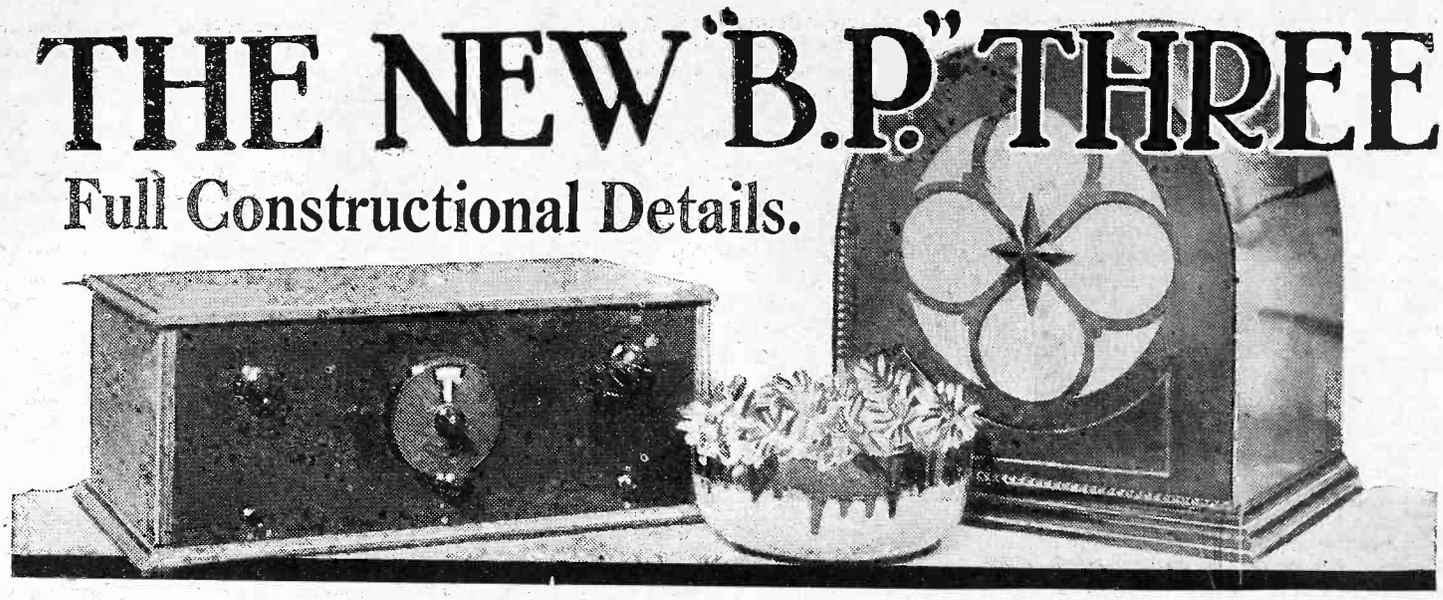
The Chatter of the Ships.

The two abreviations I have given above are only two of a whole long list by means of which it is possible to ask any normal question, or give the correct answer to one. Another great advantage of this code is that it saves an enormous amount of time. If you have ever heard the "babble" that goes on, almost continuously, on the shipping wave of 600 metres, you'll realise what this means!

It is, of course, impossible to give a complete list of the abbreviations here, owing to the space it would take up. But if any of you would like to have it, it is published in The Handbook for Wireless Telegraph Operators, issued by His Majesty's Stationery Office, price sixpence.

THE NEW "B.P." THREE

Full Constructional Details.



Here are the how-to-make instructions for building the fine three-valve band-pass receiver for long-distance loudspeaker reception, which we introduced in last week's "P.W."

BUILDING a radio set is one of the easiest things in the world. Glance at the photographs of the new "B.P." Three. Looks a simple, straightforward job, doesn't it? And it is, too! Suppose we build it together, step by step?

First of all we have got to get our parts together. In order to simplify our task, the components required are given in a tabulated list on the next page.

We obtain various parts, not forgetting a few assorted wood screws, a small quantity of rubber-covered flex, four wander plugs for the grid-bias connections, and some insulated tinned copper wire or bare wire and Systoflex covering.

Then we are ready to commence the constructional work.

Drilling the Panel.

Let us make a start by drilling the panel ready for mounting the components.

The panel is placed with its face upon a flat surface, and so that its highly polished finish is not scratched it is advisable to interpose a piece of paper between the panel and the flat surface. The next procedure is to mark off the drilling centres.

You will need a straight-edge (preferably a steel rule), a scriber, or a sharpened nail, and a centre punch.

Starting from the left of the panel (*looking at the back*) the first two components are the volume control and L.T. switch.

Place the straight-edge on the panel and scribe two lines—one vertical and two horizontal—to the dimensions given on the "panel-drilling diagram." The vertical line in this case serves for both the volume control and the L.T. switch, so one measurement from the left-hand edge of the panel (*back*) suffices here.

Carry on in the same way for the tuning condenser (this is in the centre of the panel), the reaction condenser, and the band-pass coil switch.

Use a Centre-Punch.

Make a little dent at each of the points where these dimension lines cross by giving the centre-punch a sharp tap with a hammer.

Before commencing to drill the holes it is just as well to give the various dimensions the "once-over" with the rule to make sure that no mistake has been made.

Now take your brace (a carpenter's brace preferably) and a large drill and carefully drill the five holes whose centres you have already marked.

It usually facilitates matters if you first of all run a small "pilot" drill (about $\frac{3}{32}$ in.) through, because this helps to keep the large drill from wandering out of centre.

I only mention this in case you wish to be absolutely accurate, for, of course, the "pilot" holes are not essential.

Don't press too hard on the drill, since you may make ragged edges to the holes instead of getting them clean cut.

When you have finished these five holes, drill three more smaller ones along the bottom edge of the panel for securing it to the baseboard.

You can easily countersink these holes by replacing the $\frac{3}{8}$ in. drill in the brace and rotating it a few times.

Having completed the panel the next job is the terminal strip. This is a 2-in. wide strip of ebonite running the full length of the baseboard and it contains eleven terminals and the radi-gram switch.

The Terminal Strip.

These twelve holes are each $1\frac{1}{2}$ in. apart, the first hole being $\frac{3}{4}$ in. from the end and upon the centre line of the ebonite strip. In addition there are three holes along the bottom edge for fixing the strip to the baseboard.

Drill these holes in exactly the same manner as you did those for the panel.

Now we can secure the panel and terminal strip to the baseboard. Do this carefully, so that the baseboard does not project below the bottom edge of the panel. This would look rather unsightly and might make it difficult to fit the set into the cabinet. It is a good plan to enlist the services of a member of the household to assist by holding the baseboard and panel in position while the wood screws are being inserted.

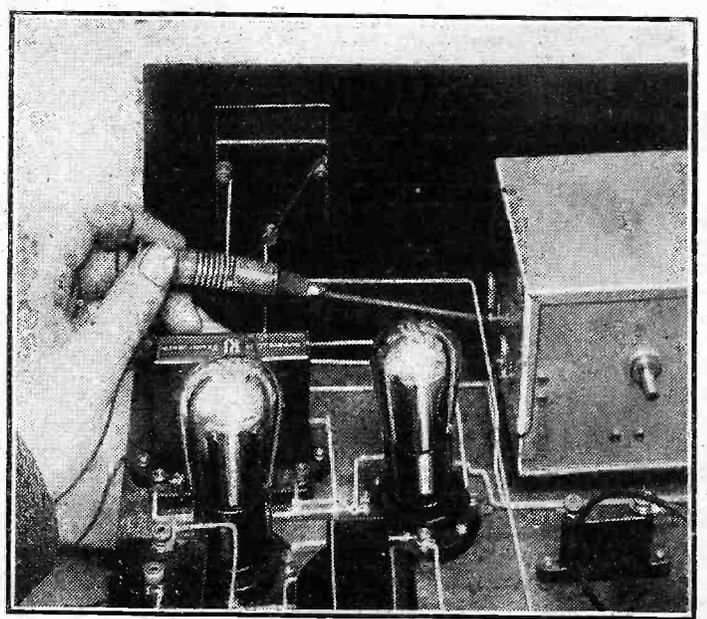
Components Next.

When this job is completed we can start mounting the components on the panel and the terminals and radio-gram switch in their positions on the strip.

At this juncture I would like to say a word or two about the twin-gang condenser. The particular unit used in the original set was not supplied with supporting brackets to take the overhanging weight, and in consequence a block of wood was placed under the condenser casing near the panel so that the

(*Continued on next page.*)

A FINAL TRIM FOR THE TUNING



When the set is first put into commission, tune-in a weak station and adjust the trimming condensers with a screwdriver, as shown, to get balanced capacity and maximum strength.

THE NEW "B.P." THREE

(Continued from previous page.)

weight should not be borne by the condenser spindle.

However, special supporting brackets are now supplied with the condenser, so the wood block will not be necessary.

Adhere To Our Layout.

So far we have fixed the panel and terminal strip to the baseboard and secured the components and terminals in position.

The next step is to screw down the remaining components to the baseboard itself, and we carry out this work by adhering as closely as we can to the back of panel diagram, assisted by the photographs of the original set.

Incidentally, we must remember to leave a small space between certain of the components and the ends of the baseboard sufficient to clear the fillets on the sides of the cabinet. Otherwise we shall find ourselves with a completed set which will not go into the cabinet until we have cut away a portion of the fillets.

The 2-mfd. output condenser is a case in point.

The final step in the construction is wiring up. It is not advisable to rush this part of the work, which should be carried out neatly and systematically.

Wiring Up.

You can start wherever you prefer, but I suggest commencing with the lead which goes from the L.T.—terminal on the terminal strip to the L.T. switch on the panel. This particular lead is the one nearest the baseboard.

You will be able to get at the L.T. switch more easily if you temporarily remove the L.F. transformer. Next, proceed to wire up the filament terminals on the valve-holders, completing the L.T. — wiring at the earth terminal on the strip.

Proceed in this way with the L.T. + lead and all the short wiring nearest the baseboard, leaving the wires from the reaction condenser, band-pass coil, volume control, and tuning condenser until later. The reason is because these last-named leads are above the remainder of the leads, and should therefore be tackled after the wiring nearer the baseboard is completed.

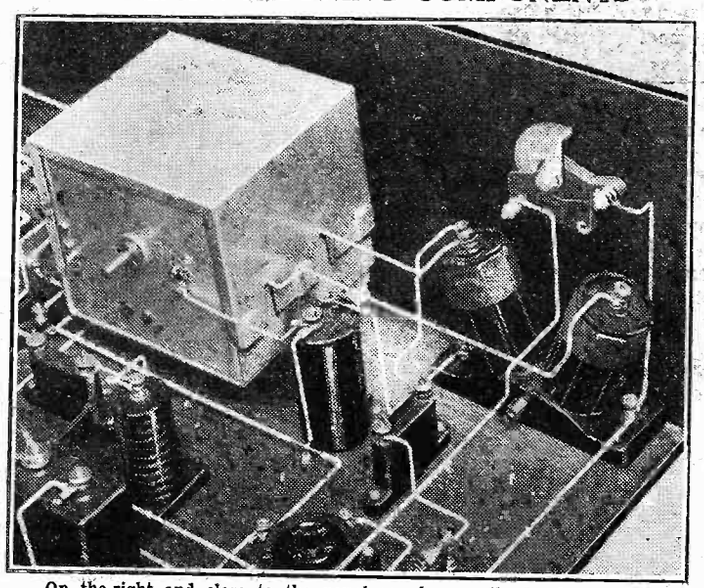
Improved Appearance.

Now for some hints concerning the arranging of the various wires and the method of connecting them. If you examine the photographs you will see that right-angle bends are employed throughout.

Naturally, when the leads are arranged in this way the set's appearance is vastly improved, but I can assure you that there is no need to go to all this trouble on the score of efficiency.

By all means space out the wiring, but don't spend hours in endeavouring to arrange each lead exactly at right angles to or parallel with its neighbour. It won't improve the working of receiver. Be as neat as you like, but don't let it worry you unduly. Don't go to the other extreme and bunch your wiring or run long straggly leads all over the place. This *will* produce inefficiency. Reasonably short direct wiring and adequate spacing is the road to efficiency. Practically every wire can be taken to a terminal, perhaps with the exception of two leads.

THE TWO TUNING COMPONENTS



On the right and close to the panel can be seen the band-pass coil, while to the left of it is its two-gang tuning condenser.

These are the wires which go to the fixed vanes of the twin condenser, and with some condensers terminals may not be provided. This should not deter you, however, since you can purchase special tags which do away with the necessity for soldering. Your dealer will be able to supply you with these.

A Few Hints.

The lead from the band-pass coupling condenser (·01 mfd.) to the moving vanes of the tuning control can be taken to any convenient nut or terminal on the casing of the condenser assembly, because this casing is electrically connected throughout and joined to the moving vanes.

The L.T. + lead from the L.T. + terminal on the strip can go direct to the positive filament terminal on the second valve holder, thus eliminating any soldering at this point.

There are four flexible leads terminating in wander plugs. These are G.B. +, G.B. — 1, G.B. — 2, and G.B. — 3. G.B. + is joined to the L.T. — terminal on the third valve holder, G.B. — 1 to the second pick-up terminal, G.B. — 2 to one side of the volume control (*not the slider*), and G.B. — 3 to "G" on the L.F. transformer.

The Bias Battery.

The grid-bias battery can be clipped on to the inside of the cabinet, and special grid battery clips are readily obtainable from most radio stores. Siemens make a grid-bias battery with a flap so that it can be screwed to any convenient part of the cabinet.

In connecting up the radiogram switch, remember that the common terminal, that is, the spindle or arm of the switch goes to the grid terminal on the first valve holder.

When you have completed the wiring, check over each lead against the wiring diagram and satisfy yourself that every wire is joined to its appropriate terminal.

Check All Connections.

Don't try the set with the batteries connected until you have proved to your own satisfaction that the wiring is identical with the diagram.

(Continued on next page.)

CHOOSE YOUR COMPONENT MAKES FROM THIS LIST

1 Panel, 18 in. × 7 in. (Permcol, Peto-Scott, Becol, Wearite, Goltone).
1 Cabinet to fit, with 10 in. baseboard (Pickett, Peto-Scott, Cameo, Gilbert, Osborn, Ready Radio).
1 Band-pass coil (Lewcos, Varley, R.I.).
1 ·0005-mfd. double gang variable condenser (Utility, Cyldon, J.B., Polar, Wavemaster, Lotus).
1 ·0005-·00075 reaction condenser (Telsen, Ready Radio, Polar, Cyldon, J.B., Lotus, Graham Farish).
1 Vernier dial for same (Igranic Indigraph, or disc drive supplied by makers of condenser).
1 Volume control, 500,000 ohms (A.E.D., Wearite, R.I., Varley, Magnum, Sovereign, Igranic, Graham-Farish).
1 On-off switch (Ready Radio, Telsen, Bulgin, Goltone, Lissen, Graham Farish, Igranic, Lotus, Peto-Scott, Wearite).
3 Valve holders (Lotus, W.B., Burton, Wearite, Telsen, Igranic, Graham Farish, Clix).
1 L.F. transformer (R.I. type 1-7, Telsen, Ferranti, or medium ratio Varley, Igranic, Graham Farish, Lotus, Lewcos).
1 H.F. choke (Ready Radio Telsen, Lewcos, Lissen, R.I., Varley, Sovereign, Watmel, Peto-Scott, Atlas, Graham Farish, Dubilier).
1 Output choke (Ferranti, Telsen, Graham Farish, Lotus, R.I., Igranic, Varley, Lissen, Bulgin).
1 ·0003-mfd. fixed condenser (T.C.C., Telsen, Lissen, Dubilier, Mullard, Ferranti, Ediswan, Igranic, Graham Farish, Goltone).
2 ·01-mfd. condensers (T.C.C., etc.).
2 2-mfd. condensers (T.C.C., Formo, Dubilier, Mullard, Igranic, Lissen, Telsen, Helsby Ferranti).
1 2-meg. grid leak and holder (Graham Farish, Lissen, Telsen, Dubilier, Mullard, Ferranti, Igranic).
1 100,000-ohm Spaghetti resistance (Varley, Ready Radio, Telsen, Lewcos, Igranic, Bulgin, Graham Farish).
1 25,000-ohm Spaghetti resistance (Ready Radio, or as above.)
1 Fuse holder (Bulgin, Ready Radio).
1 Two-way switch (Bulgin, Ready Radio, Wearite, Melbourne, Red Diamond, Ormond).
1 Terminal strip, 18 in. × 2 in.
11 Indicating terminals (Belling & Lee, Igranic, Eelex, Clix, Goltone).
Glazite, Lacoline, Quickwire, Jiffilinx.
G.B., H.T. and L.T. plugs, or spade terminals.

THE NEW "B.P." THREE

(Continued from previous page.)

Now, what about the H.T. and G.B. voltages? H.T. + 1 should be 60-80 volts, and H.T. + 2 120-150 volts. The G.B. voltages I suggest are as follows: G.B. — 1, 1½ volts; G.B. — 2, 3-4½ volts; G.B. — 3, 7-9 volts for an ordinary small power valve, and 16-21 volts for a super-power valve.

These values are approximate, and you should adhere to the valve-maker's instructions on this point.

If you are thinking about using a moving-coil loudspeaker, there are two alternatives open to you. You can either leave the output-filter choke and 2-mfd. condenser where they are and connect the primary terminals of the loudspeaker output transformer to the two L.S. terminals on the set, or insert an output transformer in the set in place of the filter-output choke and condenser.

It is impossible to have a hard and fast rule on this point, because a number of the loudspeakers at present on the market have the output transformer incorporated in the base, so that all you have to do is to join the two leads from the L.S. terminals direct to the terminals on the base of the speaker and the output transformer is automatically connected in circuit.

Output Transformers.

Sometimes the output transformer has to be purchased as a separate article, in which case there is no reason why it should not be wired directly into the set.

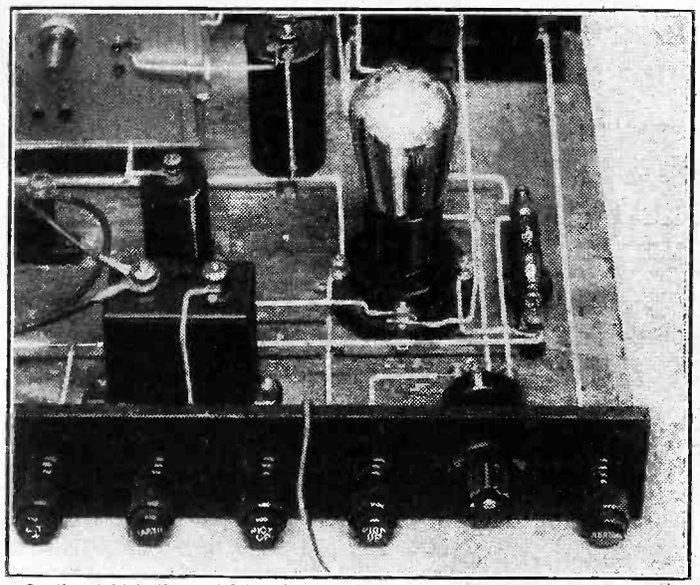
An alteration in the wiring to the last valve will be necessary, and this is as follows.

The existing output choke and 2-mfd. condenser must be removed. This will necessitate the removal of all the leads to the choke and condenser. Also remove the wire which is joined from one filament terminal of the valve holder V_3 to one of the L.S. terminals.

If you look at the wiring diagram you will see that the H.T.+2 lead is attached to one side of the output choke. It will, of course, no longer make connection at this point, since the choke has been removed, but it will simply go straight from the H.T.+2 terminal to the H.T. terminal on the transformer.

Now in the space available place the output transformer, joining one primary terminal to A on the valve holder V_3 and the other primary terminal to H.T.+2. Join the two secondary terminals to the two L.S. terminals on the strip.

AT THE INPUT END



On the right is the aerial terminal, and next to it the radio-gram switch and the two terminals for the leads to a pick-up, if used.

In connection with this question of the output transformer, it is essential to obtain an instrument having a suitable ratio for the moving coil, or you can purchase a transformer having tapped windings and match up your output circuit by experiment.

A Simple Scheme.

Now about the radio-gram side. I have already told you that the two pick-up leads are connected directly to the two pick-up terminals on the strip, but I said nothing about the use of a volume control across the pick-up itself. There is, of course, one already in the set, and in most cases this will do all that is required.

These days, however, pick-ups are very sensitive, and there is some danger of the valve V_1 becoming overloaded on loud record passages, in which case the volume control which is already in the set will be of little use in preventing distortion through overloading of this type.

ACCESSORIES

LOUDSPEAKERS.—Amplion, Blue Spot, B.T.-H., Graham Farish, Celestion, Mullard, Undy, W.B.

VALVES.—1 Detector type, 1 L.F. type, 1 power or super-power (Osram, Mazda, Mullard, Six-Sixty, Cossor, Eta, Fotos, Lissen, Tungsram, Dario). H.T. current consumption at 120 volts 15 milliamps, using P.2 type of output valve.

BATTERIES.—H.T. 120-volt max. super-capacity (Ever Ready, Magnet, Ediswan, Pertrix, Drydex, Lissen, Columbia).
G.B. 9-18 volts to suit output valve, as above.

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

MAINS UNIT.—(Heayberd, Regentone, Atlas, Lotus, Tannoy, R.I., Ekco). (State type of set and milliamp consumption, also details of mains when ordering.)

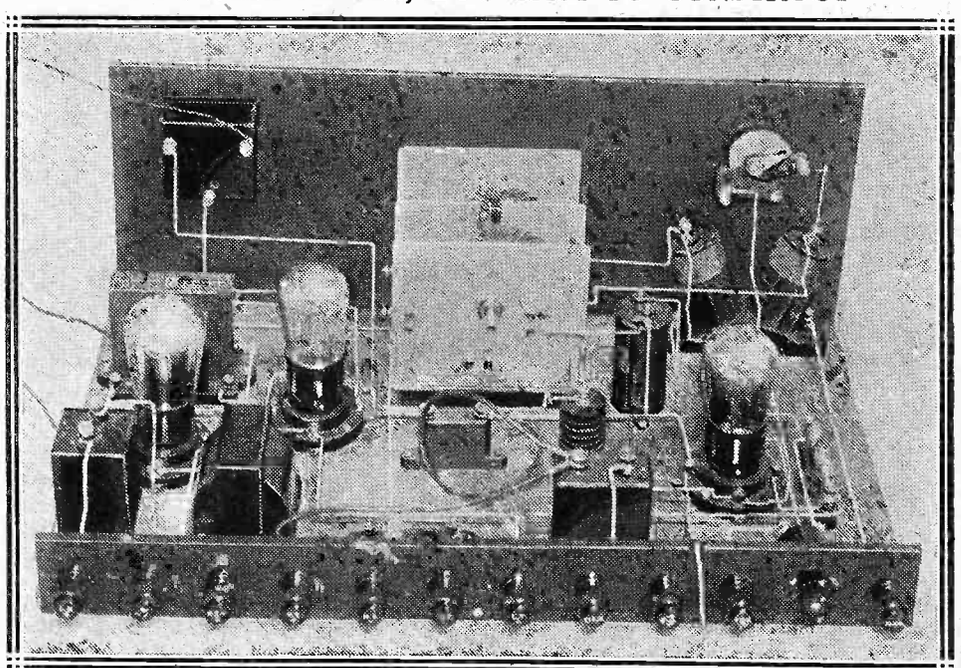
A very simple scheme, and one usually employed by radio-gram enthusiasts, is to mount a high-resistance potentiometer on the motor turntable cabinet, connecting the two leads from the pick-up to the two outside terminals on the potentiometer.

Slider Connection.

These two terminals are joined internally to the two ends of the potentiometer resistance element, and generally the slider is joined to the centre terminal. The slider is joined to the pick-up terminal on the terminal strip which goes to one side of the radio-gram switch. One of the remaining potentiometer terminals is connected to the terminal on the strip which goes to G.B.—1.

By using this method you get a splendid control of volume and absolutely no distortion through the first valve being overloaded. Moreover, it is unnecessary to go backwards and forwards to the set in order to adjust the volume control on the panel when the gramophone is in use.

A POWERFUL SET, BUT EASY TO CONSTRUCT



The whole of the wiring is quite straightforward, and component spacing troubles are not at all likely to bother you, there being ample room for everything.

SHOULD BRITAIN RESIGN?

By THE EDITOR.

For years a measure of mutual co-operation has been the only means of maintaining moderate peace in the ether, and preventing the grabbing of wave lengths by the different countries. Is this situation becoming impossible? Should we resign and let every country struggle for its own share of wave lengths?

BY the time this issue of POPULAR WIRELESS is on sale leading members of the Union Internationale de Radio-diffusion will have met in Rome, there to receive the report of the Technical Committee which met recently in Brussels.

As my readers will remember, the chief engineer of the B.B.C.—Mr. Noel Ashbridge—attended this meeting in Brussels armed with the authority of the B.B.C. to make certain offers which, if accepted, together with a specific scheme, would have resulted in a temporary revision of the Prague wave-length plan and, incidentally but most importantly, the removal of some of the chief fears in connection with ether chaos this winter.

An Insufficient Separation.

Anybody who knows anything about broadcasting to-day realises that the number of available broadcasting wave lengths is far too small, and that the present 9 kilocycle separation between these wave lengths is insufficient. Experience has shown, and many readers of POPULAR WIRELESS will bear this out, that even with the great strides made in selectivity devices to-day there is still considerable interference experienced by readers even with first-class receivers and, unless one uses some extra-ordinarily selective device—such as the Stenode Radiostat—a certain amount of interference is more or less inevitable.

Bad as it is at the moment, there is every chance that it will be considerably worse—in fact, desperately worse—as the winter nights draw in this year. A tremendous amount of research work and inventive genius has been expended on improving the selective side of receivers, but we think that at the present moment it is not so much a question of further improvement in selective devices as a more practical arrangement of broadcasting wave lengths.

Giving Up Wave Lengths.

Mr. Noel Ashbridge, the chief engineer of the B.B.C., fully realises this. Consequently, when he went to Brussels to meet the Technical Committee, he went with the proposal that there should be a conference of Administrations. That is to say, that various Continental Post Office authorities should get together in conjunction with the members of the Union, with the idea of revising the Prague Plan.

Roughly, the idea was that the B.B.C. would give up two wave lengths if other members of the Committee would, in conjunction with their various broadcasting concerns, also make concessions. France and Germany opposed this suggestion.

Certain countries, however, were quite ready to have Great Britain give up two wave lengths, because some of the smaller countries maintained that we have more than our fair share as it is; and if we had thrown these wave lengths into the common pool it looks as though certain smaller countries would have squabbled among themselves for the use of these wave lengths. Consequently, the position would have been just as bad!

A "Gentleman's Agreement."

The idea is that if every country gave up something in the way of wave lengths it would be possible to revise the Prague Plan and to increase the kilocycle separation between broadcasting wave lengths.

Well, the idea fell through, as I have said, but now the Technical Committee has met in Rome it is just possible that by the time this issue is on sale some sort of a gentleman's agreement will have been brought about, as was suggested in a recent issue of POPULAR WIRELESS by our correspondent O. H. M., who writes "The Mirror of the B.B.C."

Frankly, we have little hope that this will be so, but it is the only chance to do something quickly in order to prevent interference getting worse this winter. Otherwise it looks as though nothing will be done until the Madrid Conference in 1932.

Interference Becoming Worse.

We don't want an experience this winter similar to that we had last year, when Mühlacker was practically on top of the London Regional; but it is only fair to warn readers that conditions look like being similar and, in fact, worse. Even to-day, Mühlacker and London Regional are situated as near to each other as the Prague Plan allows, i.e. 9 kilocycles. When the Union first began, the separation was fixed at 10 kilocycles a second, but in 1929 a revision reduced it to 9 so that more stations could come "on the air."

Interference in the early days, of course, was more or less confined to a heterodyne note of a very high pitch, but now that receivers are capable of reproducing frequencies so high, and with the growth of high-power stations, a new type of interference (side-band jamming) has been growing more and more menacing. Consequently, the B.B.C. and other authorities who really keep an open mind on the question are convinced that, to say the least of it, we should all return to a separation of 10 kilocycles per second or, to be really safe, go to 11 kilocycles separation.

Receiving Technique.

The only way to space stations further apart in frequency is to effect a reduction in the wave-lengths used within the broadcasting band. It is no good listeners blaming set designers; they have done everything which modern receiver technique makes it possible for them to do in providing circuits of ultra-selectivity—within, of course, economic means.

As readers naturally realise, everyone cannot afford a Stenode Radiostat, nor can everyone afford a really first-class super-selective super-heterodyne receiver.

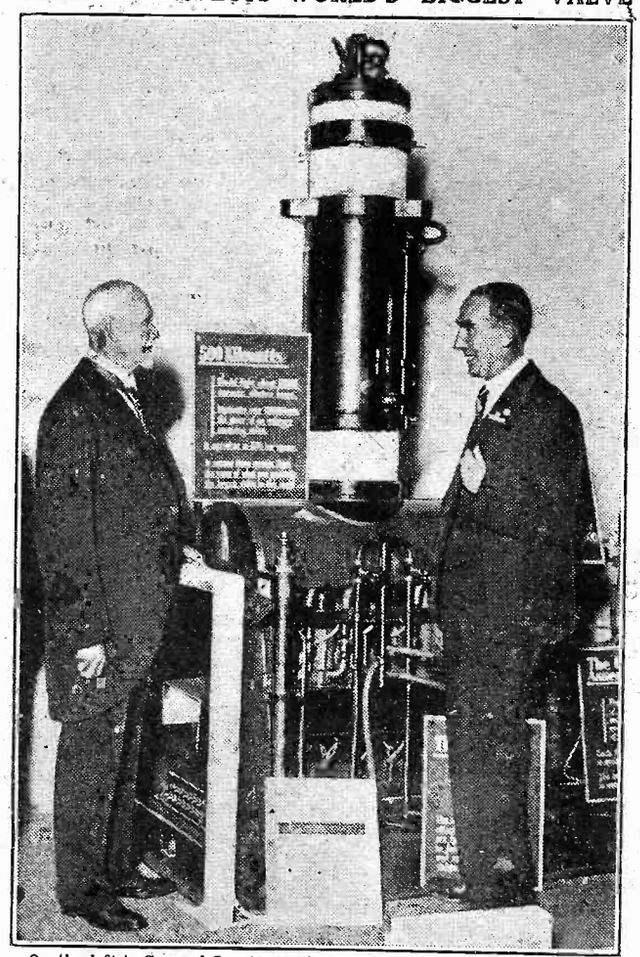
Considering Everyone.

The B.B.C. realises this. It realises that it has got to put across a broadcasting service which will be practical from the lowest common denominator, which in this case is represented by the listener with an ordinary straightforward receiver.

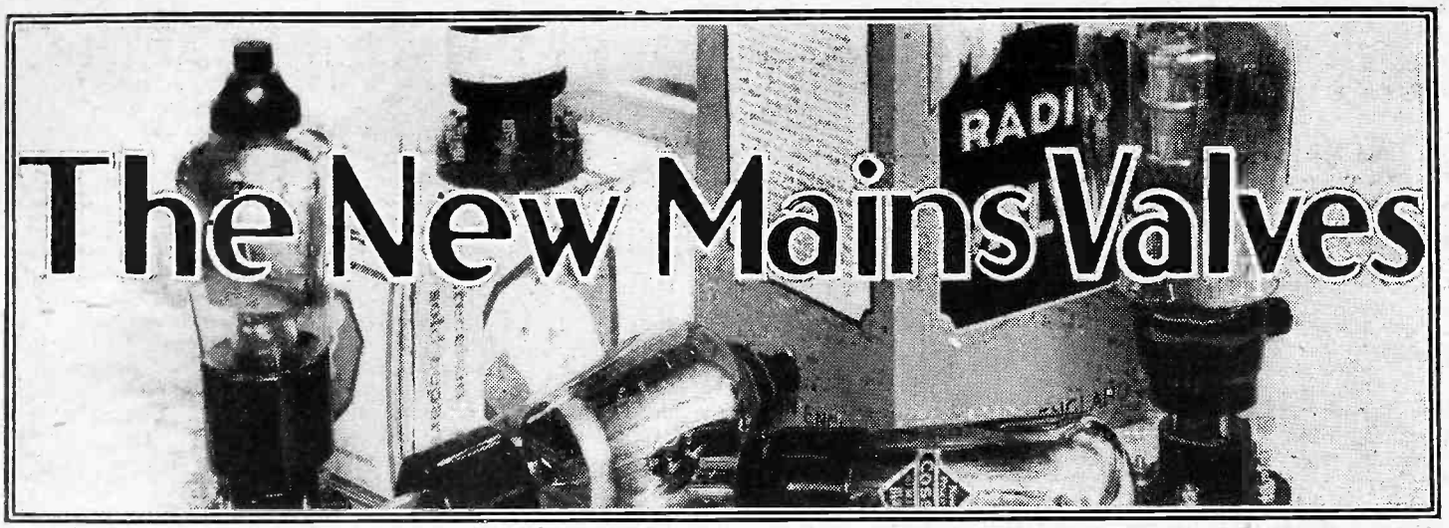
The Continental listener doesn't seem to worry so much about interference. More's the pity. And if France and Germany continue to prove recalcitrant, and to refuse a plan which, after all, is for the common good, then there is only one thing the B.B.C. can do, and that is to resign from the Union.

And if Great Britain resigns from the Union, the Union would fall to pieces automatically. There would then be a first-class scramble in the ether!

GENERAL INSPECTS WORLD'S BIGGEST VALVE



On the left is General Smuts—valiant foe, trusted friend, soldier and scientist—examining the new Metro-Vick. valve, which is far and away the most powerful in the world.



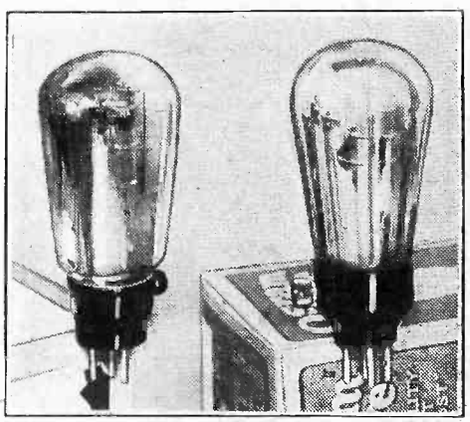
The New Mains Valves

Many notable advances have been made in the design of mains valves, and they are described in this article by K. D. Rogers.

THE mains valve that has created the most interest during the last few weeks is undoubtedly the variable-mu type of screened-grid valve. Marconi and Osram members of this type are known as VMS4, while the Mullard variable-mu valve is called the MM4V, and has a slope of 3·5.

The variable-mu valve needs some explaining, perhaps, but this can be done quite simply. The ordinary S.G. valve has not got a quite straight characteristic when operating under normal bias conditions.

FOR D.C. USERS



The D.P.T. and the D.H., two of the Osram indirectly-heated D.C. valves.

Also, if bias is increased the curvature becomes more curved, and so it is useless to try and get the valve to deal with more input by biasing it down to prevent overloading, as linear amplification will not be obtained.

Cross-Modulation Avoided.

This gives rise to cross modulation and other faults, and it is in an attempt to remedy this that the variable-mu valves have been designed, which will automatically reduce or increase their amplifying powers in accordance with the grid bias, and so the valves can be set to have either high or low mutual conductances.

Another valve that is worth note is the H.F. Pentode. This has been introduced by Cossors, and is a screened pentode capable of handling comparatively large H.F. inputs before rectification, or partial rectification due to overloading, commences. It also makes a useful power grid detector.

Mazdas have evolved a still more sensitive valve than their famous AC/S.G. in the AC/S2. This is a real star turn, for it has a slope of 5, an impedance of 600,000 ohms, and the wonderful amplification factor of 3,000.

Nothing like this in stage gain can be obtained, of course, but with efficient coils and good screening a very much higher amplification per stage should be available with this valve than with the older type.

The Mazda PP5/400 is a more or less old friend, having been introduced some nine months ago, but it has been improved since then and has met with wide popularity among large-output mains users.

Undistorted Output of 5 watts.

As our readers may remember, it is a 400-volt anode, steep slope, directly-heated A.C. valve capable of providing an undistorted output of 5 watts.

Indirectly-heated mains rectifiers are also included in the Mazda programme, and the UU60/250 and the UU2 will be of particular interest owing to this fact.

The ·5-amp. D.C. mains indirectly-heated Mazda valves are giving place to ·1-amp. valves of the same types. These are not yet generally released, but they will make for very much more economical running. At ·1 amp. and with 200-volt mains only 20 watts will be consumed, a distinct saving on the 100 watts required by the earlier ·5 amp. type.

Marconi and Osram have also come along with D.C. indirectly-heated valves, but these differ from the others in that they require ·25 amp. (50 watts at 200 volts). It seems rather unnecessary that the D.C. valves have not been standardised in their heater current in the same way as have the A.C. types. Perhaps that will come.

But the fact remains that the D.C. mains user can now compete on more or less even terms with the A.C. man. It is a big step forward and should have a rapid effect upon D.C. receivers, both commercial and home-constructed.

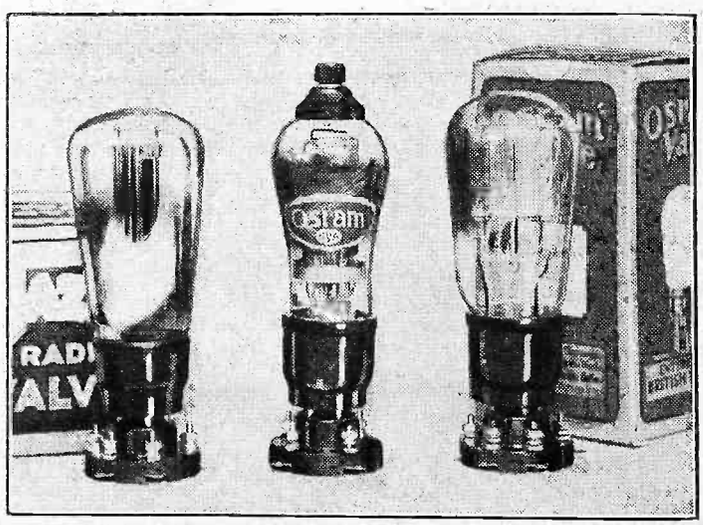
Some of the New Pentodes.

Regarding the subject of output valves, I must mention the new Mullard PM24 pentodes — the PM24C and PM24D. These are both "larger" than the popular 24A and 24B, and have outputs of 3·5 and 8 watts respectively.

An indirectly-heated pentode (the foregoing are directly-heated, of course) has also been placed on the market by the same firm. This is the Pen/4V which has a slope of 3.

Six-Sixty have several new or improved mains valves, including pentodes and an excellent mains detector, while Tungsram and Eta have devoted a lot of careful experiment to the subject of indirectly- and directly-heated valves. Of the latter type the P460 is worth noting.

SOME NEW A.C. TYPES



From left to right we have the Mazda AC HL, the Osram MS4B, and the Cossor M41L.F.—three notable A.C. valves.

THE MIRROR OF THE B.B.C. By O.H.M.

GOOD LUCK AT ROME!

B.B.C. RECEPTION STANDARDS—PACKING PARCELS AT BROADCASTING HOUSE—WHAT ABOUT EMPIRE BROADCASTING? Etc.

MR. ASHBRIDGE and his colleagues will carry with them the heartiest good wishes of all British listeners for the success of their mission to Rome next week. True, the dice are loaded against them. The "alliance" between the Germans and the French may satisfy their immediate purpose: if it persists at Rome to defeat the legitimate requirements of Great Britain, they will both live to regret their success.

We are long suffering, but when our patience is exhausted we know how to act, quite as thoroughly and as extremely as in normal conditions we practise the virtues of patience. It will be a healthy lesson to the whole Continent to realise that in a struggle for the "air" they will have to take what is left over.

B.B.C. Reception Standards.

After eight years of studied reserve in the practice of reception the B.B.C. broke out at the National Radio Exhibition, making themselves responsible for the loudspeaker work in Olympia. And, strange to relate, it just didn't come off. A lot of things went wrong, and there is an enquiry in progress now at B.B.C. headquarters to find out exactly why.

Packing Parcels at Broadcasting House.

I heard a curious tale the other day of how the B.B.C. deals with its publication mail order department, now removed to Broadcasting House. What I was told was that the publications for despatch arrive in bulk, are solemnly conveyed two floors up, then made into packages and addressed, and then as solemnly carried back downstairs.

Also, the packers work in one of the inside tower rooms in permanent artificial light, thus bearing out what I said some time ago, much to the chagrin of Savoy Hill, when a denial was issued so angrily as to discount its sincerity.

I think the B.B.C. will have to look to this anomaly of Broadcasting House. It was never intended that any offices should be in the inside tower, or in any rooms having no access to open air.

What About Empire Broadcasting?

The national economy urge seems to have affected the proposal to turn G 5 S W into a permanent properly organised Empire transmitter putting out a twenty-four hour programme for all parts of the Overseas Dominions and Colonies, and incidentally, of course, for the world at large.

I know that before the financial crisis the Chancellor of the Exchequer had been convinced that this Empire service should be developed out of the Treasury balance of licence revenue. What the situation is now is obscure, but I was told in Whitehall that there is no chance of the measure going through.

Here, if you like, is false economy with a vengeance. When all other world powers are pouring out money to get their short-wave programmes to every corner of the world, Great Britain sits tight. To go on with G 5 S W is a national and Imperial interest of the first magnitude, rendered by the crisis itself all the more important both politically and industrially.

Radio in Birmingham.

Birmingham and Broadcasting are not very happy together at the moment, and the time is fast approaching when something will have to be done about it.

The crux of the trouble is that somebody with a fair amount of authority at Savoy Hill feels that there is no real necessity for Birmingham to have a broadcasting station at all, or at any rate no more of a station than has been left to some of the eight original main stations, as they were called before the coming of the Regional scheme, such as Bournemouth, Newcastle and Aberdeen.

As originating centres of programme material, these hardly exist at the present time, and the same will soon be said about Glasgow, one of the largest cities of the Empire, now that the B.B.C. headquarters in Scotland are transferred to Edinburgh, which formerly could claim to be nothing better than a relay station.

The location of transmitters is outside the question entirely, because it doesn't matter whether the studio is five yards or fifty miles from the aerial which radiates the programmes. What does matter is whether the music and plays and vaudeville entertainments and talks are performed or given in London, Birmingham, Cardiff, Glasgow, or some other place.

As I say, there is a strong tendency at Savoy Hill practically to wash out Birmingham as an originating centre and to put the Midland Regional transmitter as permanently on to the London studios as its neighbour 5 X X at Daventry is unalterably hooked up with other transmitters that send out what is known as the National programme.

It is with considerable surprise, therefore, that I learn that Eugene O'Neil's play "The Emperor Jones," in which, as I announced some time ago, Paul Robeson was to have taken part on October 23rd, will not now be broadcast.

(*Continued on page* 392.)

THEY'VE MADE THOUSANDS OF SETS

Photo by the courtesy of Ferranti, Ltd

Your best constructional feats would be considered "less than the dust" by these young ladies, who have made thousands of sets this year! But it was all done in the day's work, for they are employed from morn till night on set-assembly.

FOR THE LISTENER

Radio Drama is the theme of our popular contributor this week—and he hits out at it with vigour.

I LISTENED-IN not long ago to "The Lost Cause," a pageant play for which Mr. Compton Mackenzie was responsible. I am perfectly sure that there is no future for this kind of play in Radio Drama.

The play lasted for 100 minutes, more or less; there were thirty-two scenes, connected together by some sort of reading. You had a scene of about a couple of minutes, then a connecting link of reading, then another couple of minutes of play-acting.

Personally, I found it almost intolerable. The dialogue was poor, the characterisation was poor.

Bonnie Prince Charlie and Flora MacDonald are characters known and loved the world over; and Mr. Mackenzie couldn't, therefore, very well go wrong with them. But the other characters, with their two-minute appearances, were so shadowy and perfunctory that I wasn't the slightest bit interested in them, and didn't care tuppence what they did or what happened to them.

I question whether an accomplished dramatist could have made this "pageant-play" live on the air. These snippets of action, inter-linked with really rather dull reading, are too irritating.

Laying Down a Law.

We have had a good deal of experimenting now for several years in the matter of Radio Plays. It ought to be possible by this time to get firmly hold of at least one end of the stick. I will lay down the law. A good Radio Play must first of all be a good play in itself.

Many Radio Plays have failed; one expects this in a period of experimenting. Some have failed because they did not lend

(*Continued on page* 391.)

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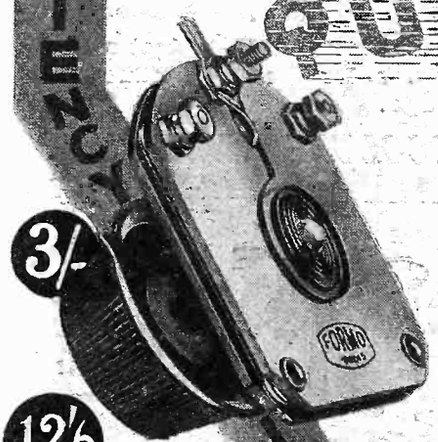

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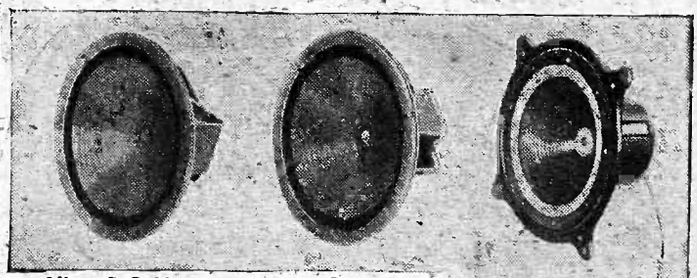

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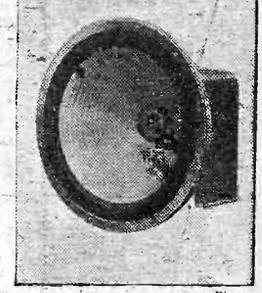

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W 179

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.

THANK goodness the improvement that I foreshadowed last week has duly occurred, though it is not perhaps quite so marked as might have been expected. Still, there is an improvement and that is the great thing.

With the decrease in atmospheric interference, in which we are rejoicing just now, reception of the long-wave stations once more becomes enjoyable, though it is out of the question when there is a constant accompaniment of crackles and fizzes and tearing noises, for the longer the wave-length of the station that you are after the worse is the interference experienced.

There is no end to the queer things that happen in long-distance reception. Why, for instance, should Huizen have continued as a strong and reliable transmission all through the period when other stations were coming in rather badly, and then have "gone off" just when they were showing signs of improvement all round? That, though, is just what happened.

Huizen Confusion

Here, for instance, is Huizen's record on seven recent consecutive days in my log: V.G., V.G., V.G., G., F., F., F. And turning back its pages for many weeks previously I find that he has been V.G. all the time.

On Long Waves

Of the other long-wave stations Zeesen is coming in splendidly, as is Radio-Paris at most times, though this station seems to be working rather shorter hours than he was. The Eiffel Tower has been rather badly heterodyned once or twice lately by Moscow.

These Russian stations really are a nuisance, for they seem deliberately to select channels only 4 or 5 kilocycles away from those of other stations on both wave-bands, and the heterodyne interference that they cause is becoming very serious. Motala is pretty good and Warsaw shows splendid strength. Kalundborg is quite back to his old form, and I can recommend Oslo as a reliable station.

The medium band, though it contains some fine transmissions, is still a little patchy. On many nights Budapest requires a good deal of amplification to bring him up to full loudspeaker volume, but he is frequently so little interfered with that you can apply this without spoiling the quality.

Vienna is still on the weak side, though I think that we shall hear him well very soon. Brussels No. 1 is by no means up to form; good nights and weak nights seem to alternate. Prague has suffered from some spark interference, but when this is absent good reception is obtainable.

Milan is generally a useful station. Langenberg remains a good standby, and both Rome and Stockholm are coming in well. Beromunster and Sottens are stations that you should never miss when you are trying round.

Berlin and Belgrade

Berlin Witzleben is surprisingly good on some nights, but on others you will have your work cut out to find him at all. Belgrade is always worth trying for, though one cannot guarantee that great volume will be obtainable.

SHORT-WAVE NOTES

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

By W. L. S.

I HAVE, of late, had rather more spare time than is my wont, and I have filled in a good deal of it by visiting friends, be they "hams" or merely receiving enthusiasts, to see what I could learn.

The net result is that the astonishing evidence of bright ideas on all sides makes me feel quite ashamed of myself. First I see a beautiful job in the way of a completely screened and portable two-valve short-waver. Then along comes about the most sensitive set I have ever heard in my life, although the wildest stretch of imagination would not describe *that* as portable.

W 2 X A D Again

Other brain waves include the use of "doublet" aerials for cutting down interference; peaked output stages for C.W. reception; "noise filters" which really work in the output circuit; and a combined monitor and portable receiver.

Most of the really brainy parts of the above-mentioned were, it is true, in matters of detail, but they certainly were there.

I am not going to detail them here, but I solemnly promise that, as I do mention them one by one, I will acknowledge them to be borrowed, and not claim the credit myself!

Regarding the week's note on W 2 X A D, the less said the better. I have not been able to listen until 10.30 p.m. most days, and by then he has usually disappeared completely. No doubt he is still good as he starts up—perhaps someone will be good enough to inform me—but he certainly does not last long. By next month he will not be worth listening to at any time, unless he is on the air by 6 p.m. Greenwich Time.

An unusual feature of conditions during the past fortnight has been the strength of amateur signals from South Africa and Asia. Two South Africans in particular, Z S 6 Y and Z S 4 M, have been uniformly good during the afternoon and early evening. The "Japs" have had two or three good evenings; two Indians have been logged more than once, and such places as Malay appear to be coming over quite well, providing that somebody at the other end is really on the air!

El Prado Calling

An interesting newcomer to the broadcasting stations is El Prado, Ecuador. He works on 39·5 metres, and I am not certain of his times except that he is on every Sunday morning from 4 a.m. to 6 a.m. G.M.T. The announcer is the operator of the famous Ecuador station H C 1 F G.

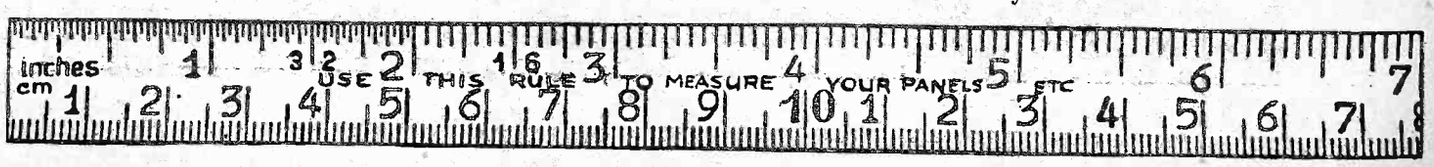
In a mild moan from Chesterfield, "D. P." expresses disagreement with my loggings on W 2 X A D. He says, "Conditions always seem to be the reverse to yours. Somehow I can hardly believe it is true when you keep saying W 2 X A D is a reliable signal." Well, "D. P.," remember that these notes have to be written some little time before you read them. Allow for the "time lag." But I know very well how conditions vary over different parts of the country.

Trades Union Results

"D. P." finds the Trades Union station one of the best, whereas here he is nothing outstanding. Curiously enough, in the same batch of letters is one from fairly near my own quarter of the globe expressing perfect agreement with my records.

Talking of records, I have been thinking of a possible use for another kind. Home recording is great fun, especially when one records funny incidents heard "on the air" and puts them out again at a later date! Amateur transmitters will have the shock of their lives when they hear some of the unimpeachable records I have made of their doings.

And I wonder whether "Croydon" would like to know that I have some bad language of his "bottled up" somewhere? When we get some real broadcasting from the States again (apart from the small hours, which have a dire effect on me) I am going to get busy.



101 HINTS AND TIPS

A good method of obtaining selectivity with an old-fashioned aerial coil is to wind 20 or so turns of No. 24 D.C.C. around it, connecting the aerial and earth wire to these, the other connections to the main coil being as formerly.

* * *

When experimenting with circuits in which centre-tapped coils are used, do not forget that the centre terminals of such coils may easily touch one another, with disastrous results if one of them is at high potential.

* * *

When condensers are placed in series with one another, remember that the total capacity of any number will always be less than that of the smallest single capacity.

* * *

When laying aside a spare variable condenser don't forget that to wrap it in clean paper will save endless trouble in removing dust from the vanes.

* * *

Improving Old Condensers.

Variable condensers of old construction which appear to have deteriorated with use, can often be greatly improved by providing a pigtail contact between the moving vanes and their connecting terminal, in place of a rubbing contact.

* * *

An unnecessarily long earth wire not only gives rise to flat tuning, but is often the cause of considerable hand-capacity effect.

* * *

If a fairly large nail is driven up through an old baseboard a reel of wire may be placed over this when coil-winding is carried out. And if three or four other small nails or staples are "staggered" over the baseboard and the wire threaded between these, the desired tension when winding may be obtained.

* * *

When using a crystal set it is essential to get as much energy as possible in the aerial, and for this purpose an outdoor aerial is generally very much to be preferred to an indoor one.

* * *

If you use an earth connection to a water-pipe make sure that the pipe is not painted or dirty, as such connections depend for their efficiency upon being affixed to a thoroughly clean surface.

* * *

When unwinding earth wire from a coil, remember that kinks should be avoided, for even though carefully straightened, they afterwards represent weak places in the wire.

* * *

A Good Earth.

If you are putting in a new earth wire, do not forget that an old gas pipe or similar metal tube leading from the buried earth to the surface is not only helpful for the wire to pass through, but acts as a channel through which water may be poured in dry weather.

* * *

A piece of corrugated iron such is as used for roofing sheds, etc., makes a good earth plate.

* * *

When baring flex, take care to nick the rubber only, as if the wire is cut, it will eventually break.

* * *

Twelve months is about the longest life one can expect from flex leads. If yours have been in use for this length of time they require an overhaul if you are to be free from "crackling," etc.

* * *

Correct grid bias is particularly important for the last valve in a set, and too little grid bias will inevitably shorten the valve's life and introduce distortion.

* * *

Although no current is actually taken from the grid-bias battery, its paste electrolyte tends to dry up after six months or so, so that the battery should be replaced when distortion appears or its voltage drops.

* * *

With valves of the indirectly-heated variety, it is usual to obtain grid bias by means of a resistance connected in the cathode lead. Bias obtained by this method is often termed "automatic bias."

* * *

One of the advantages of an anti-motor-boating device is that it can be fitted externally, if the set is of a type in which it is difficult to interfere with the internal wiring.

* * *

A possible but often unsuspected source of distortion is the allowing of grid-bias flexible leads to run close to other leads in the set.

* * *

Be extremely careful never to connect up a grid-bias battery the wrong way round. Even the momentary application of positive bias may do considerable harm to a valve.

Here are some selected reminders to aid you in getting the best possible results from your radio. Terse, tested and practical, they will be a boon particularly to new readers.

Programmes can sometimes be prevented from clashing by connecting a ·0001-mfd., or similar small fixed condenser, between the aerial terminal and the aerial lead in.

* * *

If you are using a permanent magnet moving-coil loudspeaker, be careful not to put a delicate watch near it, for you may magnetise the movement and spoil its accuracy.

* * *

When one of the loudspeaker leads is connected to earth or filament and the other to a condenser forming part of a choke output unit, this condenser will have practically the full H.T. voltage across it, and therefore it should be of good quality, able to withstand such a strain.

* * *

Do not run long leads from your set to distant loudspeakers unless you employ an output filter circuit to prevent H.T. wastage.

* * *

If two condensers are used in an ordinary choke-output circuit, remember that they are in series with one another, and that this will greatly reduce the total capacity of the arrangement.

* * *

Interference which would not otherwise be noticeable is often caused through sharing an earth wire with a neighbour.

A deciding factor in baseboard design is the circuit arrangement and on no account should positions be varied just to make the baseboard look symmetrical.

* * *

If you have not done much set building remember when making a set that you should occasionally insert the valves and the coils into their respective places, so as to make sure that none of the wires will foul them.

* * *

There is little or no advantage in using two or more wires for your aerial, unless it is a particularly short one.

* * *

Overhauling the Aerial.

When overhauling the aerial remember that the lead-in tube should also be inspected to make sure it is in first-class working order. (Only perfectly clean contacts should be tolerated.)

* * *

If you use an outdoor aerial it should be fitted with an earthing switch so that the aerial can be connected direct to earth outside the house when not in use.

* * *

On no account should an aerial with a condenser wired in series with it be left for long periods "unearthed" when the set is out of use, as even in winter an insulated wire exposed out of doors is liable to gather an electric charge (from snowflakes, rain, etc.).

* * *

If you have a compression condenser on hand and not in use, remember that inserted in series with the aerial lead it is often a great aid in improving selectivity.

* * *

One disadvantage of using an aerial behind a picture-rail is that it is too close to the wall, the ideal arrangement being an aerial well spaced away by stand-off insulators.

* * *

An excellent means of reducing the damping of an aerial for short-wave work is to connect an ordinary neutralising condenser in series with it.

* * *

By arranging that the down lead from the aerial either dips below the lead-in point, a good deal of leakage due to a wet lead-in, etc., can be overcome.

* * *

Covering an Arrester.

A little time and trouble taken in making a box or other covering for an earth arrester and switch which are placed out of doors, is well repaid by the better results due to improved contact at this point.

* * *

Enthusiastic gardeners should remember that wire stays from the aerial mast should not be run through the foliage of valuable fruit trees, as charges due to nearby lighting might easily damage the trees.

* * *

Never under any circumstances attempt to erect an aerial under, over or near to a power line carrying high voltage current.

* * *

(Continued on next page)

101 HINTS AND TIPS

(Continued from previous page.)

Distortion due to H.F. leakage into L.F. circuits can often be prevented by inserting a H.F. choke between the grid of the amplifying valve and the lead which is connected to it.

* * *

The proper way to test the voltage of a high-tension battery is to join a high-resistance voltmeter across the battery when it has been in action for about an hour.

* * *

Any leakage, however small, across the insulation of an H.T. accumulator constitutes a continuous discharge, so that great attention should be paid to maintaining the insulation as nearly perfect as possible.

* * *

Concerning H.T. and L.T. Batteries.

Never join an old H.T. battery up in series with a new one, as the latter is definitely unsuitable for use in such circumstances.

* * *

If you find that your set distorts only after the receiver has been in use for an hour or two, you can be pretty sure that either the high- or low-tension supply is inadequate for the needs of the receiver.

* * *

The dry cells used for flashlamps are quite satisfactory as H.T. batteries for a two-valve set, but when a large power valve is employed these small cells are incapable of supplying the amount of current required.

* * *

It is unwise to hold a naked light, such as a match or cigarette, near to an accumulator, particularly when this is being charged.

* * *

If you keep your L.T. battery inside the set's cabinet, see that flex leads do not touch it, as its acid will play havoc with the insulation.

* * *

Anti-sulphuric paint, which is obtainable quite cheaply, is an excellent preservative of a wooden accumulator carrying case, and is very useful for treating wooden floors, etc., where the accumulator stands.

* * *

The action of a vent plug in an accumulator is four-fold, it prevents the loss of electrolyte from spraying, it allows the gases formed in the cell to find a way out, it prevents the electrolyte from spilling, and it also keeps dirt out of the cell.

* * *

If one of the plugs from an accumulator is lost do not block up the hole with a plain cork or wooden stopper, but drill a small hole in this, or otherwise the gases formed inside the cell will have no opportunity to escape.

* * *

Unsatisfactory service from an accumulator service station often results in the return of accumulators with dirty terminals. And although it should not be necessary, the listener can, with a penknife, scrape the contacts and eradicate this trouble himself.

* * *

The greatest enemy of the accumulator is sulphation, and the best way of preventing this is to have the battery charged regularly, and never allow it to stand discharged longer than necessary.

* * *

If you are often fiddling with a terminal in a rather inaccessible place, do not forget that it may be an advantage to cut a slot across the top of it with a hack-saw, afterwards using a screwdriver to tighten the terminal.

* * *

An ordinary on-off switch fitted across the terminals of one loudspeaker wired in series with another will enable it to be switched out of circuit without affecting the other speaker much.

Faulty switches in the house lighting circuit will give rise to clicks and noises in the loud-speaker, owing to sparking occurring across the defective points.

* * *

As it is difficult to make perfectly clean cuts through brass rod without spoiling the thread, a useful method is to affix one or two nuts to the rod before cutting it, so that when these are unscrewed the thread displacement is restored.

* * *

A carpenter's brace can often be adapted to take a small wireless drill, if necessary, by winding a fairly stout wire around the drill in the form of a spiral to enlarge its diameter.

* * *

Do not throw away old hack-saw blades, as one of these, ground down and put on a handle of suitable size, will make a good keyhole saw for cutting small holes in ebonite.

* * *

Hand-capacity can often be reduced by changing over the leads to the variable condenser concerned.

* * *

When using a screened-grid valve for the first time, remember that the pin on its base opposite the grid one does not carry the output from the valve. The "P" or "A" socket on the valve holder will be connected to the screening electrode.

* * *

When calibrating a two-dial set, it is better to pay particular attention to readings of the high-frequency or anode dial, rather than to the aerial dial, as variations are more likely to affect the latter than the former.

* * *

Reducing Tuning Ranges.

When a fixed condenser is connected in series with a variable condenser used for tuning, to reduce the tuning range, the law of the tuning scale will be altered and a "straight-line" condenser will be thrown out of the straight-line condition by such a connection.

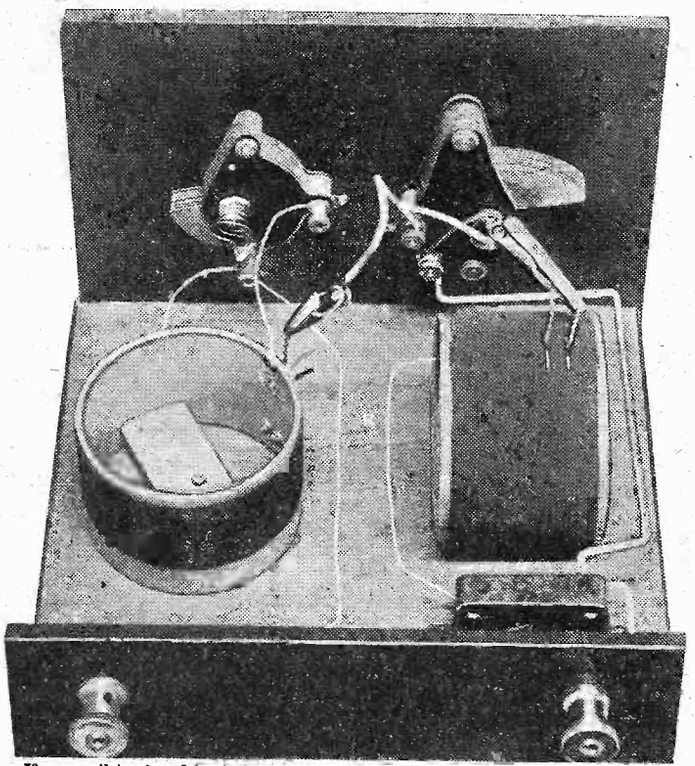
* * *

"Overloading" is not peculiar to the last stage; it often takes place on the first L.F. valve, or even on the detector.

* * *

In order to get the best possible results from a screened-grid valve, it is important to take every care that the correct voltages are used on both its plate and screen.

SPACING THE COILS



If one coil is placed horizontally and the other vertically they do not tend to "couple" and give unwanted interaction, as they would if mounted "in line."

Although the ordinary H.F. valve only takes up to about 1 milliamp. H.T. current, this is not true of the screened-grid H.F. valve, which may take up to six times as much.

* * *

In an average modern set the H.T. consumption in rough and ready figures is: H.F. valve (S.G.), 4 milliamps; detector, 1 milliamp; L.F. valve, 2 milliamps; and power valve, 6 milliamps. (Super-power valve, at least 12 milliamps, probably 15 or more.)

* * *

When a certain valve is recommended for use with a particular L.F. transformer, the valve referred to is the one preceding the transformer, and not the one to which its secondary is joined.

* * *

Decoupling for Pentodes.

Failing separate tappings for all the valves in a powerful set employing a pentode, the tendency to motor-boating may be overcome by the use of a decoupling device in the circuit of one of the valves run from the common tap.

* * *

Generally speaking, an increase in the high-tension on the detector valve will mean increased strength of reaction.

* * *

Never attempt to make any adjustments inside a set with a metal screwdriver unless the H.T. negative plug is removed from the H.T. battery.

* * *

Inside a pentode valve the next-the-plate "grid" is joined permanently to the filament of the valve.

* * *

Gradual weakness of reception in a valve set is very often caused by the emission of a valve failing.

* * *

When adjusting the high-tension positive taps to various valves, do not forget that the voltage on the plate will be less than the voltage at the plug, on account of the voltage drop through the resistance in the circuit between these two.

* * *

Generally speaking, a high-magnification valve makes a good detector for short-wave work.

* * *

Although, with modern valves, rheostats are not generally necessary, it is as well to remember that a filament adjustment of the detector valve on a short-wave set is often an invaluable aid to smooth reaction.

* * *

Among the commonest causes of crackling noises are bad connections at the accumulator terminals and imperfect joints in the wiring.

* * *

When wiring up a multi-valve set, it is a good plan to check valve holders, etc., for continuity before mounting them in place, as the little time lost is more than justified when it is remembered how long such a small fault may take to remedy in a completely-built set.

* * *

It is illegal to run a wire from your loud speaker to your neighbour so that he can listen free to your set. (In such cases a separate licence should be procured by each householder.)

* * *

An excellent test for sensitivity is to place the telephones over the ears in the ordinary way, put one of the tags between the lips and rub the other tag with a key, nail, or other piece of metal. If a rubbing noise is heard corresponding with the movement of the key, you can be sure the 'phones are sensitive.

* * *

If, for any reason, it is necessary to remove the diaphragm from the telephone earpiece, it should be slid off sideways, and not pulled up from the magnets.

* * *

Do not point your loudspeaker towards your set or place it too close to the receiver, as it is very easy to build up a howl in this way.

(*Continued on page* 388.)

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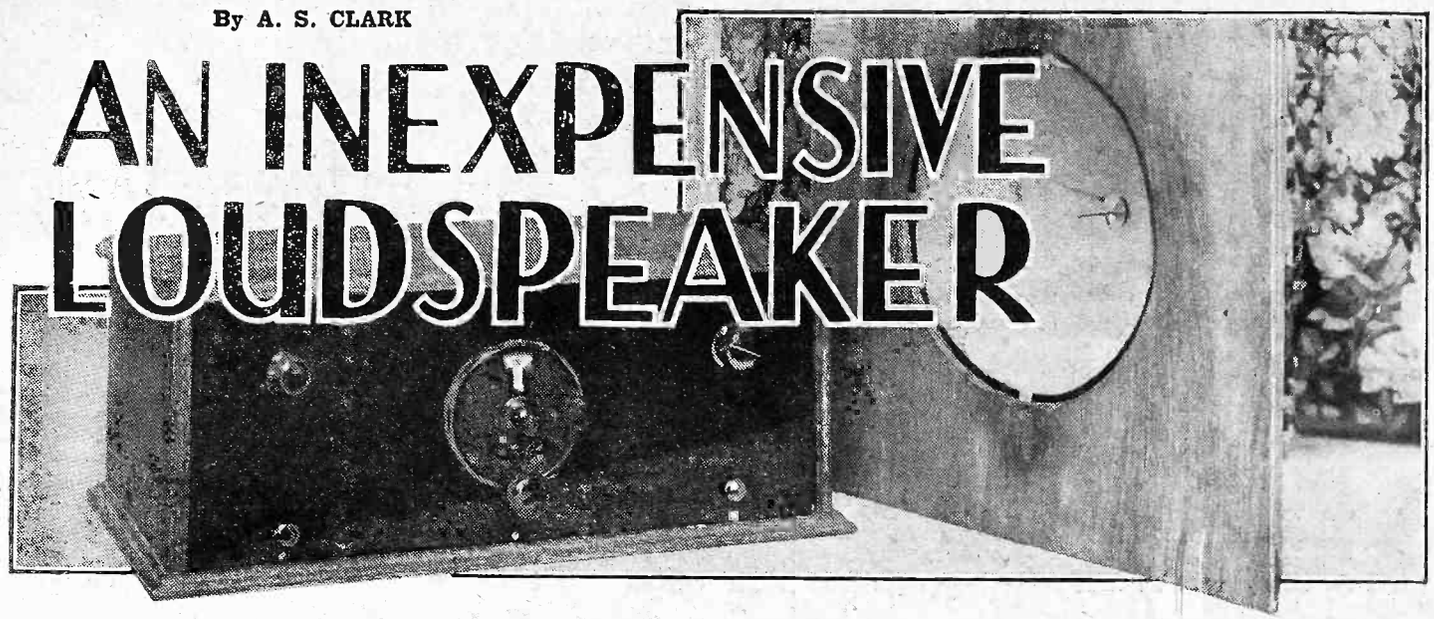
By A. S. CLARK

AN INEXPENSIVE LOUDSPEAKER



LIKE most other radio apparatus, the loudspeaker has experienced a drop in its cost of late. In spite of this, it is still an item that carries considerable weight in the question of whether one shall go in for a loudspeaker set or not.

But if you decide to make a speaker yourself—just as you, no doubt, would build your own set—there is no reason why it should not become one of the minor items of the total expenditure. For a surprisingly small sum you can make up a cone speaker of fine tonal quality, which is also very sensitive.

Four pieces of wood, one paper cone, and a speaker unit—that's all. Just assemble these in the simple manner clearly explained in this article, and you have a "pukka" cone loudspeaker that will have cost remarkably little.

The speaker illustrated on this and the next page uses a Telsen unit which costs only 5s.6d., while the necessary pieces of wood and the cone paper need not come to more than a couple of shillings. At such a price it is an attractive proposition even if you already have a loudspeaker, for I expect you can think of many ways in which you could make use of an extra one.

Easy to Make.

Quite apart from its inexpensiveness, the speaker makes high claim to popularity on its sheer simplicity. As a matter of fact, I very much doubt whether the cleverest designer could devise a simpler way of assembling the necessary parts and yet retain the same inherent efficiency!

There are four pieces of wood to be fitted together to make the chassis, four drawing-pins to be pushed in place to secure the cone, and two screws to mount the unit in place. You will agree that anyone can tackle that without misgivings as to the success of the venture.

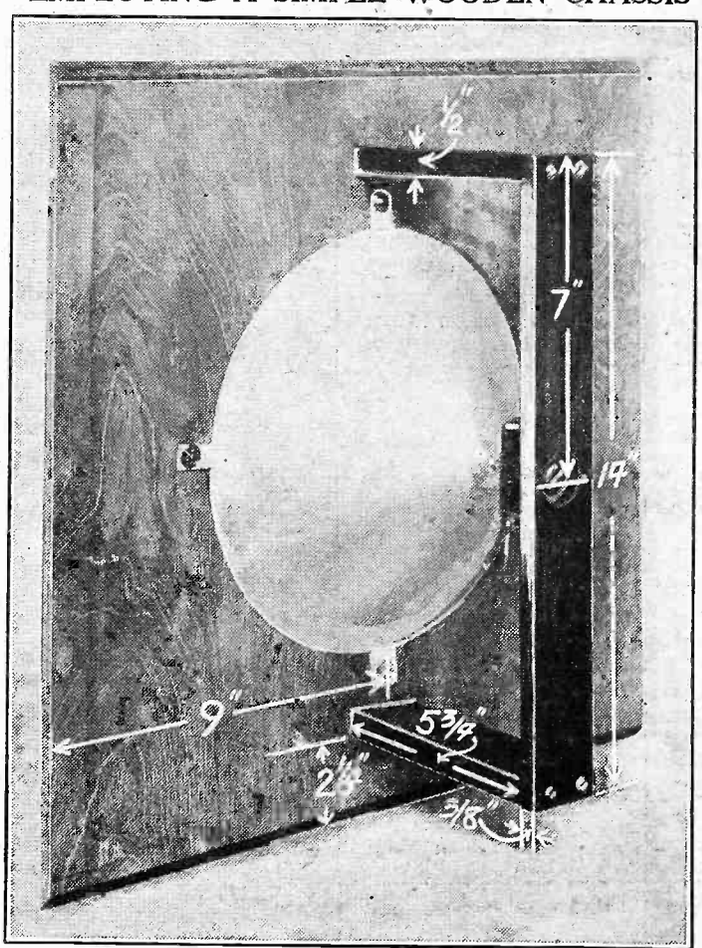
Cutting The Cone.

So far as the cone itself is concerned, a glance at the one and only diagram on the next page will show that it is as plain as can be. There is only one straight edge to glue together and there are no twiddley bits to fiddle with, four projecting paper lugs providing all the necessary mounting material.

The unit itself is screwed to a simple bridge piece attached to the baffle-board and which also serves for a "leg" for the speaker when it is used without a cabinet, as it will be in most cases. A hole in the centre of the back piece of the bridge gives access to the adjusting screw of the unit.

Now for a few practical details. First of all as regards the baffle, which is 18 in. by 18 in. Any plywood a ¼ in. thick or thicker will do. Plywood is not, of course, absolutely necessary but is certainly desirable because plain wood might become badly warped.

EMPLOYING A SIMPLE WOODEN CHASSIS



The important dimensions of the three pieces of wood which support the speaker unit are marked on this view of the back of the completed loudspeaker. The width of the three pieces is immaterial.

Aperture Size.

The aperture for the cone is in the centre of this piece of wood and is 9½ in. in diameter. You can easily cut this out with a hack-saw, or you could get it done at the wood shop where the baffle is purchased by paying a few extra pence.

Those who desire can cut out a fret to cover the hole, and can finish the baffle with varnish stain, or enamel. That, however, is all a matter of taste and personal inclination and has no bearing on the construction of the speaker, which is what we are concerned with here.

The Framework.

Having got your baffle, you next require three pieces of wood to the dimensions shown in the first photograph. These are two pieces ½ in. thick and 5¾ in. long, and one piece ⅜ in. thick and 14 in. long.

The width of these pieces is immaterial, but can be about 2 in. In the centre and half-way along the 14-in. piece, drill a hole large enough for the adjusting screw of the unit to fit in easily, and then screw the

(*Continued on next page.*)

AN INEXPENSIVE LOUD-SPEAKER

(Continued from previous page.)

three pieces together as in the photographs.

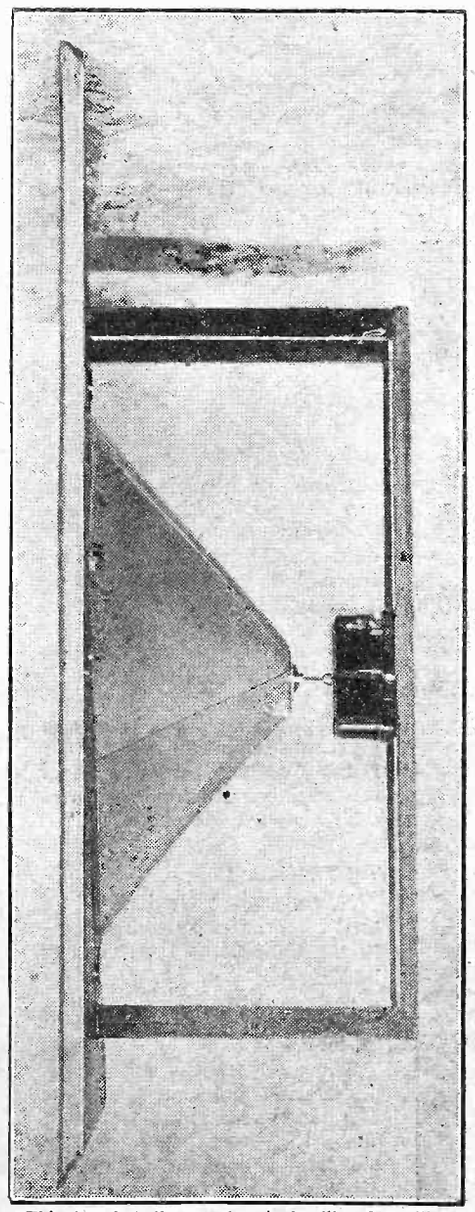
Next screw the unit to the back piece of wood with its adjusting knob sinking into the hole cut for it. Remember that the operating rod of the unit must project on the same side as the two smaller pieces of wood.

Fixing the Unit.

When you have done that, measure out carefully the positions for the four fixing screws that pass through the baffle from its front into the two smaller pieces of wood to hold the bridge piece in place against the baffle. If you don't get the holes for these just right the cone will not set centrally in the hole in the baffle.

With that completed we come to the cone.

A "STARBOARD" VIEW

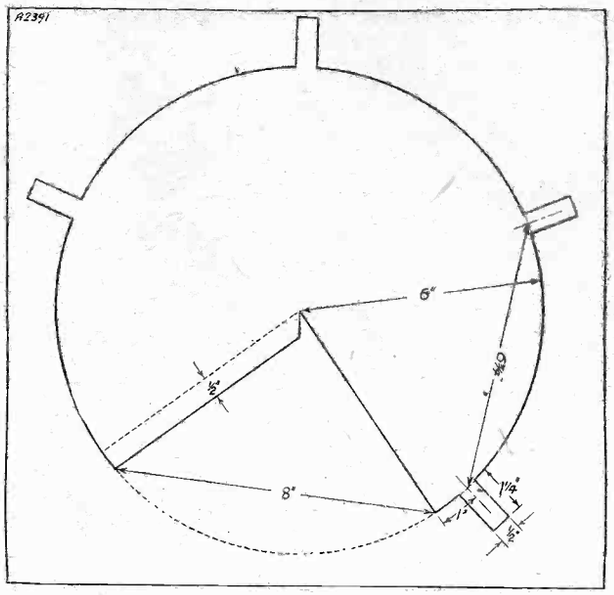


This is what the speaker looks like from the side. Note that the front edge of the cone comes flush with the back of the baffle.

This is cut out of stiff brown paper, known as Kraft paper of 120 lb. to the ream and of standard size; that is the size most commonly used.

Mark out a circle on it with a radius of 6 in. Then measure out a chord 8 in. long, and after that—but there, you have it all in the diagram and anyone can draw out an exact copy of that, without A B C instructions!

CONE AND MOUNTING IN ONE



The little tabs cut as part of the cone form the mounting strips for the former, thus greatly simplifying the fixing of the cone to the baffle.

The four spaces between the four tabs, which are all the same size as the dimensioned one, are all equal. Don't omit to cut out the little V piece near the centre of the cone, from the ½"-wide strip that is stuck down.

Check Your Measurements.

Make sure you have marked things out right, and then cut out. Put some gum, or rather glue, for a strong joint is necessary, on the little ½-in. wide flap and stick this down along the other radial edge so that the cone takes shape. Press the paper well together and also give it plenty of time to dry properly.

When the cone is dry, fit the little conical metal washer to its apex, tightening up the fixing screw really tight. Also tighten up well the little clutch nut that holds the operating spindle to the unit.

Final Touches.

Slide the cone on to the unit's spindle by passing the former through the hole in the baffle. Before tightening up the second little clutch nut, centralise the cone by fixing the four paper tabs to the baffle with four drawing-pins.

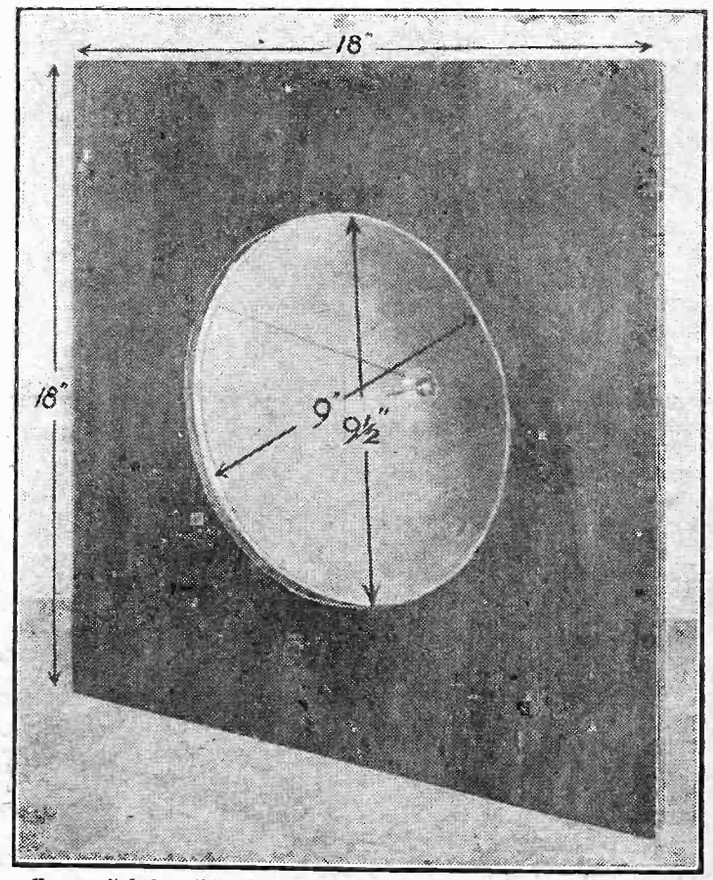
Let the cone find its own position along the unit spindle and then tighten it up finally in place, and the speaker will be complete. All that remains is to use it, but you certainly won't need any instructions on how to do that!

It occasionally happens that home-made cone loudspeakers develop a peculiar "buzz" when dealing with fairly loud passages of music or speech. This is sometimes due to the cone not fitting snugly on the unit spindle, or the nuts which grip the latter not doing their job properly.

If you experience any trouble of this nature it is a good idea to put a little shellac varnish around the spindle and securing nuts on both sides of the cone. This has the effect of welding all the small parts, which are liable to rattle, into one rigid and solid mass.

In fact, this is a little dodge that can be very usefully applied to other parts of your set. Particularly in the case of portables where nuts are liable to shake loose.

IT BAFFLES—BUT NOT YOU!



You won't find anything difficult in cutting the baffle to size. Note that the hole in it is ½ inch larger than the cone's diameter. This is to ensure that the edge of the cone will not touch the baffle anywhere.

TELSEN H.F. CHOKES

TELSEN BINOCULAR H.F. CHOKE

Hailed unanimously by the leading experts as the perfect H.F. Choke. The Telsen Binocular Choke is called for wherever highest efficiency is desired. Especially in H.F. amplification is the performance of the Choke of supreme importance.

Its highest inductance (180,000 micro-henrys) and exceptionally low self-capacity (·000002 microfarad) ensure a very high impedance at all wavelengths, and its excellent efficiency curve is free from parasitic resonances. These qualities, together with the restricted field due to the binocular formation, make it the ideal choke for a high-class circuit.

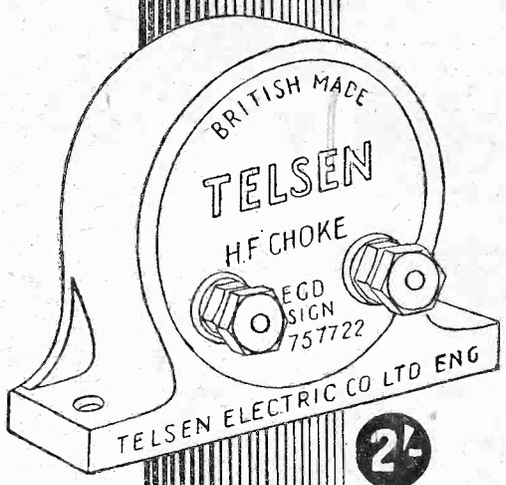
Telsen Binocular H.F. Choke .. .. Price 5/-

TELSEN STANDARD H.F. CHOKE

The Telsen Standard H.F. Choke utilises the minimum base-board space. It is designed to cover the whole broadcast band and has an extremely low self-capacity. The inductance is 150,000 microhenries and the resistance 400 ohms.

It has proved very popular and has been incorporated by set designers in many of the leading circuits.

Telsen Standard H.F. Choke .. .. Price 2/-



TELSEN

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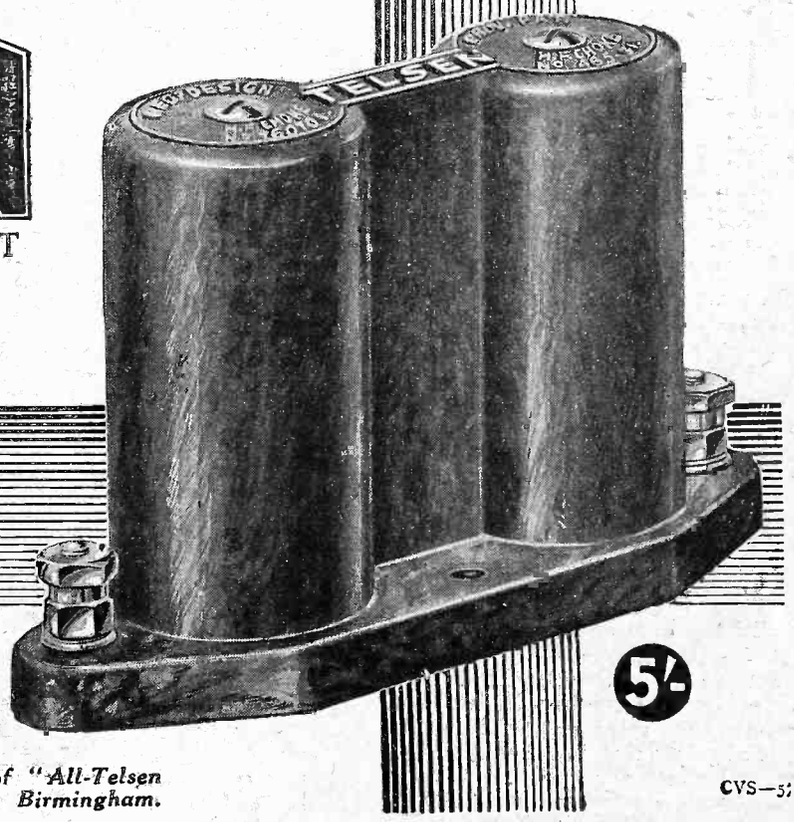


Send for the "Telsen Radio Catalogue" and book of "All-Telsen Circuits" to The Telsen Electric Co., Ltd., Aston, Birmingham.

CVS—5

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.

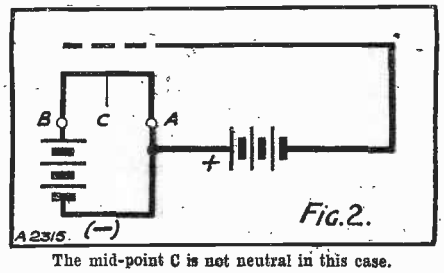
Coupling the Aerial.

M. K. (Leicester).—"I have had a certain amount of difficulty in deciding upon the best method of aerial coupling to use in a ganged-tuning receiver.

"I have found previously that when the aerial is coupled by a small coil to the first H.F. grid coil the load transference to this tuned circuit varies at various wavelengths. As the gang condenser incorporates small trimming condensers to equalise the various stray capacities and the inductances are identical, this prevents full efficiency being obtained.

"If the aerial is coupled by a small capacity to the grid end of the first tuned circuit the matching remains much more constant but the sensitivity is somewhat reduced. I should be glad if you can inform me as to the cause (and cure, if any) of the troubles experienced when the first method of aerial coupling is adopted, and why the latter system reduces the sensitivity."

D.C. HEATING



The mid-point C is not neutral in this case.

You are asking a big question. The answer—that is to say, how to keep a stable performance of coupled circuits throughout the range—is not yet available.

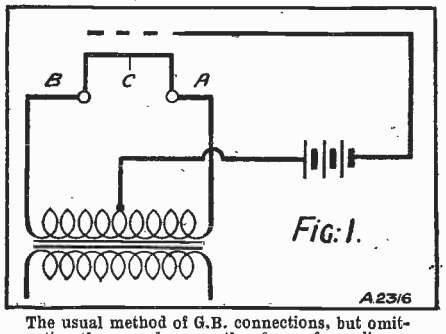
I shall be writing a good deal on this subject shortly, and so ask you not to spoil a series of articles by half statements at this stage. The reason, by the way, that you lose sensitivity by (very small) condenser coupling is that the condenser being very small the coupling is very loose, and if the coupling is very loose we always lose signals.

Selectivity and Sensitivity.

B. R. (Newcastle).—"Recently when comparing the selectivity of a receiver incorporating Litz wire coils and a neutralised triode valve with another using a screened-grid valve in the H.F. stage, it appeared that, although the latter was generally more selective than the former, greater difficulty was experienced in eliminating the local station with this receiver. What is the cause of this apparent contradiction?"

Is it not rather a contradiction to say that

CENTRE-TAPPED SECONDARY



The usual method of G.B. connections, but omitting the secondary or other form of coupling.

the one H.F. arrangement was more selective, *but* more difficulty was experienced in eliminating the local station? Would it not be fairer to say that the H.F. screened grid was more sensitive and showed an apparent sharpness of tuning on lots of distant stations which the ordinary valve did not pick up?

As a matter of fact, sensitivity and selectivity are bound up together. Thus, imagine a sensitive set, with many tuned circuits even, taken into the field at Brookmans Park and connected to a big aerial. You probably couldn't tune out Brookmans Park. A crystal set, without aerial however, could, with only one tuned circuit, tune out one station and tune in the other. And yet the crystal set has only one tuned circuit, the valve set had two or three.

The only difference was that the valve set was ever so much too sensitive. So sensitivity and selectivity are dependent.

If your ears were made very, very sensitive you might hear all the roar of London and all the people in London talking and yet not be able to pick out the nearby noise, it being so interfered with by the other noises.

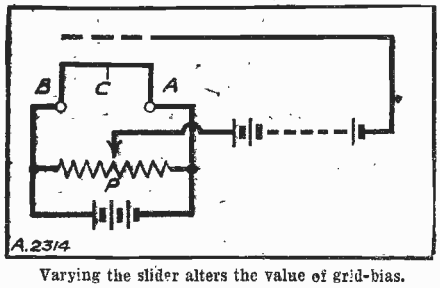
We only select what we want to hear by rejecting what we don't. A more sensitive set is, simply, in being more sensitive, less selective.

Less Bias for A.C. than for D.C. Heating.

L. K. (Plymouth).—"While reading the maker's specification of a large super-power valve, I noticed that it was stated that, when the filament of the valve was fed by A.C. from a transformer, the bias should be 2 volts less negative than when an L.T. accumulator was employed.

"The valve in question was of the ordinary directly-heated type, and I am unable to understand why a difference in the nature of the L.T. supply should affect

USING A POTENTIOMETER



Varying the slider alters the value of grid-bias.

the extent of the bias required on the grid."

It is usual to connect the grid to the filament with an A.C. directly-heated valve, as in Fig. 1.

The difference of potential between A and grid due to the A.C. heating voltage is $+\frac{1}{2}$ V (where V is the heating voltage) $-$ and between B and grid $+\frac{1}{2}$ V. C, the mid-point, remains always at 0 difference of potential as regards filament-heating voltage.

Now if you heat by D.C. (Fig. 2), B is $+$ V different due to heating voltage A is 0 and C$=\frac{1}{2}$ V$+$. This is a charged condition, and the average is $+\frac{1}{2}$ V, volts less negative.

Thus you want more negative volts in the D.C. heating.

If you like to heat with D.C., like Fig. 3, by adjusting P, you can do what you like about it all.

TELSEN SWITCHES AND DIALS

TELSEN PUSH-PULL SWITCHES

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

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

Telsen Push-Pull Switches—

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

TELSEN SLOW-MOTION DIAL

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

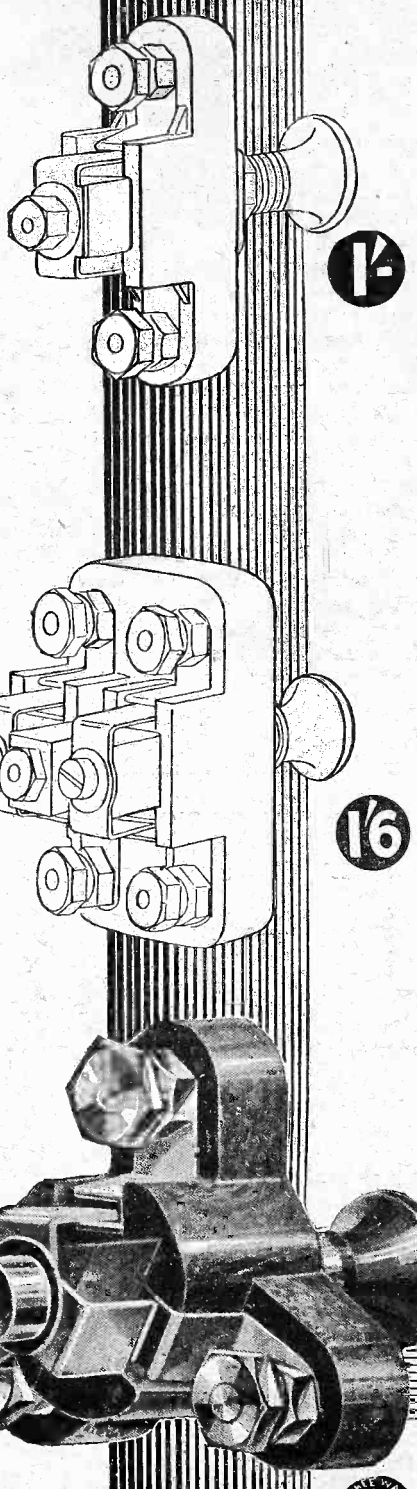
Telsen Slow-motion Dial .. .. **Price 2/6**

Supplied in Black or Brown Bakelite.

TELSEN

ALL-BRITISH RADIO COMPONENTS

2/6



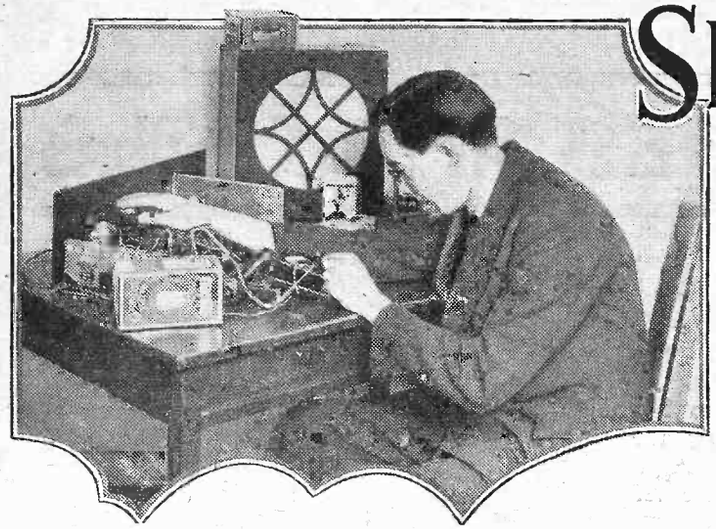
1/-

1/6

1/3

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

CVS—57



SHOCK-PROOF SETS

by A.V.D. HORT

How to fit a safety device to your mains set and provide protection against accidental shocks.

ALTHOUGH a certain degree of skill in the tuning of receivers is possessed by every member of the modern household, there is usually one expert who is responsible for the maintenance of the set, and for doing any repairs that may be necessary.

It may thus happen (such indeed has been the writer's experience) that when the expert is away from home, and the receiver chooses to misbehave, well-meaning efforts are made to rectify the fault, with disastrous effect on the apparatus.

A Worth While Addition.

When the receiver is run from the supply mains, inquisitive and unwary fingers are more than likely to take nasty shocks from live parts of the set, apart from any damage which may be done to expensive valves or other components. With gloomy forebodings of such occurrences in his own household, the writer of this article, in designing and constructing a mains-driven cabinet receiver, set himself the task of making the apparatus, as far as possible, fool-proof. The results have so far justified the attempt that some notes on the method of achieving this end may be of interest to those similarly situated.

The circuit of the receiver is of the simplest kind. It consists of a detector followed by one stage of L.F. amplification. The supply mains being 240 volts A.C., current is drawn from this source for heating the A.C. valves and for supplying the H.T., through a half-wave Westinghouse rectifier.

The cabinet is divided into three sections. The top compartment houses the receiver, the bottom compartment the mains unit, the loudspeaker occupying the space between the two. The loudspeaker compartment does not extend to the back of the cabinet; it has a false back, and the space between this and the back of the cabinet is left clear for the leads from mains unit to receiver.

The Safety Switch.

The top and bottom compartments have drop-down doors, the top one giving access to the controls, but not to the receiver itself. To reach the receiver the top lid must be lifted. This is normally kept locked, but in case some unauthorised person should open it, a switch is provided in such a position that as soon as the lid has been raised half an inch the mains circuit is interrupted at the points where the leads enter the cabinet, and the whole cabinet is "dead" from an electrical point of view.

Furthermore, the bottom door, leading to the mains unit, cannot be opened from the outside. The lock is inside the top lid, which must be opened, and the circuit consequently broken, before the mains unit can be touched. The back of the cabinet, which is removable, is also fastened from the inside.

For The Expert.

An obvious objection suggests itself—namely, that you yourself, the expert, cannot attend to the needs of the receiver while it is working. This is certainly a practice to be avoided with mains-driven receivers, but there are occasions when it is essential; provided that due respect for live parts is observed, no harm need result. This is allowed for by means of a catch on the automatic switch, so that the switch can be locked in the "on" position while the lid is open.

The actual method of making the switch is simplicity itself, and the accompanying sketches will make the details clear. The two spring plungers of the switch itself are a pair of the ever-useful contacts from the standard electric lamp holder, mounted on strips of brass, with bolts and soldering tags for the connections. Since the current taken from the mains is very small, no appreciable sparking is to be anticipated at the switch contacts, and, in fact, no noticeable burning of the contacts has taken place in spite of considerable use of the switch in the early days of the receiver, when the first adjustments were being made.

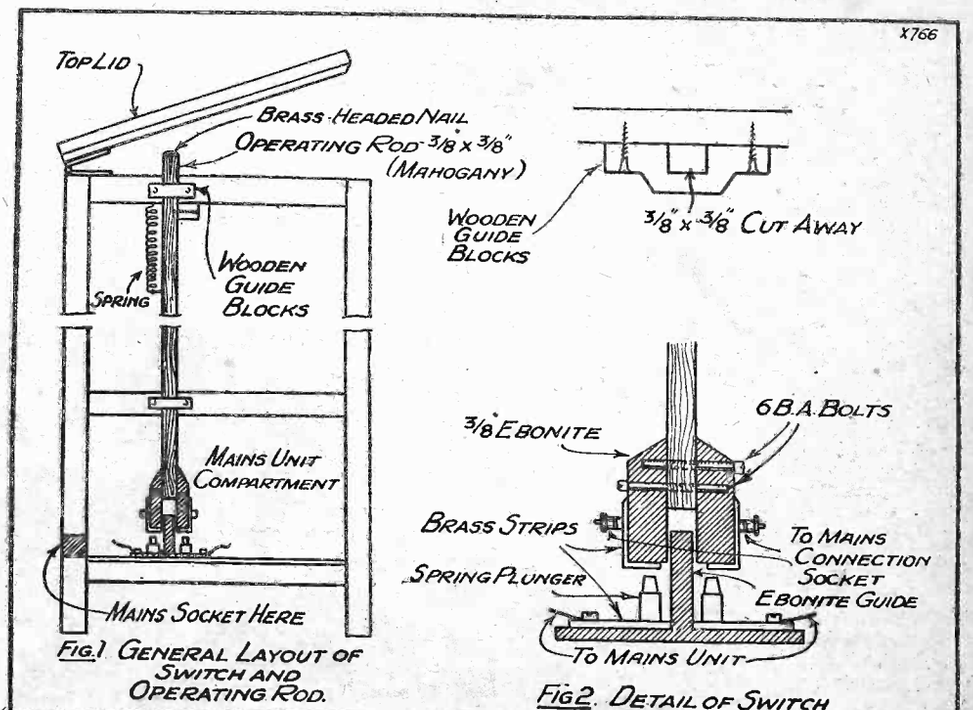
Insulated With Ebonite.

It will be observed that there is an ebonite guide piece between the two spring contacts. This serves a double purpose, to guard against accidental contact between the two poles of the switch, and to ensure that the moving portion of the switch keeps in alignment with the lower contacts. The ebonite blocks carrying the upper contacts are bolted to the operating rod, as shown.

The top of the operating rod is fitted with a brass-headed nail of the type used by upholsterers, and a brass plate is fixed underneath the lid to correspond with it. This is merely to prevent the abrasion of the wood which would otherwise occur, since the part of the lid in contact with the rod moves through the arc of a circle, while the rod itself moves up and down.

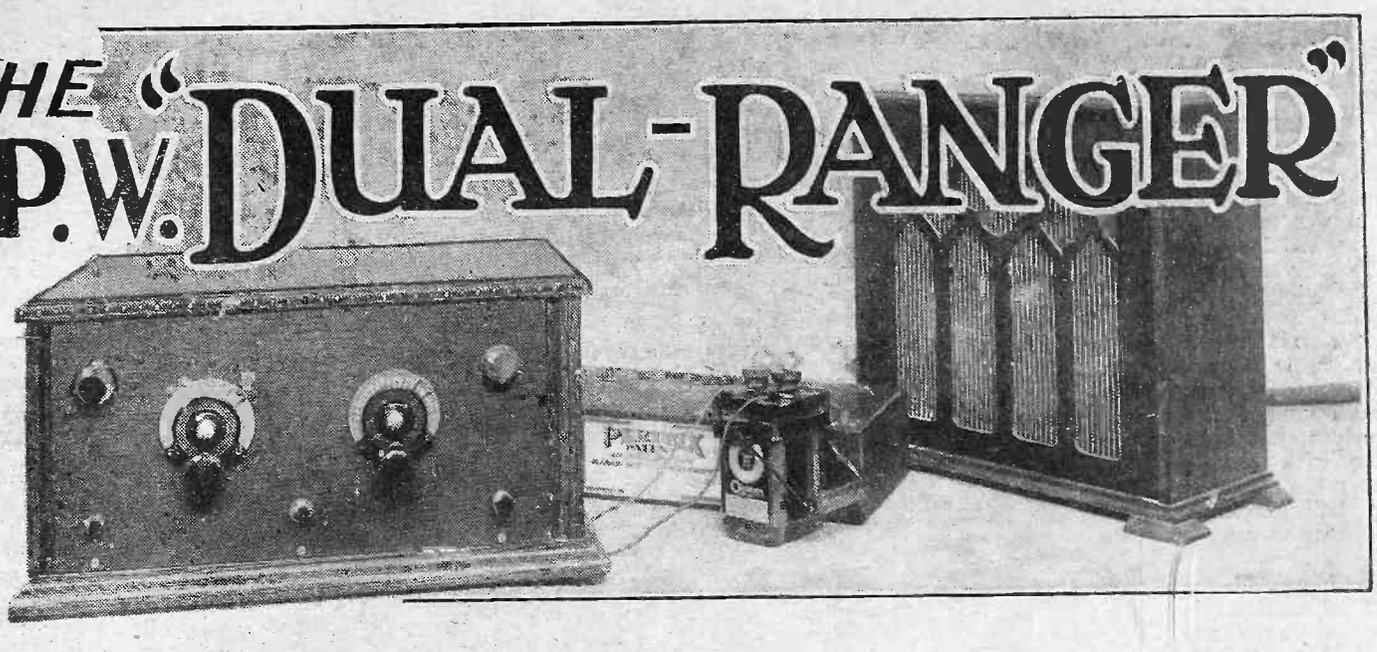
The rod moves in wooden guide blocks, and a spiral wire spring, in tension when the lid is down, raises the rod when the lid is lifted, and so opens the switch.

OPENING THE LID SWITCHES OFF THE MAINS



There is a special plunger type of switch which is actuated by the lid of the set. It is a gadget which is quite easy to make.

THE P.W. "DUAL-RANGER"



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

Some introductory notes regarding an outstanding "P.W." set design. As you will see when you have read the following article this new set constitutes one of the most important receiver developments of the year.

Further details of it will be found in next week's "P.W." and we are giving a free blue-print of the "Dual-Ranger" with every copy of that issue.

JUDGING by our correspondence, it is quite evident that there are at least a few readers who hold the opinion that the job of the "P.W." Research and Construction Dept. is to display as much ingenuity as possible in providing new variations on old themes.

And I can imagine such sceptics cynically saying to themselves, "The 'P.W.' 'Dual-Ranger!' Huh! Another slice off the same joint served up with different gravy!"

Peaks of Progress.

But they would be quite wrong. We don't go round in circles; we are moving steadily forward all the time. There may be periods during which progress is slow; and there are, likewise, times when the peaks in the calendar representing the introduction of "P.W." "star" designs tend to crowd together.

We are in the middle of an era of the latter variety at the present moment.

What of those many tens of thousands of "P.W." readers who have just built "P.W." sets of somewhat similar calibre to the "P.W." "Dual-Ranger"? Well, they have the full satisfaction of knowing that they possess "threes" which we honestly believe can hold their own against, if not beat, anything else of like nature in existence. They can hardly ask for much more than that, can they?

"Shall I Change?"

Our opinion, confirmed by exhaustive laboratory tests, is that the "Dual-Ranger" is still just a bit better, but you would have to go back eight or nine months in "P.W." set designs before the superiority of the "Dual-Ranger" became so insistently marked that you might feel like changing your existing S.G. "Three" set for this one. That is, you must agree, a straightforward statement of the position.

How It all Started.

On the other hand, you face certain satisfaction if you scrap a year-old receiver in favour of the "Dual-Ranger," and cannot be disappointed if you modify *any* three to this design.

The "Dual-Ranger" started as a brain-wave, and one for which no apologies are necessary. Perhaps you will find it of interest if I explain this in detail.

The outstanding success of the last radio season was the Kendall dual-range coil. (Two of the several firms selling commercial versions sold no less than 110,000 between them!)

This dual-range coil undoubtedly constituted the best two-band inductance system of its time, and it had an abnormally long run. But in due course, as was quite inevitable, a superior method was originated and for this our "P.V." and "P.J." coils were devised.

Using the Dual-Range Coil.

Recently it occurred to me that if the "P.V.—P.J." and Dual-Range schemes could be combined in one set, a very striking result ought to be obtained, for the qualities in the dual-range coil which have been overshadowed would be very largely augmented by the "P.V.—P.J." contribution to the whole; while those dual-range advantages which, by the way, are still entirely outstanding, would receive a further stimulus.

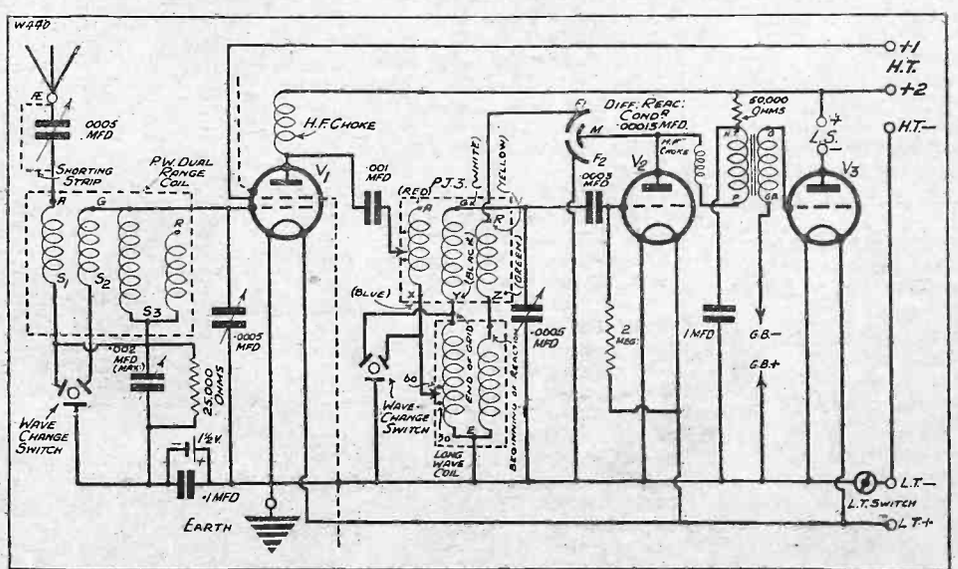
And in an S.G. Three where, in any case, two sets of inductances are required, the demand for economy is still adequately met. Further, the compactness and utter simplicity of the dual-range coil can be made to express themselves to the fullest possible extent.

The Test Model.

Quickly the thought was followed by the deed and a model of the proposed instrument built up. The results given were absolutely in accordance with our expectations.

(Continued on next page.)

THIS IS "P.W.'s" STRONGEST COMBINATION



The famous "P.W." Dual-Range coil is used in conjunction with a "P.W." Coil Quoit and the P.J.3., and arranged so that really first-class results are obtained on both wave-bands.

THE "P.W." "DUAL RANGER"

(Continued from previous page.)

After a slight modification here and there of the original plan, a most excellent performance was obtained.

It was found that practically perfectly bi-band balance had been achieved. But I forget, you may not guess what "bi-band balance" is intended to convey. As a matter of fact, it is a quite home-made term, and I apply it to a receiver that operates with exactly the same efficiency on both ordinary and long waves.

Bi-Band Balance.

I believe that it is quite safe to say that bi-band balance in radio receiver design was inaugurated by our "P.V.—P.J." system. Hitherto, it had not been possible completely to attain the condition without using inter-changeable coils.

The Kendall coil went a long way towards it—perhaps farther than anything else—but there were necessarily compromises.

All the requirements for first-class results on both wave-bands are fulfilled in the "Dual Ranger."

There is virility throughout, by which I mean there is snap and life in the set at every degree of the dials and none of those lifeless patches that are so frequently encountered in sets that are not quite up to the mark as it were.

But also a condition of complete stability is present all the time, and you do not run in and out of "edgy" approaches to oscillation. The reaction control is flexible and smooth, and the general selectivity is well above the average.

Altogether the "P. W." "Dual Ranger" tests out as a most attractive proposition, and behaves itself extraordinarily well both on distant station searching and on local station reception. Finally, it possesses the necessary high degree of selectivity to enable it to deal with modern ether conditions.

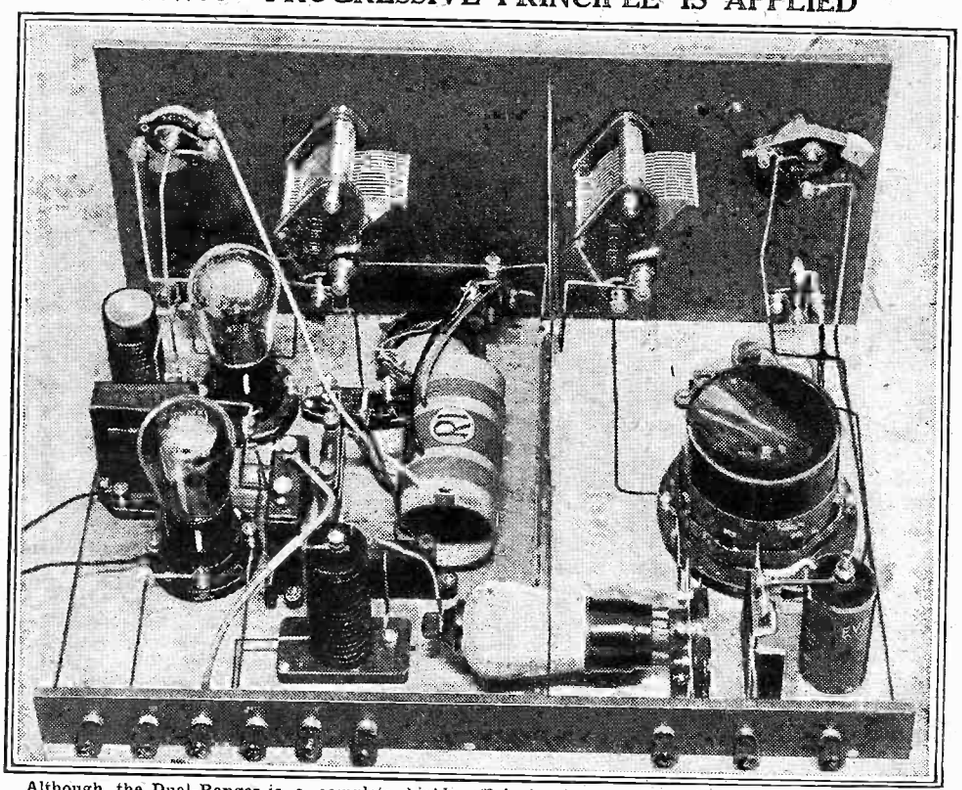
Once again we are introducing the ever-popular progressive principle. Next week we are describing the basic model and subsequently you will be told how you can add pick-up switching and a loud-speaker output filter should you desire to install them.

The "P. W." "Dual-Ranger" will be presented with ordinary variable condensers in the first instance, and, subsequently, a model incorporating extenser tuning will be detailed.

The Tuning Condensers.

The dual-range coil which figures in both designs as a central component is one of the standard designs which have been on the market during the past year. If you happen to have one of these coils you can employ it with confidence, for the "Dual-Ranger" makes better use of it than any previous "hook-up."

"P.W.'s" PROGRESSIVE PRINCIPLE IS APPLIED



Although the Dual-Ranger is a complete, highly efficient set, as you see it in this photo, provision has been made for the addition of certain refinements for those who desire a "last word" luxury set.

THE COMPONENTS WE HAVE USED IN THE "DUAL-RANGER"

1 Panel, 16 in. × 8 in. (Wearite, Permcol, Goltone, Peto-Scott, Becol).
1 Cabinet to fit, baseboard 10 in. deep (Camco, Peto-Scott, Osborn, Gilbert, Pickett).
2 ·0005-mfd. condensers (Telsen, Polar, J.B., Cyldon, Wavemaster, Astra, Formo).
If above have plain dials, the following will be required:
2 Slow-motion dials (Lotus, Telsen).
1 ·0005-mfd. solid dielectric condenser (Ready Radio, Telsen, Parex, Lotus).
2 3-point wave-change switches (Ready Radio, Telsen, Lissen, Wearite, Goltone).
1 On-off switch (Lissen, Telsen, Ready Radio, Igranic, Graham Farish, Lotus, Goltone, Wearite).
1 ·0001-mfd. differential reaction condenser (Telsen, Lotus, Ready Radio, Polar, Cyldon, Graham Farish, Wavemaster, J.B.).
1 "P.W." Dual-Range Coil.
1 ·002-mfd. max. compression condenser (Goltone, Formo, Sovereign, Telsen, Graham Farish, Colvern).
1 ·1-mfd. fixed condenser (Igranic, T.C.C., Dubilier, Formo, Telsen, Mullard, Helsby, Ferranti, Ediswan, Hydra, Graham Farish).
1 ·0003-mfd. fixed condenser (Ferranti, etc).
1 ·001-mfd. fixed condenser (T.C.C., as above).
1 1-mfd. fixed condenser (T.C.C., as above).
1 P.J.3 coil (R.I., Formo, Goltone, Parex, Melbourne, Wearite, Peto-Scott, Ready Radio).
1 Coil quoit (Peto-Scott, Sovereign, Ready Radio, A.E.D., Wearite).
2 oz. 30 D.S.C. wire for above.
1 Screen 10 in. × 7 in. (Parex, Peto-Scott, Wearite, Ready Radio).
1 2-meg. leak and holder (Graham Farish, Ferranti, Lissen, Dubilier, Mullard, Igranic, Telsen, Watmel, Varley, Loewe).
2 H.F. chokes (Lewcos and Varley, Telsen, Ready Radio, Lotus, Parex, Sovereign, Wearite, R.I., Peto-Scott, Graham Farish, Atlas).
1 L.F. transformer, medium ratio (Lotus, Telsen, Ferranti, R.I., Varley, Igranic, Lissen, Graham Farish).
1 50,000-ohm spaghetti resistance (Bulgin, Telsen, Ready Radio, Varley, Sovereign, Lissen, Igranic, Goltone, Lewcos, Peto-Scott, Graham-Farish).
1 25,000-ohm spaghetti (Bulgin, as above).
2 Valveholders (Graham Farish, Lotus, W.B., Telsen, Igranic, Lissen, Clix, Wearite, Dario, Formo, Bulgin).
1 Do., horizontal mounting (W.B., Parex).
1 Terminal strip, 16 in. × 1½ in.
9 Indicating terminals (Belling & Lee type R, Igranic, Goltone, Clix, Eelex).
Glazite, Lacoline, Quickwire, Jiffilinx, Flex, screws, etc.
Battery Plugs (Belling & Lee, etc.).
1 Crocodile clip (Bulgin, Goltone).

ACCESSORIES.

LOUDSPEAKERS. — Celestion, Graham Farish, Mullard, Blue Spot, B.T.-H., Amplion, Undy.

VALVES.—1 S.G. valve (Cossor metallised S.G., Osram, Mazda, Eta, Tungsram, Mullard, Six-Sixty, Dario).
1 detector valve (Osram H.L.2, Mazda, Mullard, Cossor, Tungsram, Six-Sixty, Eta, Lissen, Fotos, Dario).
1 small power valve (Mazda, etc.).
(Milliamp consumption at 120 volts max. 16 milliamps.).

BATTERIES.—H.T. 1, 120–150-volt super-capacity (Pertrix, Ever Ready, Drydex, Columbia, Magnet, Ediswan, Lissen).
1 1·5 or ·9-volt G.B. battery for S.G. valve (Ever Ready, etc.).
1 9–15-volt G.B. battery to suit output valve (Ever Ready, etc.).

ACCUMULATOR.—Two-, four- or six-volt, to suit valve.
(Exide, Ediswan, Lissen, Pertrix, G.E.C.).

MAINS UNITS.—Heayberd, Tannoy, Regentone, Lotus, Ekco, Atlas, R.I. (State voltage and type of mains, and give details of set when ordering).

THE "P.W." DUAL-RANGER

£3-19-9 *or 12 equal monthly payments of - 7/6*

"P.W." DUAL-RANGER

		£	s.	d.
1	Panel 16 × 8 × $\frac{1}{8}$ in., drilled to specification		5	6
1	Waldor cabinet, 16 × 8 × 10 in., with base-board		17	6
2	Wavemaster ·0005 - mfd. slow-motion condensers		11	0
1	ReadiRad ·0005-mfd. solid-dielectric condenser		3	6
2	Three-point wave-change switches		3	0
1	On-off switch			10
1	ReadiRad ·00015 differential condenser		2	6
1	Kendall dual-range coil		10	6
1	T.C.C. ·1-mfd. fixed condenser, type 50		1	10
1	T.C.C. ·0003-mfd. fixed condenser, type "S"		1	3
1	T.C.C. ·001-mfd. fixed condenser, type "S"		1	6
1	T.C.C. 1 mfd. fixed condenser, type 50		2	10
1	Sovereign pre-set condenser, type "H"		1	6
1	P.J.3 coil		2	6
1	Ready-wound coil quoit		2	6
1	Screen, 10 × 7 in.		2	0
1	ReadiRad 2-meg. leak and holder		1	4
1	Lewcos H.F. choke, type M.C.		2	6
1	ReadiRad H.F. choke for S.G. circuit		4	6
1	Lotus L.F. transformer, No. 1		5	6
1	Lewcos 50,000-ohm Spaghetti resistance		1	6
1	Lewcos 25,000-ohm Spaghetti resistance		1	6
2	Junit valve holders		1	4
1	Junit horizontal valve holder		1	9
1	Terminal strip, 16 × 2 in.		1	4
9	Belling-Lee terminals, type "R"		2	3
1	Packet Jiffilinx for wiring		2	6
1	Siemens 1½ v. S.G. cell, type G.T.			9
3	Valves. Cossor Metal Coated S.G.215, Mullard P.M.1H.L. and P.M.2	1	19	0
Flex, screws, 1 crocodile clip, etc.				3
		£6	16	3

If you do not need the complete kit of parts, you can purchase any component you require separately.

Recommended Accessories

		£	s.	d.
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.

Kit "A" (less Valves and Cabinet) **£3.19.9**
or 12 monthly instalments of **7/6**

Kit "B" (with Valves less Cabinet) **£5.18.9**
or 12 monthly instalments of **11/-**

Kit "C" (with Valves and Cabinet) **£6.16.3**
or 12 monthly instalments of **12/6**

COMPLETELY ASSEMBLED
DUAL-RANGER
£8.6.8
With Cabinet and Valves, Aerial Tested, Royalties paid.
Or 12 monthly payments of 15/3

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.

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159, BOROUGH HIGH STREET. LONDON BRIDGE. S.E.1.
Telephone Hop 3000 (Private Exchange)
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ORDER FORM

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

CASH ORDER. Please despatch to me at once the goods specified for which I enclose payment in full of £.....

C.O.D. ORDER. Please despatch to me at once goods specified for which I will pay in full the sum of £.....

EASY PAYMENT ORDER. Please despatch my Easy Payment Order for the goods specified for which I enclose first deposit of £.....

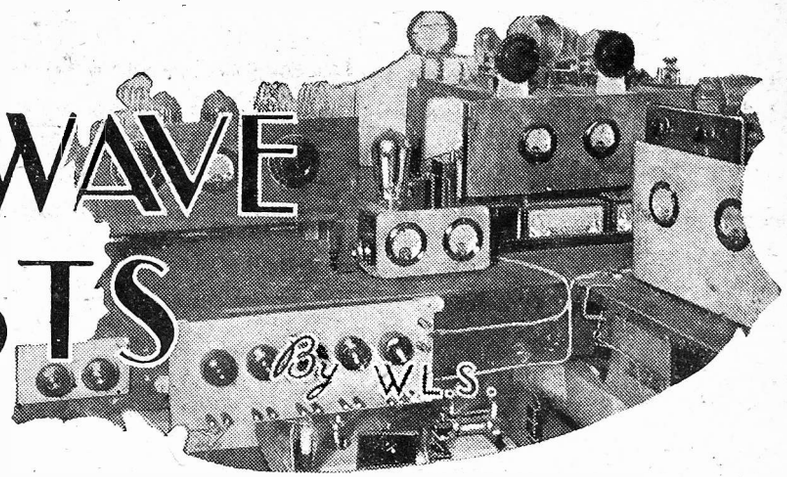
Name.....

Address.....

Kits Required.....

P.W.17/10/31

SHORT-WAVE SIGNPOSTS



By W. L. S.

Following on a recent article in "P.W." concerning the construction of wave-meters for short-wavers, our popular contributor W. L. S. tells you how he tackles such a proposition.

ALL my readers who are recent converts to the short-wave field will agree with me that the "lost" sensation that prevails for the first week or so is very disconcerting. The feelings of a main-road motorist who suddenly takes to the lanes and by-ways are as nothing compared with the sense of desolation that pervades one!

For this reason—and, more important, for the reason that the sensation is renewed when one builds a new receiver—I wish to discourse for a little on wave-meters.

There are two very simple ways of making a short-wave wave-meter that is reliable enough for the "ordinary listener." One is simply to tune in all the stations you can, wait patiently until they announce, look up their wave-lengths in a list, and calibrate from them an absorption wave-meter.

An Absorbtion Wavemeter.

The latter instrument consists of a good variable condenser of about ·0001 capacity and three coils. If you make one of three turns, one of six and one of ten, all of about 2½ in. diameter, you will cover the whole useful range of short waves.

As you log a station that can be identified, simply place the wave-meter near enough to the set to give the familiar "plop" as you run through the tuning position.

When you have found enough stations you can get busy with a piece of squared paper, and you will probably find it an easy matter to draw three nice curves.

A far better way, however, is to build a heterodyne wave-meter. The constructional details of my own have already been promised, and will duly be written up when I have finished making alterations and improvements to it. The latter, be it said, consist chiefly of making it smaller day by day, until it now resembles a *very* small biscuit tin in external appearance!

A Better Arrangement.

A heterodyne wave-meter, however, is a piece of apparatus that everyone can make without external assistance, since it consists merely of an oscillating valve. No more, and no less, than our old friend in the receiver that brings in all our goals.

The chief advantage of it is that one coil will suffice for *all* ranges, owing to the fact that harmonics are generated sufficiently well by the average oscillator to cover all the short-wave bands. Thus a coil giving a range of 60–120 metres is almost ideal. The harmonics will give us the other ranges of 30-60 metres and 15-30 metres, and there is little or no difficulty occasioned by "picking the wrong harmonic."

We will imagine that you have your little oscillating detector in a box with a good slow-motion dial on the variable condenser. The H.T. should be cut down as low as it is posible to go, with the valve still oscillating over the whole tuning range.

Now, on your short-wave receiver, find one of the following stations:

Calibrating the Instrument.

Rome, on 25·4 metres, should be easy to identify because of the presence of G 5 S W immediately above him, heterodyning his "top edge." Late in the evening W 2 X A D on 19·56 metres is an easy mark. In the small hours of the morning W 2 X A F takes his place, the latter station's wave being 31·48 metres. After 8 p.m. you cannot fail to find the Moscow 100-kilowatt station on 50 metres dead. If you choose a Sunday or a Thursday you will find identification certain because the broadcasts on those days are in English.

This is where one has to be fairly careful. If the coil has been chosen to give a *rough* range of 60–120 metres (and if you make it about the same size as the coil used for this range in your receiver, you should be all right), then you will have to set it to 100 metres to produce a "chirp" with Moscow. Leave Moscow tuned-in on your set until you find the "chirp" from the wave-meter.

Then leave the wave-meter severely alone and put your set down to Rome on 25 metres. Here you should find two chirps from the wave-meter. One will be the third harmonic on 75 metres, and one the fourth on 100 metres, which should be within a degree or so of the "Moscow" setting.

Obviously the latter is the one you want, so disregard the 75-metre one, except for noting roughly its dial reading.

Now find W 2 X A D on 19·56. Here you will find three chirps at least. You will have the third harmonic, perhaps, just below 60 metres, the fourth just below 80, and the fifth just below 100! But you know from the previous experiment where 75 metres came, so that you can identify the 80-metre chirp on W 2 X A D and add another tuning point. The 100-metre position, too, can be confirmed.

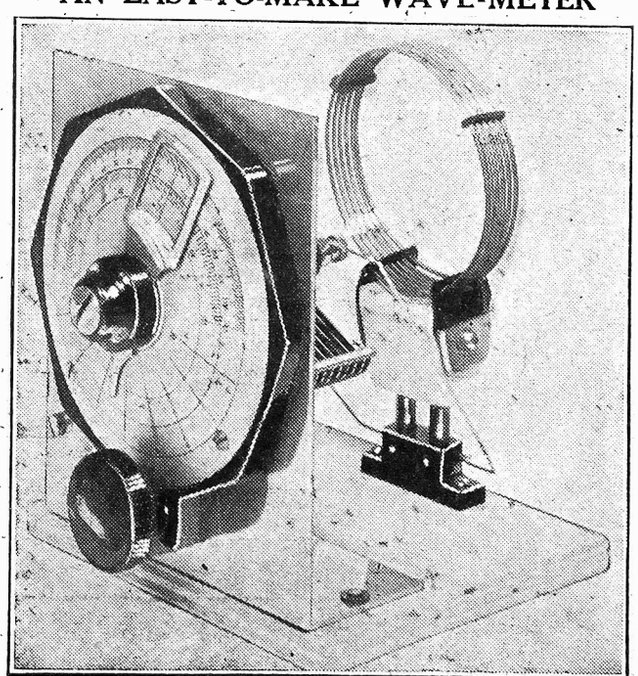
If your patience is still intact, find W 2 X A F on 31·48 and carry on. The chirp you will find just below your 100-metre mark will obviously be the third harmonic on 95 metres odd, and the other one that should come near the bottom of the dial will be in the region of 63 metres, being the second harmonic.

Make a "Curve."

Here you may well call a halt, for you will have six or seven reliable spots marked on your dial, and will be able to draw a curve that gives quite a good degree of accuracy. This will mean, mark you, that you need never lose your way again, unless you are unfortunate enough to displace the harmonics one day when you have built a new receiver!

The confusion between them need seldom arise, however, on account of the number of stations that, even if they cannot be identified, are known to be *one of two* stations.

AN EASY-TO-MAKE WAVE-METER



This absorption type of wave-meter consists merely of a variable condenser and a coil as shown above.

TELSEN CONDENSERS

TELSEN MANSBRIDGE TYPE CONDENSERS

Telsen have installed the most advanced plant in the world for the manufacture of Mansbridge Type Condensers. Only genuine Mansbridge foil paper and the finest linen tissue are employed in the exclusive method of manufacture. Every Telsen Mansbridge Type Condenser is hermetically sealed from the atmosphere and Post Office standards of insulation are adopted throughout. The preliminary research, the most modern plant in the world, the finest raw materials, the latest methods of manufacture and the final test, all combine to give Telsen Mansbridge Type Condensers a high insulation through years of service with freedom from breakdown. The type of construction employed makes them genuinely non-inductive.

The following values are guaranteed within 5 per cent :—

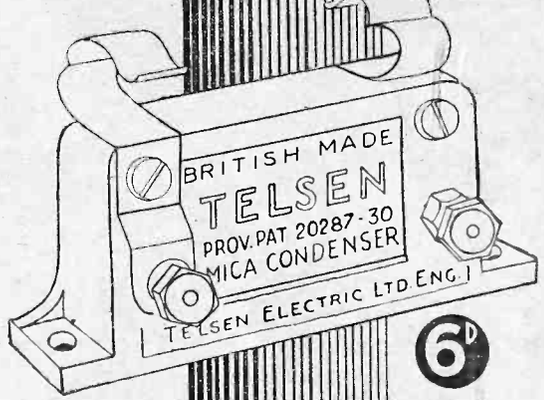
Cap. mfd.	500 Volt Test Price	1,000 Volt Test Price
·01	1/6	2/6
·04	1/9	2/9
·1	1/9	2/9
·25	2/-	3/-
·5	2/3	3/3
1·0	2/3	3/6
2·0	3/-	5/-

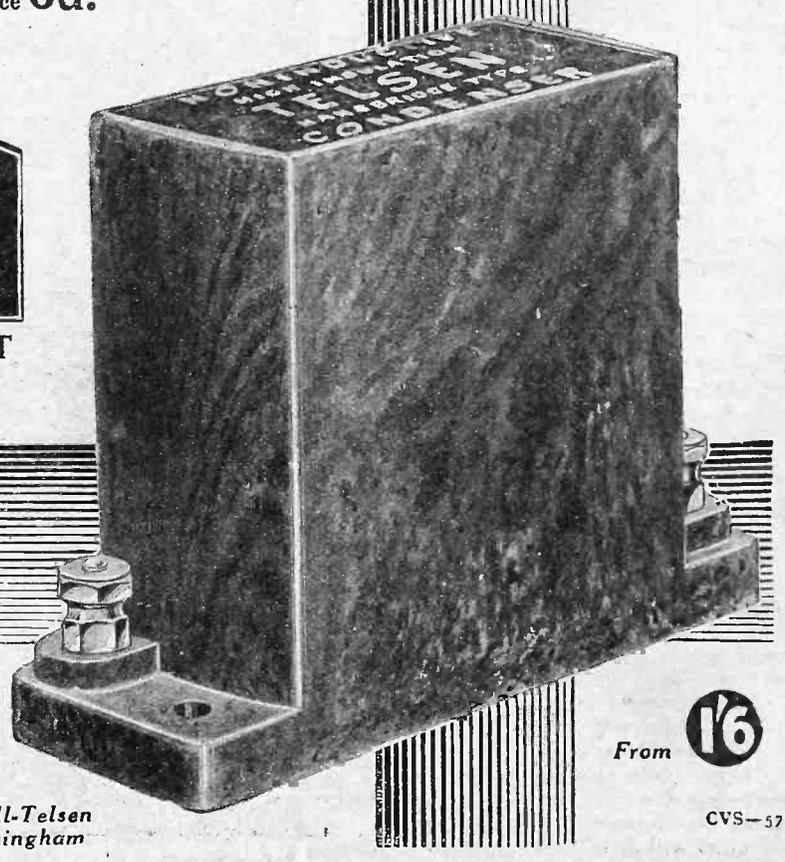
TELSEN FIXED MICA CONDENSERS

(Prov. Pat. No. 20287/30)

Telsen Fixed Mica Condensers are made in capacities from ·0001-microfarad to ·002-microfarad. They can be mounted upright or flat and the ·0003-microfarad Telsen fixed mica condenser is supplied complete with patent grid leak clips to facilitate series or parallel connections.

Telsen Fixed Mica Condensers .. .. **Price 6d.**





TELSEN

THE SECRET OF PERFECT RADIO RECEPTION

From **1/6**

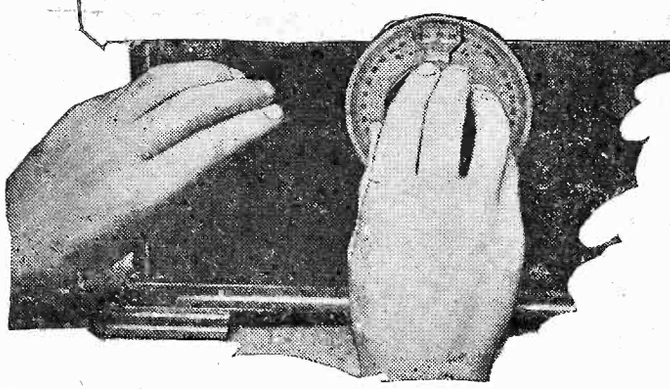
Send for the "Telsen Radio Catalogue" and book of "All-Telsen Circuits" to The Telsen Electric Co., Ltd., Aston, Birmingham

CVS—57

NOTES FROM THE NORTH

With the details given by Mr. Edward Liveing, the North Regional Director, of his plans for this winter to hand, one is led to wonder whether the Regional staff in the North is large enough adequately to handle the studio work imposed upon them. This and other vital matters concerning the North are reviewed on this page.

By OUR SPECIAL CORRESPONDENT.



SINCE my last bulletin from the North appeared in POPULAR WIRELESS Mr. Edward Liveing, the North Regional Director, has given a very remarkable account to Northern listeners of the plans he and his staff have made for programmes this winter. Mr. Liveing's talk is one of the most encouraging things that has happened in British broadcasting during 1931.

Some Promised Programmes.

Here, briefly summarised, is the promise made by the North Regional director:

Orchestral.—Hallé Orchestra, ten concerts; Liverpool Philharmonic, eight concerts; Leeds Symphony, four concerts.

Choral.—Concerts by famous Northern choirs, including North Staffordshire Choral Society, Sheffield Musical Union, Leeds Choral Union, Leeds Philharmonic Society, Huddersfield Choral Society, and Huddersfield Glee and Madrigal Society.

Chamber Music.—Some of the Rodewald Concert Society's concerts will be relayed from Liverpool.

Radio Drama.—Productions to include a war play, "Red Night" (J. L. Hodson), "The Pageant of York" (L. du Garde Peach), and "Hobson's Choice" (Harold Brighouse) from Manchester. Also a play by the noted Yorkshire author, J. R. Gregson, from Leeds studio; and "The War of the Great Ditch," a play about the Roman wall, from Newcastle.

Theatrical Relays.—Excerpts of revues, pantomimes, and musical comedies will be relayed from Northern theatres.

Miscellaneous Concerts.—Thirty relays of the Manchester Tuesday Midday Concerts; twenty-eight midday concerts from Bradford; and five from Leeds University, by artists of both local and national repute.

"This material," said Mr. Liveing, "definitely places what is a regional service of the B.B.C. on a level with many of the national services on the Continent." That is a just claim. The North Regional station is showing what can be done in the way of alternative programmes when one programme comes from London and the other receives inspiration and material from a source outside London.

What of Scotland?

Of course, the material has to be in the region to start with, and I am wondering whether Mr. Cleghorn Thomson, at Edinburgh, will find as much good broadcasting material in Scotland when the Scottish Regional transmitter is in action next year. An interesting item of news from Edinburgh is that the Scottish Studio Orchestra is now under the direction of a young violinist from London, Guy Daines, who has succeeded Isaac Losowsky.

Mr. Liveing has consistently held that there is abundant material awaiting B.B.C. exploitation in the North of England. Now he is proving that contention up to the hilt, so far as programmes from outside sources are concerned. But what about studio programmes?

AN "ECHO" OF THE RADIO EXHIBITION!

The biggest shout "rings the bell" and wins the prize. A scene at the "His Master's Voice" Modern Hall of Music during the recent radio show.

A Suggestion.

Apart from plays and the three talks which are to be given per week, Mr. Liveing did not mention studio programmes in his talk. Perhaps the less the B.B.C. says about its provincial studio orchestras the better.

The anæmic tone of an "orchestra" of nine cannot satisfy listeners who formerly enjoyed the Northern Wireless Orchestra, and who inevitably make comparisons with the B.B.C. Theatre Orchestra and other London orchestras. An interesting suggestion is that the studio orchestras at Manchester and Birmingham should be amalgamated to form a regional orchestra of eighteen players.

Vaudeville from Northern studios is not yet satisfactory, and the plays have been curiously patchy—sometimes an excellent production and other times an underrehearsed and insufficiently polished presentation. Is the Regional staff big enough to give proper time and attention to studio programmes and at the same time to organise all these "O.B.'s"?

B.B.C. Economies.

I understand from the B.B.C. that the statement about the slowing-up of schemes of development, such as the new high power transmitter for Daventry 5 X X and the new studios for Leeds, is without foundation. The decision to forgo £200,000 revenue in two years indicates economies in the B.B.C., but I am told that other means will be found.

"Work will be started at Leeds as soon as practicable," states the B.B.C. "Structural alterations are necessary, and in view of the pressure of work at Broadcasting House we are unable to make an immediate start. We cannot yet say when it will be possible to move into the new building at Leeds, but there is no prospect of a change of premises this year."

WHAT I SAW AT MANCHESTER

Our Special Staff Correspondent gives you his personal impressions of the Northern National Radio Exhibition.

I HAVE heard a lot about Manchester. And one of the last things I heard from a business friend before I left London was: "Cheerio, see you at the City Hall, and don't forget your raincoat!"

Well, I did forget my raincoat, for, thought I, when one goes to Manchester one must do as the Mancunians do. Even so, when upon arrival I commented upon the fact that it wasn't raining, I must confess I was more than a little surprised to learn that Manchester was well towards the top of the list for maximum hours of sunshine.

And that didn't come from a Mancunian—at least, not directly!

But the truth (?) about the Manchester weather wasn't the only surprise in store. Nor was sunshine the only thing in which Manchester was towards the top of the list.

The real purpose of my visit to this go-ahead city was to obtain for "P.W." readers first-hand information about the great Northern National Radio Exhibition. And that was where the second surprise came in!

Record Wrecking.

I knew from advance information I had received that the organisers of the Manchester show (the "Manchester Evening Chronicle," in conjunction with the Radio Manufacturers' Association, and Provincial Exhibitions, Ltd.) were out this year to beat all records.

I knew, also, as those of you who read last week's "P.W." will know, that this year, coinciding appropriately enough with Manchester's change-over from a local to a National centre in the broadcasting world, the exhibition was to be the first "Northern National" show carrying with it the full support of the Radio Manufacturers' Association.

But that the ultimate result could be considered by an "Olympia-tainted" mind, quite as good as, and, indeed, in some respects even better than, the great London "show," was something I had *not* believed until I paid my first visit to the City Hall!

Then—well, come with me, spiritually, on a tour of this Northern radio-fans' paradise and you shall judge for yourself.

A Tour by Proxy.

The City Hall itself, to be quite candid, is not a particularly inviting-looking building from the outside, to say the least of it.

But outward appearances, we are told, count for nothing, and never was the statement more appropriate than in the present case.

For once you are through the entrance, the eye is almost blinded momentarily by a riot of colour entirely different from the colour-limited and all too-regular internal appearance of Olympia.

Here, unlike the London "show," exhibitions seem to have an entirely free hand in the matter of colour schemes.

Little wonder, then, when you come from the drab and uninteresting-looking exterior to this bright and cheery inside, you feel yourself almost in a new world.

An Eye-Full.

The first things that hit you in the eye as you enter are two large "Polar Bears," seated on the stand of Messrs. Wingrove and Rogers.

And as you gaze upon the scene from a point of vantage just immediately inside the door—that is crowd

(*Continued on page* 370.)

HOME-CONSTRUCTION STILL ON THE UP-GRADE

This year's Radio Exhibitions are proving beyond doubt that the popularity of home-construction is still increasing. More firms than ever are making components, and prices are becoming more and more competitive.

The coil used in the P.W. DUAL RANGER was designed by G. P. KENDALL, B.Sc.

CHIEF ENGINEER, READY RADIO.

Read what "Popular Wireless" writes:—

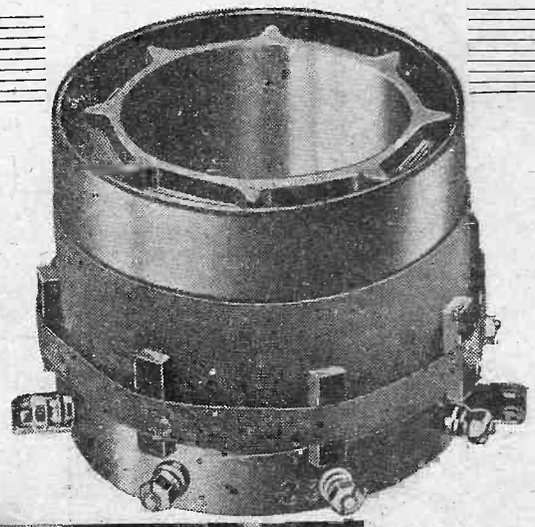
"The outstanding success of the last radio season was the Kendall Dual Range Coil."

"This Dual Range Coil undoubtedly constituted the best two-band inductance system of its time."

See pages 361 and 362 of this issue.

Be sure your coil is a genuine Kendall Dual Range Coil, obtainable only from Ready Radio. Price only 10/6

Kendall Dual Range Coils given an actual broadcast t before despatch under the pervision of the designer, . G. P. Kendall, Chief Engineer, Ready Radio.



If you require a Kendall Dual Range Coil only, use Order Form below. If you require a complete "P.W." Dual Range Kit, turn to page 363

To READY RADIO, Ltd.,
Eastnor House, Blackheath, S.E.3.

Please send me, post free, one Kendall Dual Range Coil, for which I enclose 10/6.

NAME.....

ADDRESS.....

.....

.....

P.W. 17/10/31.

WHAT I SAW AT MANCHESTER

(*Continued from page* 368.)

permitting—your eyes rest next on the gaily-decorated stand constituting the exhibit of the Pertrix people.

Then who could fail at first glance to notice the wonderful exhibit of Messrs. Cossor away on the right?

Almost mechanically one makes one's way to the Cossor stand, for it is a particularly original effort which attracts your attention the moment you enter the hall.

Some Outstanding Exhibits.

Huge cut-out letters of the name Cossor support the counters on which are to be seen their well-known kit-sets and, of course, a full range of valves.

Just across the gangway another firm well-up in the valve world are exhibiting their valves and also their kit-sets on a futurist-looking stand which is decorated in such a variety of beautiful colours that I should require almost the rest of my space to describe them!

I refer to the Mullard exhibit, and here again the counters are supported in a very ingenious way by huge models of Mullard valves.

Incidentally, I heard from one of the Mullard people that their kaleidoscopic sign up in the gallery is the only one of its kind in the world, and it is an all-British invention.

In this same gangway, a little bit farther down, is to be seen an original Oldham exhibit in the form of a large weather-gauge. You no doubt know the kind I mean—a sort of double-fronted house out of which pops either the unwelcome old man or the fair maiden. Only in this case the figures are represented by the "Lively O"—the trade mark to be seen on all the Oldham batteries.

The Ediswan people, whose stand is close by, have got a novel scheme whereby when you press a button you can read from meters the various characteristics of one of their valves.

If the crowd around this part of the show was anything to go by, that valve should be very thoroughly tested by the time the "show" is over!

There's no mistaking in which direction you should go next, even if you don't overhear, as I did, a Mancunian remark of "Ba gum, looks like an Eastern Potentate's Palace!"

Such is the Ferranti stand, and that is just about what it does look like—blue, red and gold pillars, domes and suchlike, and I take off my hat to the Ferranti people for originality of design.

It really is a very creditable effort, and if you are able to go to the show there is not much fear of your failing to agree with my verdict.

The exhibits of two other firms well-known in the radio world are almost "next door" to the "Potentate's Palace."

First we come to R.I., Ltd., with a range of Stenode receivers on an "island" in the centre of their stand, with, all round, a representative selection of their various components which we know so well.

Then there is Igranic, on whose stand, among a full range of components, is to be seen one of their big public address amplifiers.

Brilliant Colour and Decoration.

An attractive exhibit of particular interest to the home-constructor is to be seen on the Telsen stand.

Here, in addition to huge models of almost all the components they make, as well as, of course, samples of the same things normal size, there are several interesting sets made up from Telsen blueprints, which can be obtained free on request.

I think I can honestly say that I have never been to any exhibition so brilliantly coloured and so gaily decorated as this present Northern National Exhibition. And it just makes all the difference to what might otherwise tend to become a monotonous assembly.

But there is certainly nothing monotonous about this show. No two stands are alike in arrangement or colour scheme—pleasing contrast everywhere.

Big Enough to Work In!

No sooner do you turn your attention from the modernistic Ekco exhibit than you come to the Siemens' stand with its old-world atmosphere obtained by an oak-panelling effect and electric candle illuminations.

And as for the giant models, why, on one stand—that of the Westinghouse Company—almost the whole stand is built up to look like one of their metal rectifiers!

That is certainly one of the biggest models in the whole show, and to give you some idea of its size the inside of it is in use as an office!

Then there are such notable firms as Lotus, Varley, Colvern, G.E.C., Formo, Ward & Goldstone, Exide, and dozens of others, each with their own particular colour schemes and original ideas for bringing forward the merits of their lines.

I never before realised that radio was so closely allied with art!

What has particularly impressed me about this first Northern Exhibition under the National status is that much more attention has been given this year to the exhibition of components and things of general interest to the home-constructor.

The show contains as much of interest to the home-constructor as to the man who wishes to purchase anything from the cheapest commercial set to the most expensive radio-gram.

At the time of writing, I may be inclined to have my doubts about the accuracy of the first weather-criticism in this article, for it happens to be raining!

But I have no doubts whatever about the worth-whileness of a visit to the Manchester Exhibition.

It really is a good show, and if you can manage a visit, even if you have to come a hundred or two hundred miles, take my tip and come—you won't go away disappointed.

A RADIO APPEAL FROM KANSAS CITY

Capt. Georges Scapini, the blind head of the French War Veteran's Society, broadcasting an appeal from the Colonial Exhibition at Kansas City.

THE NEW "B.P." 3

	£	s.	d.
1 Ebonite Panel, 18 in. × 7 in., drilled to specification		5	6
1 "WARDOR" Cabinet to specification, with 10-in. baseboard	1	5	0
1 Lewcos Band Pass Coil		12	0
1 Lotus ·0005 Double Gang Condenser with Disc Drive	1	5	0
1 ReadiRad ·00075 Brookmans Condenser		3	6
1 A.E.D. Volume Control 500,000 ohms		8	6
1 ReadiRad on-off Switch		0	10
3 Junit Valve Holders		2	0
1 R.I. General Purpose L.F. Transformer, ratio 7-1		10	6
1 ReadiRad Standard H.F. Choke		4	6
1 R.I. General Purpose L.F. Choke		12	6
1 T.C.C. ·0003 Fixed Condenser, type 34		1	6
2 T.C.C. ·01 Fixed Condensers flat, "S" type (non-inductive)		5	0
2 T.C.C. 2-mfd. Fixed Condensers, type 50		7	8
1 ReadiRad 2-meg. Grid Leak and Holder		1	4
1 Lewcos 100,000-ohm Spaghetti Resistance		1	6
1 25,000-ohm Spaghetti Resistance		1	6
1 ReadiRad H.T. Fuse and Holder		1	3
1 ReadiRad Radiogram Snap Switch		2	9
1 Terminal Strip, 18 in. × 2 in., drilled to specification		1	6
11 Belling-Lee Indication Terminals, type "B"		5	6
1 Packet Jiffilinx for wiring		2	6
7 Belling-Lee Wander Plugs		1	2
2 Belling-Lee Spade Terminals		0	4
3 Mullard Valves to specification, PM2DX, PM1LF, PM2	1	7	6
Screws, Flex, etc.		0	8
TOTAL (including Valves and Cabinet)	**£8**	**11**	**6**

If you do not need the complete kit of parts, you can purchase any component you require separately.

Kit A (Less valves and cabinet) **£5-19-0**
or 12 equal monthly instalments of **11-0**

Kit B (With valves less cabinet) **£7-6-6**
or 12 equal monthly instalments of **13-6**

Kit C (With valves and cabinet) **£8-11-6**
or 12 equal monthly instalments of **15-9**

BATTERY EQUIPMENT

1 "B.P." Three, Kit "C"	£8	11	6
1 Pertrix 120 v. Standard H.T. Battery		15	6
1 Pertrix 9 v. Grid Bias Battery		1	6
1 Pertrix Accumulator P.X.C.3		11	0
1 British Blue Spot Speaker, type 45R	2	12	6
COMPLETE KIT	**£12**	**12**	**0**
Or 12 monthly instalments of	1	3	6

COMPLETELY ASSEMBLED RECEIVER, aerial tested and Royalties paid with all accessories for battery operation £14 2 0
Or 12 monthly instalments of 1 6 0

A.C. MAINS EQUIPMENT

1 New "B.P." Three, Kit "C"	£8	11	6
1 ReadiRad H.T. Unit and Trickle Charger	5	17	6
1 Pertrix 9 v. Grid Bias Battery		1	6
1 Pertrix Accumulator, type P.X.C.3		11	0
1 British Blue Spot Speaker, Model 100.D	3	3	0
COMPLETE KIT	**£18**	**4**	**6**
Or 12 monthly instalments of	1	15	6

COMPLETELY ASSEMBLED "B.P." THREE RECEIVER, aerial tested and Royalties paid, with A.C. Mains equipment £19 14 6
Or 12 monthly instalments of 1 16 6

INSTAMATIC OUTPUT

If you require an INSTAMAT instead of the choke-condenser output circuit add 11/2 to the cash price of Kits or 1/- per month to the Hire Purchase Terms. If you require an INSTAMAT MAJOR add £1.1.2 to the cash price of Kits or 2/- per month to the Hire Purchase Terms.

SEE PAGE 363 FOR ORDER COUPON.

Hear the "B.P." 3 and the "Dual-Ranger" demonstrated at our showrooms, 159, Borough High Street, London Bridge, S.E.1.

Cash or Easy Payments

Immediate Dispatch

BROADCASTING IN IRELAND

2. A VISIT TO STAISIUN FOIRLEATHA—2.R.N.

This week Leslie W. A. Baily, "P.W.'s" special correspondent who is touring Ireland on our behalf, describes the Dublin Broadcasting Station.

THIS is about my visit to Staisiun Foirleatha, Baile Atha Cliath. A translation thoughtfully provided in the heading of the official notepaper which invited me indicated that this means Broadcasting Station, Dublin; and, as I told you last week, I found the studios and offices of 2 R N at the Ard-oifig an Phuist, or General Post Office.

Gaelic is the official language of the Irish Free State, but although they say that it is spreading, the authorities are not blind to the fact that many people—even Irish!—do not know Gaelic; hence these translations provided on Government notepaper, on the name-plates of Dublin streets, and so forth.

The gentleman who had signed the appointment for my visit had done so in the native hieroglyphics. If you have ever seen a signature in Gaelic, you will understand why I arrived at the broadcasting station with no notion of his name. It turned out, in English, to be Seamus Clandillon, Director of Broadcasting for the Irish Free State.

When I told Mr. Clandillon about this, he retorted that his signature in Gaelic was not less clear than the signatures of certain high B.B.C. officials in English! Knowing these officials—who shall be nameless—I agreed!

Broadcasting is, of course, a valuable instrument for spreading the "national" language, but I was informed that the Government does not wish to use it as a means of propaganda, for this or anything else. The official policy is that Irish national interests should have their places in the Free State programmes along with everything else.

No Programme Delays.

Mr. Clandillon has been closely associated with such interests for many years. He is particularly well-known in Ireland for his work in reviving the old Irish folk songs.

All the members of his staff speak Gaelic, and one of them, Miss Mairead O'Grady, is a particularly fluent linguist. She has to be, because she is the announcer and has to translate from English to Gaelic at a moment's notice.

Even the engineers are all-Irish. There are four at Dublin, four at the Cork relay, and the chief engineer is Mr. T. J. Carroll, an ex-Marconi marine man.

First I visited the control-room with Mr. Carroll. The three main studios have been built round this room, so that through large plate-glass windows in three of its sides the engineer on duty can watch activities in any or all three studios. This lay-out has proved valuable as an aid to slickness, and the Dublin station claims that for absence of delays between items its programme can challenge all others in Europe.

Two Types of 'Mikes.'

The studios are equipped with both the moving-coil (magnetophone) type of microphone used by the B.B.C. years ago and the Reiss (carbon) type which they now use, but the Dublin engineers favour the former. The microphones are connected to the input of Marconi amplifiers in the control-room, the output going to land-lines joining to the Dublin and Cork transmitters.

The Dublin transmitter is a mile and a half from the studios, near Phœnix Park. It was opened in 1926, and is one of the famous Marconi Q-type sets, as used by the B.B.C. at Newcastle, Belfast, and other stations.

A wooden hut contains the transmitter (which has a Brussels wave-meter to indicate accuracy of wave-length), and the generators for providing the 6 kilowatts of power needed to drive the transmitter. The "sausage" aerial is supported between two 120 ft. poles.

I was interested to learn that the Cork transmitter is Western Electric apparatus, and is housed in a disused gaol. There is also a studio at Cork, used occasionally when local items are relayed by both the Irish Free State transmitters.

All the programme officials are concentrated at Dublin. There is a strong feminine element in the staff.

As well as Miss O'Grady, there is Miss Kathleen Roddy (Children's Hour), Miss McCarthy (secretary), and a permanent orchestra of six ladies, led by the well-known violinist, Miss Terry O'Connor. Mr. Clandillon hopes to increase the orchestra to sixteen permanently after October. The present orchestra is augmented occasionally to fifteen when opera is broadcast from the studio.

"Opera is practically as popular in Ireland as in Italy," Mr. Clandillon told me. "We have an opera company with a repertory of thirty operas, and we do them fortnightly."

For opera and orchestral concerts, No. 2 studio is used. This is a large room right at the top of the General Post Office. There is no draping, but I was told that, owing to excessive echo, it is probable that drapings will be introduced. Here, again, Dublin runs counter to the trend of activities in the B.B.C.

Ban on Politics.

Studios No. 1 (medium-sized) and No. 3 (talks) have undraped walls, but draped ceilings. The studios have a special electrically-driven ventilating plant.

Outside broadcasting in the Free State consists mostly of sports relays. Church services are never broadcast, and I was not surprised to learn that there

(*Continued on page* 376.)

THE TRANSMITTER AT DUBLIN

The transmitting hut and aerial of the Dublin broadcasting station. Dublin has a power of 1½ kw., and transmits on a wave-length of 413 metres.

THE NEW B.P. THREE

★ **W 306/2**

W 306/2 two gang complete with dial. **25/-**

Utility TUNED

Again "Popular Wireless" designers have specified 'Utility' Condensers, this time for the B.P. Three. For this fine 3-valve set the choice is Utility W 306/2, our very latest fully-screened condenser complete with trimmers.

This new condenser is so accurately made and adjusted that it is balanced within one half of one per cent. Never before has a British-made condenser with such a high efficiency ratio been available to the amateur, and he is now assured of the accurate hair-splitting tuning which is imperative if he wishes to get the utmost from his circuit.

Remember then to insist on the new Utility complete with Disc Dial, the dial specially made for it.

★ *Send a post-card for the new "Utility" Catalogue.*

WILKINS & WRIGHT LTD.

UTILITY WORKS, HOLYHEAD RD., BIRMINGHAM

AGENTS—London: E. R. Morton, Ltd., 22, Bartlett's Buildings, Holborn Circus, E.C.1; Scottish: E. B. Hammond, 113, Vincent Street, Glasgow; Lancashire and Cheshire: J. R. Lister, 93, Old Road, Blackley, Manchester; Westmorland, Cumberland, Durham, Northumberland, Yorkshire and Derbyshire: H. C. Rawson, Ltd., 100, London Road, Sheffield; South Western: Mr. Lawrence Fraser, Chelsea House, Lansdown Road, Bath.

The following represents the complete range of these wonderful condensers.

SEMI-SCREENED

W 305/2, 2 gang	**17/6**
W 305/3, 3 gang	**22/6**
W 305/4, 4 gang	**40/-**

Disc Dial 2/6 extra

TOTALLY SCREENED

W 306/2, as illustrated ...	**22/6**
W 306/3, 3 gang	**27/6**
W 306/4, 4 gang	**42/6**

Disc Dial 2/6 extra

Always insist on Utility Condensers and Switches the finest in the World.

Belmont

BROADCASTING IN IRELAND

(*Continued from page* 374.)

is a rigid ban on politics. A time-signal similar to the B.B.C.'s "six pips" is relayed from the Irish observatory at Dunsink, near Dublin.

The news arrangements are particularly interesting. The B.B.C. depends entirely on the news agencies for its supply of news, but the Dublin station taps other sources. Mr. Clarke Ryan, the news editor, sometimes goes out and obtains the reports himself, and another source of news is a short-wave receiving set in the control-room.

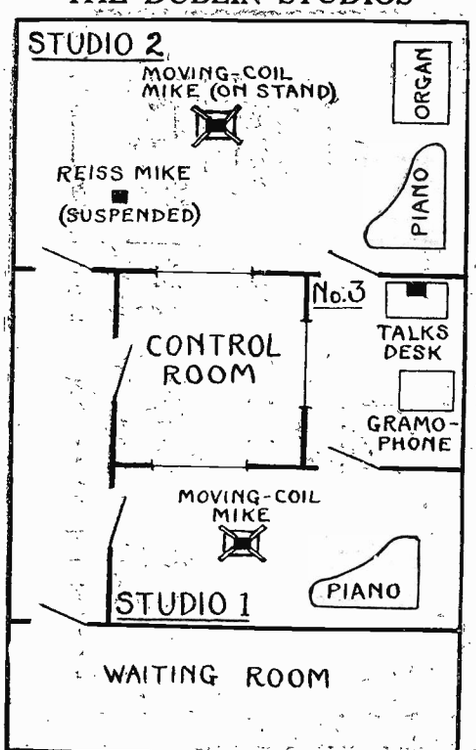
On the floor below the studios I found a spacious suite of offices, a gramophone library of 3,000 records, and a music library of 1,500 numbers. I was introduced to Mr. Seamus Hughes, the Assistant-Director, and I was told that the Music Director, Mr. Vincent O'Brien, was the man who "discovered" John McCormack.

An Interesting Experiment.

The talent for the Irish programmes is drawn mainly from the Dublin and Cork areas. As I explained last week, the Free State has only about £15,000 to spend on programmes this year. At this rate imported talent cannot be afforded.

Broadcasting in the Irish Free State is, in fact, conducted on a minor scale compared with broadcasting in Great Britain, but as an attempt at complete State control, and on account of its experiments with sponsored programmes, it is particularly interesting to England, which will have to decide five years hence whether its system—broadcasting run by an independent corporation under Royal Charter—is the best.

THE DUBLIN STUDIOS



The engineers in the control room can see into any of the studios through plate-glass windows.

Alternatives are broadcasting by private commercial companies, as in America, which means sponsored programmes, or State control. Ireland is trying both.

DUBLIN'S BROADCASTING DIRECTOR

Mr. Seamus Chandillon, Director of Broadcasting for the Irish Free State, and his wife.

PRACTICAL POINTS FOR CONSTRUCTORS

A few words concerning the selection of components.

THAT very many people do buy cheap components is evident from the number of retailers who specialise in selling them.

It is improbable however that more than half of the purchasers discriminate between those components which may safely be bought cheaply and those which afterwards are going to make one say, "I wish I had paid a little more and got results like Jones gets!"

It is, of course, obvious that if you are going to build an O-V-1 set you are treading on safer ground if you economise than if you attempt to save pence on a highly specialised 2-V-1 or super-heterodyne.

Improvised Ganging.

For instance, you can save quite a lot of money by buying variable condensers at from two to three shillings each. If you use a simple detector-L.F. set with reaction and ordinary aperiodic or auto-coupled aerial tuning, then not much harm will result from using one of these condensers.

On the other hand, if you want to use a band-pass filter with ganged control, then it is going to cause you considerable annoyance and trouble if you think to economise by purchasing two or more of these cheap condensers and improvising a method of ganging.

Also the material of the dielectric is of great importance if you are going to use high-frequency coils. Many cheap compositions are used that would cause enormous loss in a high-grade set, so that much of the signal voltage picked up by the aerial would never reach the grid of the first valve.

Moderately cheap fixed condensers may be considered quite reliable providing they bear the name of a well-known firm. Shoddy condensers always give trouble. Those of the paper type if used for decoupling and smoothing are liable to short-circuit the H.T. supply and even without complete shorting to let current leak by.

This last remark applies also to the mica variety. The result being, that when one is used for coupling in an R.C. stage, a "plus voltage" (it is connected through the anode resistance to H.T. positive, remember) leaks on to the valve and upsets all the biasing arrangements!

When it completely breaks down, the result is better imagined than described.

Tips about Transformers.

The difficult part about transformer design is to make it pass on what it receives in the correct proportions. The high notes must be there, the low notes must be there, the middle will take care of themselves as usual.

The less you pay for a nameless transformer, the worse it is likely to be.

Of two of the same price, the heavier will be the better, *providing* the core is of the same material as the other. If one core is of iron and the other of high permeability alloy, then it is scarcely possible to judge without testing.

With a cheap and inefficient L.F. transformer a valve of low internal impedance should be used, a very awkward fact seeing that the lower the impedance as a rule the higher the current, and the cheaper the transformer the less current it will comfortably handle.

That is where the resistance-feed scheme comes in again.

Yet after all it pays to pay a little more.

With regard to cheap valve holders, scarcely more can be said than that all valve holders are cheap. There is therefore little reason to go in for any of the shoddy ones. The main fault with these latter is the composition of which the holder is made.

Slow Motion Dials.

Since good valve holders are so inexpensive, the makers of shoddy stuff have not been able to secure a market in this field at any rate.

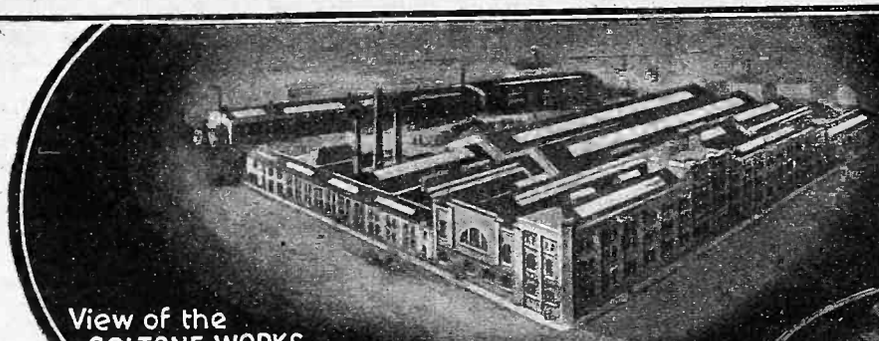
It is always best to make sure, when buying a slow-motion dial, that an end stop is provided after each half revolution. Some quite expensive makes have not this provision, with the result that the dial slips on the condenser spindle and upsets all our readings.

A second important point is to see that there is no back-lash and, because a certain dial has toothed gearing, you must not assume that it is of necessity worse than one with some other type of drive. Toothed gearing certainly admits of more errors in design through inexpert workmanship, but I know of some quite good little dials that adopt this method of reduction.

Also, see that the method of fixing to the condenser spindle (and panel if necessary) is going to result in a firm and secure grip. There's nothing worse than trying to "reach out" with an uncertain dial.

Finally, never judge a component's worth in terms of money alone. Just because an item costs less than most others, it does not necessarily follow that it is of poor quality.

ALL SPECIFIED IN THE "DUAL RANGER"



View of the GOLTONE WORKS, Pendleton, Manchester

ESTABLISHED nearly 40 years.

Goltone REGISTERED

DW/12

The combination of a most up-to-date Bakelite Moulding Plant, with an Instrument Wire Dept. of nearly 40 years' experience, enables Ward & Goldstone, Ltd., to offer "Popular Wireless" Readers, components of the highest standard at competitive prices.

The effective performance and excellency in finish of "GOLTONE" COMPONENTS leads to their specification in all "Popular Wireless" circuits.

Other components for the "Dual Ranger"
P.J. 3 Coils - - Price 2/- ea.
Wound Coil Quoits - Price 2/6 ea.

"GOLTONE" "P.W." & "M.W." DUAL RANGE COIL as illustrated, DW/12

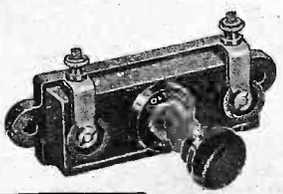
7/6

Each

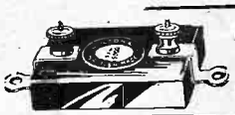
Radio Catalogue with full particulars on request.

From all First-class Radio Stores—Refuse Substitutes—If any difficulty write direct.

FROM **1/-**

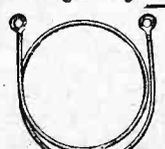


"GOLTONE" COMPRESSION TYPE CONDENSERS.



"GOLTONE" MIDGET FIXED CONDENSERS. **5D**

"GOLTONE" PUSH-PULL SWITCHES. **9D** **7D**



SPAGHETTI RESISTANCE LINKS, from **6D**

Ready drilled Panels, 16" x 8" x 3/16", mahogany. Price 7/-
Ready drilled Screen, 10" x 7" Price 2/-

Ward & Goldstone PENDLETON MANCHESTER Ltd.

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

You can embody it in your loudspeaker filter arrangement with the knowledge that you are getting all the advantages of a filter with none of the disadvantages that accompany the use of an inefficient choke.

THE EVER READY FORTNIGHT.

THE Ever Ready Co. initiated a great drive in connection with the selling of their batteries, and all over the country special window displays were to be seen competing in the trader competitions which are a feature of the campaign.

IGRANIC ANNOUNCEMENT.

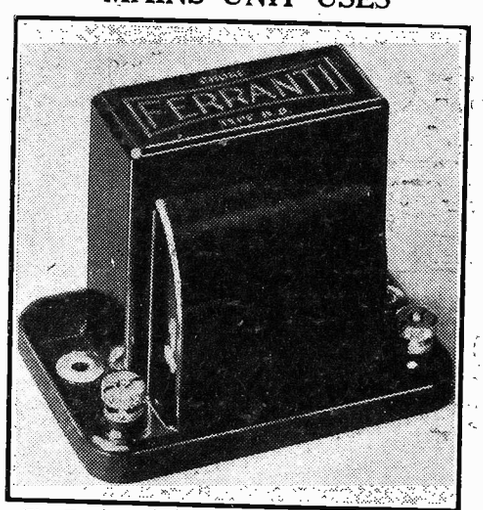
Igranic Electric Co., Ltd., announce numerous price reductions in their existing and popular lines, and the addition of a number of new components to their list.

A FINE CHOKE.

Ferranti's have produced an inexpensive L.F. choke which they list as the B 8. Remembering the reliability of Ferranti components, this B 8 appears to me to be a specially attractive line.

It is built into a cleanly finished black case, having eyeletted holes for the base-board fixing screws. The terminal screws, which are of the milled and slotted variety, are fixed at the base of the component.

MAINS UNIT USES



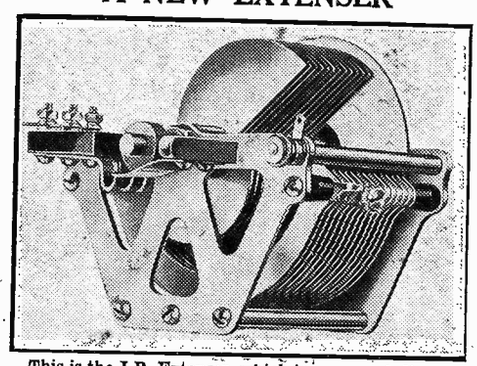
The Ferranti B 8 choke can be used in mains units, as well as in set output circuits, for it can carry up to 45 milliamperes of current.

From an electrical point of view this Ferranti B 8 choke stands out shoulders high above many others of a similar "price class." It retains a good 25 or 30 henries inductance when carrying the kind of current met in the average output stage.

"RIPOFLEX" SLEEVING.

Ripaults Ltd. are producing a varnished insulated sleeving which constructors should find very useful, particularly for the protection of leads that pass through or close to metal screening.

A NEW EXTENSER



This is the J.B. Extenser, which is now, we believe, going into production. It will undoubtedly receive a very warm welcome, for it appears to be J.B. at their very best, more than which need not be said.

"Ripoflex," as it is called, is very flexible, although it is tough, and has high insulating properties. It is available in all the standard colours at reasonable prices.

USEFUL INFORMATION.

The new Lanchester loudspeaker catalogue, published by Lanchester's Laboratories Ltd., is notable in that it contains a number of interesting and informative articles by Dr. Lanchester himself on the use of loudspeakers.

A BATTERY FOLDER.

If you are facing the problem of L.T. or H.T. battery renewals I would advise you to send for the new "Pertrix" Battery folder which succinctly describes the many types of "Pertrix" batteries that are now available.

A BRIGHT IDEA.

The new Benjamin catalogue is a fine piece of work, and besides describing the various Benjamin components in the usual way, it includes a large circuit diagram in which Benjamin valve holders and a Benjamin switch are shown byphotographically

BLUE SPOT RECEIVERS.

I have just been reading some descriptive literature that has reached me which deals with the new Blue Spot receivers. These appear to be very fine propositions and I advise readers who may be thinking of buying a set and whose advice is sought by friends on the subject, to acquire the catalogues concerned.

FORMO GANGED CONDENSER.

One of the most interesting condenser productions of the year is the Formo gang with a shadow indicator. This is available in two- and three-gang assemblies, and the main features of design are found in both.

PLEASE NOTE.

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

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

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

By means of an ingenious arrangement of a semi-transparent scale and indicator light, the readings are sharply defined by a shadow moving through the scale.

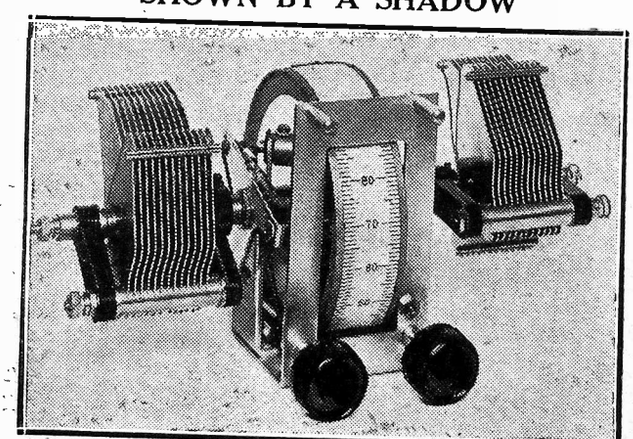
There are two control knobs symmetrically placed towards the bottom of an artistic escutcheon. The one simultaneously adjusts all rotors and actuates the scale, and the other applies a trimming movement to the fixed vanes of one section.

This trimming movement is of generous proportions, and should be able to cope with any normal circuit discrepancy.

The main drive, which is accomplished through a kind of belt, is exceptionally smooth.

Altogether, the "Formo" gang is a notable piece of modern radio engineering.

SHOWN BY A SHADOW



The "pointer" is actually behind the scale and its shadow is thrown on this by the lamp the base of which is seen in the photo.

A Valveless Amplifier!

—well-known inventor's brilliant achievement

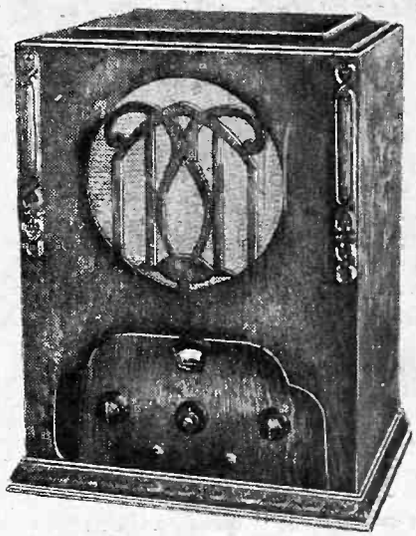
The "Microbox" is one of the latest inventions of Mr. S. G. Brown, F.R.S., inventor of the very first loudspeaker, and a host of other devices, including the already famous Battery Superseder, which he introduced at this year's Radio Show. The "Microbox" is no bigger than the ordinary pick-up, yet it is a self-contained amplifier producing all the volume and rich tone of an expensive multi-valve reproducer. All you have to do is to change your present gramophone tone-arm and sound-box for the "Microbox" and connect it up to your loudspeaker. The little power required (10 volts at ½ amp.) can easily be supplied by a small accumulator. The only other component required—a transformer—is supplied with the "Microbox." The price of the two complete is 3 gns.

The MICROBOX combines pick-up and amplifier on the microphone principle. Price (with transformer) **3** Gns. (or 9 payments of 8/6).
Mains unit. A.C. £3/15/0. D.C. £3/3/0.

Is yours a popular 'kit'?

—if so, here's something to interest you!

Excellent idea—the Kit. But not quite perfect unless you get a speaker worthy of the set, and a hiding place for your batteries. Well, you can get both in an S. G. Brown Kit-Cabinet Speaker. These S. G. Brown KIT-CABINET SPEAKERS are definitely built to save you time and trouble—and money. Scarcely worth while to make your own when you can walk away with one of ours having spent so little.
They are priced from only 39/6. (See photograph and full description on right.)

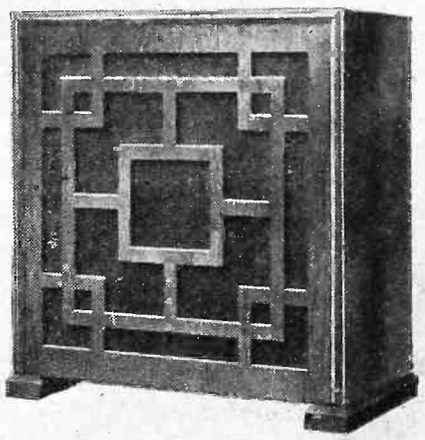


KIT-CABINETS.
MODEL 1. For Mullard 1932 3-valve Kit or Radio for the Million V.3 Kit (incorporates S. G. Brown SOLO Speaker). Price **47/6** (or 6 monthly payments of 10/-).
MODEL 2. Stand-on KIT-CAB. for 1932 Melody Maker, Osram 1932 Music Magnet, etc. Price (with Brown SOLO Speaker), 39/6 (or 6 monthly payments of 8/-.)

Is your set 'muffled' by your loudspeaker?

—ten to one you'll answer 'No'—but are you sure?

Improvements in loudspeaker design have recently been so rapid that speakers which were the last word three years ago sound amazingly inefficient when heard beside such speakers as the new S. G. Brown permanent magnet moving coil (which costs only £4/7/6). Nine people out of every ten "muffle" perfectly good sets with old-fashioned speakers—and don't realise it. Are you quite sure you are not one of them? Go to your dealer and hear the new S. G. Brown Speakers for yourself. You'll know then whether you are doing your set justice, or not.



S. G. BROWN PERMANENT MAGNET MOVING COIL UNIT costs £4/7/6. Complete with handsome cabinet shown it costs **£4/19/6** (or 8 monthly payments of 13/6).

Send to 19 Mortimer Street, W.1, for free leaflet describing the FAITHFUL MODELS MADE BY

Yours faithfully

FAITHFUL RADIO **S. G. Brown**

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

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

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

QUESTIONS AND ANSWERS

THE ANODE RESISTANCE FOR THE "POP-VOX."

T. T. S. (Cardiff).—"I would like to use an 80,000-ohm wire-wound anode resistance in the 'Pop-Vox,' instead of the 100,000 shown. Can this be done successfully, and if so, do I have to make the 10,000-ohm spaghetti in series with it a 30,000, or what?"

You can use the 80,000 instead of the 100,000, but there is no need to alter the value of the 10,000-ohms resistance as well. It would be better left at 10,000.

THE "COMET" THREE.

The following letters to the Editor are of such general interest to builders of the "Comet" and similar sets that we are reproducing them here instead of in the "Correspondence" columns:

The Editor, POPULAR WIRELESS.

Dear sir,—Referring to the reply given to E. C. F. (Liverpool) in your "Radiotorial" of September 26th. I experienced the same trouble with my "Comet" Three—that is, no reaction on long waves. At first I suspected the coil, but this was found to be O.K. Next the .002 compression condenser fell under suspicion, but found not guilty. These two items being O.K., the reaction condenser had to come out, and although this was of a reputable make, and was stated to be .00015 capacity, I now have my doubts, because the insertion of a .0002 condenser of the same make immediately gave reaction effects over the whole of the long-wave band, where previously there had been none. Another alteration which gave a great improvement on both wave-bands was the substitution of a P.M.2 D.X. valve for one of the H.F. type.

E. C. F. may find that his lack of reaction may be due to the same cause as that found in my set. So perhaps you would be kind enough to draw his attention to this letter.

Wishing the "P.W." and other wireless journals from the same "stable" every success.

Yours faithfully,
R. E. F. (Bletchley).

The Editor, POPULAR WIRELESS

Sir,—I notice that a number of your readers seem to find difficulty in obtaining satisfactory reception of long-wave stations on the "Comet"

(*Continued on page* 384.)

YOUR BIT TOWARDS ECONOMY

Have you ever thought how difficult it is for a newsagent to order just the right number of copies of any particular paper each week? You can make his task much easier if you place a regular order with him. You will not only help him to order correctly and avoid waste but will make sure of getting your copy regularly each week.

RADIOTORIAL QUESTIONS AND ANSWERS

(*Continued from page 382.*)

Three. In my own experience the "Comet" brings in the long-wavers fairly well. It may be of interest to other readers to learn of two little things which enhanced the value of my own "Comet" (built exactly to the "P.W." specification).

TWO TIPS WORTH TRYING.

(1) I found the detector valve (H.L.210) set up bad microphonic howls, and gave no reaction on long waves, but I transposed this valve and the L.F. valve (L.210), using the latter as detector, and both troubles disappeared. (The—L.210, by the way, required practically no G.B.)

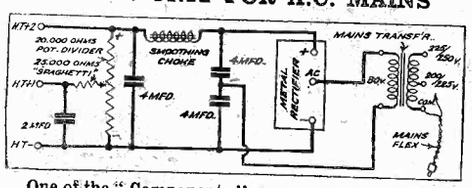
(2) The spaghetti resistance between the first transformer and detector valve was very troublesome, causing crackling noises, especially if touched by hand or any other substance. Several makes of spaghetti resistance were tried, with no improvement; but on the resistance being dispensed with entirely, everything was O.K.

Yours sincerely,
H. W. B. (Southampton).

[Will E. N. (Chertsey) and others please note that directions for changing the "Comet" to "Inter-wave" coupling were given in "P.W." No. 486 (September 26th, 1931), and for using P.J. coils instead of the dual-range type in "P.W." No. 488 (October 10th, 1931).]

MISSING LINKS, No. 19

AN H.T. UNIT FOR A.C. MAINS



One of the "Components" was purposely omitted from last week's diagram, and here it is shown to be the smoothing choke, connected between two of the 4-mfd. condensers.

MILLIAMMETER KICKS AND THE DISTORTION THEY INDICATE.

L. T. T. (East Grinstead, Sussex).—"My set has for years had a milliammeter in the plate circuit of the last valve, with facilities for taking it out of that position and placing it in the H.T. negative lead, also between detector's choke and primary, etc.

"It has proved of great assistance in checking H.T. supply, lost emission, and so on, but I have never been quite clear on the method of checking distortion with it.

"I am told that if it 'kicks' distortion is taking place. Why should it 'kick' because of that, as surely the plate current is fixed by grid bias and H.T. voltages, and it is the plate current that the milliammeter measures? Also, about upward and downward kicks. I have seen it stated in 'Radiotorial' that if the needle kicks up, grid bias is too high. But Mr. English says, in his article on 'Measuring the Power Supply' (page 240), that if the needle kicks up insufficient grid bias is applied. I should be glad if you could explain in simple words why the needle kicks at all, and also what it indicates when the kicks are up or downwards."

The best way to look at it will be from the point of view of the milliammeter itself. Its sole task in life is to indicate the current flowing through it, so when it is connected in the plate circuit of the last valve we expect it to show how many milliamps. are flowing there. These, as you know, depend on anode voltage and G.B.

In a typical case we might have an anode voltage of 200, with 20 milliamps indicated on the milliammeter when grid bias was fixed at 20.

With these figures in mind, what do you think would happen if you altered grid bias to 10? Your own experience will tell you that anode current, as shown on the meter, would immediately *increase*.

Probably you would get about 40 or 45 milliamps. instead of 20 (the H.T. being left exactly the same as before), showing that *reduced* grid bias *increases* plate current.

While you were at it you might try the reverse process. This time increase grid bias up to, say, 30 or 40 volts, again leaving H.T. at 200 as before. One glance at your milliammeter shows that *increased* grid bias *reduces* the plate current.

Once having firmly grasped that relationship, you can apply it in the case of the kicking milliammeter. When it kicks *upwards* you can say to

(*Continued on page 386.*)

WHAT'S THE MATTER WITH THE SET?

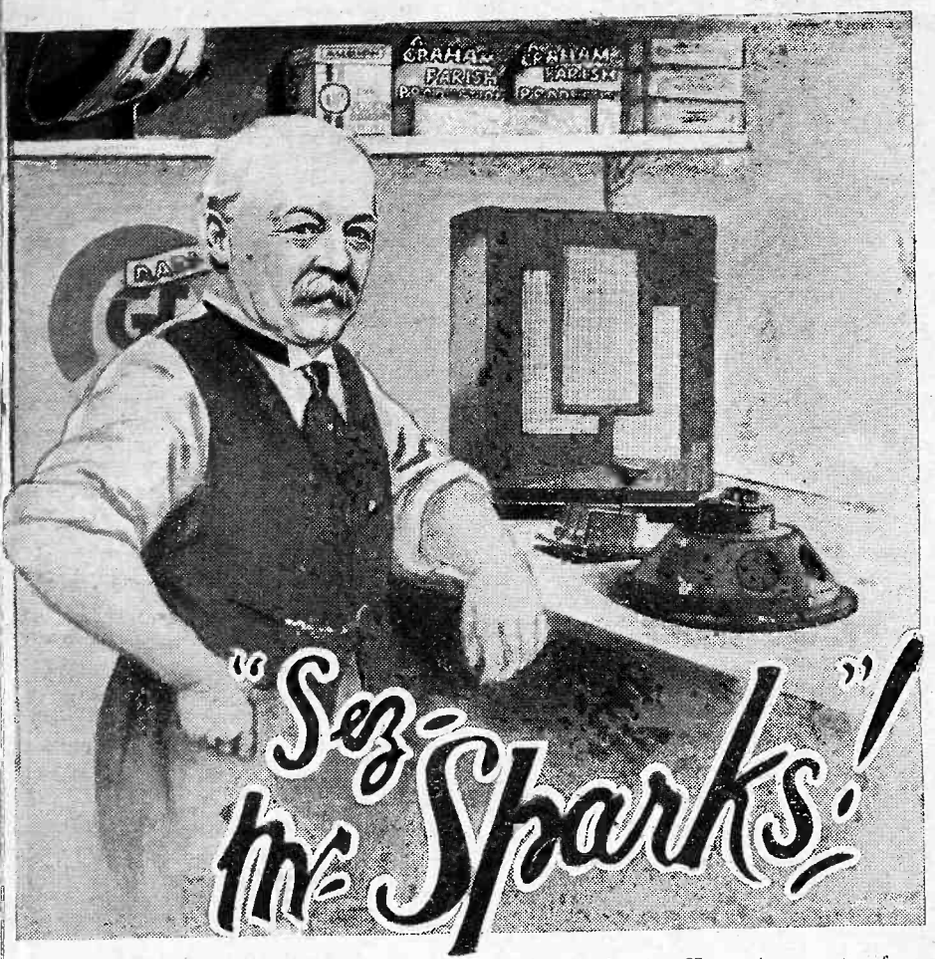
Perhaps the switching doesn't work properly? Or some mysterious noise has appeared and is spoiling your radio reception?—or one of the batteries seems to run down much faster than formerly?

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.

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

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



"MR. SPARKS," that's what they call me, sir, and I may say I'm proud of it. People don't give you a name like that unless they have a bit of respect for you, do they now, and a bit of a warm spot for you too, specially the ladies.

"Ladies? Why yes, sir, hundreds of 'em come in here. Y'see in a general way they're a bit cautious—don't want to be talked into buying a thing they don't understand, in a manner of speaking, so they makes quite sure who they're dealing with. Yes, sir, I reckon I've more lady customers than any dealer for miles around.

"Same with the gents—they come in more of an evening, of course, sometimes for a bit of advice or a few things for their set, but pretty near everyone asks my advice and, what's more, takes it too.

"What it comes to is this, I never to my knowledge let a customer down. I take care to have nothing here that isn't first class—it don't pay—not when you've a reputation to consider. Once or twice I've been caught. You've got to only handle goods what have a good name behind them, and what'll be a credit to you.

"Take this little 'SNAP' Speaker Unit fr'instance now—I only just got 'em in, but I knew it 'ud be all right directly I saw it on Graham Farish's Stand at Olympia. I even fixed one up to demonstrate without first testing it—and listen! Cost's five-and-six and as good as many at thirty bob!

"Same with all their goods—never get a complaint; they're just as particular as I am about the stuff they sells. So I just tells every customer the same—if you want to be sure always use Graham Farish components. They costs no more and you know where you are without mucking about. Yes, sir, most of my customers is just as keen on Graham Farish now as what I am.

"You see, where it is these Graham Farish people make pretty near everything barring sets and eliminators—they're specialists at the game—been at it for years.

"If it's a speaker you want, here you are. 'Amazing' they call it—it's as true a description as you could find—42/-, or perhaps you want to build your own cabinet? Right! Here's their A.C.4 Chassis at 21/-. I always use their pick-up for selling Gramophone records 'cause every note comes out as if I had a performer here—32/6 they cost, and many a customer for a record or two has taken a pick-up with him—then I sell more records than ever.

"But when it comes to building sets—well, all the papers can tell you how, and pretty easy it is—if you put good stuff in—and good stuff means Graham Farish."

"You seem very keen on Graham Farish, Mr. Sparks."

"You're right there, sir, I am—I'm a bit too old to be bothered about sets that don't work when my customers build 'em, and I feel kind of responsible for the goods they use, so I always tell 'em to use Graham Farish parts, or I won't answer for the results."

Mr. Sparks will be happy to enlarge in these columns on topics of mutual interest to the readers of "Popular Wireless" and Graham Farish Limited, and a postcard to him, care of Graham Farish Ltd., will receive his careful consideration. The directors of Graham Farish Ltd. beg to state that the above article is intended to advertise their goods; they hope that Mr. Sparks will prove a popular and entertaining personality and that their endeavour to combine business with pleasure will be appreciated.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 384)

yourself: "Hullo! Current has increased! Does that mean grid bias has been decreased?"

If, on the other hand, the needle kicks *down* to a lower value, you know that such an effect could be caused by *raising* the grid-bias voltage.

Next, remember that all the time the set is receiving a programme, voltages are being placed on the grid.

And when we consider those applied "programme" voltages, and their effects on anode current, we get to the heart of the matter.

The first point to bear in mind is that, unlike the true grid bias, these "programme" voltages are *alternating*, and every *positive* volt is *instantly* cancelled by a *negative* volt.

If a note is coming along in the form of, say, a 1,000-times-a-second alternating positive and negative voltage variations, it is obvious all the positive voltages will immediately balance out all the negatives.

So the effect of a programme on the grid is really to alter the grid bias all the time, by *equal* positive and negative variations. And that promptly alters the plate current all the time, increasing and decreasing it.

But you will notice that in spite of all these changes the *average* grid bias will remain as it was to begin with. And the *average* plate current, also, has all its increases wiped out by all its decreases.

So we can expect the milliammeter to remain perfectly steady even when the programme is tuned-in strongly. Which is exactly what happens *when there is no distortion.*

But when the milliammeter kicks up or down it shows there *is* distortion.

It shows that the equal and opposite voltage variations on the grid are *not* being accompanied by equal and opposite variations in plate current. And a common reason for that fault is incorrect grid bias.

You can easily see why if you examine the valve's "curve." It shows that over one straight portion of the curve equal grid voltage changes produce corresponding equal increases and decreases in anode current. But the valve must be biased to the centre of its straight portion to the left of zero grid volts, or the plate current will not always vary equally with grid volts.

It may for small values, but not for big ones.

Suppose you start with a valve that is *biased too strongly* negative. What will be the effect on plate current and the milliammeter.

When the alternating voltages come along, the *positive* voltages increase the plate current by, say, 20 milliamps; but the negative impulses, equally large in themselves, cannot likewise reduce the plate current by 20 milliamps to correspond, because the valve is not working "on the straight." The current may drop only 18 milliamps.

So the effect is that the negative voltages do not now completely cancel the effect of the positive voltages, but the latter are allowed to increase the *average* grid bias to some extent. And therefore up goes the plate current a little.

Consequently, the milliammeter kicks "up"—in this case about 1 milliampere.

The opposite case is true, also. If there is too little grid bias to begin with, the negative "programme" voltages will be able to create their corresponding decreases in plate current, all right, but the positive "programme" voltages will not give the full corresponding rise in plate current.

So the equal alternating voltages will have an unequal effect on current. The *average* plate current will in this case be somewhat lowered. So the milliammeter will "kick down."

It is, of course, a somewhat involved process to explain without a diagram, but if you read the foregoing with a valve curve in front of you, you should have no difficulty in seeing the reason for the kicks, and what their direction indicates.

You will note, too, that the statement in Mr. Englsir's article was inaccurate. It should have read: "If the needle kicks *downwards* insufficient grid bias is indicated, while upward deflections indicate the reverse."

CONNECTIONS FOR AN S.G. VALVE.

A. P. T. (Portsmouth).—"I cannot get my S.G. H.F. amplifier to work. The circuit was given to me by an acquaintance who has a set like mine, and he got wonderful results with it. I have not actually seen his set, but he told me the dimensions of the cabinet for the unit and sent me a theoretical circuit to wire up.

"I am enclosing this, and also the layout, as I have got it wired in practice. Why is it that it will not work?"

TECHNICAL TWISTERS

No. 83. WIRING A.C. VALVES.

CAN YOU FILL IN THE MISSING LETTERS?

As the heater current taken by A.C. valves is much . . . . . than for battery valves, the wiring should be arranged accordingly.

* * *

It should be as short as possible, and of low . . . . . to keep the voltage drop as low as possible.

* * *

To obviate hum being introduced into the set . . . . . flex is usually recommended.

* * *

It is generally advantageous to employ the "armoured" variety of wire, and to . . . . . this coating to prevent unwanted interaction.

Last week's missing figures (in order) were: 186,000. 300,000,000. 300. 300,000,000.

Your trouble is due to the fact that you have confused the screening grid and the plate terminal of the S.G. valve. As you know, the anode output from the *ordinary* three-electrode valve comes from the *plate* pin (which is opposite the grid pin on the valve holder). The S.G. valve has a screened grid as well as the ordinary grid, and it also has an extra terminal on the top of the valve. You have wired up on the assumption that the extra terminal on the top of the valve is connected internally to the extra grid of the valve. That is wrong, it goes to the plate.

THE NEW TUNGSRAM POWER DETECTORS

TUNGSRAM BARIUM VALVES

T.3123.

Here are three types from the complete new Tungsram range, particularly suitable for portable receivers: PD220, a new and specially designed anti-microphonic detector valve; P220, a new and extremely efficient low current consumption power valve; L210, an entirely new valve which is mainly suitable as detector or first low frequency amplifier. Characteristics are given below.

Type	Fil. Volts.	Fil. Amps.	Max. H.T. Volts.	Amp Factor.	Anode Resistance (Ohms).	Mutual Cond. m/a V.	Price
L210	2	·1	200	16	16,000	1·0	5/6
*PD220	2	·2	150	17	10,000	1·7	6/3
*P220	2	·2	150	7	4,500	1·5	7/9

*These types will be generally released during the early part of the season

Write to Dept S.T.3 for full particulars of the complete new range. Prices from 5/6 to 19/-.

Tungsram Barium Valves are manufactured under one or more of the following Patent Nos.: 289,762, 289,763, 311,705, and 313,151.

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

Makers of the famous Tungsram Electric Lamps.

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

Lamp, Valve and Glass Factories: Austria, Czecho-Slovakia, Hungary, Italy and Poland.
I.F.S. Organisation, Tungsram Lamps & Radio, Ltd., 11, Burgh Quay, Dublin.
Tungsram photo-electric cells: Nava "E" (for scientific measurement), £2 17s. 6d.; Nava "R" Red sensitive cell (for colour matching devices), £3 3s.; Nava "EH" (for talkie work), £3 13s. 6d.

TUNGSRAM

THE NEW 2 VOLT SUPER DETECTOR AND POWER VALVES

101 HINTS AND TIPS

(Continued from page 352.)

Do not neglect the adjusting screw on your loudspeaker, as the exact distance of the permanent magnet from the diaphragm (controlled by this) is of great importance in getting maximum sensitivity.

* * *

If one of your telephone earpieces breaks down, remember that a wire across its two terminals may enable you to listen to the conclusion of the programme on the one earpiece.

* * *

Remember that great care is necessary in the handling of electric light wiring. It should not be undertaken by inexperienced persons.

* * *

When using mains units, remember that safety fuses are cheap and easily fitted, and that such apparatus should never be left at the mercy of inexperienced people or children.

* * *

On no account connect up a mains unit without reading the manufacturer's directions carefully, as serious damage may be caused by wrong connections.

Checking Charging.

A good voltmeter enables you to run the set economically, and not only indicates when battery renewal or re-charge are necessary, but enables you to check the work of the re-charging station.

* * *

If you use an H.T. mains unit, you should always switch this off when you switch the set off, and not rely on the on-off switch of the set to break both circuits.

* * *

A spare fixed condenser (·001 will do) fitted between the aerial terminal and the aerial lead is a worth-while precaution on valve sets which take their H.T. from D.C. mains.

If you are unable to get reaction when your condenser is all in, except towards the lower end of your tuning range, a small fixed condenser, usually ·0001 or less, connected across the reaction condenser is an improvisation worth trying.

* * *

A grid leak inserted between the grid of the first L.F. valve and the wiring to this is useful in obviating troubles due to H.F. superimposed on L.F. (The value of the resistance should be about a quarter of a megohm.)

* * *

Trouble with reaction overlap is often due to the wrong H.T. voltage on the detector, to an unsuitable detector valve, or to a grid leak of wrong resistance.

* * *

Do not assume that a short-wave circuit is no good for long-distance reception owing to ploppy reaction until you have tried varying the H.T. voltages on the detector, a different valve, wide variations of aerial coupling, variable control of filament resistance, and a small indoor aerial.

* * *

If a lead pencil of the HHH or HHHH hard type is soaked in water and half the wood removed, the lead itself embedded in the wood will be found to make a satisfactory emergency resistance for a potentiometer or similar purpose.

Too much reaction is worse than none at all, for it is impossible to hear long-distance or good quality signals if your set is oscillating.

* * *

If you are interested in short-wave reception, but do not wish to build a special set for this, do not forget the possibilities of the "P.W." "Antipodes Adaptor," which plugs into your ordinary set and enables it to receive short-wave stations.

Tuning A Short-waver.

For accurate tuning on a short-wave set there are many advantages in mounting a small magnifying glass over the tuning-dial scale.

* * *

A useful safeguard against threshold howl in a short-wave set is the provision of a ·5-megohm resistance across the secondary of the L.F. transformer.

* * *

One of the best methods of arranging a loudspeaker extension is by means of a plug and jack, the jack being of the type in which the circuit is closed when the loudspeaker plug is withdrawn from it.

* * *

Arc lamps as used for "sunlight" ray treatment are capable of causing tremendous interference with near-by receiving sets.

* * *

The most important wires in a short-wave set are those from the grid to the tuned circuit

"P.W." PANELS. No. 41—SHORT WAVES.

In addition to ordinary broadcasting, intended to cover areas adjacent to the broadcasting station, "short" waves are used for transmission to very distant places.

* * *

Great Britain has a short-wave station at Chelmsford, to link it with the Empire.

* * *

Although Chelmsford's programmes are not heard well in this country, the short wave-length used (25·53 metres) enables the transmissions to be picked up in places like India, Africa, America and Australia, when special short-wave coils are used for tuning.

THE REGENTONE TWO-VALVER

A remarkably inexpensive and efficient all-mains receiver described by F. BRIGGS.

THE new Regentone two-valve receiver is designed for all-mains working, and will work on A.C. supplies of any voltage between 200 and 250 volts. Built into a moulded bakelite case, it is one of the "nattiest" sets I have seen, although it will work a large moving-coil speaker with ease, giving more than sufficient volume for ordinary domestic purposes.

Free from Hum.

The receiver employs a metal rectifier and is remarkably free from mains hum. Only by placing one's ear close to the loud speaker is it possible to hear the smallest trace of ripple and then only when there is no broadcasting going on.

Now, turning to the back of the receiver, eight plug holes will be found. There are three marked as follows, A1, A2 and A3, these being for the aerial. The first is only used when the receiver is situated close to a powerful broadcasting station, and when maximum selectivity is required. The second is for average conditions, and the last when an indoor aerial or a very short outdoor aerial is employed.

The remaining plug sockets are one for the earth connection, two for a pick-up, if required, and two more for the loudspeaker. The three controls on the front panel are also very conveniently arranged.

On the extreme right is the wave-change switch and on the opposite side is the reaction control. The single tuning knob is situated right in the centre of the panel.

In operation, the set is extremely easy to handle and the merest novice should not have the slightest difficulty in handling it. At a distance of approximately twelve miles from the two London transmitters no difficulty was experienced in separating the programmes with the aerial, which was a fairly large one, plugged in the A2 socket.

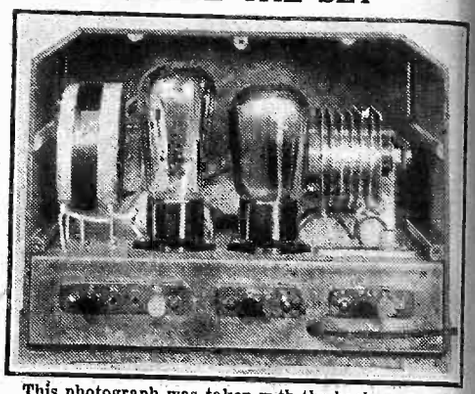
The quality from the two local transmissions, as heard on a good moving-coil speaker, was first class.

By using a "spot" of reaction it was fairly easy to bring a few of the more powerful foreigners as well. Among these Rome, Brussels and Radio Paris were particularly good, the latter came in at good loud speaker strength at all times of the day.

ATTRACTIVE APPEARANCE

The Regentone A.C. set is built into a beautifully moulded bakelite case, and the controls are few in number and very easy to manipulate.

INSIDE THE SET



This photograph was taken with the back removed and clearly shows all the "innards." Note the dry rectifier on the right.

Wide Wave Range.

The wave-range covered is more than adequate. With the aerial connected to the A2 socket stations down to about 200 metres could be received, while the other end of the tuning condenser took one up to about 650 metres, which is well above the medium broadcasting band. On the long waves, zero on the pointer represented 850 metres, and with the knob turned right round to the maximum, 2,400 metres was reached.

Altogether the Regentone 2-valve set is a fine proposition and is representative of the best practice in up-to-the-minute British radio.

FOR THE LISTENER

(*Continued from page* 344.)

themselves to Radio production. Others because of the weakness of the actors. But most of the failures have been due to the fact that the plays were poor plays in themselves. A poor play will never make good Radio.

What is a good play? Mr. Bernard Shaw has said that a play must contain 'a story and some characters.' A good play, therefore, must contain a good story and some good characters.

The characters must be interesting and well drawn. This is required in any good play, radio or otherwise. If a character is not interesting, that part of the play is dead.

Froth and Bubble.

The control panel can do pretty well what it likes with him; you can hear him driving furiously in a taxi along a road, or even more furiously in an aeroplane through the sky; he can hold conversations with ghosts and goblins; he can be in London one moment, in Arabia the next, in the South Seas the next after that; you can shoot him out of a gun to the Moon, or back into the year 1000 B.C., or forward into the year A.D. 4000; but if you are not interested in him, and don't really care whether he is dead or alive, all this will be mere froth and bubble, a mechanical excitement; it won't be a play.

He might as well be a sack of potatoes; and though it would be exciting enough to see a sack of potatoes shot to the Moon, you couldn't make a play out of it. It is the characters which make and play, and your interest in them keeps the play moving.

I often wonder how many persons listen to the Radio Plays. Comparatively few, I think. Not so many as listen to the vaudeville programmes, for example, or the Symphony Concerts. A few thousands, perhaps.

Most of these, I imagine, listen because they are fond of plays. Country folk very likely, who rarely get to a decent theatre. They have every right to be catered for. They must, in my view, be fed with good plays.

Stunts, Spooks, and Pageants.

I think that the Dramatic Section of the B.B.C. ought to make up its mind what sort of an audience it wants to cater for, and to concentrate on that. Out of the millions of listeners, it can in time get what audience it likes.

Nothing is so much wanted in the dramatic world just now as the creation of an audience which will demand plays of the highest possible order. There is no reason why the B.B.C. should not become, in this part of it, a kind of National Theatre, devoted to the provision of first-rate plays, old and new, if they are such as can be well produced in its medium.

But it seems to me to lack policy. We get plays of all sorts, good, bad, and indifferent. We get kaleidoscopic plays, pageant-plays, spook plays, Shakespeare cut into shreds, stunt plays without so much idea in them as would buy a penn'orth of second-hand toffee; and so on. I suppose the idea is to spread the net wide, and to catch as many listeners as possible. Along such a line I do not think we shall ever get anywhere.

(*Continued on next page.*)

FOR THE LISTENER

(Continued from previous page.)

I listen to most Radio Plays, partly because I like plays and partly because it is my job. I confess that, if it were not my job, I shouldn't listen to so many as I do.

I should have switched out of "The Lost Cause" at the end of the first five minutes. Because, as a play-lover, I ask first of all for good plays; well-constructed stories, with living, interesting characters.

I venture to suggest to the organisers of the Dramatic Section that it is worth while catering for me, and for listeners who are play-lovers like me. It would be better to build up an audience of listeners like us, and play up to us with the best material possible; to make a regular audience of us; rather than to spread the net, baiting it with stunts and curiosities, in the hope of catching Tom, Dick and Harry for an odd night or two—whose interest is not in plays, but merely in being tickled and amused for the moment.

MIRROR OF THE B.B.C.

(Continued from page 344.)

The author has changed his mind and withdrawn permission for a radio version of the play, which might have been very awkward were it not that sufficient time still remains to arrange something else for Mr. Robeson.

The famous Negro singer will now appear in a composite programme based upon the song and story of his race, the first half of which will consist of a revival of "Gods Trombones," which he gave about two months ago.

The other part of the programme will trace the expression of the Negro genius in English song and story from Uncle Remus to the jazz rhythmic songs, and listeners will hear Robeson sing Blues for the first time. I understand he will also give a recital of Vachell Lindsay's poem "Congo." The programme will be given on Friday, October 23rd, and repeated the following evening.

Vaudeville entertainments are showing a distinct improvement since the end of the summer holidays brought back to London many well-known artistes.

Good Vaudeville Coming.

This type of entertainment is still the most popular part of the broadcast programmes, irrespective of the fact that the all-round standard of excellence in broadcasting material has improved out of all recognition when listeners voted vaudeville to be what they wanted most two years ago.

The B.B.C. is well aware of our preferences in this direction, and intends to put on an average of two first-class shows each week during the winter, as well as a regular series of radio revues and other light features. Tuesday, October 20th, has a particularly good bill when Edith Day of "Rose Marie" fame and Robert Naylor (Tauber's understudy in "The Land of Smiles"), who have joined forces in a variety act, will make their first appearance together before the microphone. Geoffrey Gwyther, Isobel Elsom and Harold French, The Two Pairs, Clapham and Dwyer and eight members of the Male Voice Chorus will also take part. Wish Wynne and Dorothy McBlain are also appearing in another vaudeville programme the same week.

TECHNICAL NOTES

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

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

A Ganging Fallacy.

THERE is a popular idea that the two halves of a band-pass filter must necessarily be tuned simultaneously—by ganging their controls. This, however, is not so, and where ganging is used it is merely for the sake of ease of control.

There is no particular reason, apart from this, why the two parts of the filter should not be operated separately if desired. People often think that if they are not operated by ganged control, the proper action of the band-pass filter is lost.

Coupling for Selectivity.

This brings us to the general question of coupling circuits for the purpose of obtaining selectivity and I daresay some readers may also have the idea that the addition of a coupled circuit is a complicated business, or may have some adverse effect upon the original circuit.

As a matter of fact, however, it is often quite simple to add a coupled circuit and, although there will be a reduction of signal strength due to the interposition of the additional circuit, this need not be serious and is often more than counterbalanced by the extra selectivity which is gained.

For instance, take the case where the tuned circuit consists simply of the conventional coil and variable condenser, the aerial being connected to a tapping on the coil. Now, if another tuned circuit is introduced before this circuit, it is only necessary to remove the aerial connection from the tapped coil and connect it instead to the appropriate tapping on the coil of the additional tuned circuit, this circuit being then coupled through a (variable) condenser to a tapping on the coil of the original circuit.

There are thus three variable condensers, one in each of the two tuned circuits and one for the coupling. Of course, the aerial need not be connected directly to a tapping of the coil of the additional circuit, but may be coupled to the coil in any of the well-known ways.

Varying the Coupling.

With an arrangement of this sort, the amount of the coupling can be varied by adjustments of the coupling condenser. If the capacity is made very low, the coupling will be weak, and the signal strength will be cut down, although on the other hand the selectivity will be increased. Conversely as the coupling is increased, the signal strength will be improved, but the selectivity will not be so sharp.

There is, however, a limit to the extent to which you can go on increasing the coupling, for there comes a point where the separate resonances of the two circuits become pronounced; in other words, the whole circuit shows double-tuning.

(Continued on next page.)

TECHNICAL NOTES

(Continued from previous page.)

This is an effect often found with coupled circuits and although theoretically you can go on increasing the coupling beyond this point, there is no practical advantage in doing so.

There are, of course, many variations of the coupled circuit, of which the foregoing is one of the simplest examples. Beyond certain precautions for special cases, however, there is nothing difficult about the addition of tuned circuits, and if your set is not sufficiently selective, it is well worth while to consider going in for something of this kind.

Using the Controls.

The question of selectivity is closely bound up with the question of tuning and of getting the greatest number of stations of which your set is capable. I often find that people complain that their sets will not bring in a sufficient number of stations when, in point of fact, all that is necessary is attention to a few details, often overlooked.

Many people think that it should only be necessary to turn the tuning control, or controls, including reaction, and stations should come tumbling in. Well, of course, this is the ideal to be aimed at, but before you can expect this, you have to be sure that the set itself has been brought to the proper state of efficiency.

Let us consider the controls in the broad sense. There is the simple set with only one tuned circuit and reaction. Then there is the set with an H.F. stage, having two tuning controls, one for the H.F. and one for the detector, as well as a reaction control. Then there is the set with one tuning control operating two or three ganged circuits and also a reaction control.

Bringing Them In

If results are not satisfactory with the first type of set, you may turn your attention first of all to a band-pass tuner or wave-trap on the lines I mentioned earlier in these Notes. When you turn the tuning control, probably you pass over a succession of squeaks, and if so you have to find out why it is that these carrier-waves pass by in the form of squeaks instead of coming in as stations.

The reaction must, of course, be smooth and the set must not "plop" in and out of oscillation. Possibly the value of the high-tension on the detector requires altering, whilst again another very common fault—if the reaction is misbehaving—is too low a value of grid leak.

Another thing to try is a variable bias on the grid, by means of a potentiometer: this often helps considerably in obtaining smooth reaction. Make sure also that the value of the reaction condenser is not too large.

Tuning and Reaction.

It is essential to get the reaction smooth, and the tuning fairly sharp, before you begin to search in earnest for stations. Then you want to bring the reaction up to the point just short of oscillation and turn the tuning control very slowly, keeping pace with it by corresponding adjustments of the reaction—for in most sets you will find that the tuning and reaction adjustments are dependent upon each other, and

(Continued on next page.)

TECHNICAL NOTES

(Continued from previous page).

alteration of the one involves alteration of the other.

If you have a high-frequency valve, with separate control, you want, as far as possible, to keep this "in step" with the aerial circuit. These two controls are usually a little bit out, and the amount of the discrepancy can best be determined by sharpening up the tuning.

When searching for stations you want to keep the two controls in step, having regard to the amount of apparent out-of-step which you have previously ascertained by test. In this way, and moving the controls very slowly, you should be able to bring in a good many additional stations.

With a set using ganged tuning, a good deal depends upon how accurate the ganging happens to be. With modern sets, you should not have much difficulty under this heading, but sometimes with older sets quite a lot of work is involved in getting the ganged circuits in tune.

Variable Ganging.

Often the ganging is not the same for longer waves as for shorter ones, and naturally this means that if the ganging is correct for one position, it becomes more and more "out" as you move away from that position.

With ganged circuits it is generally advantageous to have a certain amount of negative bias on the grid of the S.G. valve. It is also a good plan to see what can be done by adjustment of the aerial circuit to keep the ganging constant.

NEXT WEEK

A FREE BLUE PRINT

of the "P.W."

"DUAL-RANGER"

I haven't the space to go further into this question at the moment, but I want to say that if you are not getting all the stations you would like, or your set does not seem to "bring them in" like somebody else's, it is quite on the cards that a little time spent in adjustments, on the lines indicated above, may make all the difference and may bring out a performance from your receiver of which you never suspected it was capable.

H.F. in L.F. Circuits.

The presence of high-frequency oscillations in a low-frequency power stage is not always easy to show, but a very simple way of illustrating it was shown some time ago by the Mullard Valve Company. For the purpose of the demonstration a two-valve power stage was used with milliammeters to show the currents to the anodes.

Dangers of H.F.

It is very desirable to keep high-frequency oscillations out of the low-frequency part of the circuit for various reasons. For one thing, of course, they will interfere, often seriously, with the quality of the reproduction.

(Continued on next page).

TECHNICAL NOTES

(Continued from previous page.)

This particular trouble may be avoided by introducing a high resistance into the grid circuit of each of the valves, say not less than about 250,000 ohms.

Capacity Reaction.

What is nowadays commonly called capacity reaction is, as a matter of fact, generally a combination of capacity and magnetic reaction. The simple magnetic reaction is, of course, the original type of electro-magnetic reaction between coils, the position of which in relation to one another can be varied by means of a control.

One of the great drawbacks of the old-fashioned type of magnetic reaction is the fact that every alteration of the reaction adjustment means a corresponding alteration of the tuning adjustment and vice versa.

The result is that if you bring up your reaction to a point which makes the set fairly sensitive and then start altering the tuning, your reaction adjustment goes immediately and in actual practice you have to keep juggling about with the two adjustments simultaneously.

Various schemes have been proposed from time to time for giving so-called constant reaction, that is to say, a reaction adjustment which will be entirely independent of the tuning adjustment, but although these constant reaction circuits represent a great improvement upon the older-fashioned schemes, it cannot be said that they are absolutely a hundred per cent. perfect so far as constant reaction goes.

For one thing, the coupling "constants" vary according to the different frequencies to which the grid circuit is tuned and to the adjustment of the reaction condenser.

Isolating the L.F.

In most circuits of this type the anode circuit of the detector valve is isolated from the high-frequency current so as to leave it only with the L.F. A high-frequency choke interposed in the anode circuit is better than connecting a condenser by-pass unless, of course, a very large capacity condenser is used, but often this is impracticable for other reasons.

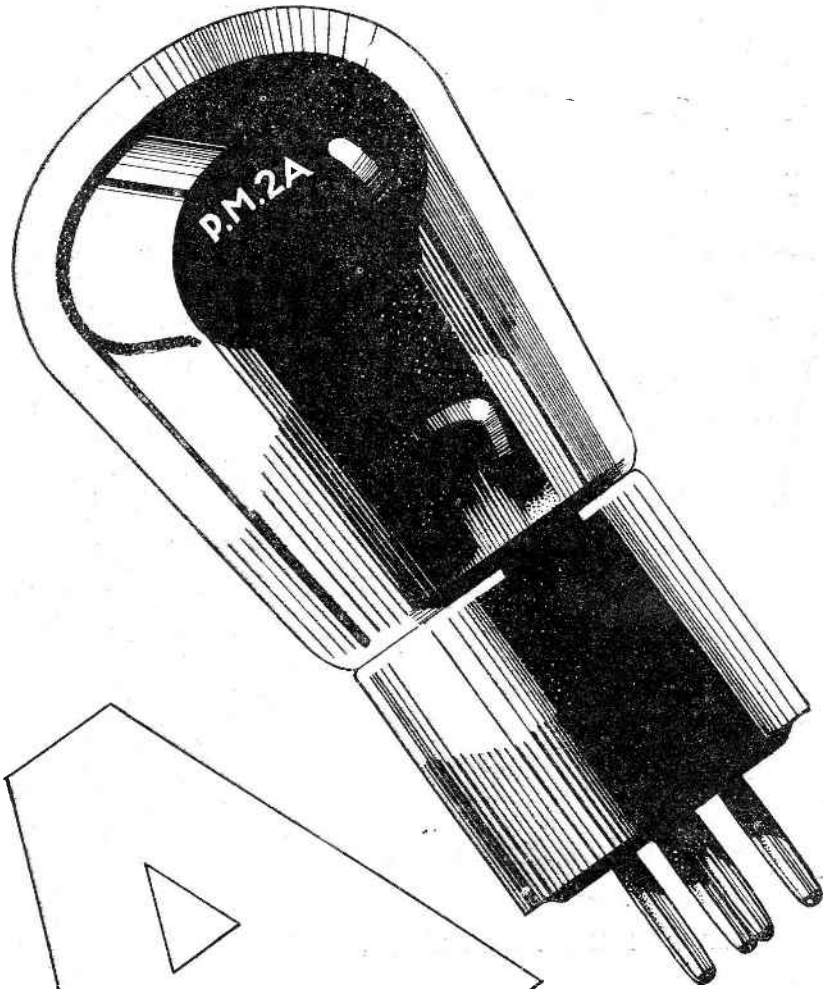
In the case of a multi-valve set capacity reaction has the advantage, amongst others, that it helps to keep the high-frequency currents out of the L.F. stages, where they would be liable to produce instability, or actual distortion.

When a high-frequency choke is used in connection with the capacity-reaction arrangement, you do not need to be so particular about the quality of the choke as in certain other cases, for example in a screen-grid circuit.

This does not mean to say that the choke must not be reasonably good, but if you have two chokes on hand and you want to keep the better one for use in a circuit where a good quality choke is needed, you will quite probably find that the other choke will be good enough for mere reaction purposes.

Triotron Valves.

Will readers please note that the Triotron valve shown on page 20 of our first gift book is in actual fact one that has been superseded in favour of even better Tritrons.



2A

Performance has established the supremacy of Mullard valves. Every type in the Mullard 2-volt range does its job in the most efficient manner, and thus definitely improves the performance of your receiver. The P.M.2A, for example, the 2-volt power valve, has an amplification factor of 12.5, combined with a "slope" of 3.5mA./volt, giving an impedance of 3,600 ohms—an unusually low figure for a valve of this class. It thus makes the very most of even the weakest signals. Discover its effectiveness by fitting one in your receiver.

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